The Elusive Divide Between Tacit Collusion and Concerted Practices

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Abstract

Sellers in oligopolistic markets can cooperate in ways that diverge from the orthodox vision of competition. It is a bigger issue, however, that there are also deviations in vision between competition law and economics on some basic categories. Foremost among these is the grey zone between two of the practices this thesis studies: tacit collusion and concerted practices. The two disciplines' divergent interpretations of the interaction between sellers permeate the canon of enforcement practice, case law, and academic thinking. In more clear-cut instances, like cartels, this underlying divergence is inconsequential. However, the more ambivalent the practice, the more glaring the divergence becomes. Blind spots ensue because the two disciplines look at the problem from different angles. Using the prism of natural and artifical transparency, this thesis explores these blind spots, which feature throughout the history of competition law but appear to be expanding as technology and the means of interaction evolve from human intution to artificial intelligence ("AI"). Novel forms of coordination may expand the scope of tacit collusion. Here, the competition toolkit will likely prove adaptable. Yet, as long as human actors remain involved in the process, certain social codes and mutual perceptions of the market and will continue to enhance transparency in ways that competition law struggles to categorise. These social and economic vagaries of human interaction necessarily elude clean binary categorisations between the permissible and the impermissible.

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AI	Artificial Intelligence
BCP	Beating Competition Clause
CLEC	Competitive Local Exchange Carrier
CMA	Competition and Markets Authority
FCC	Federal Communications Commission
FCO	Federal Cartel Office
FTC	Federal Trade Commission
EC	European Commission
EU	European Union
ILEC	Incumbent Local Exchange Carrier
LPG	Low Price Guarantee
MCC	Meeting Competition Clause
MFC	Most Favoured Customer Clause
MFN	Most Favoured Nation
MOR	Meet-or-Release Clause
NR	Non-Release Clause
OECD	Organisation for Economic Cooperation and Development
PCT	Price Comparison Tool
PCW	Price Comparion Website
PPC	Price Parity Clause
RPM	Resale price Maintenance
RPR	Retail Price Recommendation
TFEU	Treaty on the Functioning of the European Union

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Introduction

Sellers compete; at least they should. Modern markets typically ought to function according to the principle of free competition, which is generally considered to maximise societal welfare. Prominent among the goals of competition is the maximisation of consumer welfare.[1] Law and economics both extoll the benefits of effective competition for buyers. It reins in seller market power and profits otherwise sustained to the detriment of buyers. To pit sellers against one another and have them compete for buyers is generally considered to generate the widest benefit to society. Sellers do not unequivocally share this vision of competition and may try to circumvent it to generate the widest benefit to themselves instead. Perhaps this is to be expected, so laws are implemented to safeguard competition.

It is a bigger issue, however, that there are also deviations in vision between competition law and economics on some basic categories. Foremost among these is the grey zone between two of the practices this thesis studies: tacit collusion and concerted practices. The two disciplines' divergent interpretations of the interaction between sellers permeate the canon of enforcement practice, case law, and academic thinking. In more clear-cut instances, like cartels, this underlying divergence is inconsequential. However, the more ambivalent the practice, the more glaring the divergence becomes. Blind spots ensue because the two disciplines look at the problem from different angles. Using the prism of natural and artifical transparency, this thesis explores these blind spots, which feature throughout the history of competition law but appear to be expanding as technology and the means of interaction evolve from human intution to artificial intelligence ("AI").

In essence, sellers either compete or cooperate. By cooperating, they might attempt to reduce or altogether circumvent the competitive pressure that trims their profit margin. They might agree amongst themselves to set prices higher than they would otherwise be forced to set under competitive pressure. Sellers fixing prices or other competitive conditions in this manner will generally find themselves liable under competition and antitrust laws. An extensive strand of case law and literature comprises the study of cartels – that 'supreme evil of antitrust'[2] – analysing how they form, persist, and break.

[1] OECD, The Objectives of Competition Law and Policy, *OECD Global Forum on Competition*, CNM/GF/COMP(2003)3, 9; ME Stucke, What is Competition?, in D Zimmer (ed.), *The Goals of Competition Law* (Edwar Elgar, 2012), 28.
[2] *Verizon Communications v. Law Offices of Curtis V. Trinko* (2004) 540 U.S. 398, 408.

Outright cartels, typified by explicit communication between competitors in restraint of competition, are not the only method for achieving coordination. There are certain lesser forms of interaction – clandestine signals and forms of quasi-communication – that may enable sellers to achieve the same, or a substantially similar, economic outcome. Competition law denotes such signals and forms of quasi-communication as *concerted practices*. Not necessarily a fully-fledged cartel, yet afoul of the competition law dictum of determining conduct independently, concerted practices fall short of constituting an outright agreement.

The third category of conduct whereby sellers might achieve coordination is *tacit collusion*. Tacit collusion may occur under certain market conditions and constitutes the intelligent adaptation to the expected conduct of competitors, which does not entail communication and is therefore generally permissible although it can bear the same economic results.[3] It arises in situations where few sellers recognise their interdependence, such that they can profitably lower or increase their prices only jointly. Sellers may then individually realise that it is better in the long term to coordinate with their competitors, which follows solely from the mutual recognition of the oligopolistic conditions of the market.

These categories – agreements, concerted practices, and tacit collusion – are the three main strands of parallel conduct between competitors. Focusing on method rather than outcome, competition law only considers agreements and concerted practices illegal, whereas tacit collusion is permitted. Usually, agreements that characterise cartels do not pose inherent analytical difficulty once detected, since their illicit nature is well-established and understood. By contrast, tacit collusion and concerted practices tend to flourish under the same conditions and lead to the same economic outcome, which can render it difficult to determine both whether observed parallelism is the result of one or the other and whether certain types of conduct constitute tacit collusion or concerted practices.

This thesis is an analysis of this grey zone and the implicit dividing line between tacit collusion and concerted practices, arguably one of the more abstruse areas of Article 101 of the Treaty on the Functioning of the European Union and Section 1 of the Sherman Act. Studying the interaction between interdependent sellers from a legal perspective requires understanding their economic incentives and constraints. The very concept of tacit collusion and each of the various practices discussed in this thesis all operate according to economic principles. A plethora of economic literature addresses whether tacit collusion is actually sustainable in

[3] Joined Cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85 (*Woodpulp II*) *A. Ahlström Osakeyhtiö and others v Commission* [1993] ECLI:EU:C:1993:120, para. 71.

practice and, therefore, relevant to study.[4] Is it artistry or alchemy? Economic studies generally look at these issues of equilibrium selection, which corresponding legal analysis has to consider.

Chapter 1 provides an overview of the key economic principles that govern oligopolistic markets and how they inform the applicable legal reasoning. These principles also inform the analysis of the various practices that may facilitate coordination. The practices discussed in this thesis are information disclosure (Chapter 2), hub-and-spoke (Chapter 3), and Most Favoured Customer and Meeting Competition Clauses (Chapter 4). Throughout these chapters, it emerges that the economic conception of interdependence and coordination in terms of degrees on a spectrum differs from the binary legal conception of permissible or impermissible. Chapter 5 takes a closer look at this conceptual mismatch and the corresponding implications this has for legal analysis.

Although this conceptual mismatch has always vexed attempts to provide a legal distinction between tacit collusion and concerted practices, early case law that sought to furnish this distinction provides helpful insights regarding the development and relevant elements of legal thinking with regard to tacit collusion and concerted practices. The remainder of this introduction therefore explores the key issues pertaining to tacit collusion and conerted practices and why it has proven so difficult to differentiate between them. It explores the evolution of both concepts in the context of EU and US law, since they are supra-jurisdictional phenomenon: 'Collusion is a mode of conduct among firms in a market that is defined independent of the legal regime. Indeed, collusion existed long before competition laws were introduced that sought to make it illegal'.[5]

Widely discussed in legal and economic literature, the concept of tacit collusion might – barring exceptional cases, like *Woodpulp II* or *Theatre Enterprises*, discussed below – have seemed a figment of the theoretical mind and therefore irrelevant in practice. However, galloping technological development is changing the ways sellers compete and collude. A recent topic of focus, there is a sense that certain algorithm types might enable sellers to effectively coordinate within the traditional scope of tacit collusion, evading scrutiny from

[4] EJ Green, RC Marshall, LM Marx, 'Tacit Collusion in Oligopoly', in RD Blair & DD Sokol (eds.), *The Oxford Handbook of International Antitrust Economics, Volume 2* (2014, OUP: Oxford), 472; DJ Cooper & KU Kühn, 'Communication and Cooperation: A Methodological Study' (2016) *82 Southern Economic Journal 1167*, 1167; DJ Cooper & KU Kühn, 'Communication, Renegotiation, and the Scope for Collusion' (2014) *6 American Economic Journal: Microeconomics 247*, 248; KU Kühn, 'Fighting Collusion by Regulating Communication Between Firms' (2001) *16 Economic Policy 167*, 174.

[5] JE Harrington, 'Developing Competition Law for Collusion by Autonomous Artificial Agents' (2019) *14 Journal of Competition Law & Economics 331*, 334.

competition authorities. The extent to which this might be the case and how technological developments in the field of Big Data and artificial intelligence could affect the parameters of tacit collusion are discussed in the final Chapter 6.

1) Early EU and US Law on Tacit Collusion and Concerted Practices

Article 101 TFEU and Section 1 of the Sherman Act both view parallel conduct within a binary framework that distinguishes tacit collusion from concerted practices. The TFEU refers to concerted practices, which can be interpreted as conduct of 'a lesser degree of formality than is inherent in either "agreements" or "decisions", however expansively interpreted'.[6] Concerted practices entail direct or indirect contact between sellers that influences their conduct and facilitates collusion.[7] The Sherman Act instead refers to the terms "combination" and "conspiracy", which envisage a meeting of the minds between competitors towards a common scheme and are, therefore, also wider than outright agreement.[8]

The dividing line between tacit collusion and concerted practices remains elusive to both economic and legal observers. From an economic perspective, they display the same market outcome in the form of a collective restriction of output and an increase in price.[9] Both are subject to three conditions: first, there must be a shared understanding of the terms and focal point of coordination. Second, there must be sufficient transparency to monitor mutual adherence to a common scheme and enable coordination on a lasting basis. Third, the implementation of coordination must be enforceable over time by means of sufficient deterrents from deviation, which requires the ability to punish sellers that deviate from coordination.[10]

From a legal perspective, focusing on method rather than outcome, it remains unclear where tacit collusion ends and concerted practices begin. This bedevils the quest for an actionable prohibition of the latter that does not unduly curtail the former. Tacit collusion eludes conventional legal notions of agreement but can in practice be indistinguishable from concerted practices in terms of economic outcome.[11] In 1979, Bachman lamented the following regarding contemporary US antitrust law:

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[6] T Soames, 'An Analysis of the Principles of Concerted Practice and Collective Dominance: A Distinction Without a Difference?' (1996) *17 ECLR 1*, 25.
[7] OECD, *Algorithms and Collusion – Background Note by the Secretariat* (DAF/COMP(2017)4, 2017), 37.
[8] ibid.
[9] OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables DAF/COMP(2012)17, 21-22.
[10] T-464/04 *Impala v Commission* [2006] ECLI:EU:T:2006:216, 123; T-342/99 *Airtours v Commission* [2004] ECLI:EU:T:2002:146, 62; J Faull & A Nikpay, *The EU Law of Competition* (3rd edn OUP, Oxford 2014) 383; F Wagner-von Papp, 'Information Exchange Agreements' in I Lianos and D Geradin (eds), *Research Handbook in European Competition Law: Substantive Aspects* (Edward Elgar, Cheltenham 2013) 138.
[11] R Dibadj, 'Conscious Parallelism Revisited' (2010) *47 San Diego Law Review 589*, 596; WE Kovacic et al., 'Plus Factors and Agreement in Antitrust Law' (2011) *110 Michigan Law Review 393*, 399.

> *Many decisions discuss the kinds of evidence which either are or are not required to prove agreement, without articulating exactly what it is that has to be proved. We are told, for example, that under Section 1, agreements may be tacit or express, that they do not have to be formal, and that they may be inferred from circumstantial evidence. But there is very little discussion in the cases as to what an "agreement" is.*[12]

Unable to determine a practicable distinction, early case law sought to circumvent the problem by introducing economic benchmarks for ostensibly normal conduct. The Court of Justice of the European Union first sought to distinguish concerted practices from tacit collusion in *Dyestuffs*. In that case, there was not only similarity in the rate and timing of price increases, but the Commission had also identified informal contacts between the sellers.[13] The Court drew a distinction between the two concepts by setting out that, in principle, sellers were not prohibited from adapting their conduct in line with the present or anticipated conduct of their competitors – i.e. tacit collusion – as long as this did not amount to a concerted practice:[14]

> *By its very nature ... a concerted practice does not have all the elements of a contract but may inter alia arise out of coordination which becomes apparent from the behaviour of the participants. ... Although parallel behaviour may not by itself be identified with a concerted practice, it may however amount to strong evidence of such a practice if it leads to conditions of competition which do not correspond to the normal conditions of the market, having regard to the nature of the products, the size and number of the undertakings, and the volume of the said market.*[15]

By drawing this distinction, the Court sought to remedy the possibility of a dual inference from parallel conduct by setting as a benchmark the "normal" conditions of the market. The observance of normal conditions would indicate that tacit collusion caused parallel conduct, because sellers could only have taken into account information that could be observed on the

[12] MD Blechman, 'Conscious Parallelism, Signalling and Facilitating Devices: The Problem of Tacit Collusion Under the Antitrust Laws' (1978-1979) *24 New York Law School Law Review 881*, 895.
[13] 48/69 *Imperial Chemical Industries v Commission (Dyestuffs)* [1972] ECLI:EU:C:1972:70, para. 52.
[14] Faull & Nikpay (n 10) 219.
[15] *Dyestuffs* (n 13), paras. 65-66.

market. Conversely, anomalous conditions would suggest undue interference with the market and justify an inference of concerted practices.

While it is true in some respect that the conditions resulting from concerted practices do not technically correspond to what is normal, there is no easy way to benchmark them to normal conditions and explain why they are contextually anomalous. Normal benchmark conditions do not exist. Even in *Dyestuffs*, the Court forewent assessing what market outcome such normal conditions would bear.[16] Failing to resolve the underlying problem of the possible dual inference applicable to parallel conduct, cases after *Dyestuffs* did not repeat this approach in this particular evidentiary context.[17]

In the subsequent *Suiker Unie* case, the Commission found that concerted practices between several sugar manufacturers had led to price parallelism. The Court considered concerted practices and tacit collusion at separate points in the judgment, starting with the former:

> *The concept of a "concerted practice" refers to a form of coordination between undertakings, which, without having been taken to the stage where an agreement properly so-called has been concluded, knowingly substitutes for the risks of competition, practical cooperation between [them].*[18]

The Court went on to clarify:

> *Although it is correct to say that [the] requirement of independence does not deprive economic operators of the right to adapt themselves intelligently to the existing and anticipated conduct of their competitors, it does however strictly preclude any direct or indirect contact between such operators the object or effect whereof is either to influence the conduct on the market of an actual or potential*

[16] N Petit, 'The Oligopoly Problem in EU Competition Law' in I Lianos and D Geradin (eds), *Research Handbook in European Competition Law* (Edward Elgar, Cheltenham 2013) 280.
[17] R Allendesalazar, P Martínez-Lage, R Vallina, 'Oligopolies, Conscious Parallelism and Concertation' (EU Competition Law and Policy Workshop/Proceedings, European University Institute Robert Schuman Centre for Advanced Studies, 2006) 5; Petit (n 16) 280; J Joshua and S Jordan, 'Combinations, Concerted Practices and Cartels: Adopting the Concept of Conspiracy in European Community Competition Law Symposium on European Competition Law' (2003 - 2004) *24 New Journal of Internationall Law & Business 647*, 664.
[18] Joined Cases 40 to 48, 50, 54 to 56, 111, 113 & 114-73, *Coöperatieve Vereniging "Suiker Unie" UA and others v Commission* [1975] ECLI:EU:C:1975:174, 26.

competitor or to disclose to such a competitor the course of conduct which they themselves have decided to adopt or contemplate adopting on the market.[19]

Sellers may therefore adapt their conduct intelligently to the conduct of their competitors but may not facilitate coordination through direct or indirect contact. It is neither required to work out an actual plan, nor to reach consensus on parallel conduct orally or by means of direct contact for it to amount to concertation.[20]

Dystuffs and *Suiker Unie* strongly alluded to the existence an oligopoly defence protecting mere parallel conduct. This understanding was confirmed in *Woodpulp II*. Canon to every EU competition lawyer, *Woodpulp II* establishes that 'parallel conduct cannot be regarded as furnishing proof of concertation unless concertation constitutes the only plausible explanation for such conduct', since Article 101 TFEU 'does not deprive economic operators of the right to adapt themselves intelligently to the existing and anticipated conduct of their competitors'.[21]

Woodpulp II clarified that parallelism may also arise as a result of undertakings having applied sound economic reasoning in response to an externality, like increases in the price of a mutually traded commodity, or as a result of intelligent adaptation to the anticipated conduct of competitors in an interdependent oligopoly.[22] The court noted that the particular conditions of the market rendered sellers interdependent and concluded that 'the parallelism of prices and the price trends may be satisfactorily explained by the oligopolistic tendencies of the market'.[23] The court thereby followed the Opinion of AG Darmon, who reasoned that one could not infer the existence of a concerted practice if there was another plausible explanation that the Commission had failed to refute.[24] Alternative explanations for parallelism would therefore suffice to dispel claims of concerted practices.[25]

US case law similarly sets out that parallel conduct alone does not permit an inference of concertation. In *Interstate Circuit*, a motion picture exhibitor had sent copies of the same letter containing a minimum price proposal to several film distributors. Each copy contained

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[19] ibid 174.
[20] Joined Cases T-202/98, T-204/98 and T-207/98 *Tate & Lyle plc, British Sugar plc and Napier Brown & Co. Ltd v Commission* [2001] ECLI:EU:T:2001:185, 55.
[21] *Woodpulp II* (n 3) 71.
[22] ibid.
[23] ibid 126.
[24] Allendesalazar, Martínez-Lage, Vallina (n 17) 6; Opinion of AG Darmon in Joined Cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85 (*Woodpulp II*) *A. Ahlström Osakeyhtiö and others v Commission* [1993] ECLI:EU:C:1988:258, 195.
[25] Allendesalazar, Martínez-Lage, Vallina (n 17) 6.

the names of all the distributors the letter had been sent to and – without further communication – all distributors accepted the proposed minimum price. Finding a violation of Section 1 of the Sherman Act, the court gave little regard to the absence of reciprocal communication between the film distributors, holding that it 'was enough that, knowing that concerted action was contemplated and invited, the distributors gave their adherence to the scheme and participated in it'.[26]

Interstate Circuit may have left room for an argument that tacit collusion should also be prohibited. The unambiguous language in the subsequent *Theatre Enterprises* ensured that it would stay clear of prohibition under the Sherman Act. The owner of a theatre in Baltimore had tried to acquire rights to first run releases from major distributors and had been rejected by all, which he claimed could only be the result of concerted practices. The court disagreed:

> *This court has never held that proof of parallel business behaviour conclusively establishes agreement or, phrased differently, that such behaviour itself constitutes a Sherman Act offense. Circumstantial evidence of consciously parallel behaviour may have made heavy inroads into the traditional judicial attitude toward conspiracy; but "conscious parallelism" has not yet read conspiracy out of the Sherman Act entirely.*[27]

In other words, parallelism constitutes merely circumstantial evidence of conspiracy but falls short of constituting agreement under Section 1 of the Sherman Act.[28] This aligns with the EU position following *Woodpulp II*: to successfully claim the existence of a concerted practice, plaintiffs have to adduce evidence that parallel conduct cannot be explained as the outcome of the prevailing market conditions or another legitimate reason.

An important factor in *Theatre Enterprises* was that the distributors' decision not to act in accordance with the plaintiff's request – to permit him to show first-run movies in his theatre – could be made independently of the anticipated conduct of competitors. That is, the distributors were able to react to the proposal according to the profit they individually anticipated, rather than the reaction of competitors.[29] Hay notes that the conduct in *Theatre Enterprises* was no more than independent conduct, the 'distributors may not have been aware

[26] *Interstate Circuit Inc. v. United States* (1939) 306 U.S. 208, at 226.
[27] *Theatre Enterprises Inc. v. Paramount Film Distributing Corp.* (1953) 346 U.S. 537, at 541.
[28] Blechman (n 12) 884.
[29] PE Areeda & H Hovenkamp, *Fundamentals of Antitrust Law* (3rd Ed. Aspen Publishers, New York 2004), 14-46.

of one another's parallel conduct and, more importantly, even if they were aware, it made no difference'.[30]

Comparing this aspect in *Theatre Enterprises* with *Interstate Circuit* clarifies why the judgments and their outcomes differ. In *Interstate Circuit*, the recipients were aware of each other's knowledge of the proposed scheme, because the letter – an external communication – contained the names of all the addressees. The nature of the proposal and the mutual awareness of all addressees facilitated 'an understanding that each addressee would gain if all accepted the proposal, but lose if it alone accepted'.[31] In the words of the court: '[It] taxes credulity […] that the several distributors would […] have accepted and put into operation with substantial unanimity such far-reaching changes in their business methods without some understanding that all were to join.'[32] By contrast, in *Theatre Enterprise* the refusal of the offer could easily be explained as a series of individual appraisals of the anticipated profitability of the venture.[33]

Finally, in *Bell Atlantic Corp. v Twombly*, the complaint alleged parallel conduct in restraint of trade by regional phone service monopolies (together amounting to approximately 90 percent of the US local telephone services market) – so called Incumbent Local Exchange Carriers (ILECs) – which had evolved from the 1989 divestiture of AT&T's local telephone business.[34] Incumbent ILECs were required by the FCC to share their network with Competitive Local Exchange Carriers (CLECs). More specifically, the plaintiffs claimed that the ILECs had artificially increased prices and failed to compete with each other in their respective service areas to curtail growth of CLECs.[35]

The plaintiffs submitted as evidence of the alleged infringement the apparently parallel conduct of ILECs which included, amongst other indicators, that they all forewent pursuing ostensibly attractive opportunities in locations where they held a competitive advantage.[36] The court reiterated how the 'inadequacy of showing parallel conduct or interdependence, without more, mirrors the ambiguity of the behaviour: consistent with conspiracy, but just as much in line with a wide swath of rational and competitive business strategy unilaterally prompted by common perceptions of the market'.[37]

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[30] GA Hay, 'Oligopoly, Shared Monopoly, and Antitrust Law' (1982) *Cornell Law Faculty Working Papers 1124*, 461.
[31] S Stoux, *US and EC Oligopoly Control* (Kluwer Law International, The Hague 2004) 44.
[32] *Interstate Circuit Inc. v. United States* (n 26) 223; Stoux (n 31) 44.
[33] Stoux (n 31) 12.
[34] *Bell Atlantic Corp. v. Twombly* (2007) 425 F3d 99, at 549.
[35] ibid.
[36] ibid.
[37] ibid at 554.

The Supreme Court established that claims must at least be "plausible" – without having to be probable – to pass a motion to dismiss but set out little guidance as to what would meet this threshold.[38] While *Twombly* therefore reconfirmed that parallel conduct without more would not constitute proof of concerted practices and, importantly, spared defendants from costly discovery and defence in cases unlikely to have merit, it too did not elaborate further on what exactly would suffice to substantiate such a claim and how to discern an operable distinction between the two concepts in question.

[38] L Goldman, 'Trouble for Private Enforcement of the Sherman Act: Twombly, Pleading Standards, and the Oligopoly Problem' (2008) *4 Brigham Young University Law Review 1057*, 1058.

2) Distinguishing Tacit Collusion from Concerted Practices

The above case law struggled with the problem that parallel conduct merits a dual inference. Where merely parallel conduct without more can be observed, even the more expansive definitions of coordination that aim to encapsulate conduct of a lesser degree of formality than is inherent to agreements are not ideally suited to distinguish between concerted practices and tacit collusion. This discussion belongs to the economic study of non-cooperative games with cooperative outcomes. The distinction between cooperative and non-cooperative games is that the former can be enforced by an outsider (usually courts) whereas the latter cannot.[39] Although the illegality of anticompetitive agreements renders them non-binding – that is, unenforceable by legal means – the oligopoly problem denotes the existence of a 'possibly quite significant residual: cases in which firms may nevertheless be able to charge coordinated supracompetitive prices despite their inability to enforce cartel agreements in court'.[40]

Tacit collusion and concerted practices are both instances of non-cooperative games, which are not enforceable by outsiders. Viewed from an economic perspective, this common characteristic makes it difficult for the outside observer to differentiate between the two: although '[n]oncooperative game theory has shown that noncompetitive results can occur without the strong form of cooperation […] these results cannot tell us which of the noncompetitive outcomes involve concerted action in a legal sense'.[41] In short, notwithstanding their different legal implications, these practices lead to the same economic outcome.

Legal definitions alone struggle to accurately distinguish concerted practices from tacit collusion. Arguably the most conventional benchmark envisages some form of **agreement**. Agreement generally denotes an expression or understanding of commitment to a common scheme or, more precisely, a meeting of the minds.[42] *American Tobacco* envisages 'a unity of purpose or a common design and understanding, or a meeting of the minds';[43] *Monsanto* refers to a 'conscious commitment to a common scheme';[44] the *ABA Model Jury Instructions in Civil Antitrust Cases* require that 'the parties knowingly worked together to accomplish a common

[39] L Kaplow, *Competition Policy and Price Fixing* (Princeton University Press, Princeton 2013) 177.
[40] Kaplow (n 39) 177-178.
[41] WH Page, 'Communication and Concerted Action' (2007) *38 Loyola University of Chicago Law Journal 405*, 425.
[42] H Hovenkamp, *Federal Antitrust Policy: The Law of Competition and its Practice* (5th edn West Publishing, St. Paul 2013) 208; M Filippelli, *Collective Dominance and Collusion: Parallelism in EU and US Competition Law* (Edward Elgar, Cheltenham 2013) 4.
[43] *American Tobacco Co. v. United States* (1964) 328 U.S. 781, at 810.
[44] *Monsanto Co. v Spray-Rite Svc. Corp.* (1984) 456 U.S. 752, at 768.

purpose'.[45] *Paramount Pictures* similarly requires commitment and adherence, stating that it 'is enough that a concert of action is contemplated and that the defendants conformed to the arrangement'.[46] *Dyestuffs* contemplates 'a form of coordination which […] knowingly substitutes practical cooperation between them for the risks of competition'.[47] Faull and Nikpay refer to a 'meeting of the minds'[48]; Phlips and *Bayer* identify a 'concordance of wills'.[49]

These definitions are equally applicable to tacit collusion. An expansive interpretation of *Paramount Pictures* could permit equating tacit collusion with conspiracy, as indeed it did in some subsequent cases.[50] Therefore, it bears reiterating that merely reformulating the definition of agreement cannot resolve the problem: '[O]bserved parallelism is just as consistent with what agreement doctrine recognizes as independent action – namely, the recognition and response to interdependence – as with an inference of collusive behaviour'.[51] Therefore, anchoring the discussion and distinctions in notions of agreement is unlikely to provide a suitable filter.

Another possible benchmark for concerted practices is that there is some form of **communication**. Black argues that 'the critical issues in evaluating parallel conduct are whether the requisite reliance, belief, and knowledge that accompany the parties' actions were acquired, at least in part, by communication between the rivals'.[52] Page similarly argues that 'the distinguishing characteristic of concerted action is communication among rivals, not only of intentions, but also of the firms' reliance on their rivals' actions in choosing a common course of action'.[53] The essential component is that 'communication must successfully convey the speaker's intention to act in a certain way in reliance on others doing the same'.[54]

However, communication can manifest in different degrees.[55] Moving away from secret conversations or direct exchanges, at some point it becomes difficult to distinguish between legitimate dissemination of information and illicit signalling tantamount to communication. Generally speaking, conduct itself can communicate information. How a seller

[45] American Bar Association Section of Antitrust Law, '*Model Jury Instructions in Civil Antitrust Cases*' (2005) B-3.
[46] *United States v. Paramount Pictures Inc.* (1948) 334 U.S. 131, at 142.
[47] *Dyestuffs* (n 13) 64.
[48] Faull & Nikpay (n 10) 220.
[49] L Phlips, *Competition Policy: A Game-Theoretic Perspective* (CUP, Cambridge 1995) 2; T-41/96 *Bayer AG v Commission* [2000] ECLI:EU:T:2000:242, para. 69.
[50] Stoux (n 31) 45 – 46.
[51] Kovacic et al. (n 11) 393, 407; Joshua & Jordan (n 17) 647, 661.
[52] Page (n 41) 427.
[53] ibid 405, 410.
[54] ibid 159-60.
[55] O Black, *Conceptual Foundations of Antitrust* (CUP, Cambridge 2005) 154; Page (n 41) 405, 427.

acts in a certain context can provide attentive competitors with useful information about their purpose. This, amongst other reasons, renders benchmarks based on conventional communication potentially under-inclusive:

> *... [C]onceivably, one might be able to infer that the requisite knowledge, reliance, common goals, and communication were present without any specific evidence of communication, if the parties' conduct could be explained in no other way. Obviously, however, under a definition that requires communication of a particular sort, evidence of specific communications is important.*[56]

Where prevailing market conditions facilitate sellers' requisite self-interest to collude, it could be argued that 'the observation of communication is neither necessary nor sufficient for [the] existence of collusion'.[57] On the other hand, economic theory indicates a significant link between the degree of communication and the sustainability of coordination.[58] Chapter 1 discusses how and why it remains a key point of contention whether or not communication is indeed neither a necessary nor a sufficient condition.

Finally, the expectation of **reciprocity** in coordinating to some anti-competitive end has been considered a possible benchmark for concerted practices, albeit less frequently.[59] Continued reciprocal adherence to a common scheme implies 'conspiracy as a method, rather than a result'.[60] AG Darmon refers to the element of reciprocity as providing an assurance to undertakings of conduct to be expected from competitors.[61] However, others have found it 'debatable whether this legalistic filter, in its current interpretation, selects the right cases for further scrutiny; there are forms of *unilateral* dissemination of competitively sensitive information that facilitate tacit collusion' (emphasis in original).[62] This point is discussed further in Chapter 2.

Case law suggests that whereas conduct has to be reciprocal, communication does not.

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[56] Page (n 41) 428.
[57] R Rees, Tacit Collusion, *Oxford Review of Economic Policy 9(2)* (1993), 27-28; S Sacher & J Sandford, *No Shortage of Theories: The Role of Capacity in Antitrust Analysis* (SSRN, 2016), 10.
[58] Green, Marshall, Marx (n 4) 472; Cooper & Kühn (n 4) 1167; Cooper & Kühn (n 4) 248.
[59] A Jones & B Sufrin, *EU Competition Law: Texts, Cases, and Materials* (OUP, Oxford 2015) 713; F Castillo de la Torre, 'Evidence, Proof and Judicial Review in Cartel Cases' (EU Competition Law and Policy Workshop/Proceedings, European University Institute Robert Schuman Centre for Advanced Studies, 2009) 6; Black (n 55) 143.
[60] Filippelli (n 42) 4.
[61] AG Darmon (n 24) 171-173.
[62] Wagner-von Papp (n 10) 138.

For example, the former understanding of reciprocity would not catch the type of conduct in *Interstate Circuit*, according to which conspiracy requires '[a]cceptance by competitors, without previous agreement, of an invitation to participate in a plan, the necessary consequence of which, if carried out, is restraint of interstate commerce'.[63] It would seem that a reaction by the recipient that corresponds to the initial communication ought to suffice to establish concertation, even where the communication itself was unilateral. This is consistent with *Cimenteries*, where the mere receipt of information about the conduct of competitors was considered sufficient.[64] The mere receipt of strategic data from competitors creates a rebuttable presumption that the seller takes the information into account.[65]

None of the above definitions conclusively describe conduct that is invariably concerted without there being a risk that it could not also be considered tacit collusion. Oligopolistic sellers recognise their interdependence and may act accordingly in a conscious manner: 'it would not distort "common design or understanding" (or any of the other phrases) to encompass simple price leadership', the conventional mechanism to facilitate tacit collusion.[66] Moreover, economic phenomena generally considered indicative of concerted practices – declining market shares of incumbents, lingering inflexibility of market shares, increases in non-price competition, high demand elasticity – 'are consistent with tacit as well as express collusion; their absence would tend to negate both, but their presence would not point unerringly to express collusion'.[67] Therefore, tacit collusion and concerted practices can be virtually indistinguishable not only in terms of their welfare effects but also in terms of observed conduct:

> *[V]iewed from the outside, the absence of competition could be the manifestation of anything from a common sense recognition by the individual operators that there is no point in competing vigorously, to a full-blown price fixing cartel meeting in the traditional smoke-filled room.*[68]

As a result, the mere observance of parallel conduct is of inconclusive evidentiary value. This has tempted proposals to obviate the need to legally distinguish the two concepts by also

[63] *Interstate Circuit Inc. v. United States* (n 26) at 227.
[64] T-25/95 *Cimenteries CBR and Others v Commission* [2000] ECLI:EU:T:2000:77, para. 852.
[65] C-49/92 *Commission v Anic Partecipazioni* [1999] ECLI:EU:C:1999:356; C-199/92P *Hüls AG v Commission* [1999] ECLI:EU:C:1999:358, para 162; OECD (n 9*)* 21-5.
[66] Page (n 41) 419.
[67] *Aircraft Check Services Co. v. Verizon Wireless* (2015) 782 F.3d 867*,* 877.
[68] Joshua & Jordan (n 17) 647, 661.

prohibiting tacit collusion, since 'the concept of a concerted practice […] is broad enough to catch tacit collusion since the firms do not behave totally unilaterally, but determine their strategy by taking account of the likely response of their competitors'.[69] Simply severing the proverbial Gordian knot by bringing tacit collusion within the purview of concertation would circumvent the challenge of having to distinguish between the two types of conduct.[70]

Such efforts to attach liability to tacit collusion characterised by an absence of formal agreement have been unsuccessful and a 'basic reason for this lack of success is the courts' failure to link legal notions of culpability with a relevant economic model of oligopoly behaviour'.[71] *Clamp-All Corp. v. Cast Iron Soil Pipe Institute* describes the underlying enforcement dilemma:

> *[I]t is not because such pricing is desirable (it is not), but because it is close to impossible to devise a judicially enforceable remedy for "interdependent" pricing. How does one order a firm to set its prices without regard to the likely reactions of its competitors?*[72]

There is no straightforward method for attaching conventional agreement-based liability to the dynamic of tacit collusion: 'Liability is avoided because in the standard model, nothing that the individual oligopolist has done appears to be culpable; its [decision making] merely takes into account the assumed reaction of rivals'.[73] *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.* helpfully refers to 'the process, not in itself unlawful, by which firms in a concentrated market might in effect share monopoly power, setting their prices at a profit-maximizing, supracompetitive level by recognizing their shared economic interests and their interdependence with respect to price and output decisions'.[74]

Indeed, where interdependent conduct alone results in parallelism, competition law fails to prescribe avoidable conduct that could be prohibited.[75] It could even be argued that in certain settings oligopolistic sellers have little choice but to act interdependently and, as stressed by Judge Posner in *Aircraft Check Services v Verizon Wireless*, should in any event

[69] Jones & Sufrin (n 59) 709.
[70] Kaplow (n 39) 177.
[71] Hay (n 30) 465.
[72] *Clamp-All Corp. v. Cast Iron Soil Pipe Institute* (1988) 851 F.2d 478, at 484.
[73] Hay (n 30) 480.
[74] *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.* (1993) 509 U.S. 209, at 227.
[75] Kovacic et al. (n 11) 393, 407.

not be required to exclusively price competitively.[76] The continued toleration of tacit collusion is the consequence not of disregard for its potentially negative welfare effects, but rather of the perception that oligopolistic sellers cannot avoid it and, further, that it is impossible for courts to devise an appropriate remedy:[77] 'Once firms are aware of their interdependence they cannot be expected or easily compelled to ignore that in deciding their competitive behaviour.'[78]

This approach also honours the key purpose of competition law: to safeguard the competitive process by deterring anticompetitive conduct rather than bringing about specific market outcomes or structure, since the latter would amount to undesirable market regulation.[79] Since a blanket prohibition of market outcomes and over-regulation are undesirable, it remains necessary to formulate competition measures capable of distinguishing between tacit collusion and concerted practices to adequately address the oligopoly problem.

If evidence of parallel conduct is consistent with both concertation and tacit collusion, the 'task, then, it might seem, is simply to determine when parallel conduct is interdependent and when it is independent'.[80] Where parallelism may result either from concertation or from oligopolistic, interdependent, and non-competitive conduct, the challenge is to adduce circumstantial evidence that distinguishes the former from the latter.[81] In recognition of this, courts in the US require additional "plus factors" to substantiate conspiracy claims.[82] Plus factors convert the problem of tacit collusion into an evidentiary question: 'what circumstantial evidence can be used to adduce an agreement'?[83]

Decisions following *Theatre Enterprises* required 'conscious parallelism plus', meaning parallelism coupled with additional circumstantial evidence.[84] Plus factors constitute the mechanism that enables detection of methods that facilitate conspiracy, that is, conduct bridging the conceptual gaps between conspiracy and tacit collusion.[85] They constitute a framework that identifies elements that '[tend] to exclude the possibility' of sellers having acted independently in achieving parallelism.[86] Whereas observed parallelism itself does not

[76] *Aircraft Check Services Co. v. Verizon Wireless* (n 67) at 873.
[77] WH Page, 'Tacit Agreement Under Section 1 of the Sherman Act' (2017) *81 Antitrust Law Journal 593*, 596.
[78] OECD, 'Oligopoly' (1999) *DAFFE/CLP(99)25*, 19.
[79] OECD (n 7) 3; *Aircraft Check Services Co. v. Verizon Wireless* (n 67) at 874.
[80] GA Hay, 'Anti-Competitive Agreements: The Meaning of "Agreement"' (2013) *Cornell Law Faculty Working Papers 105*, 12-13.
[81] ibid. 16-17.
[82] *Wallace et al. v. Bank of Bartlett et al.* (1995) 55 F.3d 1166, at 1168.
[83] Dibadj (n 11) 598.
[84] Blechman (n 12) 884-885; Filippelli (n 42) 5.
[85] Filippelli (n 42) 7; Dibadj (n 11) 597-598.
[86] *Matsushita v Zenith Ratio Corp.* (1986) 475 U.S. 574, at 588; *Monsanto Co. v Spray-Rite Svc. Corp*. (n 44) at 765; ABA (n 45) B-8; D Yao & SS DeSanti, 'Game Theory and the Legal Analysis of Tacit Collusion' (1993) *38 Antitrust Bulletin 113*, 117.

merit an inference of collusion, conversely, 'this reasoning indirectly fixes the opposite principle that, when evidence of parallelism is supported by indicia of conspiracy, there is room for courts to infer collusion'.[87]

Plus factors are neither ranked by evidentiary value nor is there a predetermined threshold that needs to be met to justify a finding of conspiracy.[88] Rather, this broad concept permits any plausible evidence that tends to exclude the possibility of independent action having resulted in parallel conduct:[89]

> *The term "plus factor" ... has been used to describe a broad array of types of evidence that, together with interdependent conduct, might contribute to an inference of agreement. The term is now most often used, however, as a conclusory label to describe evidence that actually satisfies the plaintiff's burden of production.*[90]

Courts have provided little guidance on specific types of evidence requisite for an inference of concerted practices.[91] Plus factor doctrine generally inquires whether seller conduct reflects independent business rationale, but for collective action.[92] Lack of an independent business justification for parallel conduct would tend to permit an inference of concerted practices.[93] This method examines 'whether the conduct would be contrary to an alleged conspirator's self-interest – i.e., would the conduct make individual business sense "but for" a hypothesis of joint action'.[94] *Interstate Circuit* illustrates conduct contrary to individual self-interest, since the 'change in contracting was so radical and so risky […] that simple oligopolistic interdependence could not explain it'.[95] Similarly, in *American Tobacco* it sufficed for the court that sellers had failed to show an economic justification for their market conduct.[96]

Other plus factors are evidence that sellers facilitated opportunities for regular

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[87] Filippelli (n 42) 9.
[88] F Ghezzi & M Maggiolino, 'Bridging EU Concerted Practices with U.S. Concerted Actions' (2014) *10 Journal of Competition Law 647*, 682.
[89] Ghezzi & Maggiolino (n 88) 682; *Williamson Oil Co. v. Philip Morris USA* (2003) 346 F.3d 1287, at 1301; *Matsushita v Zenith Ratio Corp.* (n 86) at 588; *Monsanto Co. v Spray-Rite Svc. Corp*. (n 44) at 765.
[90] Page (n 41) 417.
[91] OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables DAF/COMP(2012)17, 36-37.
[92] Yao & DeSanti (n 86) 118.
[93] M Freed et al., 'The Detection and Punishment of Tacit Collusion' (1997) *9 Loyola Consumer Law Review 152*, 155-156.
[94] Yao & DeSanti (n 86) 118; Hay (n 80) 19; Freed et al. (n 93) 155-156.
[95] Hay (n 80) 19.
[96] *American Tobacco Co. v. United States* (n 43) at 805; Stoux (n 31) 45.

communication as well as the presence of a plausible motive for conspiracy.[97] Facilitating regular communication aids monitoring compliance, a key component for sustaining collusion, which prompts enforcement authorities to inquire whether 'a firm will provide firm-specific information to other cartel members that it would almost never provide when acting noncollusively'.[98] Evidence of communication and information sharing, inter-firm transfers of funds that lack a non-collusive economic justification or dominant conduct by non-dominant sellers are all considered "super-plus factors" and permit a strong inference of concertation.[99]

However, as symptoms may have different causes, observable practices may have different motives.[100] Ambiguity in agreement-based distinctions between concerted practices and tacit collusion also complicates plus factor methodology, since inquiring into independent business rationale in interdependent market settings does not accurately account for oligopolistic incentive structures. Where interdependent sellers take into account each other's conduct, testing whether an action is contrary to independent interests is not without difficulty. Observed conduct 'may be contrary to a firm's individual interest measured by short-run profit maximisation, but entirely consistent with its "individual" interest, if the firm takes account of the likely responses of its rivals'.[101] In other words, 'most plus factors only "restate the phenomenon of interdependence" by identifying markets in which oligopolistic coordination is possible, not those in which there is a Section 1 agreement'. [102]

As a result, following *Twombly*, US courts have increasingly relied on evidence of communication and reliance between competitors to establish infringements of Section 1 of the Sherman Act.[103] Courts continue to emphasise the importance of carefully demonstrating 'intentional or conscious conduct, and this element has always prevailed against the opposite need for ensuring adequate antitrust enforcement in relation to collusion'.[104] This approach entails a trade-off between toughening the enforcement against collusion, on the one hand, and maintaining legal certainty, on the other hand. For example, Petit argues that *Woodpulp II* was

[97] Yao & DeSanti (n 86) 118; Freed et al. (n 93) 155-156; Kovacic et al. (n 11) 405; JF Zellmer, 'Detecting Collusion in Oligopolistic Industries: A Comparison and Proposal' (1982-1983) *6 Hastings International and Comparative Law Review 829*, 841-842.
[98] RC Marshall & LM Marx, *The Economics of Collusion: Cartels and Bidding Rings* (MIT Press, Cambridge (Mass.) 2012), 232.
[99] Marshall & Marx (n 98) 236.
[100] C d'Aspremont & R Dos Santos Ferreira, 'Meet-or-Release and Most-Favored-Customer Clauses with Price-Quantity Competition Yield Cournot Outcomes' (2005) *17 Économie Publique / Public Economics 221*, 223.
[101] Page (n 41) 422, citing *Williamson Oil Co. v. Philip Morris USA* (n 89), 1311.
[102] *In re Flat Glass Antitrust Litigation* (2004) 385 F.3d 350, at 360; Page (n 77) 597.
[103] OECD (n 91) 36-37.
[104] Filippelli (n 42) 5.

laudable for creating legal certainty, its analytical shortcomings notwithstanding.[105] Persisting ambiguity as to where tacit collusion ends and where concerted practices begin motivates courts to avoid premature findings of concerted practices.

Case law on both sides of the Atlantic sets out a distinction between clear instances of tacit collusion and concerted practices. In both *Dyestuffs* and *Interstate Circuit*, the conduct in question enabled sellers to ascertain their mutual adherence to coordination. In *Woodpulp II*, *Theatre Enterprises*, and *Twombly*, by contrast, sellers acted in parallel in a manner that could be explained by independent business rationale. These cases show relatively clearly some of the relevant characteristics that differentiate tacit collusion from concerted practices. Implied in that distinction is that pre-arranged commitments designed to ensure mutual adherence to coordination, however loose, would be considered concerted practices.

A case in point is *United States v. Foley*: to overcome a financial dry spell, Mr. Foley hosted a dinner for fellow realtors where he outlined to his colleagues that the industry was in dire straits and announced that he would raise his sales commission from six to seven per cent of the property price.[106] The ensuing discussion between realtor competitors included mention of a previous raise of commissions that had been attempted by one of the realtors but, succinctly put, 'had failed because of competition'.[107] Sellers therefore understood that cooperation was essential to the success of any attempt to raise commissions.[108] The court affirmed that a single exchange of intended prices and subsequent conduct consistent with said exchange sufficed for a finding of concertation.[109]

It is relatively clear that the same prohibition would apply to sellers that ostensibly 'serve benign functions, but function as private signals because of a prior agreement to use them at a critical moment to convey information necessary for a decision'.[110] Similarly, receiving unsolicited commercially sensitive information from a competitor, by whatever means and even if only on a one-off occasion, creates a presumption of receipt and corresponding action, unless there is a clear and open rejection of such information.[111]

Conversely, *Aircraft Check Services v. Verizon Wireless* in no uncertain terms confirmed that price leadership – the iterative readjusting upward of prices between

[105] Petit (n 16) 300.
[106] *United States v. Foley* (1979) 598 F.2d 1323.
[107] ibid.
[108] ibid.
[109] Page (n 77) 630.
[110] WH Page, 'Signaling and Agreement in Antitrust Law' (2017) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2620786> accessed 04 October 2019, 11.
[111] *Commission v Anic* (n 65).

interdependent competitors that is emblematic of tacit collusion – remains within the scope of permissible tacit collusion. Plaintiffs claimed that wireless network providers had conspired in restraint of Section 1 of the Sherman Act to increase the price per use of text messages.[112] They submitted as evidence that the oligopolistic sellers had acted in parallel to switch to a simplified pricing model and simultaneously increased their prices and, in addition, referred to internal e-mails by an employee of one of the defendants stating, amongst other things, 'I know the other guys are doing it but that doesn't mean we have to follow'.[113] Judge Posner's dismissal of the claim is one of the more instructive explanations of tacit collusion and the applicable legal rationale:

> *The point that [the plaintiffs] have particular difficulty accepting is that the Sherman Act imposes no duty on firms to compete vigorously, or for that matter at all, in price. This troubles some antitrust experts, such as Harvard Law School Professor Louis Kaplow, whose book Competition Policy and Price Fixing (2013) argues that tacit collusion should be deemed a violation of the Sherman Act. That of course is not the law, and probably shouldn't be. A seller must decide on a price; and if tacit collusion is forbidden, how does a seller in a market in which conditions (such as few sellers, many buyers, and a homogeneous product, which may preclude nonprice competition) favour convergence by the sellers on a joint profit-maximizing price without their actually agreeing to charge that price, decide what price to charge? If the seller charges the profit-maximizing price (and its "competitors" do so as well), and tacit collusion is illegal, it is in trouble. But how is it to avoid getting into trouble? Would it have to adopt cost-plus pricing and prove that its price just covered its costs (where cost includes a "reasonable return" to invested capital)? Such a requirement would convert antitrust law into a scheme resembling public utility price regulation, now largely abolished.*[114]

[112] *Aircraft Check Services Co. v. Verizon Wireless* (n 67) at 869.
[113] ibid at 872.
[114] *Aircraft Check Services Co. v. Verizon Wireless* (n 67) at 875.

3) The Grey Zone Between Tacit Collusion and Concerted Practices

The relatively recent *Aircraft Check Services* judgment suggests that even following well over half a century of theoretical and practical attention there remains a certain ambiguity about the two concepts at issue. Observing parallel conduct between several sellers alone does not provide sufficient proof of illicit conduct, both for lack of economic and legal distinguishability. Where market conditions so permit, coordination might be the result of either the realisation of interdependence or illegal agreement and communication. This setting makes two assumptions that are important to the discussion in the following chapters: first, the conditions necessary to sustain coordination are present and second, there are no indicators of illicit conduct that may have caused parallelism between competitors.

Whether the conditions necessary to sustain coordination are present is an economic question. Chapter 1 explains the important connection between structural market conditions and the sustainability of collusion. Where these structural conditions alone do not sustain collusion, the lack of information can be supplanted through communication. Connecting these two strands of analysis – and central to this thesis – is the underlying concept of market transparency. The connecting factor is that requisite transparency can result from market conditions, communication, or both. It will become clear that supply side transparency – which refers to the availability of sufficient information for sellers to anticipate their competitors' likely reactions – is the principal determinant for the sustainability of coordination.

This shifts analytical focus to the reasons for information being observable to sellers in the first place. What generated the transparency that enables sellers to coordinate and does it contain indicia of illicit conduct? This is a legal question. Overt communication between sellers to facilitate coordination is of course prohibited, constituting either a cartel or at least a concerted practice. However, there are myriad reasons other than concerted communication for information to pass in markets. Markets are but clusters of entities in actual or potential supply-and-demand relationships. Their efficient functioning requires information flows and structures.

In markets pervaded by information, what does and does not constitute illicit communication is a fickle question. In between clear instances of tacit collusion and concerted practices lies a wide spectrum of conduct that may facilitate coordination because of the manner in which it affects the flow and structure of information on the market. It becomes

more complicated to root competition analysis in notions of agreement where conduct moves away from direct and reciprocal exchanges of assurances aimed at facilitating coordination.[115] Classifying conduct into binary categories of tacit collusion and concerted practices becomes more and more difficult the further the analysis ventures into the grey zone between hard evidence of illicit communication on the one hand and the mere observance of parallel conduct on the other:[116]

> *As to how "overt" must that communication be, an "explicit, verbally communicated assent to a common course of action" certainly does the trick. The issue is "how far may we move away from direct, detailed, and reciprocal exchanges of assurances on a common course of action and yet remain within the statutory and conceptual boundaries of an agreement." Notably, an "overt act of communication" could fall well short of a clearly articulated invitation to collude with a corresponding acceptance of that invitation. It is sufficient that there is some expression of intent resulting in reliance among firms that they will coordinate to reduce competition.*[117]

Examining the causes for transparency brings into the spotlight a subset of practices that lack conventional traits of communication but may, nevertheless, facilitate coordination. These practices make up a legal grey zone where one needs to identify whether sellers cater to supply-and-demand requirements or, instead, adopt methods or signals aimed at facilitating collusion. Exploring this grey zone is the task of this thesis.

Sellers employ a variety of practices that enable or improve the supply of goods and services. For the most part, those practices are either benign or beneficial to the competitive process. Some, however, attract competition scrutiny where they – incidentally or intentionally – affect the conditions for coordination. The crux with the subset of practices that do raise issues in the context of the dividing line between tacit collusion and concerted practices is that they may serve a legitimate purpose and, at the same time, affect the availability and/or flow of information in a manner that facilitates coordination. The question then becomes whether and on account of what factors the practice in question enables coordination in a manner that could be legally categorised as concerted.

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[115] JE Harrington, 'Posted Pricing as a Plus Factor' (2011) *7 Journal of Competition Law & Economics 1*, 3.
[116] Castillo de la Torre (n 59) 25-26; Joshua & Jordan (n 17) 677.
[117] Harrington (n 5) 338.

Each of the chapters in Part II of this thesis examines a certain category of practices, which qualifies into the legally opaque grey zone, in terms of its effect on the dividing line. Each category has potentially efficiency-enhancing effects but also carries the potential to facilitate coordination, since 'we must remember that an act can facilitate undesirable consequences without being an unalloyed evil'.[118] Further, these practices constitute indirect communication, at best, and are therefore difficult to classify into either tacit collusion or traditional agreement-based notions of concerted practices. The practices discussed are as follows:

- **Information disclosure and signalling:** A necessary component for efficient transactions, the transmission of information to match and optimise supply and demand is *sine qua non* to competition in the free market economy. The widest possible dissemination of (relevant) information is generally considered a good thing for the functioning of markets.[119] Nevertheless, certain types of disclosure may, although ostensibly directed at buyers and purported to foster competition, signal competitively sensitive information to competitors.[120] It is for competition authorities to identify the actual intended audience, pace commercial rationale, of information disclosure. This will be the focus of analysis in **Chapter 2**.
- **Hub-and-spoke and third-party intermediaries:** Hub-and-spoke describes settings of parallel vertical relationships with the same entity.[121] It entails structural constraints and potentially inadvertent information flows between competitors, which may facilitate coordination, resulting from independent vertical relationships with the same entity.[122] Abiding by the logic of vertical relationships, the commercial rationale for conduct here follows from the metrics of information flows necessary along the supply chain, rather than the transmission of information to buyers. This will be examined in **Chapter 3**.

[118] Areeda & Hovenkamp (n 29) 14-27.
[119] *Maple Flooring Manufacturers Association v. United States* (1925) 268 U.S. 563, at 582-83.
[120] Page (n 77) 614.
[121] GL Zampa & P Buccirossi, 'Hub and Spoke Practices: Law and Economics of the New Antitrust Frontier?' (2013) *9 Competition Law International 91*, 91, 98; PJG van Cayseele, 'Hub-and-Spoke Collusion: Some Nagging Questions Raised by Economists' (2014) *5 Journal of European Competition Law & Practice 164*, 164; R Amore, 'Three (or More) Is a Magic Number: Hub & Spoke Collusion as a Way to Reduce Downstream Competition' (2016) *12 European Competition Journal 28*, 28; N Sahuguet & A Walckiers, 'A Theory of Hub-and-Spoke Collusion' (2016) *International Journal of Industrial Organisation*, 2.
[122] E Prewitt & G Fails, 'Indirect Information Exchanges to Hub-and-Spoke Cartels: Enforcement and Litigation Trends in the United States and Europe' (2015) *2 Competition Law & Policy Debate 63*, 63.

- **Most Favoured Customer and Meeting Competition Clauses:** Most Favoured Customer (MFC) and Meeting Competition Clauses (MCC) generally guarantee the best price to buyers in reference to other customers and in reference to competitors, respectively. Contractual commitments in vertical relationships purported to provide customers with favourable terms, these clauses entail structural constraints and flows of information along the supply chain, which may also facilitate coordination. **Chapter 4** discusses the competition implications of these clauses.

These practices do not themselves constitute the actual process of coordination but rather the preceding step of implementing information structures that facilitate coordination. In view of their effect on transparency, these practices might instead be thought of as derivatives of tacit collusion. They arguably subdivide into two derivative layers of tacit collusion. Since the transparency required for coordination is directly derived from the availability and nature of information, the disclosure of information constitutes the first derivative of tacit collusion. It directly shapes the available information on the market and thereby begets transparency requisite for coordination. One notch further removed are structural constraints within vertical relationships that influence conduct and the flow of information, which make up hub-and-spoke structures as well as MFCs and MCCs. These can be thought of as the second derivative of tacit collusion.

Stating that these practices facilitate coordination, and examining how they do so, follows economic reasoning, which does not usually bear insights regarding their legality. Indeed, economic theory does not inherently distinguish between tacit and explicit collusion. This distinction is a legal construct. A surprisingly awkward *pas de deux*, want of observable economic markers proscribes a failsafe mechanism for categorising conduct according to this legal fiction. Parallel conduct alone may not reveal whether it resulted from tacit collusion or concerted practices. It can also prove rather difficult to determine the legality of practices in the abovementioned grey zone between clear instances of tacit collusion and concerted practices. Only rarely, if ever, will sellers manage "pure" coordination. More often than not, they will employ the above practices – not necessarily with that goal or even consciously – that have the economic potential to facilitate coordination. Then the question becomes when and on account of what factors these practices become concerted.

An abstract legal framework for tacit collusion requires some operable benchmark to distinguish permissible from impermissible conduct. Yet, current legal benchmarks intended to do just that can fail to adequately capture actions that should be prohibited without inhibiting

permissible conduct. Neither individually nor combined do the abovementioned benchmarks based on agreement, communication or reciprocity prove adequate for grasping the various types of conduct that warrant a dividing line. This has the challenging implication that, for certain practices economically capable of facilitating coordination, there is no abstract legal framework or clear dividing line that would enable the observer to determine with some degree of confidence whether they amount to tacit collusion or concerted practices. This dividing line remains elusive.

By exploring the grey zone between tacit collusion and concerted practices, this thesis also discusses what a suitable benchmark to distinguish these two concepts might look like. To that end, it takes a closer look at the pre-existing, albeit vaguely defined, distinction between natural and artificial transparency. This distinction envisages that certain practices which create transparency follow legitimate commercial rationales grounded in demand patterns whereas others do not and are implemented solely to enable coordination.

To further examine this distinction, it helps to note the difference between pure tacit collusion – typically price leadership – and practices that enhance transparency and thereby facilitate coordination. The former entails a meeting of the minds where sellers act reciprocally merely through the recognition of their interdependence. For lack of an actionable prohibition of structurally predicated interdependence, actions that anticipate and only succeed through parallel conduct are themselves consistent with a legitimate commercial rationale. The latter, however, entail an intermediary step that enhances transparency in a manner that facilitates coordination. There it is necessary to identify whether a practice is consistent with tacit collusion or concerted practices. Unlike pure tacit collusion, those practices can be tested for their economic rationale.

A stringent view of natural transparency, in a nutshell, requires that there is a legitimate commercial rationale underlying a given type of practice. This translates differently, depending on whether the practice in question is directly oriented at demand or oriented vertically within the supply chain. As further explained in Chapter 2 on information disclosure and signalling and in Chapter 6 on Big Data and Big Analytics, the key element for demand-oriented practices is that they cater to demand patterns in a way that secures or improves the competitive position of a seller vis-à-vis her competitors. That is, there needs to be an actual effect on demand instead of a mechanism that solely enables sellers to circumvent demand pressure before they implement coordinated conduct. As further explained in Chapter 3 on hub-and-spoke and Chapter 4 on MFCs and MCCs, the key element for vertically oriented practices is that they

secure or improve the seller's position within the supply chain instead of solely enabling sellers to circumvent demand pressure before they implement coordinated conduct.

The various concerted practices discussed in this thesis put in place information flows or structures – that is, transparency – which enable sellers to mutually ascertain their conduct prior to its implementation, thus enabling them to coordinate before buyers are able to respond. This is the common thread at the heart of the otherwise rather different practices conducive to coordination, be it clandestine backroom negotiations, some information disclosures, hub-and-spoke arrangements, certain types of MFCs and MCCs or certain types of algorithms. They convey or structure information in a manner that asymmetrically favours seller transparency and thereby distort the demand pressure that is the driving force of competition. As such, irrelevant or unnecessarily obfuscated information is more likely to generate consumer harm rather than to create efficiencies.

The quest for a suitable framework that distinguishes permissible from illicit coordination encounters further complexity in the very nature of market interaction between sellers and buyers. First, informational asymmetries created by practices that elude traditional agreement-based notions of concerted practices are typically compounded by sellers being more favourably positioned to receive and interpret information than buyers. That is to say, sellers are prone to benefit from an informational advantage over buyers. They tend to have a better insight into supply and demand conditions, capacity aspects, and competitor information.[123] As noted by Marshall and Marx:

> *Oligopolistic sellers of a product know many things that buyers of that product do not know. Sellers typically interact with many buyers and deal with all aspects of production and market conditions. … Overall, sellers are typically better informed about many aspects of the product, market, and industry than a buyer.*[124] *Without rivalry, buyers have little defence against the informational advantages of sellers. Buyers need rivalry, as expressed through competitive processes, to protect themselves against suppliers who are informationally advantaged.*[125]

Second, the practices at issue are embedded in certain less tangible social familiarities that arise

[123] Marshall & Marx (n 98) 83.
[124] ibid.
[125] ibid 84.

between sellers who interact frequently and, simply put, know and understand each other. Sellers can develop an "industry identity" that not only instils a sense of familiarity but also one of quasi-collegiality between them, potentially to the detriment of competition. As memorably noted by Justice Souter in *Bell Atlantic Corp. v. Twombly,* such disinclination to compete where the structural conditions so permitted was not indicative of conspiracy, 'if history teaches anything', since the sellers 'were born in that world, doubtless liked the world the way it was, and surely knew the adage about him who lives by the sword'.[126] The analysis also has to reckon with these unavoidable social familiarities that can arise in oligopolistic markets. This, too, will be explored in the course of this thesis, starting with Chapter 1 on the economics of collusion.

[126] *Bell Atlantic Corp. v. Twombly* (n 34) at 568.

PART I: THE FEATURES OF COORDINATION

Chapter 1: The Economics of (Tacit) Collusion

This first chapter provides a framework understanding of the economics of oligopolistic markets, necessary to inform a theoretical dividing line between tacit collusion and concertation. It provides a basic economic framework for the analysis of various practices considered to facilitate coordination, which follows in Part II. Subsequent chapters will frequently refer back to the economic framework set out in this chapter to assess whether and how practices influence the conditions for tacit collusion. That being said, the following economic analysis does not generally discuss legal implications. It discusses the pertinent economics of coordination and remains largely impartial with regard to the legality of conduct.

The foregoing thesis introduction outlined the tenets of the oligopoly problem and the purpose and approach of this thesis. It noted the importance of economics in competition law analysis. In the EU, strong economic influence can be seen for example in the EU Merger Regulation, block exemptions, and recourse to economic evidence in Commission decisions.[1] In the US, the generality of the Sherman Act invited economic interpretation by courts and 'gave economists a singular opportunity to shape competition policy'.[2] Wide interpretative competence allowed 'judges to devise standards of conduct at least in part by reference to the likely economic effects of various forms of business behaviour'.[3] Economics continues to inform competition law also through the arguments presented in adversarial proceedings.[4]

The economics of oligopolies and collusion are complex. If, how, and why sellers collude is subject to several interrelated economic principles. Collusion is governed by the laws of game theory, the study of interdependent actors in payoff situations. Sustaining collusion is contingent on certain structural conditions.[5] These structural conditions are in turn affected by a range of supply and demand variables. They can also be influenced proactively by sellers seeking to collude. Legal analysis only becomes relevant where the sum of these interrelated conditions, variables, and actions enables collusion. The following analysis unpacks each of these points and makes them accessible to legal analysis.

The concept of collusion has different meanings for economists and lawyers. The

[1] I Lianos, 'Some Reflections on the Question of the Goals of EU Competition Law' (2013) *UCL CLES Working Paper Series 3/2013*, 3, 41.
[2] WE Kovacic & C Shapiro, 'Antitrust Policy: A Century of Economic and Legal Thinking' (2000) *14 Journal of Economic Perspectives 43*, 43.
[3] WE Kovacic, 'The Influence of Economics on Antitrust Law' (1992) *30 Economic Inquiry 294*, 295.
[4] TO Barnett, 'Competition law and Policy Modernization: Lessons from the U.S. Common-Law Experience', in *Competition Law and Economics: Advances in Competition Policy Enforcement in the EU and North America*, AM Mateus & T Moreira (eds.) (2010 Edwar Elgar: Cheltenham), 149.
[5] J Faull & A Nikpay, *The EU Law of Competition* (3rd edn OUP, Oxford 2014), 32.

former view the concept as a market outcome achieved through collective output restriction that increases prices.[6] For the latter, collusion describes a method that triggers the application of Article 101 TFEU and analogous provisions.[7] Collusion in the legal sense refers to the existence of illegal communication between sellers to achieve an output restriction and an increase in prices.[8] It views collusion primarily as a method rather than an outcome.

This distinction between outcome and method is central to this thesis. The introduction already highlighted the main legal benchmarks used to capture concerted practices – agreement and communication – and their analytical shortcomings. Competition law screens for illegal agreements and facilitating practices but remains somewhat toothless where coordination follows without some form of agreement or communication that legally distinguishes tacit collusion and concerted practices.[9] Notwithstanding this important legal distinction between the two concepts, 'from an economic point of view, explicit collusion and tacit collusion are not fundamentally different'.[10]

This chapter explores some of the economic reasons for why parallel pricing without additional proof of illicit method 'is an extremely unreliable indicator of collusion', since 'collusive conduct and collusive equilibrium are neither in a necessary nor in a sufficient relationship'.[11] However, the two perspectives interconnect and economic analysis necessarily informs competition law analysis. Subsequent chapters further explore how the legal interpretation of practices and, crucially, whether they are indicative of agreement or not significantly depends on their economic rationale.

The discussion proceeds as follows: Section 2 sets out the basic economic tenets of oligopoly conduct. Section 3 discusses the conditions that are required to maintain tacit collusion, which recur in subsequent chapters. Section 4 lists some of the most relevant market characteristics that affect the conditions and sustainability of (tacit) collusion. Section 5 discusses the practical feasibility and likelihood of tacit collusion in reference to the market

[6] OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables DAF/COMP(2012)17, 21-22.
[7] O Odudu, 'Indirect Information Exchange: The Constituent Elements of Hub and Spoke Collusion' (2011) *7 European Competition Journal 205*, 218.
[8] JE Harrington, 'Thoughts on Why Certain Markets are More Susceptible to Collusion and Some Policy Suggestions for Dealing with Them' (2015) *OECD Global Forum on Competition DAF/COMP/GF(2015)8*, 2.
[9] JE Harrington, 'A Theory of Tacit Collusion' (2011) <https://econpapers.repec.org/paper/jhupapers/588.htm> accessed 07 October 2019, 2; OECD (n 6).
[10] L Phlips, *Competition Policy: A Game-Theoretic Perspective* (Cambridge University Press, 1995), 94.
[11] P Buccirossi, 'Does Parallel Behaviour Provide Some Evidence of Collusion?' (2006) *2 Review of Law & Economics 85*, 88, 97.

characteristics, the importance of communication, and the effects of less tangible notions of industry identity.

1) The Theory of Oligopoly

Although the formulation of a coherent, let alone comprehensive, definition of the goal(s) of competition law is difficult to come by, simply put, one aim is to maintain competition within the marketplace so as to enhance consumer welfare.[12] Viewed on a bipolar spectrum, the ideal state is the maintenance of perfect competition between sellers. On the other end of that spectrum looms the monopoly as the market structure least desirable in terms of consumer welfare.[13] Somewhere between those two ends of the competitive spectrum lies the oligopoly, inhabited by few interdependent sellers and a world of interesting questions for competition law.[14]

Perfect competition assumes no entry barriers, full transparency, product homogeneity, and multiple sellers and buyers.[15] The large number of sellers and buyers allows only a small proportion of overall output to each individual seller, which designates her a price taker without sufficient power to significantly influence the market.[16] Sellers produce at optimal efficiency and set the competitive price.[17] Perfect competition fosters allocative, productive, and dynamic efficiency. Under allocative efficiency, products are sold at the equilibrium price, such that aggregate demand and supply levels align.[18] Productive efficiency means that each seller manufactures at marginal cost.[19] Dynamic efficiency refers to economically desirable innovation by sellers that try to attain market power through optimising processes or use of resources, for example through technological development.[20]

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[12] JP Choi & H Gerlach, 'Cartels and Collusion: Economic Theory and Experimental Economics' in RD Blair & DD Sokol, *The Oxford Handbook of International Antirust Economics – Volume 2* (OUP: Oxford 2015), 415; R Whish & D Bailey, *Competition Law* (8th Ed. OUP: Oxford 2015), 20-21; OECD, The Objectives of Competition Law and Policy, *OECD Global Forum on Competition*, CNM/GF/COMP(2003)3, 9; ME Stucke, What is Competition?, in D Zimmer (ed.), *The Goals of Competition Law* (Edwar Elgar, 2012), 28.

[13] N Dunne, *Competition Law and Economic Regulation* (CUP, 2015), 14-15; D Begg et al. *Economics* (11th Ed., McGraw Hill, 2014), 170.

[14] Dunne (n 13) 14; Whish & Bailey (n 13) 595.

[15] RC Marshall & LM Marx, *The Economics of Collusion: Cartels and Bidding Rings* (MIT Press, Cambridge (Mass.) 2012), 3; Begg et al. (n 13) 171; RH Frank & E Cartwright, *Microeconomics and Behaviour* (McGraw Hill, 2013), 351-352.

[16] Dunne (n 13) 15; Begg et al. (n 13) 171; D King, *Economics* (OUP, 2012), 170; Faull & Nikpay (n 5) 20.

[17] Begg et al. (n 13) 171; Frank & Cartwright (n 15), 368.

[18] D Gale, *Strategic Foundations of General Equilibrium: Dynamic Matching and Bargaining Games* (Cambridge University Press, 2000), 45; Frank & Cartwright (n 15), 360; A Fatur, *EU Competition Law and the Information and Communication Technology Network Industries* (Hart Publishing, 2012), 42; Faull & Nikpay (n 5) 21.

[19] Frank & Cartwright (n 15), 18W-14; Fatur (n 18) 42; Faull & Nikpay (n 5) 21.

[20] Fatur (n 18) 40; M Glader, *Innovation, Markets and Competition Analysis: EU Competition Law and US Antitrust Law* (Edwar Elgar, 2006), 27.

Monopoly, on the other hand, refers to a single seller who controls the market and is protected by high entry barriers.[21] Free of challenge, the monopolist is a price setter who dodges competitive pressure.[22] She can operate at supra-competitive levels, surpassing production costs and the equilibrium price.[23] This market setting is fraught with productive, allocative and dynamic inefficiencies. Prices exceed marginal costs (allocative inefficiency) and the monopolist has no incentive to produce efficiently (productive inefficiency):[24] 'it is no surprise then to find among the great monopolists massive undertakings with breathtakingly high cost curves'.[25] But for the counter-argument that their resources can better finance research and development, the prevalent view is that monopolies lead to inefficient and undesirable market outcomes.[26]

An oligopoly is a market with few, at minimum two (a duopoly) influential sellers; the upper limit of oligopoly is not fixed and can vary depending on the market. These few sellers collectively control the market, but none individually to an extent where she can act unilaterally. Since each seller has sufficient weight so that her unilateral actions impact the market, oligopolistic sellers act in mutual dependency: 'firms feel the effects of each others' moves and are prone to react to them'.[27]

In oligopoly markets, whether collusive or not, each seller is bound to some extent to take into account her competitors.[28] Each can significantly impact market variables and the profit of her competitors.[29] The effects of this interdependency can be ambivalent. While oligopolistic markets can generate efficiencies, such as economies of scale and scope, they may also be conducive to coordinated conduct.[30] As set out in the Introduction, where oligopolistic interdependence leads to coordinated outcomes, it can be difficult to distinguish permissible tacit collusion from impermissible concerted practices.[31]

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[21] Begg et al. (n 13) 180; Faull & Nikpay (n 5) 22.
[22] Begg et al. (n 13) 180; Frank & Cartwright (n 15), 388; King (n 16) 195; Faull & Nikpay (n 5) 22.
[23] D Geradin, AL Layne-Farrar & N Petit, *EU Competition Law and Economics* (OUP: Oxford, 2012) 65; Dunne (n 13) 15.
[24] Geradin, Layne-Farrar & Petit (n 23) 66; Dunne (n 13) 120; Begg et al. (n 13) 185; Frank & Cartwright (n 15), 18W-18; King (n 16) 246-247.
[25] Geradin, Layne-Farrar & Petit (n 23) 66.
[26] ibid, 67.
[27] ME Porter, *Competitive Strategy*, (Free Press, New York 2013), 88.
[28] RC Marshall & LM Marx (n 15) 4; RH Frank & BS Bernanke, *Principles of Economics* (5th Ed., McGraw-Hill/Irwin 2013), 252; Phlips (n 10) 5; Porter (n 27) 88; Faull & Nikpay (n 5) 25.
[29] BE Hawk & GA Motta, 'Oligopolies and Collective Dominance: A Solution in Search of a Problem' *Eighth Treviso Conference on "Antitrust Between EC Law and National Law"* (2008), 60; EJ Green, RC Marshall & LM Marx, 'Tacit Collusion in Oligopoly', in RD Blair & DD Sokol (eds.), *The Oxford Handbook of International Antitrust Economics, Volume 2* (2014, OUP: Oxford), 465.
[30] Frank & Bernanke (n 28) 217.
[31] Buccirossi (n 11) 86.

Oligopoly conduct quintessentially revolves around how sellers act when required to take into account the actions of their competitors. This falls under the study of industrial organisation, which examines the 'latticework of interactions between agents in situations of payoff inter-dependency' where optimal strategies calculate with the likely (re)actions of competitors.[32] The underlying logic of this form of interaction is subject to game theory, the core tenets of which are part of any competition lawyer's toolkit.

Game theory denotes the study of models that depict situations of interdependency between rational actors.[33] The game theoretic model of the "prisoners' dilemma" illustrates how a seller chooses a strategy that yields the highest payoff attainable without knowledge of her competitor's strategy, which is her dominant strategy.[34] Where both sellers opt for their dominant strategy, they attain Nash equilibrium, which means that 'each player's strategy is the best he or she can choose, given the other players' choices'.[35] Nash equilibrium constitutes the starting point for competition – and, more importantly, oligopoly – analysis.[36]

The conventional prisoners' dilemma model envisages two sellers, A and B, who can opt to price either high or low. If A sets a higher price by restricting her output, the rational choice for B is to price low and capture a higher market share. If A prices low, B should do the same to prevent losing her market share to A. Both sellers opt for the lower price, attain Nash equilibrium, and forego supra-competitive profits.[37] It is in neither seller's self-interest to deviate from her strategy when they act in equilibrium.[38]

This model portrays a simplified oligopoly setting, since at the very essence of market conduct 'it can be assumed that the basic choice is between competing and colluding'.[39] The dominant strategy for a seller is to compete, acting in her self-interest and against cooperation. However, this is merely a model that portrays possible trajectories of a restrictive game. These restrictions can be loosened and expanded to reflect different and changing conditions between sellers.

The most significant theoretical expansion of such restrictions are games where sellers interact in repeated intervals. Games with a finite time horizon are not conducive to collusion,

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[32] SB Wolf, Non-Cooperative Collusion in Static and Dynamic Oligopolies, *Theoretical Economics Letters 3* (2013), 317; Green, Marshall & Marx (n 29) 468.
[33] K Leyton-Brown & Y Shoham, *Essentials of Game Theory: A Concise, Multidisiplinary Introduction* (Morgan & Claypool Publishers, 2008), 1.
[34] Frank & Bernanke (n 28) 253; Leyton-Brown & Shoham (n 33) 9.
[35] Frank & Bernanke (n 28) 254.
[36] Phlips (n 10) 5; Leyton-Brown & Shoham (n 33) 9.
[37] Green, Marshall & Marx (n 29) 466; Leyton-Brown & Shoham (n 33) 2.
[38] Frank & Bernanke (n 28) 217; Phlips (n 10) 5; Faull & Nikpay (n 5) 26.
[39] Hawk & Motta (n 29) 49.

because backward induction from the final round of the game reverts back to static equilibrium logic and does not permit supra-competitive subgame perfect equilibria.[40] However, where sellers interact in an infinite game, meaning a sequence of non-cooperative Nash equilibria, they anticipate discounted future profits and a coordinated outcome becomes possible.[41]

Once lifted from the sealed environment of repeated equilibrium models, the sustainability of coordination depends on several conditions and the prevailing market variables. In essence, four conditions are required to sustain coordination. These conditions are discussed in the following Section 2. The extent to which these conditions can be met is largely dependent on the particular characteristics of the market.[42] These characteristics are subsequently discussed in Section 3.

[40] P Belleflamme & M Peitz, *Industrial Organization: Markets and Strategies* (2010 CUP: Cambridge), 344.
[41] ibid, 344-345.
[42] Phlips (n 10) 7; A Gallice, The Neglected Effects of Demand Characteristics on the Sustainability of Collusion, *Research in Economics 64* (2010), 242; Wolf (n 32) 319; Choi & Gerlach (n 12) 416.

2) Conditions for (Tacit) Collusion

Four conditions influence the relative ease with which sellers are able to coordinate their conduct. In theory, therefore, the following four conditions indicate how conducive a market setting is to collusion:[43]

1. Sellers must share an understanding on the terms of coordination, which is a question of **equilibrium selection**.[44]
2. Sellers must be able to **monitor** mutual adherence to coordination.
3. The threat of **punishment** must deter sellers from cheating.
4. **Entry barriers** must prevent actual or potential competitors or buyers from jeopardising coordination.[45]

To reiterate, meeting these conditions depends on certain market characteristics, mostly supply and demand variables governing the market as well as the relative positions sellers hold towards each other.[46] These are discussed in Section 3 below.

Condition 1: Equilibrium Selection

To sustain collusion each seller evaluates whether her short-term gain from deviation outweighs her potential profits from collusion in the chosen subgame perfect equilibrium of an infinitely repeated game.[47] The value of collusive equilibrium profits invariably exceeds aggregate Nash equilibrium levels resulting from single-shot games.[48] Collusion is sustainable if no seller has an individual incentive to deviate.[49] This requires that sellers select a mutually

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[43] Faull & Nikpay (n 5) 32.
[44] *Impala v Commission* (n 10); N Petit, 'The Oligopoly Problem in EU Competition Law' in I Lianos and D Geradin (eds), *Research Handbook in European Competition Law*, 266.
[45] T-464/04 *Impala v Commission* [2006] ECLI:EU:T:2006:216, 123; T-342/99 *Airtours v Commission* [2004] ECLI:EU:T:2002:146**,** 62; F Wagner-von Papp , 'Information Exchange Agreements' in *I Lianos and D Geradin (eds),*
Research Handbook in European Competition Law: Substantive Aspects (Edward Elgar, Cheltenham 2013) 138; I Ayres, 'How Cartels Punish: A Structural Theory of Self-Enforcing Collusion' (1987) *87 Columbia Law Review 2*, 296.
[46] M Ivaldi et al., The Economics of Tacit Collusion (2003) *IDEI – Final Report for DG Competition, European Commission*, 11.
[47] S Colombo, Product Differentiation, Price Discrimination and Collusion, *Research in Economics 64* (2010), 18; R Rees, 'Tacit Collusion' (1993) *9 Oxford Review of Economic Policy 27*, 33; Choi & Gerlach (n 12) 416-417; J Correia-da-Silva & J Pinho, '*The Profit-Sharing Rule that Maximises Sustainability of Cartel Agreements*' (2016) *FEP Working Papers 463*, 2.
[48] O Compte, F Jenny & P Rey, 'Capacity Constraints, Mergers and Collusion' (2003) *46 European Economic Review 1*, 6-7.
[49] Gallice (n 42) 242.

sustainable collusive equilibrium. Sellers have to select a price high enough to incentivise all of them to adhere to coordination. Game theory reflects this incentive in terms of the "discount factor", which depends 'on the stage game payoff parameters above which players cooperate and below which they [do not] cooperate'.[50]

Simply put, oligopolistic sellers choose whether to cooperate or compete.[51] In a repeated game, this is primarily decided by the discount factor, which refers to the relative value of current over future profits. In essence, the term denotes how patient sellers are, considering that the value placed on current profits usually exceeds that of future profits.[52] Therefore, it contemplates 'the time value of money and the likelihood that collusion will be sustainable in future periods'.[53]

This time value of money partially depends on individual seller characteristics, such as capital structure, cost and corresponding interest rates.[54] That is why seller asymmetry implies divergent payoffs and non-deviation functions, which complicate equilibrium selection by misaligning discount factors.[55] It further depends on market characteristics, such as demand and supply patterns, the forcefulness of competition authorities, the behaviour of competitors, and the prospect of punishment.[56]

Equilibrium selection therefore entails certain "non-deviation constraints", which relate to the parameters of the market, like anticipated collusive gains, the degree of potential rewards and punishments from cheating, sellers patience, and the frequency of interaction.[57] Hence, '[o]ne of the main tasks of equilibrium selection theory is to develop general solution requirements which would take into account [the] different incentives of players'.[58] Taking these into account, game theory determines payoff dominant equilibria, which yield increased

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[50] M Blonski, P Ockenfels & G Spagnolo, 'Equilibrium Selection in the Repeated Prinsoer's Dilemma: Axiomatic Approach and Experimental Evidence' (2011) *3 American Economic Journal: Microeconomics 164*, 166.
[51] Hawk & Motta (n 29) 49.
[52] PB Overgaard & HP Møllgaard, 'Information Exchange, Market Transparency and Dynamic Oligopoly' (2007) *University of Aarhus Economics Working Paper 2007-03*, 6; S Sacher & J Sandford, *No Shortage of Theories: The Role of Capacity in Antitrust Analysis* (2016) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2804948> accessed 06 October 2019, 10; I Bos & JE Harrington, 'Endogenous Cartel Formation with Heterogeneous Firms' (2010) *41 RAND Journal of Economics 92*, 93; D Fudenberg & J Tirole, *Dynamic Models of Oligopoly* (1990, Harwood Academic Publishers), 53; Wolf (n 32) 319; Correia-da-Silva & Pinho (n 47) 2.
[53] Sacher & Sandford (n 52) 10.
[54] Sacher & Sandford (n 52) 10; Bos & Harrington (n 52) 93; Wolf (n 32) 319.
[55] Blonski, Ockenfels & Spagnolo (n 50) 165.
[56] Sacher & Sandford (n 52) 10; Fudenberg & Tirole (n 52), 53; Wolf (n 32) 319.
[57] Blonski, Ockenfels & Spagnolo (n 50) 165.
[58] W Güth & B Kalkofen, 'Unique Solutions for Strategic Games: Equilibrium Selection Based on Resistance Avoidance' in *Lecture Notes in Economics and Mathematical Systems*, eds. M Beckmann and W Krelle (Springer: Berlin 1989), 6.

payoffs for all participants.[59]

From the set of discount factors applicable to each seller, equilibrium selection can be analysed at several levels of detail:

> *The coarsest question is whether players cooperate at all. If players do cooperate, one cold ask how frequently they cooperate, which raises more particular questions about how players can learn and continue to cooperate. This, in turn, leads to the next level of detail about how cooperation is supported – i.e., how strategies react to off-equilibrium misbehaviour. One of the puzzles in repeated game theory is that for each of these questions there is not just more than one but a whole universe of possible and consistent answers.*[60]

The latter point alludes to the issue of "folk theorems": in infinitely repeated games there are many possible equilibria between multiple sellers, which makes it difficult to predict equilibrium trajectories.[61] Cooperation does not follow solely from the theoretical availability of an equilibrium, which 'provides a word of caution against the extended practice […] of assuming that subjects will cooperate whenever it is an equilibrium action'.[62] The ability to predict equilibrium points alone is only of limited utility to reducing strategic uncertainty.[63]

This renders the analysis of facilitating practices, explored in Part II of this thesis, essential to competition law on collusion. By disclosing information about prices, quantities or other relevant strategic variables into the market, sellers can indicate possible equilibria and facilitate coordination.[64] Equilibrium selection therefore requires sufficient transparency between sellers. To feasibly align conduct without resorting to illicit communication, sellers need to understand their own as well as their competitors' payoff functions. It is this need for competitors to understand each other's strategies that has led some experimental economic studies to question whether collusion without communication can be achieved at all. This is further discussed in Section 4 below.

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[59] Güth & Kalkofen (n 58) 6.
[60] Blonski, Ockenfels & Spagnolo (n 50) 165-166.
[61] P Dal Bó & GR Fréchette, 'The Evolution of Cooperation in Infinitely Repeated Games: Experimental Evidence' (2011) *101 The American Economic Review 411*, 411; Blonski, Ockenfels & Spagnolo (n 50) 165; Green, Marshall & Marx (n 29) 469.
[62] Dal Bó & GR Fréchette (n 61) 426-427.
[63] D Yao & SS DeSanti, 'Game Theory and the Legal Analysis of Tacit Collusion' (1993) *38 Antitrust Bulletin 113*, 132; Güth & Kalkofen (n 58) 3.
[64] Wagner-von Papp (n 45) 137.

Condition 2: Monitoring

Having chosen an equilibrium path, sellers need to verify their continued adherence to coordination. This requires monitoring the conduct of competitors, which is a function of market transparency. The degree to which sellers are able to monitor their mutual adherence to coordination depends on the composition of certain variables and practices pertaining to the market. Many of the factors briefly raised here will therefore resurface in more detail in the following discussion on the relevant market variables.

Certain types of markets are less observable for sellers than others. Developments in final markets that necessarily advertise prices to buyers in stores or online can be monitored with relative ease. Information in intermediary markets, on the other hand, can be restricted. There, interactions between sellers and buyers occur in less public format, for example through individual quotes. Availability of information is an important factor for the stability of coordination. An individual seller's demand can recede because of an exogenous shock or because of a competitor lowering her price. Where sellers can only observe their own demand statistics, it would be difficult for them to know which is the case.[65]

Structural factors also have an impact on the availability of information. The composition of the market in terms of the number of sellers affects the ability to monitor.[66] Where products and/or sellers are differentiated, sellers might have difficulty observing or understanding strategically relevant actions of their competitors.[67] Relatively stable markets provide better benchmarks for sellers to observe or infer deviations than cyclical markets.[68]

Monitoring also relates to the velocity of information. For example, frequent price adjustments enable sellers to observe deviations timelier and thus retaliate.[69] The volume, variety, velocity, and value of data as an input generated through technological advances in Big Data and Big Analytics open up new horizons – partially promising, partially unsettling – for sellers and buyers to navigate markets, recalibrating significant parameters of how to compete and coordinate.[70] Some of these technology-related issues are discussed in Chapter 6.

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[65] Ivaldi et al. (n 46) 22-23.
[66] OECD (n 6) 22; Belleflamme & Peitz (n 40) 347.
[67] OECD, 'Oligopoly' (1999) *Policy Roundtables DAFFE/CLP(99)25*, 22.
[68] Ivaldi et al. (n 46) 25.
[69] Ivaldi et al. (n 46) 22.
[70] AP Grunes & ME Stucke, 'No Mistake About It: The Important Role of Antitrust in the Era of Big Data' (April 2015) *The Antitrust Source*, 2; DD Sokol & R Comerford, 'Does Antitrust Have a Role to Play in Regulating Big Data?' (2016) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2723693> accessed 08 October 2019, 8; I Graef, 'Algorithmic Price Fixing Under EU Competition Law: How to Crack Robot Cartels?' (2016) <https://www.law.kuleuven.be/citip/blog/algorithmic-price-fixing-under-eu-competition-law-how-to-crack-robot-cartels/> accessed 08 October 2018; SK Mehra, 'Antitrust and the Robo-Seller: Competition in the Time of Algorithms' (2015) *100 Minnesota Law Review 1323*, 1327.

It could further be argued that monitoring becomes easier where several sellers construct boundary parameters that restrict their conduct into an observable action space. Chapter 4 on Most Favoured Customer Clauses (MFCs) and Meeting Competition Clauses (MCCs) explores such considerations of transparency and monitoring in the context of practices that do not necessarily add to the observable information on the market but rather pre-configure seller incentives into alignment. In those instances, each seller knows that she will not be secretly undercut by competitors, because there is a vertical contractual relationship in place to preclude secret price cuts.

Condition 3: Punishment

The ability to punish deviations serves as a mechanism to deter non-compliance.[71] This relates to the abovementioned game theoretic dictum that one seller can usurp her competitor's profit by deviating from collusive equilibrium, while 'both make less profits when they both cheat than if they had both refrained from cheating'.[72] Viewing a lowering in the price down to (or even below marginal cost as punishment, each seller assesses whether her profit from deviation outweighs the adverse impact of foregone future profits and the cost of punishment from competitors.[73] This deterrent weighs into the calculation of each seller's self-interest to sustain collusion.[74]

Frank and Bernanke illustrate the gist of this "commitment problem" through the rather poignant Mafia concept of "*Omertà*": the 'logic of the underworld code […] under which the family of anyone who provides evidence against a fellow mob member is killed'.[75] In keeping with other illustrative models, this example is purposefully simplistic yet principally accurate: if there is little to prevent an action, there is always the deterring threat of retribution. In oligopoly theory, the theme of applicable punishment mechanisms involves the threat of lapse in profits – a price war – which is sufficiently serious to deter sellers from deviating in the first place.[76]

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[71] Choi & Gerlach (n 12) 420.
[72] Phlips (n 10) 50.
[73] Belleflamme & Peitz (n 40) 346; Ivaldi et al. (n 46) 5, 7; Phlips (n 10) 47; S Ardiyok, 'Comparative Analysis of Collective Dominance' (2006) *3 Journal of Yeditepe University Faculty of Law 1*, 7; Wolf (n 32) 319; Choi & Gerlach (n 12) 417, 421; Sacher & Sandford (n 52) 9; Faull & Nikpay (n 5) 30.
[74] Ayres (n 45) 299; R das Nair & L Mncube, 'The Role of Information Exchange in Facilitating Collusion-Insights from Selected Cases' (2014) <http://www.compcom.co.za/wp-content/uploads/2014/09/The-role-of-information-exchange-dasNairMncube140809-2.pdf> accessed 06 October 2019, 3; Rees (n 47) 31; Wolf (n 32) 318; Marshall & Marx (n 15) 108.
[75] Frank & Bernanke (n 28) 268.
[76] Rees (n 47) 31.

The ability to punish in this particular format is of such relevance for collusive theory and practice, because sellers cannot resort to legal remedies if coordination breaks, whether it is because someone deviates from tacit collusion or because an illegal agreement is breached.[77] It constitutes the economic remedy to safeguard the economic phenomenon of collusion, understood as the outcome of a collective output restriction. This punishment mechanism replaces unavailable legal remedies.[78] Without such a mechanism to punish sellers who deviate from collusion, available supra-competitive equilibria are superfluous.[79] Two components are implicit: first, the threat of sufficiently serious punishment through loss of discounted future profits and, second, the credibility of this threat, since 'if any suspicious behaviour is not castigated, the threat of punishment is not credible'.[80] To what extent each criterion is fulfilled depends on the particular punishment mechanism, some of which it is therefore helpful to briefly mention.

In a repeated game, grim-trigger strategies prescribe that sellers price at collusive levels and continue to do so for as long as all other sellers cooperate in the foregoing period.[81] Grim-trigger strategies sustain collusion by threatening to revert to competitive conduct once the market performs under a certain trigger threshold.[82] Upon deviation, demand recedes for all sellers but the deviator, and the price correspondingly falls below a trigger price. All sellers break from collusion and the market reverts to competitive Nash equilibrium of the static game, either infinitely or for enough subsequent periods to offset deviation profits.[83] The extent of loss therefore comprises the foregone future profits from collusion.[84]

Another mechanism is the so-called minimax punishment. Game theory charts the set of dominant strategies for each seller, her optimal responses given the actions of competitors.[85] By the same logic, it is also possible to determine strategies for sellers that force the smallest best response profit onto any competitor, her minimax profit. Accordingly, by pursuing a strategy that results in minimax profit for the deviator, below which she cannot be pushed, the

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[77] Choi & Gerlach (n 12) 416.
[78] Marshall & Marx (n 15) 138; Ayres (n 45) 297.
[79] Wolf (n 32) 318.
[80] C Rojas, 'The Role of Demand Information and Monitoring in Tacit Collusion' (2012) *43 RAND Journal of Economics 78*, 82; Rees (n 47) 31; Green, Marshall & Marx (n 29) 469.
[81] Overgaard & Møllgaard (n 52) 6.
[82] RH Porter, 'Optimal Cartel Trigger Price Strategies' (1983) *29 Journal of Economic Theory 313*, 313-314.
[83] Belleflamme & Peitz (n 40) 345; A Brandão, J Pinho & H Vasconcelos, 'Asymmetric Collusion with Growing Demand' (2014) *14 Journal of Industry, Competition and Trade 429*, 437; Porter (n 82), 315; Bos & Harrington (n 52) 97; Wolf (n 32) 321; RC Marshall & LM Marx (n 15) 136; Rees (n 47) 32; Phlips (n 10) 54; Ayres (n 45) 302; T Matsumura & N Matsushima, 'Competitiveness and Stability of Collusive Behaviour' (2012) *64 Bulletin of Economic Research 22*, 27; Choi & Gerlach (n 12) 421.
[84] Ayres (n 45) 302.
[85] Frank & Bernanke (n 28) 253; Leyton-Brown & Shoham (n 33) 9.

remaining sellers can punish her more effectively and accurately than through Nash reversion.[86]

Alternatively, two-phase stick-and-carrot strategies impose profit reductions for one phase following a deviation (the stick), but anticipate return to supra-competitive equilibrium in the following phase (the carrot).[87] Abreu's simple penal codes expand this to a prolonged stick-and-carrot punishment path.[88] Each seller faces a pre-formulated punishment path, according to which she initially incurs losses following non-compliance but subsequently regains collusive profit over several stages. While incentivising the initially non-compliant seller to adhere, this strategy retains an option to reset this form of corporate penitence. Sellers who fail to punish a deviator are themselves punished.[89]

The punishment arsenal spans further and encompasses practically any action that lends credibility to a sufficiently serious threat of punishment.[90] Bó and Fréchette summarise further theoretical strategies:

> *The simplest strategies are Always Cooperate (AC) and Always Defect (AD). [Another strategy] is Tit-For-Tat (TFT). TFT starts by cooperating, and in subsequent rounds, matches what the other subject did in the previous round. ... A strategy that is often discussed in the literature is Win-Stay-Lose-Shift (WSLS, also known as Perfect TFT, or Pavlov), it starts by cooperating, and cooperates whenever both players made the same choice last round, and defects otherwise. WSLS is considered desirable because when it plays itself, it would not defect forever after a deviation. Finally, another strategy of interest is suspicious Tit-For-Tat (STFT), which starts by defecting and, from then on, matches what the other subject did in the previous round.*[91]

Punishment methods are thus manifold and varied. They can imply a return to the competitive equilibrium, possibly even a short-term price war at sub-competitive levels or be tailored to a particular seller, if conditions so permit.[92]

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[86] Wolf (n 32) 321; Rees (n 47) 32; Compte, Jenny & Rey (n 48) 10, 15.
[87] Belleflamme & Peitz (n 40) 349-350.
[88] Rees (n 47) 32.
[89] Rees (n 47) 32; Ayres (n 45) 303.
[90] Wolf (n 32) 321.
[91] Dal Bó & Fréchette (n 61) 14.
[92] Marshall & Marx (n 15) 136.

Where punishment implies a general reduction of prices that affects all sellers in near-equal measure, it must remain in each seller's interest to punish if a deviation occurs.[93] Primarily envisaged as a deterrent, sellers must commit to actually punish in case of a breach.[94] If sellers do not expect a punishment reaction, they have ample incentive to deviate.[95] Therefore, having regard to the harsh results of trigger strategies, sellers prefer to tailor punishment where 'the breaching firms will be forced to absorb a greater proportion of the punishment cost than the punishing firms'.[96]

Tailored punishment enhances the credibility of the threat. This requires that market transparency permits sellers to identify the deviator and, furthermore, that there is a mechanism which enables targeted punishment without triggering a mutually disadvantageous price war.[97] For example, certain specific practices enable more targeted punishment. Part II of this thesis discusses how some facilitating practices like information exchange or MFCs can stabilise collusion by enhancing the accuracy and severity of punishments.[98]

More generally, targeted punishment could also be achieved through the structural setup of collusion. Marshall and Marx discuss how a 'cartel using a geographic allocation can implement a targeted punishment by sending extra sales people into the territory of the deviating firm'.[99] They cite as an example the use of a base-point pricing system – wherein prices are determined through a base price from a specified geographic point plus the additional freight costs to the buyer – in *FTC v. Cement Institute*:[100] to punish a deviator, other sellers set their base point at the deviator's manufacturing plant, which was relatively inexpensive for them but came at a high cost for the deviator.[101] However, it should be noted that it might prove rather difficult to implement targeted punishment to such an advanced degree through mere tacit collusion, that is, without communication.

This is but one of several points noted above that highlight how transparency affects the nature of punishment. For one, the ability to do so efficiently depends on the time it takes

[93] Ayres (n 45) 301.
[94] Ayres (n 45) 303; Rees (n 47) 33.
[95] Porter (n 82) 320.
[96] Ayres (n 45) 303.
[97] OECD, 'Price Transparency' (2001) *Policy Roundtable DAFFE/CLP(2001)*, 24.
[98] M Bennett & P Collins, 'The Law and Economics of Information Sharing: The Good, the Bad and the Ugly' (2010) *6 European Competition Journal 311*, 322-323; TE Cooper, 'Most-Favored-Customer Pricing and Tacit Collusion' (1986) *17 Rand Journal of Economics 377*, 378; JB Baker & JA Chevalier, 'The Competitive Consequences of Most-Favoured-Nation Provisions' (2013) *27 Antitrust 20*, 21-22.
[99] Marshall & Marx (n 15) 136-137.
[100] ibid 137.
[101] *FTC v. Cement Institute* (1948) 333 U.S. 683, at 714; Marshall & Marx (n 15) 137.

to identify a deviation.[102] The below discussion regarding the frequency of interaction takes up this point. Moreover, the accuracy of information in terms of the ability to correctly identify the non-compliant seller, enhances the efficiency of a chosen punishment.[103] Conversely, sustaining collusion is harder where sellers struggle to correctly determine whether a decline in demand is due to an external demand reduction or due to cheating.[104] With limited means to observe the market, sellers find themselves in the awkward position where they have to evaluate whether to engage in possibly excessive punishment for the wrong reasons, or whether to be unwittingly lenient to a cheating competitor, and both prospects hinder collusion.[105]

The prospect and form of punishment directly factor into initial equilibrium selection. Important here is the interrelationship between the supra-competitive price and the severity of punishment. Prior to punishment considerations, '[b]y fixing a more competitive price, firms in a cartel could lower their profits … and therefore lower the possible profits from breaching'.[106] Adding into this, the higher the credible threat of punishment, the higher the price level that can be supported. Supra-competitive prices can therefore settle below the monopoly price: 'once we appreciate how punishments relate to self-enforcement, the alternative to monopoly behaviour as an explanation is not necessarily competition, but may well be intermediate types of collusive behaviour – as cartels attempt to reduce the profits from breach in order to make collusion self-enforcing'.[107]

Condition 4: Barriers to Entry

Finally, to safeguard the market conditions necessary for coordination, sellers must ensure that they are not undercut by entrants.[108] To this end, entry barriers prohibit or at least complicate market entry and exit, decreasing the likelihood of a competitive outcome.[109] They ought to prevent permanent as well as "hit and run" entry, where sellers can easily and swiftly divert resources to enter a market for a brief but profitable stint.[110] Investigating the possibility of

[102] Ivaldi et al. (n 46) 25; OECD (n 97) 22, 21; J Potters, *Transparency About Past, Present and Future Conduct. Experimental Evidence in the Impact of Competitiveness*, Department of Economics and CentER - Tilburg University (2007), 3.
[103] Choi & Gerlach (n 12) 420.
[104] Fudenberg & Tirole (n 52) 51.
[105] Choi & Gerlach (n 12) 421.
[106] Ayres (n 45) 300.
[107] ibid.
[108] OECD (n 6) 22; Petit (n 44) 266.
[109] JH Abbring & JK Campbell, 'Oligopoly Dynamics with Barriers to Entry' (2006) *Federal Reserve Bank of Chicago Working Paper Series 2006-29*, 12; RF Adams & D Amel, 'The Effects of Past Entry, Market Consolidation, and Expansion by Incumbents on the Probability of Entry' (2007) *Finance and Economics Discussion Series – Divisions of Research & Statistics and Monetary Affairs – Federal Reserve Board*, 3.
[110] OECD, 'Barriers to Entry' (2005) *OECD Policy Roundtables DAF/COMP(2005)42*, 20; Porter (n 27) 7.

market entry in competition analysis is a somewhat hypothetical exercise, due to its forward-looking nature. EU and US authorities both assess entry barriers through the criteria of timeliness, likeliness, and sufficiency of potential entry.[111]

Entry barriers can be structural (sunk costs, economies of scale/scope, network effects, barriers to exit) or strategic (predatory pricing, capacity investment, rebates, bundling, patents).[112] Some of the practices examined in this thesis affect entry. For example, the EU Commission Horizontal Cooperation Guidelines discuss how information exchanges can foreclose markets (see Chapter 2).[113] Also MCCs, briefly summarised as a promise to match any competing price, affect the prospect of entry (see Chapter 4).

Some authors argue that concentration – the hallmark of oligopolistic markets – may itself serve as a barrier to entry.[114] Powerful sellers have the means and motivation to 'respond forcefully to make the entrant's stay in the industry an unpleasant one', which can be signalled through a history of aggressive conduct or the willingness to expend significant resources to act against entrants.[115] Where market entry calculates anticipated long-term profits vis-à-vis entry-forestalling profits, which 'are a function of entry barriers and market characteristics', incumbent sellers can influence some of the pertinent variables to foreclose entry.[116]

Already the prospect of entry constrains sellers and compromises the profitability of tacit collusion.[117] Hence, low entry barriers incentivise sellers to deviate from coordination, even if entry has not yet occurred, because the mere potential for entry incentivises pre-emptive deviations.[118] Incumbents may also be aware of a potential entrant and disrupt a collusive agreement to delay or discourage the entrant.[119] Probability of entry and intensity of competition therefore correlate in competition analysis.[120] Levenstein and Suslow observe that '[i]ndustries as varied as shipping and sugar, which are characterised by relatively high fixed costs, rarely seem to maintain stable competition'.[121]

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[111] OECD (n 110) 46, 50; Sacher & Sandford (n 52) 33-34.
[112] OECD (n 110) 26, 29, 30, 33, 34-36, 39.
[113] European Commission, *Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Cooperation Agreements* (2011/C 11/01), paras. 69ff.
[114] Adams & Amel (n 109) 5-6; AM Spence, 'Entry, Capacity, Investment, and Oligopolistic Pricing' (1977) *8 The Bell Journal of Economics 534*, 534-535, 544.
[115] Porter (n 27) 14; Spence (n 114) 534-535, 544.
[116] Adams & Amel (n 109) 8.
[117] OECD (n 110) 17.
[118] OECD (n 110) 23.
[119] Brandão, Pinho & Vasconcelos (n 83) 457-458.
[120] Adams & Amel (n 109) 2.
[121] MC Levenstein & VY Suslow, 'Cartels and Collusion: Empirical Evidence' in RD Blair & DD Sokol, *The Oxford Handbook of International Antirust Economics – Volume 2* (OUP: Oxford 2015), 445.

3) Variables that Influence Coordination

The conditions for coordination can be met or complicated in several ways and depend to a significant extent on the market context. This section outlines how certain market characteristics affect the "coordination problem", meaning the variables that ease or complicate coordinated conduct simply by observing the market and competitors. Those variables often relate to the nature of demand and supply, whether it is growing or contracting, whether there are business cycles, whether it is prone to innovation, the degree of product homogeneity, or similarities in price and production structures.[122]

To reiterate, these are economic variables that can facilitate the economic phenomenon of collusion, but cannot be directly used to derive conclusions regarding the legality of conduct. Legal caveats are only included where contextually relevant or necessary. Moreover, since it would be difficult to produce an exhaustive list, the following discussion flags the more relevant issues generally understood to affect the relative ease of coordination. In principle, any change, variable, or factor that can influence the abovementioned conditions can become relevant to an assessment of (tacit) collusion.

a) Concentration

A principal condition of oligopolistic conduct is that sellers must collectively have majority control of the market, which is protected by entry barriers.[123] Oligopolistic markets are concentrated by definition, being characterised by a low number of sellers and the fewer sellers there are, the easier it becomes to sustain coordination.[124] With increasing numbers, it becomes more difficult to recognise the existence and remit of interdependence.[125] Moreover, where illicit communication does occur, the number of participants raises the probability of it being uncovered by mistake or through a whistle blower.[126]

In addition, a market with many sellers makes collusion less profitable. First, profits have to be split into smaller proportions, leaving each seller with a smaller slice of the pie. Second, the incentive to deviate increases with the number of participants, given the prospect of collecting a comparatively larger market share from all the others.[127] In sum, short-term

[122] Ivaldi et al. (n 46) 11.
[123] Ivaldi et al. (n 46) 12, 16; Petit (n 44) 266.
[124] OECD (n 67) 22; Ivaldi et al. (n 46) 12; OECD (n 6) 22; Belleflamme & Peitz (n 40) 347.
[125] OECD (n 67) 22.
[126] Ivaldi et al. (n 46) 21-22; M Hanazono & H Yang, 'Collusion, Fluctuating Demand, and Price Rigidity' (2007) *48 International Economic Review 483*, 504.
[127] Choi & Gerlach (n 12) 418.

profits through deviation from collusion become enticing, whereas long-term coordination bears unsubstantial profits when divided between too many sellers.[128]

Concentration alone, however, may not determine the competitiveness of a market.[129] Such concentration has to be protected through entry barriers, which were discussed in the previous section. Assessing sunk costs, which constitute an important barrier to entry, Duvall and Ford note that 'the equilibrium number of firms in an industry, or inversely, the equilibrium level of concentration depends on the extent of sunk set-up costs together with the intensity of price competition and size of the market'.[130]

b) Frequency of interaction

Frequent interactions facilitate collusion in several ways, since they improve sellers' observational capacity of demand and supply patterns. First, the more exposure sellers have to one another, in whatever form, the more likely they are to understand their conduct and strategies. Second, the more frequently buyers purchase, the better sellers grasp demand trends and the easier it is to sustain coordination. On both accounts, frequency of interaction therefore feeds into the key issue of transparency.

Time lags affect the ability of sellers to react, since the information obtained may no longer be accurate. Low velocity of information prone to time lags 'requires firms to be more patient and have higher discounts and lower time preferences for money (interest rates)'.[131] This has significant implications in the context of near-instantaneous transmission over the Internet, since the 'rapid dissemination of pricing information to the marketplace may chill future discounting and foster supra-competitive pricing'.[132] Chapter 6 on Big Data and Big Analytics further explores this point. For this chapter, it pertains to note that the timeliness of information is as valuable to coordination as the precision and detail of information.[133]

Frequent interaction – e.g. through price adjustments – significantly reduces the time lag between deviation and detection. Time lags magnify the impact of deviation and increase profits made by the deviator.[134] Generally, the longer a seller can undercut collusion

[128] Ivaldi et al. (n 46) 12; Hanazono & Yang, (n 126) 503.
[129] JB Duvall & GS Ford, 'Changing Industry Structure: The Economics of Entry and Price Competition' (2001) *Phoenix Center Policy Paper Number 10*, 15.
[130] ibid.
[131] Overgaard & Møllgaard (n 52) 9.
[132] ME Stucke, 'Evaluating the Risks of Increased Price Transparency' (2005) *19 Antitrust 81*, 81.
[133] OECD (n 97) 21; Potters (n 102) 3.
[134] Porter (n 27) 95-96.

undetected, the higher the profits she can reap.[135] Shorter intervals of control therefore enable sellers to monitor their competitors and to respond swiftly to deviations.[136] In sum, '[t]he faster the breach can be detected, the sooner the punishment can commence'.[137] In practice, this means that markets prone to large, infrequent orders are less conducive to collusion since they have extended time lags, before the next stage of purchasing or bidding occurs.[138]

c) Demand elasticity

Demand elasticity determines the ease and speed with which buyers can switch between substitutable products. Characteristic for some of the market variables to follow, its effects can be somewhat ambivalent. On the one hand, demand elasticity promises higher profits from deviation.[139] On the other hand, it also amplifies punishment.[140] Demand elasticity can be affected by various factors, including transparency, long-term contracts, absence of geographical limitations, or consumer loyalty.[141]

The effect of transparency is illustrative, since it correlates with demand elasticity and strongly influences the sustainability of collusion.[142] Buy-side transparency renders demand more elastic, since it enables buyers to seek the best prices. Since well-informed buyers readily switch products, transparency-induced demand elasticity incites deviations that aim to capture a large portion of the market.[143] Understandably, therefore, these positive effects associated with buyer-side transparency tend to guide competition policy.[144]

Yet, improved information on the buyer side also increases the severity of punishment for deviation.[145] Transparency increases the quantity of demand that can be captured by a price decrease, which in turn affects how low the optimal price can be set.[146] Overgaard and Møllgaard outline the countervailing effects of transparency on demand: '[I]f improved

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[135] Rees (n 47) 31.
[136] Ivaldi et al. (n 46) 19-20; Wolf (n 32) 321.
[137] Ayres (n 45) 300.
[138] Overgaard & Møllgaard (n 52) 8; Marshall & Marx (n 15) 26.
[139] C Schultz, 'Transparency on the Consumer Side and Tacit Collusion' (2005) *49 European Economic Review 279*, 280.
[140] Schultz (n 139) 280.
[141] Schultz (n 139) 280; Overgaard & Møllgaard (n 52) 10; A Rasch & J Herre 'Customer-side Transparency, Elastic Demand, and Tacit Collusion under Differentiation' (2013) *25 Information Economics and Policy 51*, 51-59, 52.
[142] D Collie, Collusion and the Elasticity of Demand' (2004) *12 Economics Bulletin 1*, 4; Rasch & Herre (n 141) 11; Schultz (n 139) 280, 284.
[143] Schultz (n 139) 280; Overgaard & Møllgaard (n 52) 10; Rasch & Herre (n 141) 51-59, 52.
[144] Overgaard & Møllgaard (n 52) 12.
[145] Overgaard & Møllgaard (n 52) 10; C Schultz, 'Transparency and Tacit Collusion in a Differentiated Market' (2002) *CESifo Working Paper No. 730(9)*, 21; Rasch & Herre (n 141) 51-59, 52.
[146] Schultz (n 145) 17-18.

information on the consumer side makes it easier for a firm to steal customers from its rivals, it must also make it easier for theses rivals to "steal" them back again'.[147] Transparency therefore affects demand elasticity in that it impacts the number of buyers that become aware of a price change.[148]

d) Seller (a)symmetry

Seller symmetry, generally expressed through similar market shares, is considered to facilitate collusion.[149] Conversely, various interrelated coordination problems arise with increasing seller asymmetry. First, similar to a market with too many sellers, asymmetry is likely to reduce transparency. It becomes more difficult to set common goals and rules. It reduces strategic cohesion, since 'choices right for one competitor will be wrong for others'.[150] Smaller, low-cost sellers tend to prefer lower prices than large sellers.[151]

Second, seller asymmetry usually implies differences in capital costs, which in turn affect the discount factor and the effectiveness of punishment.[152] Different capital cost structures alter seller incentives and complicate profit allocation.[153] The rate at which a seller discounts future profits depends significantly on her capital cost. This renders less efficient sellers more likely to deviate and less exposed to the threat of future punishment, thus destabilising collusion.[154] A seller with a high discount factor would consider future punishment relatively harmless:

> *In the absence of side-payments, the less efficient firms are the most tempted to deviate because: (i) they gain the most from a deviation (i.e., the difference between the deviation and the collusive profits is the highest); and (ii) they lose the less from the punishment (i.e., the difference between the collusive and the competitive profits is the lowest).*[155]

Economically, profit allocation can be readjusted through side-payments. Under the Nash

[147] Overgaard & Møllgaard (n 52) 12.
[148] Schultz (n 145) 3.
[149] Brandão, Pinho & Vasconcelos (n 83) 432.
[150] Porter (n 27) 19.
[151] Bennett & Collins (n 98) 324.
[152] Choi & Gerlach (n 12) 418.
[153] OECD (n 67) 25; OECD (n 6) 22.
[154] Rees (n 47) 31.
[155] Brandão, Pinho & Vasconcelos (n 83) 430.

bargaining rule, sellers receive profit shares corresponding to their relative input, such that the distribution of profits accords with the relative capacity of each seller.[156] This leaves a risk that smaller sellers remain unsatisfied with lower shares of the profit. This risk can be remedied through side-payments to sustain sellers' self-interest to adhere to collusion.[157] Otherwise, smaller sellers may be less inclined to collude or even attain larger profits under competition: '[i]t is not difficult to construct cases in which firms have unequal marginal costs and some firms earn higher profits at the Nash equilibrium than at the joint profit-maximizing allocation'.[158]

It bears repeating that the sustainability of collusion essentially depends on the 'behaviour of the firm that has the strongest propensity to deviate'.[159] Inter-firm transfers or agreements to split supra-competitive profits proportionately can raise the discount factor of those sellers who are most likely to compromise collusion.[160] However, while it could motivate a seller to adhere to collusion from an economic standpoint, such conduct would likely require some degree of communication and inter-firm transfers, therefore risking competition intervention.

e) Product differentiation

Generally, product homogeneity fosters strategic cohesion. The more homogenous the market, the easier it is for sellers to maintain coordination.[161] This also relates to issues of transparency, since it is easier to determine strategy and cooperate with regard to a single product rather than an entire range of differentiated, yet substitutable products. Coordination naturally becomes easier with the ability to set a common price.[162] This also relates to price differences, since it is 'easier to co-ordinate on a price for a single, homogeneous product, than on hundreds of prices in a market with many differentiated products'.[163]

What is more, where products are similar or identical, sellers lack justification to sustain significant price differences.[164] Buyers tend to switch to cheaper products if there are no other loyalty-inducing features.[165] Homogeneity then reduces buyer decisions to price and, as

[156] Bos & Harrington (n 52) 110; J Correia-da-Silva & J Pinho (n 47) 2-3.
[157] Phlips (n 10) 52; J Correia-da-Silva & J Pinho (n 47) 2-3, 12-13.
[158] Rees (n 47) 32.
[159] J Correia-da-Silva & J Pinho (n 47) 3,6.
[160] J Correia-da-Silva & J Pinho (n 47) 6.
[161] OECD (n 6) 22; Ivaldi et al. (n 46) 11.
[162] Harrington (n 8) 10.
[163] OECD (n 6) 22.
[164] Colombo (n 47) 18.
[165] Colombo (n 47) 18; Wolf (n 32) 321.

Harrington highlights in that regard, 'the most striking regularity [in existing literature and evidence] is that cartels occur most frequently in markets for which buyers' decisions are heavily based on price'.[166] Given the low profit margins attainable through competition for homogeneous goods, 'firms go to tremendous effort to avoid buyers making decisions largely based on price', investing in product differentiation, variants, or advertising traits.[167] However, where perceptions of variation are difficult to achieve, frequently in intermediary markets, two avenues remain. One is limiting capacity; the other is collusion, simply avoiding 'intense price competition by agreeing not to compete in price'.[168]

One practical example is the chemicals industry, which has an unusually high propensity for cartelisation. It is a stereotypical market for homogenous products.[169] Not only is the product market therefore conducive to collusion but, as abovementioned, interfirm rivalry can also be a major encumbrance to supra-competitive profits.[170] Indeed, cartel detection is notably high in certain homogeneous product markets – e.g. cement, construction, or chemicals – where low competitive profit has given way to substantial incremental collusive profit.[171] Coordination is also easier to monitor and sustain over time where products are homogeneous. Product differentiation, conversely, renders it difficult for sellers to identify whether demand variations reflect changing buyer preferences or competitor deviations.

That being said, theoretically, product homogeneity also allows deviators to capture a larger portion of demand. Buyers can better observe homogeneous markets, which enhances demand elasticity. The incentive to cheat therefore correlates with homogeneity.[172] Differentiation lowers buyer power and demand elasticity, since it complicates comparisons and decreases substitutability.[173] For sellers, therefore, 'product differentiation enhances the effectiveness of expenditures to influence the willingness to pay of consumers at some critical market size'.[174] Deviations are therefore less profitable with differentiated products because non-compliant sellers cannot gain the portion of buyers vested in a particular and different

[166] Harrington (n 8) 6-7.
[167] ibid.
[168] ibid.
[169] RC Marshall & LM Marx, 'Participation in Multiple Cartels Through Time' (2015) *DAF/COMP/GF*(2015)3, 5.
[170] Marshall & Marx (n 169) 5.
[171] Harrington (n 8) 10, 14.
[172] Ayres (n 45) 299; Colombo (n 47)18.
[173] Porter (n 27) 38.
[174] Duvall & Ford (n 129) 23.

product characteristic of a competitor. In theory, product differentiation may therefore support the conditions for collusion in certain circumstances.[175]

Mirroring the effects of deviation – and for the same reasons – product homogeneity also strengthens the forcefulness of punishment. Punishment can force the deviator's profits close to zero when products are homogenous, whereas '[t]he most severe credible punishments in markets with product differentiation therefore generally will give the breaching firms positive profits'.[176] Demand elasticity therefore incentivises deviation as well as enhances the potential severity of punishment.[177] The mirroring effects logic also applies to market entry. On the one hand, differentiation complicates market access 'by forcing entrants to spend heavily to overcome existing customer loyalties'.[178] On the other hand, however, a high degree of product differentiation is more difficult to define and collectively control. It creates product niches and corresponding potential for new entrants.[179]

f) Growth/Decline in Demand

Demand trends affect the size of profits that sellers anticipate in the future, which has an impact on their incentive to either cooperate or deviate. Generally, demand growth reduces the incentive to deviate, because continuing and gradually increasing collusive profits are more likely to outweigh short-term deviation profits followed by competitive pricing.[180] The opposite holds true for declining demand. These findings apply to incentives following demand trends. These differ from the incentives arising out of high or low demand states.

Regarding demand states, Rotemberg and Saloner argue that collusion is difficult to sustain during times of high demand, since the deviation profit rises with demand levels. They argue that 'it may be optimal for firms to price countercyclically in order to maintain the stability of the collusive arrangement'.[181] Pertaining to demand trends, Haltiwanger and Harrington find that 'when demand is rising during a boom, firms would expect to lose large profits in the immediate future if they were to induce a price war'.[182] Sellers ought to have more incentive to deviate when demand recedes, where current deviation profits are likely to

[175] OECD, *Roundtable on Information Exchanges Between Competitors Under Competition Law*, DAF/COMP/WD(2010)118, 47.
[176] Ayres (n 45) 305.
[177] Rasch & Herre (n 141) 51-59, 51; Schultz (n 145) 3.
[178] Porter (n 27) 9.
[179] Duvall & Ford (n 129) 22.
[180] Ivaldi et al. (n 46) 26-27; Choi & Gerlach (n 12) 419.
[181] J Haltiwanger & JE Harrington, 'The Impact of Cyclical Demand Movements on Collusive Behavior' (1991) *22 RAND Journal of Economics 89*, 90.
[182] ibid. 95-96.

outweigh foregone future collusive profits.[183] By the same token, the potential for punishment loses more potency the further a market contracts.[184]

These findings illustrate the relevance of demand patterns to the sustainability of coordination. If sellers expect demand to either rise or fall, they have a respective incentive to cooperate or deviate.[185] Haltiwanger and Harrington explain:

> *In summary, the analysis of Rotemberg and Saloner (1986) explores the relationship between the level of demand and the difficulty of collusion, while the analysis of this article explores the relationship between the level and direction of demand and the difficulty of collusion. Once allowing for this second factor, firms find it most difficult to collude when demand is declining, and this results in systematically lower prices during recessions than during booms.*[186]

Hence, if there is short boom – that is, a brief but significant rise in demand - it likely poses an obstacle to collusion, since sellers will attempt to deviate during this temporary phase of high demand. Rotenberg and Saloner's model applies. However, where demand growth or decline is prolonged, Haltiwanger and Harrington's model is more suitable, seeing as 'the level of current demand has no effect on firms' expectations of future demand, and thus the expected losses from cheating are independent of the level of current demand'.[187]

Finally, demand growth may raise the potential for market entry.[188] Where significant demand growth motivates market entry, incumbents may expect current profits to outweigh future profits that might be forced back to the competitive price by market entry. Incumbents can inhibit market entry by breaking from collusive conduct. Hence, where demand growth enhances the prospect or even anticipation of market entry, it may yet inhibit collusion when it occurs for absence of alternative entry barriers.[189]

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[183] J Haltiwanger & JE Harrington, 'The Impact of Cyclical Demand Movements on Collusive Behavior' (1991) *22 RAND Journal of Economics 89*, 90; K Bagwell & RW Staiger, 'Collusion over the Business Cycle' (1995) *NBER Working Paper #5056*, 2.
[184] Ivaldi et al. (n 46) 27.
[185] Haltiwanger & Harrington (n 181) 98.
[186] ibid.
[187] Gallice (n 42) 240; Ivaldi et al. (n 46) 28; N Fabra, 'Collusion with Capacity Constraints Over the Business Cycle' (2006) *24 International Journal of Industrial Organization 69*, 71.
[188] C Capuano, 'Demand Growth, Entry and Collusion Sustainability' (2002) *Fondazione Eni Enrico Mattei Nota di Lavoro 62*, 9; Brandão, Pinho & Vasconcelos (n 83) 432.
[189] Brandão, Pinho & Vasconcelos (n 83) 431.

g) Market cycles

In a similar vein to growing or contracting markets, cyclical markets can motivate deviations. Where cyclical markets peak at their most profitable state, sellers have strong incentives to deviate. The potency of corresponding punishment lessens in the subsequent downturn in the cycle, where the market contracts. The effectiveness of punishment fluctuates with the demand cycle, whereas the incentive to deviate takes into account current demand.[190] As a result, 'for any given level of demand, collusive prices tend to be higher in booms than in recessions'.[191]

While susceptible to a similar logic to demand growth and decline, the impact of cycles may be less pronounced, depending on how soon an upturn is expected to follow a current downturn or vice versa. However, balancing the short-term profits from deviation vis-à-vis long-term profits from continued coordination in a cyclical market, 'the relationship between the [former] and the expected long-term cost from doing so need not be constant, and maintaining a balance between the two may require periodic adjustments in the collusive price.[192]

However, stronger fluctuations can render it more difficult for undertakings to maintain a cooperative scheme.[193] Volatile demand creates uncertainty and makes it harder for sellers to monitor coordination. Under demand uncertainty the discount factor has to be higher than under demand certainty.[194] For example, it can be even harder for sellers to identify whether in a volatile market a downturn follows from deviation or the market cycle.[195] Hence, there is an assumption that the equilibrium price is causally related to the level of volatility in the market.[196]

h) Innovation

Innovation can be consequential for collusion for several reasons, being connected to issues like product differentiation, seller heterogeneity, and market entry. Associated with an accelerated pace of development and the 'implementation of a new or significantly improved product (good or service)', innovation may imply market fluctuations and a certain lack of

[190] Choi & Gerlach (n 12) 419.
[191] ibid.
[192] Bagwell & Staiger (n 183) 1.
[193] Ivaldi et al. (n 46) 31-32.
[194] Belleflamme & Peitz (n 40) 359.
[195] Bennett & Collins (n 98) 322.
[196] ibid.

transparency.[197] The question of how and to what extent innovation affects competition is, unsurprisingly, receiving particular attention in the context of technology- and data-driven markets. Its effects in that specific context are taken up in Chapter 6.

First, there is a connection between the extent of innovation and the degree of product differentiation. The very concept of product innovation implies the ambition to develop an edge that differentiates a seller from her competitors to offer the most appealing product to the market. The most innovative seller takes a larger portion of the profits than her competitors, because her product is simply more advanced or appealing to buyers than all the others.

Second, this can lead to seller asymmetry which, as previously elaborated, affects the sustainability of collusion. This might be amplified through mechanisms protecting innovation, like patents or trademarks. Ultimately, the innovation leader might consider cooperation less appealing than she would have in a homogenous market.[198] Due to heterogeneity, innovation 'reduces both the value of future collusion and the amount of harm that rivals will be able to inflict if the need arises.[199]

Third, innovation can challenge conventional entry barriers. Abbring and Campbell argue that high entry barriers spark innovation, since '[i]ncreasing the cost of [an] imitator's entry encourages entry by an innovator'.[200] This relates to the concept of leapfrogging, where a market is suddenly and potentially unexpectedly disrupted due to an innovation that captures significant demand proportions.[201]

i) Capacity constraints

Capacity constraints prevent sellers from producing the quantities necessary to effectively deviate from collusion and saturate significantly more demand than they would have to when colluding.[202] They equally confine sellers' abilities to respond to deviations, since they reduce the value of prospective losses inflicted by less severe punishments.[203] The underlying theme is therefore relatively straightforward: there has to be capacity to supply the additional demand

[197] OECD, Glossary of Statistical Terms <https://stats.oecd.org/glossary/detail.asp?ID=6865> accessed 07 October 2019.
[198] Ivaldi et al. (n 46) 32.
[199] ibid.
[200] Abbring & Campbell (n 109) 11.
[201] D Encaoua & D Ulph, 'Catching-up or Leapfrogging? The Effects of Competition on Innovation and Growth' (2005) 2 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2555627>
[202] Brandão, Pinho & Vasconcelos (n 83) 433; Marshall & Marx (n 15) 119; Sacher & Sandford (n 52) 11; J Paha 'Cartel Formation with Endogenous Excess Capacity and Demand Uncertainty' (2015) *Annual Conference 2013 (Duesseldorf): Competition Policy and Regulation in a Global Economic Order 79726*, 27.
[203] Ayres (n 45) 304; Fabra (n 187) 71; Marshall & Marx (n 15) 119; Sacher & Sandford (n 52) 11; Paha (n 202) 27.

that is to be captured.[204]

Choi and Gerlach argue that equal capacities are conducive to collusion, because they align incentives.[205] In a similar vein, Brandão et al. argue that '[w]hat is quite consensual is that the existence of asymmetric capacity constraints undermines collusion'.[206] Where cartel profits are split equally – not commensurately with market shares (*see* Section 4.d) – but one seller has no capacity constraints while all others do, the former may deviate without fear of punishment.[207]

Capacity constraints may also have an impact on some of the market variables previously discussed in this section. For example, capacity constraints affect issues of profit allocation between heterogeneous sellers. A seller that might otherwise have an incentive to deviate as a result of sufficient capacity and little prospect of punishment may be compensated sufficiently through side-payments that adjust profits relative to capacity.[208]

Furthermore, excess capacity can discourage market entry. Incumbents with excess capacity can aggressively respond to entry with a period of low prices, supported by sunk cost investments and subsequent low marginal costs.[209] Potential entrants might thus anticipate the prospect of increased sunk costs and/or a price war as a welcome to the market, as is well explained in *In re High Fructose Corn Syrup Antitrust Litigation*:

> *Maintenance of excess capacity discourages new entry, which supracompetitive prices would otherwise attract, and also shores up a cartel by increasing the risk that its collapse will lead to a devastating price war ending in the bankruptcy of some or all of the former cartelists.*[210]

[204] Wolf (n 32) 320.
[205] Choi & Gerlach (n 12) 418.
[206] Brandão, Pinho & Vasconcelos (n 83) 433.
[207] Sacher & Sandford (n 52) 8-9, 12; Choi & Gerlach (n 12) 418.
[208] Sacher & Sandford (n 52) 12-13.
[209] ibid 34.
[210] Sacher & Sandford (n 52) 23; *In re High Fructose Corn Syrup Antitrust Litigation* (1996) 936 F. Supp. 530, at 23.

4) The Anti-Competitive Minuet

Market characteristics are one important component determining whether the conditions for coordination can be sustained. Each of the aforementioned variables individually renders markets either more or less conducive to coordination. Further to the effects of such structural characteristics, sellers have at their disposal additional methods of enhancing transparency and thereby facilitating coordination. This refers to the range of practices sellers can engage in to navigate and influence markets, ranging from mere signalling to the formation of cartels. The practices more pertinent to this analysis of tacit collusion and concerted practices are examined in Part II.

Various combinations of the structural conditions addressed in the previous section and, sometimes, additional practices may therefore enable sellers to cooperate rather than to compete and 'in practice, to cooperate does seem to be the dominant or chosen strategy in a not insignificant number of cases'.[211] However, tacit collusion – the elusive ability to coordinate without illicit communication – holds a much discussed and contentious position among the practices that enable coordination. As will be further discussed below, the extent to which tacit collusion is practically feasible has been subject to considerable debate in economic and legal literature.

This is largely the result of scepticism regarding the extent to which the four conditions set out in the above can be maintained through observation and alignment alone. Academics and practioners alike remain unconvinced that pure coordination without some form of communication – legally indicative of an agreement between sellers – can be achieved in practice. To understand the crux of this argument, and its relevance to the legal analysis of collusion, the two key concepts of transparency and communication require attention.

a) The trick: transparency

The important point to be extracted from the foregoing discussion is that coordination requires market transparency.[212] From an economic perspective, it is not primarily relevant whether this transparency is achieved by favourable structural factors, facilitating practices, communication, or a combination of them. It would be difficult to overstate the importance of market transparency in the context of collusion. Transparency refers to the content, type, and

[211] Faull & Nikpay (n 5) 30.
[212] OECD (n 97) 21; Potters (n 102) 4; Petit (n 44) 266.

timeliness of information, which sellers and buyers can access to navigate markets. It lies at the core of almost every condition and market variable pertinent to coordination.

For sellers, the abilities to select an equilibrium, monitor coordination, and effectively punish, all at least partially depend on requisite transparency. For buyers, transparency improves purchasing choices and exerts downward pressure on prices, which intensifies competition.[213] Due to its effects on both sides of the market, 'economic literature has historically placed transparency and access to information at the centre of the competition process and of the economic benefits that it generates'.[214] All of the practices discussed in Part II of this thesis have an impact on transparency with correspondingly bifurcating pro- and anticompetitive potential. In fact, it is for this reason that conduct that may be understood to proactively add to the information that exists on a market attracts the lens of competition analysis in the first place.

Being conducive to increases in both competition and coordination, it might seem that transparency has contradictory effects on markets. While perfect competition assumes full transparency to help buyers acquire knowledge of prices, quantities, and product characteristics, it also provides competitors with means to select and monitor supra-competitive equilibria.[215] This ambivalence trickles down into individual market variables. For example, Schultz argues that increased transparency in a differentiated product market reduces collusive potential, whereas increased transparency in homogenous product markets facilitates collusion.[216] Analysis thus frequently turns to investigating whether there is the right kind of transparency and how it came about.

In brief, transparency is bi-dimensional. For buyers, it can support low search costs to detect the best prices; competition authorities fear that it can facilitate the conditions for collusion.[217] Yet, these two perspectives 'may relate to the flow of *different pieces of information* and/or to the flow between *different groups of economic decision makers*' (emphasis in original).[218] One dimension relates to sellers sharing horizontally, usually to the detriment of buyers; the other dimension envisages vertical information flows between sellers and buyers.[219] Transparency is advantageous when it is vertical and public, but can turn harmful when it is horizontal and private – the latter being an unavoidable by-product of the desired

[213] OECD (n 6) 25.
[214] ibid 24.
[215] Stucke (n 132) 81; Schultz (n 139) 279.
[216] Schultz (n 145) 2; Schultz (n 139) 280.
[217] Overgaard & Møllgaard (n 52) 2; Schultz (n 145) 3.
[218] Overgaard & Møllgaard (n 52) 2.
[219] Wagner-von Papp (n 45) 143; Overgaard & Møllgaard (n 52) 2.

former.[220] Finding the right balance between these two types of transparency is a, if not the, key theme in each of the following chapters. Adding to the complexities of this balance, however, is the fact that these dimensions may also conflict.[221]

It is fairly undisputed that sell-side transparency can facilitate collusion. In general, '[i]mproved information flows between oligopolist[ic] rivals, through shortened detection lags, increased precision of observations, more detailed communication about future intentions, etc., have the tendency to increase the scope for coordinated behaviour, whether tacit or explicit'.[222] Each of these factors corroborates information in a way that helps sellers mutually anticipate their future conduct.

The more precise the observation, the more sophisticated the seller's understanding of demand patterns and her grasp on the probable strategies of her competitors. As previously highlighted, certain supply and demand predispositions enhance transparency. For example, seller symmetry or product homogeneity help sellers understand their strategy sets (*see* Sections 4.d – e).[223] Part II of this thesis will outline how, in addition to such structural predispositions, certain practices like information exchange, MFCs, or Big Analytics can amplify sellers' abilities to observe the market by enhancing the scale or scope of information. More precisely, it will discuss how the format of communication has the potential to tilt the nature of transparency to favour horizontal over vertical transparency.

Although such distinctions eventually blur in practice, structural predispositions and seller actions broadly constitute two separate factors that affect market transparency. At the core of the practices in question lies the incentive to receive and transmit information about markets, sellers and buyers. The detail of communication complements the observability of markets and enhances transparency to alleviate information gaps or asymmetries.[224] Before meaningfully discussing the corresponding implications of specific practices, it is therefore helpful to explore the effects of communication from an economic perspective.

b) Coordination and communication

The beginning of this chapter noted that the need for competitors to understand each other's strategies raises the question of the extent to which coordination can be achieved without communication. This is important, of course, because communication is a conventional

[220] Wagner-von Papp (n 45) 143; OECD (n 6) 25.
[221] Overgaard & Møllgaard (n 52) 2.
[222] ibid 11.
[223] Porter (n 27) 19; OECD (n 6) 22.
[224] EC Horizontal Cooperation Guidelines (n 113) para. 77.

benchmark for concerted practices. Indeed, a key economic insight stresses that communication increases the scope of collusion.[225] The simple economic dictum that communication fosters coordination lends itself to the argument that tacit collusion may be unlikely to materialise in practice.[226]

> *It is logically possible for this agreement to be a tacit one, which arises spontaneously. Nevertheless, in view of the relative complexity of the conduct to be specified by this particular equilibrium and of the need for close coordination among its participants, it seems natural to assume here that the equilibrium arises from an explicit agreement.*[227]

Where tacit collusion denotes an absence of communication, its conceptual counterpart is the cartel, which usually entails the secret communication of complex and seller-specific information to aid several competitors to coordinate. These two opposing ends of an economic spectrum fit into the legal binary of being permissible and impermissible, respectively.

There is a strong correlation on the economic spectrum between the ability of sellers to communicate and their ability to collude, whereas '[t]he absence of communication seems to lead to significantly less successful collusion and a downward bias of prices'.[228] This research complements the practical observation that communication 'increases dramatically' when sellers (are suspected to) collude.[229] The frequency of communication in detected cartels further 'suggests that it must be a valuable tool for collusive outcomes'.[230] Hence the questions as to the efficacy and sustainability of tacit collusion.

First, without communication sellers would have difficulty coordinating among multiple collusive equilibria.[231] The 'plethora' of possible equilibria complicates both the initiation and the continued implementation of coordination without communication, and

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[225] Green, Marshall & Marx (n 29) 472; DJ Cooper & KU Kühn, 'Communication and Cooperation: A Methodological Study' (2016) *82 Southern Economic Journal 1167*, 1167; DJ Cooper & KU Kühn, 'Communication, Renegotiation, and the Scope for Collusion' (2014) *6 American Economic Journal: Microeconomics 247*, 248; KU Kühn, 'Fighting Collusion by Regulating Communication Between Firms' (2001) *16 Economic Policy 167*, 174.
[226] Green, Marshall & Marx (n 29) 472; Cooper & Kühn (n 225) 1167; Cooper & Kühn (n 225) 248; Kühn (n 225) 174.
[227] Green, Marshall & Marx (n 29) 468.
[228] Kühn (n 225) 183.
[229] ibid 180.
[230] Cooper & Kühn (n 225) 247-248.
[231] Cooper & Kühn (n 225) 248; Kühn (n 225) 174.

misunderstandings may jeopardise coordination or trigger price wars.[232] Sellers would not know their competitors' actions in advance and their competitors would not know whether or not a seller understands how to interpret their actions.[233] Sellers need to know that their counterparts have understood what equilibrium to follow; 'the subjects must reach agreement'.[234]

In that regard, Green, Marshall, and Marx distinguish mutual knowledge of something, which 'just means that everyone knows it', from common knowledge of something, which means that 'everyone knows that everyone else knows it'.[235] They argue that it might be difficult for sellers to attain common knowledge of each other's intent to collude without communicating their intentions.[236] This issue of initiation tends to be under-emphasised or assumed away in cartel literature.[237]

Second, where equilibrium selection succeeds, sellers need to sustain coordination. That is, following initiation, coordination requires continuous implementation. Depending on the prevailing market characteristics, this may require complex collusive structures relating to prices, profit allocation, compliance, or possible trigger events.[238] These questions and their pertinence to the specific arrangement naturally relate to nearly all of the variables discussed in Section 4. The less conducive the market is to coordination, the more complex collusive administration becomes. In that regard, Section 4 already noted that, for example, methods of targeted punishment and profit allocation may both require a degree of communication that would invariably meet the legal threshold for concerted practices.

More generally, Cooper and Kühn find that especially the communication of punishment threats as well as reassurances of trust foster the ability of sellers to collude. The communication of credible, explicit threats is considered particularly effective as a collusive device.[239] Frequent assurances to adhere to the terms of coordination facilitate mutual trust, leading to a decrease in cheating.[240] Their economic argument references psychological literature on the correlation between promises and trust.[241]

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[232] Bennett & Collins (n 98) 321, citing: M Motta, *Competition Policy: Theory and Practice* (Cambridge University Press, 2004) 141.
[233] Kühn (n 225) 181.
[234] Cooper & Kühn (n 225) 1168.
[235] Green, Marshall & Marx (n 29) 481.
[236] ibid.
[237] Green, Marshall & Marx (n 29) 469; Kühn (n 225) 174; Harrington (n 9) 3.
[238] Green, Marshall & Marx (n 29) 466.
[239] Cooper & Kühn (n 225) 250, 269, 273; Cooper & Kühn (n 225) 1168.
[240] Cooper & Kühn (n 225) 250, 273.
[241] ibid 250.

A practical example of this is the Canadian gasoline cartel, where frequent communication via phone calls between sellers aided not only coordination and monitoring but also helped to 'convince dissidents or would-be-dissidents to participate'.[242] In this case, communication stabilised coordination even where a seller initially deviated through the issuance of threats or renegotiation of the agreement.[243] It may further be the case that, through enhanced accuracy of communication, a wider set of punishments exists under explicit collusion.[244]

Equilibrium selection, monitoring, and punishment can therefore all be enhanced through direct communication. Awaya and Krishna develop a model where, under certain conditions with noise signals and monitoring ability, explicit collusion can sustain higher prices than tacit collusion, 'because even unverifiable communication improves monitoring'.[245] Their model maintains a fixed discount factor and compares different monitoring structures – one with and one without communication – to 'drive a wedge between tacit and explicit collusion'.[246]

Awaya and Krishna cite several studies[247] which show that communication is sufficient for cooperation but that fail to show that it is also necessary for cooperation.[248] However, Sugaya and Yamamoto show that in repeated games with private monitoring sellers can learn over time and render explicit communication unnecessary since they can communicate implicitly through their actions, so that the folk theorems hold (i.e. sellers can coordinate).[249] This has the key implication that communication is, in theory, not a necessary condition for coordination.

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[242] R Clark & JF Houde, 'The Effect of Explicit Communication on Pricing: Evidence from the Collapse of a Gasoline Cartel' (2014) *62 The Journal of Industrial Economics 191*, 195-196.
[243] Clark & Houde (n 242) 197.
[244] Harrington (n 9) 21.
[245] Y Awaya & V Krishna, 'On Tacit Versus Explicit Collusion' (2014) <https://kelley.iu.edu/doc/bloomington/business-economics-and-public-policy/seminars/fall-2014/krishna-paper.pdf> accessed 07 October 2019, 2.
[246] Awaya & Krishna (n 245) 3.
[247] Awaya & Krishna (n 245) 4, citing: O Compte, 'Communication in Repeated Games with Imperfect Private Monitoring' (1998) *66 Econometrica 597*; M Kandori & H Matsushima, 'Private Observation, Communication and Collusion' (1998) *66 Econometrica 627*; D Fudenberg & D Levine, 'The Nash-Threats Folk Theorem with Communication and Approximate Common Knowledge in Two Player Games' (2007) *132 Journal of Economic Theory 461*; I Obara, 'Folk Theorem with Communication' (2009) *144 Journal of Economic Theory 120*; M Aoyagi, 'Collusion in Dynamic Bertrand Oligopoly with Correlated Private Signals and Communication' (2002) *102 Journal of Economic Theory 229*; J Harrington & A Skrzypacz, 'Private Monitoring and Communication in Cartels: Explaining Recent Collusive Practices' (2011) *101 American Economic Review 2425*.
[248] Awaya & Krishna (n 245) 4.
[249] T Sugaya & Y Yamamoto, 'The Folk Theorem in Repeated Games with Individual Learning' (2015) <https://sites.google.com/site/takuosugaya/home/research> accessed 07 October 2019, 2-4; Awaya & Krishna (n 245) 4.

There is of course no universally exact benchmark for the level of communication required for coordination to be feasible, or for determining when conduct displays sufficient characteristics of a concerted practice. Instead, the relevant research has suggested that there is a difference between economically possible trajectories, achievable in theory, and commercially or practically feasible ones, which may be less attainable through tacit collusion.[250] Pure tacit collusion, argue Cooper and Kühn, would be difficult to sustain.

In some markets, Green, Marshall, and Marx point out, the variables may be too complex and difficult to achieve without communication.[251] Uncertain market environments would also require some degree of communication to attain collusion.[252] They acknowledge that repeated games supported by Nash reversion may, in theory, not require communication.[253] Yet, they argue, 'in few real-world environments would the informational requirements be met for there to be tacit coordination equilibria […] that provide firms with the same level of profits as through strong explicit collusion'.[254]

These arguments suggest that even if tacit collusion is practically feasible, its scope ought to be narrow. It requires an environment highly conducive to the complex task of coordinating between multiple sellers. This follows from two factors: First, the more sellers communicate, the better their ability to collude.[255] Second, the more conducive the market conditions are to coordination, the less collusive devices are required.[256] There is an inverse relationship between the susceptibility of the market to coordination and the necessary level of communication. This assumes that if sellers could sustain coordination legally, they would.[257]

With these arguments in mind, it proves helpful to briefly survey known instances of cartelisation. Doing so yields insights into the logistics of successful coordination and to appraise whether the level of communication required reflects the theoretical arguments set out above. To be sure, tacit collusion, concerted practices, and cartels are different concepts. However, they all gravitate toward the same oligopolistic sphere, require the same conditions (equilibrium selection, monitoring, punishment, entry barriers), and respond to the same variables (*see* Section 4), because the sustainability of each of them cannot be enforced in

[250] Cooper & Kühn (n 225) 275.
[251] Green, Marshall & Marx (n 29) 466.
[252] Green, Marshall & Marx (n 29) 471.
[253] ibid.
[254] ibid 472.
[255] Cooper & Kühn (n 225) 1167; Cooper & Kühn (n 225) 248; Kühn (n 225) 174.
[256] Ivaldi et al. (n 46) 11; Faull & Nikpay (n 5) 32.
[257] Harrington (n 8) 5.

courts.[258] The crucial difference lies in the manner in which these conditions and mechanisms are sustained, whether – in broad brushstrokes – through mere observation, the sending of signals, or secret communication.

The underlying assumption is that sellers may resort to concerted practices or cartelisation where tacit collusion would not suffice.[259] This may, for example, be the case where the market is insufficiently concentrated. The cartels in *Prestressing Steel* or *Bathroom Fixtures and Fittings* each had seventeen participants.[260] Sustaining tacit collusion amongst this many sellers would prove difficult, thus corroborating the assumption that (illicit) communication facilitates coordination.[261] Price developments after the detection of a vitamins cartel confirm this: following the prohibition of explicit collusion, prices for vitamins produced by more than two sellers returned to competitive levels within two years, whereas prices for vitamins produced by only two sellers remained supra-competitive for several years.[262]

Marshall and Marx analyse the chemicals industry, which has shown an unusually high propensity for cartelisation. A good example of a nearly homogeneous product market, it is conducive to – and even incentivises – collusion, since interfirm rivalry can become a major encumbrance to incremental profits.[263] Hence, it is not entirely surprising that cartels seem to emerge rather consistently in the chemicals sector.[264] The same observation follows from evidence on cartel recidivism which is disproportionately frequent in the chemicals industry.[265]

Even in this environment, cartel operation reveals itself as a feat of formidable complexity. Participants may have to consider allocation structures, to divide and occasionally redistribute profits.[266] Market fluctuations may affect prices or quantities and, consequently, relative profits.[267] Deficient cartel structures, such as disproportionate shares, incite breaches of the agreement.[268] Such eventualities require some form of enforcement system to settle disputes.[269] These observations mirror Cooper and Kühn's as well as Green, Marshall, and Marx' forgoing theoretical work. Marshall and Marx conclude:

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[258] Belleflamme & Peitz (n 40) 343, 347.
[259] Marshall & Marx (n 15) 16, 18-19; OECD, *Algorithms and Collusion: Problems and Counter-Measures – Note by A. Ezrachi and M.E. Stucke* (DAF/COM/WD(2017)25, 2017), 6.
[260] C Veljanovski, 'Deterrence, Recidivism, and European Cartel Fines' (2011) 7 *Journal of Competition Law and Economics 871*, 880-881.
[261] Ivaldi et al. (n 46) 16; Petit (n 44) 266.
[262] Marshall & Marx (n 15) 16, 18.
[263] Marshall & Marx (n 169) 5.
[264] Veljanovski (n 260) 889-890; Marshall & Marx (n 169) 4.
[265] Veljanovski (n 260) 896.
[266] Marshall & Marx (n 15) 120.
[267] ibid 110.
[268] ibid 120, 124-125.
[269] ibid 32-33.

> *Creating and running a successful cartel is, from our perspective, a remarkable accomplishment. Without access to the legal system to enforce agreements, successful cartels are able to profitably operate with ongoing stability. Given the creativity and flexibility of successful cartels in creating solutions to problems, we expect changes to their operating environment to be greeted with quick and effective adjustments to the collusive structures*.[270]

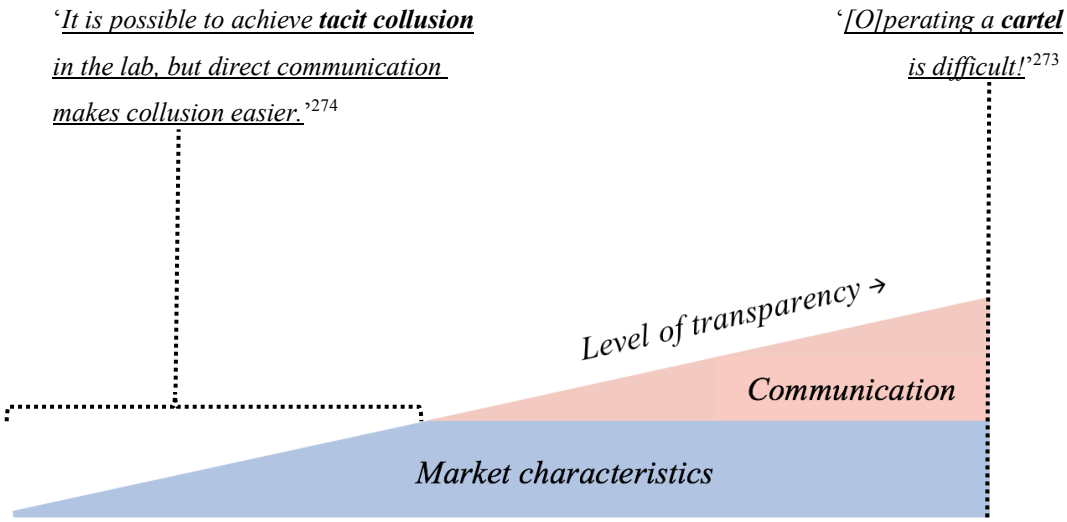
Available evidence of detected cartels thus suggests that sellers have to devise complex mechanisms to sustain collusion.[271] This is consistent with several significant economic arguments that highlight the importance of communication and doubt that tacit collusion could succeed in practice.[272] This begs the question of whether, in practice, tacit collusion can provide the organisational sophistication required to sustain coordination.

c) Industry and identity

It is here that the economics and the law begin to clash in their understanding of competition. From an economic perspective, the foregoing observations suggest that tacit collusion might be unattainably difficult, whereas cartels supported by extensive communication have at times proven impressively durable. From a legal perspective, it is clear that tacit collusion is permissible and that cartels are prohibited. Categorising these two ends of the spectrum is rather simple. The difficult part is reconciling two incongruent concepts – the spectrum logic of economics and the binary logic of the law – closer to the middle of the spectrum. First, it needs to be clarified from an economic perspective at what point practices are capable of sustaining coordination. Second, it is necessary to determine at what point an economic practice crosses over from legally permissible to prohibited.

Having outlined the structural factors that affect the conditions for coordination, the theoretical arguments correlating communication and collusion, and some sense of the complexity of cartelisation, the following picture of oligopolistic coordination emerges:

[270] ibid 30 138.
[271] ibid 30 138.
[272] Cooper & Kühn (n 225) 275; Green, Marshall & Marx (n 29) 472.



(*Figure 1*: Spectrum of transparency)

This spectrum represents economic and empirical insights without legal appraisal. Although 'it is a distinction that is largely absent from economic theory', somewhere between the two ends of the spectrum lies the theoretical *legal* border between tacit collusion and concerted practices.[275] Hence, from a legal perspective, the issue is to determine at what point – and on account of what factors – tacit collusion turns into concerted practices.

This issue requires a closer look at the enigmatic realm of signals and actions with ambivalent meanings and, sometimes, effects. It requires elucidation of the range of practices that are not manifestly concerted but tend to cultivate the interaction between competitors into a sense of mutuality or common purpose. These practices will be discussed in Part II of this thesis. However, in keeping with the theme of this chapter, the central feature of these practices is that they tend to enhance market transparency and thus reduce uncertainty between sellers.[276]

These practices constitute quasi-communication mechanisms between interdependent sellers. Their effects are borne out of the very same interdependence that creates between oligopolistic sellers another, less tangible and informal codex, which the quantifiable prescriptions of economic models or empirical research may struggle to reflect. This informal codex, woven into the incentive structure of oligopolistic sellers, tends to enhance transparency as a result of continuous interaction and mutual awareness between such sellers. An informal social rulebook, it adds to the discussion and arguably complicates the placement of conduct

[273] Harrington (n 8) 7.
[274] Cooper & Kühn (n 225) 275.
[275] Harrington (n 9) 3.
[276] OECD (n 6) 19.

on the spectrum depicted in *Figure 1*, because it enhances transparency in a subtle manner without itself constituting an act of communication or a tangible practice of the sort discussed in Part II of the thesis.

The first sentence of the introduction to the chapter on oligopoly of Gravelle and Rees' *Microeconomics* states: 'There is oligopoly when a firm believes that the outcome of its decisions depends significantly on the decisions taken by one or more other identifiable sellers'.[277] Interdependence is not a phenomenon restricted to the spoils and perils of price increases. It permeates oligopolistic strategy. It not only affects the objective incentive structure of sellers, but also shapes their subjective self-perception and the perception of their entire industry. In other words, 'competitors in concentrated markets watch each other like hawks', persistently and attentively.[278] The behavioural implications of interdependence are therefore not restricted to collusion but condition an industry irrespective of whether sellers compete or collude.

Economic analysis views an oligopoly as a social subgroup within economies to study individual decision-making in the pursuit of collective aims.[279] These aims are not limited to price.[280] According to Grillo, rational actors pursuing Nash-type strategies 'presupposes that the players share a mutually consistent system of beliefs (the same overall view concerning the likelihood of various outcomes), in the sense that each player's beliefs can be derived as conditional distributions from a "common prior"'.[281] Stucke cites the Merriam-Webster Dictionary definition of competition as 'the effort of two or more parties acting independently to secure the business of a third party by offering the most favourable *terms*'.[282]

Legal practice understands this phenomenon. The US DOJ and FTC Horizontal Merger Guidelines grasp 'parallel accommodating conduct' as the risk of 'competitive moves' generally, not merely of price or quantity, which embolden price increases.[283] *US v Aluminium Company of America* considers competition to include 'the offer of more attractive *terms* or superior merchandise'.[284] *Aircraft Check Services Co. v. Verizon Wireless* reminds that '[w]e can (…) expect competing firms to keep close track of each other's pricing *and other market*

[277] H Gravelle & R Rees, *Microeconomics* (3rd edn Pearson Education Ltd., Harlow 2004) 400.
[278] *Aircraft Check Services Co. v. Verizon Wireless* (2015) 782 F.3d 867, at 875.
[279] M Grillo, 'Collusion and Facilitating Practices: A New Perspective in Antitrust Analysis' (2002) *14 European Journal of Law and Economics 151*, 156.
[280] Marshall & Marx (n 15) 83.
[281] Grillo (n 279) 158.
[282] Stucke (n 12) 32; 'Competition' (2010), Merriam-Webster Online Dictionary, retrieved 15 January 2018, http://www.merriam-webster.com/dictionary/competition.
[283] US Department of Justice & Federal Trade Commission, *Horizontal Merger Guidelines* (2010), 24-25.
[284] *United States v Aluminum Company of America* (1950) 91 F Supp 333, at 355.

behaviour and often to find it in their self-interest to imitate that behaviour rather than try to undermine it – the latter being a risky strategy, prone to invite retaliation'.[285]

Industrial organisation literature addresses notions of "industry identity",[286] "strategic groups",[287] or by a slightly fancier connotation, of a "rivalrous consonance of interests".[288] While these terms do not refer to one and the same dynamic, they all convey the quintessential point that sellers are conditioned to take into account the observed and/or anticipated conduct of their competitors within a loosely defined space. They do not necessarily perceive the group in exactly the same terms or mirror each other's characteristics. Rather, they understand each other's conduct and the 'underlying logic of their decision-making'.[289] Economically, 'this is akin to firms having the ability to predict one another's reaction functions', a description that may well be found in an introductory text on tacit collusion.[290]

Concentration and economic interdependence support the idea of an industry identity, meaning 'a collective understanding or shared set of beliefs widely held by members of an industry about what constitutes the central, enduring, and distinctive characteristics of the industry as a whole and its members'.[291] Forming strategic groups, sellers therefore follow similar strategies and are protected from outsiders by barriers to entry.[292] Hence, entry barriers define the strategically relevant area not only by distinguishing sellers who can act without prospect of outside interference, but also by positioning them to coexist as mutual points of reference internally.

Ultimately, sellers' 'recognition of mutual interdependence is a natural result of relational modelling built on observation and interaction' making them aware of interdependence and inciting explicit or tacit collusion.[293] The more structurally homogenous the industry, the more likely it is that a cognitive group can develop or sustain itself.[294] This interrelationship mirrors conventional economic wisdom on the positive relationship between seller homogeneity and collusion (*see* Section 4.d). Proximity and frequency of interaction –

[285] *Aircraft Check Services Co. v. Verizon Wireless* (2015) 782 F.3d 867, at 879.
[286] R Dhalla & C Oliver, 'Industry Identity in an Oligopolistic Market and Firms' Responses to Institutional Pressures' (2013) *34 Organization Studies 1803*, 1804.
[287] M Peteraf & M Shanley, 'Getting to Know You: A Theory of Strategic Group Identity' (1997) *18 Strategic Management Journal 165*, 165.
[288] RE Kuenne, *Price and Nonprice Rivalry in Oligopoly – The Integrated Battleground* (Springer, 2016), 4.
[289] Peteraf & Shanley (n 287) 167.
[290] ibid.
[291] Dhalla & Oliver (n 286) 1804.
[292] Peteraf & Shanley (n 287) 172.
[293] ibid 179.
[294] ibid 176.

pace game theory – aid comparison, imitation, and identification.[295] The strength of an industry identity may be influenced by further factors, like presence or absence of adversarial advertising traits or international reach versus geographic proximity.[296]

As concentration increases, so does the prospect of an industry identity.[297] Therefore, industry identity may be particularly strong in the case of oligopolies, where 'interdependence and mutual referencing' influence seller performance.[298] A concentrated oligopolistic market structure amplifies a sense of industry identity, which induces sellers to imitate or complement each other's conduct.[299] Within this community, incentives are 'shaped by a mixture of rivalry and cooperation in varying degrees, the mixture varying with the industry'.[300]

Rivalry may dominate interdependence, but cooperation counterweighs and tempers competition, which creates this 'rivalrous consonance of interests'.[301] Imitating competitors may aid rivalry and cooperation alike. Imitation reduces the likelihood that 'any firm will succeed or fail relative to others', thereby preserving a status quo.[302] Pursuing this strategy makes sense in various scenarios, like when certain sellers are considered to hold superior insight into a market, where sellers try to avoid price wars, where prestigious sellers are copied to signal legitimacy, or simply where the aim is to compete with others on equal terms.[303]

One example is a study of the Canadian banking industry, where members understood the underlying logic of decision-making of their competitors and thus had a degree of predictability about their actions.[304] The industry understood the value of sustaining strategic uniformity to preserve lower costs of doing business for all of them.[305] In the oil industry, a similar understanding of interdependence materialises from a confidential planning document by an Exxon subsidiary:

> *It is felt that there is a fair amount of mass psychology in the industry and that, while many companies would prefer to go slow because of their domestic crude*

[295] U Staber, 'Imitation Without Interaction: How Firms Identify with Clusters' (2010) *31 Organization Studies 153*, 157.
[296] Dhalla & Oliver (n 286) 1828.
[297] ibid.
[298] ibid 1805.
[299] ibid 1828.
[300] Kuenne (n 288) 4.
[301] ibid.
[302] MB Lieberman & S Asaba, 'Why do Firms Imitate Each Other?' (2004) *31 Academy of Management Review 1*, 5.
[303] Lieberman & Asaba (n 302) 6, 12; *Aircraft Check Services Co. v. Verizon Wireless* 782 F.3d 867 (2015), at 874-875.
[304] Dhalla & Oliver (n 286) 1811.
[305] ibid 1825.

> *interests … they would feel compelled to start plants if others did and particularly so if a company with the stature of [Exxon] did.*[306]

Oligopolistic sellers recognise 'that to get along [they] must go along with the group in order to avoid disrupting their cosy industrial bonhomie'.[307] Imitation commits sellers to preserving the status quo.[308] This not only flows into the identity of abstract corporate actors but also directly shapes managerial cognition, which categorises industries into groups of sellers, thereby facilitating strategic group identities and mitigating uncertainty and bounded rationality.[309] Competitors have a natural tendency to align where 'observational learning and reciprocal interactions among cognitive, behavioural, and environmental factors enter into individual decision-making'.[310]

Industry identity does not necessarily depend on face-to-face interaction and mutual trust, but rather on a sense of commonality, observational vagaries and institutionalised conventions.[311] Therefore, industry identity constitutes a fleeting and variable concept: it entails a sense of mutual recognition, but remains a creation of competitive dynamics.[312] Imitation of rivals reflects this tension well, since 'firms may imitate rivals to maintain competitive parity and also out of belief that rivals may possess superior information'.[313]

Sellers constitute a continuous point of reference and a source of vicarious learning.[314] Interdependence is more than just economic positioning; it flows into a seller's identity. Kuenne argues that settings where these 'restraining forces are firmly embedded in the goal structure of the major incumbents' constitute mature oligopolies.[315] Centred on the notion of oligopolistic interdependence, each seller recognises that her decisions will impact the welfare of competitors, and that 'affected rivals must pursue modes of adaptation'.[316] Sellers sharing a rivalrous consonance of interests naturally resort to an informal codex, an understanding of the rules of the game that governs cooperation and rivalry 'within viable bounds'.[317]

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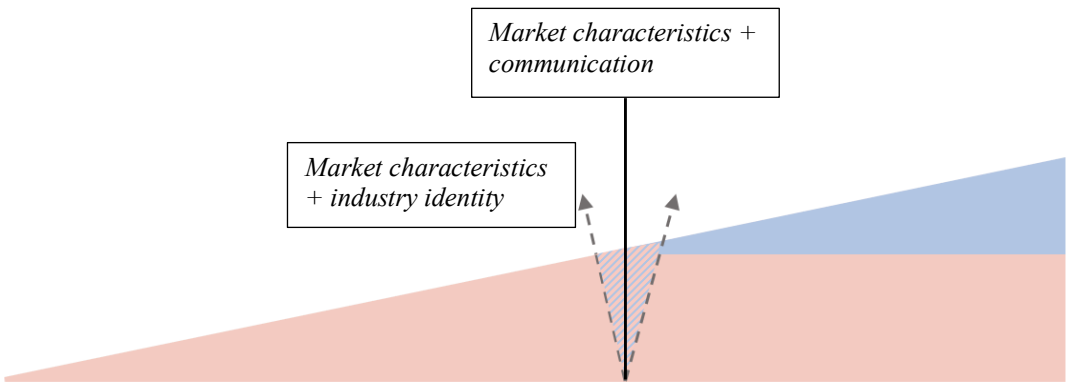
[306] JW Brock, 'Antitrust Policy and the Oligopoly Problem' (2006) *51 The Antitrust Bulletin 227*, 244, citing M Mintz, 'Synfuel Development Delay Laid to Exxon' *Washington Post 11.08.1981*, at A2.
[307] Brock (n 306) 227-228.
[308] Lieberman & Asaba (n 302) 17.
[309] Peteraf & Shanley (n 287) 166.
[310] ibid 169.
[311] Staber (n 295) 167.
[312] ibid 168.
[313] Lieberman & Asaba (n 302) 19.
[314] Peteraf & Shanley (n 287) 169.
[315] Kuenne (n 288) 51.
[316] Kuenne (n 288) 52.
[317] ibid.

These viable bounds are partially shaped by competition law and are explored at length in the following chapters. However, as a preliminary point it is important to note that the existence of an industry identity between oligopolistic sellers creates a sense of commonality that is difficult to place with precision on the spectrum set out in *Figure 1*. The strength of industry identity follows from the transparency variables set out in Section 4. The more concentrated and transparent the market, the larger the potential for a sense of industry identity. At the same time, it seems difficult to account for the social maxims of such identity in theoretical economic models.

Hence, the appraisal of conduct between sellers – their understanding of the market, perception of competitors, and rationale for acting – is subject to this additional social factor, which complicates calculations that only consider market characteristics and the degree of communication as constitutive of transparency. Sellers that interact are never unfamiliar, rational, abstract entities. This can mean different things. It could mean that they have an even better understanding of each other and the market than observable market characteristics and communication suggest. It could also mean that they have a worse understanding of the market than the ostensible degree of coordination suggests, because they merely act on intuition. That applies where the imitation of conduct, which may enhance transparency, follows from something resembling informed intuition rather than knowledge and actual coordination.

In theory, the prevailing market characteristics might indicate a certain point on the spectrum of transparency. Yet, the effects of industry identity might tilt the actual degree of transparency slightly further to the right or to the left, broadly depending on whether sellers act on better mutual understanding or, instead, in careful imitation of each other. Industry identity might then bring about a quantum of transparency not usually considered by economic models and, therefore, factor into the sustainability of coordination regardless, and potentially even instead of, communication:



(*Figure 2*: Potential effects of industry identity on market transparency)

Further potential effects of industry identity are explored in Chapter 5, following the discussion in Part II of the various practices in between the two ends of the economic spectrum that are less obviously categorised within the legal binary. Yet, the question regarding the sustainability of coordination accompanies legal tacit collusion discourse with regard to these practices, too. In terms of their economic ability to facilitate coordination, many of the practices that broadly fit into the concept of signals are equally met with scepticism, a sentiment well summed up in *Brooke Group*:

> *The signals are subject to misinterpretation and are a blunt and imprecise means of ensuring smooth cooperation, especially in the context of changing or unprecedented market circumstances. This anticompetitive minuet is most difficult to compose and to perform, even for a disciplined oligopoly.*[318]

[318] WH Page, 'Signaling and Agreement in Antitrust Law' (2017), <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2620786> accessed 04 October 2019, 23; *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.* (1993) 509 U.S. 209, at 257.

5) Conclusion

The foregoing discussion provides a sense of the factors that drive oligopolistic markets and can affect the conditions for collusion. The complex web of relevant factors surrounding oligopolistic markets is difficult to grasp comprehensively, even for the sellers that navigate them or the competition authorities, lawyers, and economists that seek to analyse them. What is more, the economics of oligopoly only tell part of the story. Economics contemplates trajectories and tendencies based on assumptions in models. This can result in certain inconsistencies that may be difficult to explain or seem counterintuitive.

For example, contrary to economic theory, various studies find that most EU cartels are made up of asymmetrically sized sellers.[319] Moreover, although theory contemplates cheating as the primary risk to successful coordination, it appears it rarely destroys collusion and, indeed, that issues of profit allocation prove more corrosive.[320] Similarly inconsistently, whereas theory suggests that declining demand renders collusion less profitable, 'one of the best documented triggering events for cartel formation is a significant decline in prices and profits which is typically attributed to a decline in demand'.[321]

There is also a risk of drawing inaccurate inferences from the observed evidence of cartels.[322] There is no exhaustive set or understanding of cartels, because it remains unclear how many cartels are actually detected, and why.[323] Because it can only focus on the sample of detected cartels, the analysis may be unrepresentative:

> *Perhaps the identified cartel participants are participating in a vast number of cartels relative to other firms, and these are the few that were detected (...). Perhaps these firms are inept/incompetent at running cartels and thus they get caught frequently. Perhaps the EC scrutinizes firms within the industries of these firms, or the firms themselves, and thus the participation in cartels appears to be more frequent than other firms, or firms in other industries. Finally, perhaps these firms are choosing to have their collusive conduct detected for strategic reasons*.[324]

[319] Brandão, Pinho & Vasconcelos (n 83) 432.
[320] Bos & Harrington (n 52) 107-108; Levenstein & Suslow (n 121), 442; Harrington (n 8) 4.
[321] Harrington (n 8) 3.
[322] ibid 5.
[323] Marshall & Marx (n 15) 2-3, 7.
[324] Marshall & Marx (n 15) 3, 4.

Nevertheless, examining the economics of collusion provides insights into the incentives, conditions, and constraints of oligopolistic sellers that corresponding legal assessment has to take into account. The economic conditions for coordination – equilibrium selection, monitoring, punishment, and barriers to entry – are linked to questions of transparency. The level of transparency, which is the key element enabling coordination, depends on the various market characteristics set out in Section 4. Moreover, communication between sellers can significantly increase transparency and thus the scope for coordination. Inversely, the more transparent the market characteristics, the less it may be necessary for sellers to communicate to successfully coordinate.

The effects of the social maxims of industry identity, which tend to correlate with issues of concentration and transparency, may be vaguer but are certainly relevant to practical manifestations of oligopolistic interdependence. Where sellers meet repeatedly and provide mutual reference points, their understanding of the market might not be accurately described through game theoretic models of market characteristics or conduct. This issue and its relevance for the dividing line between tacit collusion and concerted practices will be further explored in Chapter 5, following the discussion on various practices that may facilitate coordination.

As previously set out in the Introduction, the purpose of this thesis is to explore the space in between the two ends of an economic spectrum, between tacit collusion and explicit collusion. To that end, this chapter outlined some of the factors that structure the applicable dynamics that govern this space. The practices outlined in the subsequent Part II constitute the mechanisms that are conducive to coordination in a way that tend to challenge the legal appraisal of oligopolistic conduct.

The correlation between communication and stability of collusion is an important issue for the discussion of the various practices addressed in Chapters 3 to 6 of this thesis. These practices tend not to be instances of direct communication. They are within the vast grey area between tacit and explicit collusion where coordination may arise without direct communication. They usually have some purpose for the market or commercial rationale that prevents their outright prohibition. With the economic framework set out in this chapter, the discussion in Part II will take up the question, briefly addressed in the Introduction, regarding what may or may not be considered communication for purposes of competition law.

This boils down to identifying whether the practices in question are sensible commercial practice or a collusion-facilitating device. For each practice, this generally entails two questions. First, whether it is capable of facilitating coordination. This is the domain of economics and relates to the discussion in this chapter. Second, whether the practice should be prohibited and if so, to what extent this follows from its economic capacity to facilitate coordination. This is primarily a legal question, which is discussed in the following chapter.

These two questions link somewhat awkwardly. Whereas all practices that are prohibited for their collusive potential are by definition considered capable of facilitating coordination, conversely, not all practices that are capable of facilitating coordination are also prohibited. The binary legal categorisation of practices necessarily factors into economic considerations but, as the continued tolerance of tacit collusion itself attests, they are neither exclusive nor decisive.

PART II: THE FACILITATORS OF COORDINATION

Chapter 2: Information Disclosure and Signalling

The Introduction and Chapter 1 discussed the law and economics of tacit collusion and concerted practices. They elaborated the legal benchmark, which remains centred around the notion of agreement, the economic conditions necessary to sustain coordination, and how certain market factors affect these conditions. Beginning with this chapter, Part II now turns to how certain types of conduct or restraints by sellers can affect the sustainability of collusion. Starting with information disclosure and methods of signalling in this chapter, it explores types of practices that tend to enhance market transparency and thereby improve the conditions for seller coordination.

The Introduction and Chapter 1 set out the central role of transparency for the analysis of oligopolistic coordination. Although transparency is a necessary component of markets governed by supply and demand, it can, depending on the type of conduct and the market context, favour sellers to the detriment of buyers. With this chapter begins the quest for the "right kind" of transparency, which refers to the difference between transparency that enables buyers to make better choices and transparency that facilitates coordination. Going forward, for each practice discussed in Part II it will be helpful to keep a simple question in mind: how and why does the subject influence market transparency?

In keeping with the purpose of this thesis, this chapter identifies why and how conduct is relevant for an analysis of the dividing line between tacit collusion and concerted practices. In doing so, it distils what elements are important for determining this dividing line. The focus of this chapter are methods of information disclosure, which can be part of wider agreements, constitute stand-alone information exchanges, or take the form of public and/or unilateral announcements. Each of these can be the result of legitimate commercial rationales or be intended as a signal to competitors with the aim of facilitating coordination.[1] Being a direct method of adding information in a manner that increases transparency, information disclosures and signalling constitute the first derivative of tacit collusion. They do not constitute the coordination itself, but add to the information that facilitates coordination.

Following a brief discussion of the current framework applicable to information disclosure, this chapter focuses on public and unilateral announcements. Being accessible to (and ostensibly aimed at) buyers, these announcements are particularly interesting, because their purpose – legitimate communication or collusive signal – is less readily discernible. The

[1] WH Page, 'Tacit Agreement Under Section 1 of the Sherman Act' (2017) *81 Antitrust Law Journal 593*, 613.

task is to identify signals in the form of 'actions or words with general, often benign meanings for more than one audience, but that also include information that conveys a special meaning for rivals'.[2] They are therefore within the relevant legal grey zone described in the Introduction. Conducive to both competitive and collusive ends, for each of the practices examined this chapter notes the challenges in ascertaining the dividing line between permissible conduct that nonetheless promotes tacit collusion and concerted practices.

The difficulty of distinguishing between legitimate communications and signals results from a certain inseparability of economic notions of markets, sellers, and conduct. Part I discussed some of the factors that influence the dynamic of a market. Some aspects of a given market dynamic emerge almost naturally. For example, varying degrees of demand elasticity, market cycles, or product homogeneity follow from an interplay between product, supply, and demand characteristics. However, sellers can directly influence the market, since they are themselves a significant component thereof. Markets are dynamic clusters of sellers and buyers whose actions and interactions continuously shape the parameters of competition.This effect is amplified in oligopolistic markets.

In other words, there is no bipartite distinction between a preconfigured market as a separate entity on the one hand, and independent sellers who merely respond to observed market developments on the other. At a certain level of detail, definitions of sellers and markets become incommensurable. It is more appropriate to think of the two as continuously influencing each other in a feedback loop. Indeed, Chapter 1 illustrated that the extent to which sellers and markets influence each other heavily depends on the degree of concentration.[3] Applied to this chapter, the implication is simple: disclosing information shapes market conditions. Sellers who publicly disclose information about their prices influence the transparency of the market.

With this in mind, the conversation focuses on the purpose of information disclosure. Sellers might be tempted to tip transparency in their favour by adjusting market conditions in a way that enables coordination. For example, information exchange and signalling can aid equilibrium selection and monitoring where the market would otherwise lack sufficient transparency.[4] This is why the ostensible purpose and effects of information disclosure attract

[2] Page (n 1) 614.
[3] M Ivaldi et al., 'The Economics of Tacit Collusion' (2003) *IDEI Working Paper n.186 – Final Report for DG Competition, European Commission,* 16; N Petit, 'The Oligopoly Problem in EU Competition Law' in I Lianos and D Geradin (eds), *Research Handbook in European Competition Law: Substantive Aspects* (Edward Elgar, Cheltenham 2013), 266.
[4] T-464/04 *Impala v Commission* [2006] ECLI:EU:T:2006:216, 123; T-342/99 *Airtours v Commission* [2004] ECLI:EU:T:2002:146, 62; OECD Working Party No. 3 on Co-Operation and Enforcement, *Unilateral*

such scrutiny. This reverts to the question, set out in the Introduction, of how far removed from direct, reciprocal exchanges of competitively sensitive information conduct can be while remaining within the 'conceptual boundaries of an agreement'.[5] Benchmarked on the dictum that each seller ought to determine their conduct independently, competition law examines whether practices reflect the aim to effectively cater to demand or are, instead, intended to facilitate coordination.[6]

Implicit in this argument is a notion of balance between sellers and buyers who together constitute the market. Sellers ought to act in a way that caters to buyers, which is to say, captures the largest possible portion of demand vis-à-vis competitors. The focal point of seller conduct ought to be demand, even though the anticipated reactions of competitors figure into the calculation. This means that sellers are prohibited from acting in a way that enables them to coordinate their conduct before it is exposed to the risks of a demand response. As noted in the Introduction, competition law prohibits sellers from putting in place information flows or structures that enable them to ascertain their actions prior to implementation in a manner that facilitates coordination before risking a demand response. Intentionally asymmetric information disclosure favouring supply side transparency therefore tends to distort competition.

Where a practice is capable of facilitating coordination, the economic prerequisite for competition law analysis, two issues must be examined: first, if there are no alternative reasons for its adoption. The following discussion elaborates that practices, which may plausibly constitute either tacit collusion or a concerted practice, carry both pro- and anticompetitive potential. Second, it needs to be considered whether a practice has countervailing efficiencies that offset its anticompetitive effects. These steps may seem indistinct, because reasons alternative to the facilitation of coordination frequently stem from anticipated procompetitive effects. They are, however, not the same. Chapter 5 will discuss this point in further detail.

Beginning with an outline of various types of information disclosure – individualised or aggregate, private or public, reciprocal or unilateral – this chapter explores what instances of information disclosure or signalling actually qualify under these general definitions and how

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Disclosure of Information with Anticompetitive Effects (e.g. Through Press Announcements) (DAF/COMP/WP3/WD(2012)21), 2; MC Levenstein & VY Suslow, 'Cartel Bargaining and Monitoring: The Role of Information Sharing', in Konkurrensverket/Swedish Competition Authority (2006) *The Pros and Cons of Information Sharing*, 47; X Vives, 'Information Sharing: Economics and Antitrust', in Konkurrensverket/Swedish Competition Authority (2006) *The Pros and Cons of Information Sharing*, 91.

[5] JE Harrington, 'Developing Competition Law for Collusion by Autonomous Artificial Agents' (2019) *14 Journal of Competition Law & Economics 331*, 338.

[6] Joined Cases 40 to 48, 50, 54 to 56, 111, 113 & 114-73 *Coöperatieve Vereniging "Suiker Unie" UA and Others v Commission* [1975] ECLI:EU:C:1975:174, 174.

they affect the balance between seller and buyer transparency. The discussion narrows down the types of conduct that plausibly constitute tacit collusion and ascertains their common characteristics. These common characteristics are then formulated into an abstract framework of the dividing line between tacit collusion and concerted practices. Since the underlying logic distinguishing tacit collusion from concerted practices applies regardless of the practice, this framework will be applied and further developed in subsequent chapters.

1) Information Disclosure: The General Framework

Information pervades markets. Whether a university student purchases a book or an industrial conglomerate charters a fleet of bulk carriers, their decision-making is guided by the information they can attain about the products in question. Who offers a certain product? Do they offer the sought-after type of function or service? What are their prices? How is their quality? These questions influence purchasing decisions across markets. The savvy supplier seeks to disseminate information about her products as widely as possible. Wines in ancient Rome bore the mark of the producer, allowing the satisfied customer the chance for repeat business.[7] Today, the ability to compare in minute detail a world of products online enables ever more sophisticated buyer choices.

Ingrained in markets, information shapes the competitive process. It sends necessary and legitimate signals to markets which function on information about prices, quality, origin, and other product characteristics that enable sellers to arrange supply pursuant to demand. Information that is relevant to buyers may equally interest sellers who compete for custom. Yet, as a conduit for transparency, information disclosure between sellers can reduce uncertainty and facilitate tacit or explicit collusion.[8]

The Introduction and Chapter 1 discussed how sellers in oligopolistic markets could, without explicitly communicating, forego to compete pursuant to demand pressures and instead coordinate supra-competitively. Their ability to do so primarily depends on whether they can anticipate each other's conduct.[9] This requires sufficient transparency between them. To that end, it can prove invaluable for sellers to signal strategically relevant information to each other, to single out particular market developments or generally to alleviate uncertainty that impedes coordination.[10]

These forms of signalling are the subject of this chapter. Methods of information disclosure are varied, manifold, and evolving. This section sets out the tools that competition authorities employ in analysing information disclosures. These tools have regard to the content,

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[7] M Beard, *SPQR: A History of Ancient Rome* (Liveright, 2015).
[8] Federal Trade Commission & Department of Justice, *Antitrust Guidelines for Collaborations Among Competitors* (2000), 12; M Bennett & P Collins, 'The Law and Economics of Information Sharing: The Good, the Bad and the Ugly' (2010) *6 European Competition Journal 311*, 321; OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables (DAF/COMP(2012)17), 19, 39-40; Greenberg Traurig Maher, 'EU Competition: Information Exchanges and Antitrust Compliance' (2011) *Antitrust Litigation and Competition*, 2.
[9] PB Overgaard & HP Møllgaard, Information Exchange, Market Transparency and Dynamic Oligopoly (2007) *University of Aarhus Economics Working Paper 2007-03*, 11.
[10] OECD, *Roundtable on Information Exchanges Between Competitors Under Competition Law*, (DAF/COMP/WD(2010)118), 35.

method, and context of information. Whether it is individualised or aggregate, private or public, reciprocal or unilateral; each attribute has different competitive and legal implications.

Information disclosure can occur in the context of wider cartel infringements or other cooperation agreements, like joint ventures.[11] In those instances, information disclosure is assessed in the broader context in which it occurs.[12] This chapter only examines instances of stand-alone information disclosure and signalling, and covers various types of conduct, ranging from actual exchanges between sellers to mere unilateral disclosure. Where information is disclosed outside a wider agreement, it needs to be established that this action itself constitutes a concerted practice.[13] This requires clarification of two issues: when does the disclosure of information have anticompetitive effects and when does it constitute conduct that meets the threshold for a concerted practice?[14] In other words, it pertains to examine, first, the economic effects of information disclosure and, second, the applicable legal parameters for different types of information disclosure.

a) The Competitive Effects of Information Disclosure

Whether information disclosures or signalling are considered legally anticompetitive is currently determined by a calculus of countervailing pro- and anti- competitive economic effects. Procompetitive effects associated with improved information flows are central to information exchange analysis.[15] They are an ordinary, oftentimes necessary component of commercial interaction, and the model of perfect competition itself envisages perfect information.[16] Both sellers and buyers legitimately benefit from the availability of the right kind of information.

Generally, information fosters allocative efficiency by enabling sellers to optimise commercial strategies, plan inventories, position products, and match supply and demand

[11] ibid 21.
[12] ibid 22.
[13] ibid 22.
[14] M Hall, *Recent Developments in Price Signalling in the EU* (2015) ABA Section of Antitrust Law Spring Meeting, 3; OECD (n 10) 22.
[15] F Wagner-von Papp, 'Information Exchange Agreements' in I Lianos and D Geradin (eds), *Research Handbook in European Competition Law: Substantive Aspects* (Edward Elgar, Cheltenham 2013) 134; R Nitsche & N von Hinten-Reed, 'Competitive Impacts of Information Exchange' (2004) Charles River Associates, 4.
[16] J Kattan, 'Beyond Facilitating Practices: Price Signaling and Price Protection Clauses in the New Antitrust Environment' (1994) 63 *Antitrust L J* 133, 135; FTC & DOJ (n 8) 15; OECD (n 8) 24; RC Marshall & LM Marx, *The Economics of Collusion: Cartels and Bidding Rings* (The MIT Press, 2012), 3; D Begg et al. *Economics* (11th Ed., McGraw Hill, 2014), 171; RH Frank & E Cartwright, *Microeconomics and Behaviour* (McGraw Hill, 2013), 351-352; Opinion of AG Darmon in Joined Cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85 (*Woodpulp II*) *A. Ahlström Osakeyhtiö and Others v Commission* [1993] ECLI:EU:C:1988:258, para 180.

trends.[17] Comprehensive information enables benchmarking and improving internal efficiency.[18] Doing so enables sellers to observe "best practices", optimise means of production, save costs, and pass on the benefits to buyers.[19] By reducing uncertainty, a good understanding of markets can also encourage long-term investment.[20] Essentially, the better the information that sellers have at their disposal, the better their ability to adopt efficient conduct, which ultimately enhances social welfare.[21]

Buyers equally require information to optimise purchasing choices. Understanding markets permits buyers to better appraise product characteristics.[22] The ability to compare terms and products improves choice and enhances discovery processes.[23] Readily available information also lowers search costs.[24] It fosters demand elasticity and propels the competitive process. These supply-and-demand efficiencies generally render the wide dissemination of information desirable as a mechanism to improve the competitive functioning of markets.[25]

However, information disclosure can also enhance market transparency in a manner that enables seller coordination by influencing the conditions discussed in Chapter 1. It can aid equilibrium selection and facilitate mutual terms for coordination and profit allocation.[26] Subsequently, it can enable monitoring and discipline the internal stability of collusion.[27] To

[17] OECD (n 10) 24; European Commission, *Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Cooperation Agreements* (2011/C 11/01), para. 57; LS Morais & LT Feteira, 'The Chameleon in the Room: Transatlantic Views on Information Exchange in the Field of Competition Law' (2015) *Concurrences – Liber Amicorum Professor Barry Hawk*, 9; JT Rosch, 'Antitrust Issues Related to Benchmarking and Other Information Exchanges' (2011) *Remarks Before the ABA Section of Antitrust Law*, 2; OECD (n 8) 24; Bennett & Collins (n 8) 318; Nitsche & von Hinten-Reed (n 15) 10.
[18] Rosch (n 17) 15, Ghezzi & Maggiolino (n 88) 657; EC Horizontal Cooperation Guidelines (n 17) para. 57; Morais & Feteira (n 17) 9; Bennett & Collins (n 8) 318.
[19] Rosch (n 17) 16; R Whish, 'Information Agreements', in Konkurrensverket/Swedish Competition Authority (2006) *The Pros and Cons of Information Sharing*, 19; Bennett & Collins (n 8) 318; OECD Working Party No. 3 on Co-Operation and Enforcement, *Unilateral Disclosure of Information with Anticompetitive Effects (e.g. Through Press Announcements)* (DAF/COMP/WP3/WD(2012)21), 2.
[20] OECD (n 10) 25; PE Areeda & H Hovenkamp, *Antitrust Law: An Analysis of Antitrust Principles and Their Application* (Wolters Kluwer, 1979 (Supplement 9/2017)), at 2111b; Nitsche & von Hinten-Reed (n 15) 10.
[21] Whish (n 19) 19; OECD (n 10) 24.
[22] OECD (n 10) 27.
[23] EC Horizontal Cooperation Guidelines (n 17) para. 57; Morais & Feteira (n 17) 9; Bennett & Collins (n 8) 314; OECD (n 8) 24; Nitsche & von Hinten-Reed (n 15) 10.
[24] OECD (n 10) 27; Ghezzi & Maggiolino (n 88) 657; EC Horizontal Cooperation Guidelines (n 17) para. 57; Nitsche & von Hinten-Reed (n 15) 10; Morais & Feteira (n 17) 9; OECD (n 8) 24.
[25] *Maple Flooring Manufacturers Association v. United States* (1925) 268 U.S. 563, at 582-83.
[26] EC Horizontal Cooperation Guidelines (n 17) para. 66; T-464/04 *Impala v Commission* [2006] ECLI:EU:T:2006:216, 123; T-342/99 *Airtours v Commission* [2004] ECLI:EU:T:2002:146, 62; Wagner-von Papp (n 15) 142; Levenstein & Suslow (n 4) 44; Vives (n 4) 91; FTC & DOJ (n 8) 15; OECD (n 8) 39; OECD (n 19) 2.
[27] GA Hay, 'Oligopoly, Shared Monopoly, and Antitrust Law' (1982) Cornell L Fac Working Papers 1124, 463-464; EC Horizontal Cooperation Guidelines (n 17) para. 59; HP Møllgaard & PB Overgaard, 'Market Transparency and Competition Policy' (2001) *91 Rivista di Politica Economica 11*, 2, 17; Levenstein & Suslow (n 4) 47; Vives (n 4) 91; FTC & DOJ (n 8) 15; Bennett & Collins (n 8) 322-323.

pre-empt deviations, sufficiently precise information amplifies the effectiveness and severity of punishment.[28] The more precise the information, the more targeted the punishment.[29] Moreover, information can enhance demand elasticity, which 'aggravates the consequences of triggering a price war and, hence, might deter the deviation in the first place'.[30]

Enhancing transparency can further aid sellers in maintaining the external stability of coordination by monitoring and combating market entry.[31] Finally, information disclosure, arguably a form of communication, can augment trust among sellers and can prove a powerful stabiliser for coordination.[32] Communication and augmentation of trust also foster a sense of oligopolistic industry identity (*see* Chapter 1), which can create a sense of common purpose between sellers that naturally structures their incentives into closer alignment than might be acknowledged in economic models that envisage rational actors.[33]

As such, information disclosure generally has ambivalent effects: whereas the resulting transparency can be beneficial for consumers, its countervailing effect could be to promote tacit or explicit collusion.[34] Reducing uncertainty among sellers can facilitate each condition for successful coordination (equilibrium selection, monitoring, punishment, barriers to entry).[35] This ambivalence bedevils the smooth application of competition law:

> *[A]lthough information sharing may create benefits, the same information may allow firms to collude and harm consumers. Thus, just because information sharing may generate benefits, it does not, in itself, create a justification for the activity.*[36]

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[28] M Stucke, 'Evaluating the Risks of Increased Price Transparency' (2005) *19 Antitrust 81*, 81; Nitsche & von Hinten-Reed (n 15) 5.
[29] Bennett & Collins (n 8) 322; JP Choi & H Gerlach, 'Cartels and Collusion: Economic Theory and Experimental Economics' in RD Blair & DD Sokol, *The Oxford Handbook of International Antirust Economics – Volume 2* (OUP: Oxford 2015), 420.
[30] Møllgaard & Overgaard (n 27) 3.
[31] EC Horizontal Cooperation Guidelines (n 17) para. 68.
[32] Levenstein & Suslow (n 4) 48; OECD (n 19) 2; CR Leslie, 'Trust, Distrust, and Antitrust' (2004) *82 Texas Law Review 82*, 580-581.
[33] R Dhalla & C Oliver, 'Industry Identity in an Oligopolistic Market and Firms' Responses to Institutional Pressures' (2013) *34 Organization Studies 1803*, 1804.
[34] Wagner-von Papp (n 15) 137-138; Møllgaard & Overgaard (n 27) 2; Vives (n 4) 84; Bennett & Collins (n 8) 312; Hall (n 14) 3; OECD (n 8) 24.
[35] EC Horizontal Cooperation Guidelines (n 17) para. 65; *Impala v Commission* (n 26) 123; *Airtours v Commission* (n 26) 62; Petit (n 3) 266; A Capobianco, 'Information Exchange under EC Competition Law' (2004) *41 Common Market Law Review 1247*, 1256; C-194/99P *Thyssen Stahl* v *Commission* [2003] ECLI:EU:C:2003:527, para 86; C-8/08 *T-Mobile Netherlands and Others v Commission* [2009] ECLI:EU:C:2009:343, para 35.
[36] Bennett & Collins (n 8) 314.

Enforcement authorities recognise these countervailing effects in all but the most straightforward of anticompetitive exchanges, which explains the application of the US rule of reason and EU effects analysis.[37] EU effects analysis therefore applies to the knotty category of information disclosures that are neither sufficiently flagrant as to merit a prohibition by object, nor so clearly procompetitive that Article 101 TFEU is firmly inapplicable.[38] This category is, of course, the most relevant to this discussion.

b) The Legal Parameters of Information Disclosure

Taking into account the countervailing effects of information disclosure, the applicable threshold for concerted practices is notoriously elusive. Their analysis is generally structured along certain axes describing the type of information and the method in which it is disclosed. Where a practice in any context entails the disclosure of information, the following axes ought to provide a sense of direction in analysing its competitive effects.

Different types of information have different competitive implications. Some are considered less hazardous to competition than others. Information on prices and quantities is considered to be the most competitively sensitive.[39] Following this is information relating to costs and demand.[40] The age of data also matters. Absent a binding commitment, information about future conduct is considered conducive to collusion.[41] Current information incurs some anticompetitive risks, for example where sellers can follow a price leader on current prices, but it also brings benefits for buyers.[42] Since current information frequently constitutes a necessary component in the competitive process – oligopolistic or not – it tends to be vindicated.[43] At least this position holds in the brick-and-mortar context. Chapter 6 will explore how this label can become specious in the context of algorithmic interaction. Historical information is deemed less risky than future and current information.[44] However, what constitutes "historical"

[37] EC Horizontal Cooperation Guidelines (n 17) paras. 57-58; FTC & DOJ (n 8) 3-4, 17-18; Rosch (n 17) 14.
[38] Bennett & Collins (n 8) 313.
[39] Page (n 1) 614; FTC & DOJ (n 8) 15; Morais & Feteira (n 17) 15; Hall (n 14) 7; Greenberg Traurig Maher (n 8) 1; Capobianco (n 35) 1258; Nitsche & von Hinten-Reed (n 15) 3, 8; H Bergmann & R Carlton, '*As Penalites for Anticompetitive Exchanges in a Wider Range of Situation Increase, How Should Companies Manage Risk?*' Freshfields Bruckhaus Deringer - Information Exchange (2013) <http://www.freshfields.com/en/global/Global_Antitrust_TKT/5_Information_exchange/> accessed 27 September 2018; OECD (n 10) 41.
[40] Greenberg Traurig Maher (n 8) 2; OECD (n 10) 41.
[41] Nitsche & von Hinten-Reed (n 15) 3; FTC & DOJ (n 8) 15; Morais & Feteira (n 17) 15; Bennett & Collins (n 8) 321; OECD (n 8) 44.
[42] Bennett & Collins (n 8) 333-334; FTC & DOJ (n 8) 15-16; AT.39850 *Container Shipping* [2016], para. 49; EC Horizontal Cooperation Guidelines (n 17) para. 99; OECD (n 10) 49.
[43] Page (n 1) 625-626.
[44] EC Horizontal Cooperation Guidelines (n 17) para. 90; OECD (n 10) 41.

depends on market context and even historical data may carry some anticompetitive risk where it aids monitoring and punishment.[45]

Finally, because individualised information enables sellers to anticipate each other's conduct, it carries more anticompetitive risk than aggregate information.[46] That being said, even aggregate information can aid monitoring where it enables sellers to assume deviation if the aggregate price drops below a certain level.[47] Further, truly aggregate information ought not to allow the observer to deduce individual seller data.[48] The ability to deduce individual statistics from an aggregated information exchange system was an issue in *Cartonboard* and subsequently in *CEPI-Cartonboard*.

In the former, the General Court annulled a Commission decision prohibiting the exchange of generalised statistical data, since the exchange did not in fact permit inferences regarding individual sellers.[49] In the latter, which concerned a replacement of the former exchange, the Commission ordered the parties to modify the notified system to preclude identification of individual sellers.[50] Similarly, in *UK Agricultural Tractor Registration Exchange* the General Court confirmed a Commission decision prohibiting an information exchange system between sellers of agricultural tractors, which allowed the identification of individual sales volumes and market shares.[51]

The foremost concern with these different types of information disclosure – raised before questions regarding alternative reasons for adoption and countervailing efficiencies – is whether they facilitate coordination. The Commission screens for information that 'reduces strategic uncertainty in the market thereby facilitating collusion'.[52] Theoretically, strategic inter-seller contacts should therefore be tantamount to concerted practices.[53] But what qualifies as strategic? Von Papp points out that '[e]xchanged information will almost always have some "strategic value"'.[54] There are obvious cases of competitively sensitive, strategic information.

[45] Greenberg Traurig Maher (n 8) 2; EC Horizontal Cooperation Guidelines (n 17) para. 90; Stucke (n 28) 85; Bennett & Collins (n 8) 322.
[46] Nitsche & von Hinten-Reed (n 15) 3; FTC & DOJ (n 8) 16; Morais & Feteira (n 17) 15; Bennett & Collins (n 8) 331; Greenberg Traurig Maher (n 8) 2; Bergmann & Carlton (n 39)
[47] OECD (n 10) 49.
[48] ibid 48.
[49] ibid 37-38.
[50] ibid.
[51] T-34/92 *Fiatgari UK Ltd & New Holland Ford Ltd v Commission* [1994] ECLI:EU:T:1994:258, para. 91; IV/31.370 & 31.446 *UK Agricultural Tractor Registration Exchange* [1992], para. 34.
[52] EC Horizontal Cooperation Guidelines (n 17) para. 61.
[53] F Ghezzi & M Maggiolino (n 88) 658.
[54] Wagner-von Papp (n 15) 136.

The abovementioned data on prices, quantities, costs, and demand surely qualify as strategic.[55] Likewise, elements central to corporate strategy generally cannot be disclosed:[56]

> *If the information is central to corporate strategy and is ordinarily kept confidential from, or used to gain a competitive advantage over, a competitor, it almost certainly should not be shared with that competitor. Even if this information (or some of it) is in the public domain, its exchange may still reduce strategic uncertainty between those exchanging it.*[57]

What qualifies as strategic and confidential should be apparent to the proprietor of the information. When the sellers in *UK Agricultural Tractor Registration Exchange* themselves classified their information exchange to contain confidential information, it is no surprise that it raised Commission eyebrows.[58] At a more granular level, however, the strategic value of information can heavily depend on contextual market characteristics. This reverts assessment to the same common denominator underlying general analysis of information disclosure.[59]

Further to the types of information, different methods of disclosure have different competitive implications. Broadly speaking, the method of disclosure can vary according to structure and form. Information can be disclosed between competitors, indirectly through a common agency, or through third parties (e.g. market research organisations or consultancies).[60] This chapter addresses the former category of information disclosure in a horizontal setting. Exchanges with a vertical element or through third parties are covered in the following chapter.

In the horizontal category, there is a tendency to highlight two axes regarding the method of exchange. Private communication generally increases the likelihood of collusion, whereas public communication is considered to generate pro-competitive effects.[61] This is where questions about the right kind of transparency – previously noted in Chapter 1 and the beginning of this chapter – arise. The underlying idea is that public transparency aids sellers and buyers, whereas private disclosure only enhances seller transparency without being

[55] R Whish & D Bailey, *Competition Law* (8th edn OUP: Oxford, 2015), 581; EC Horizontal Cooperation Guidelines (n 17) para. 86.
[56] OECD (n 10) 48.
[57] Bergmann & Carlton (n 39)
[58] *UK Agricultural Tractor Registration Exchange* (n 51) para. 22.
[59] Hall (n 14) 11; Greenberg Traurig Maher (n 8) 4
[60] EC Horizontal Cooperation Guidelines (n 17) para 55; Morais & Feteira (n 17) 4; FTC & DOJ (n 8) 2-3.
[61] OECD (n 10) 30; Nitsche & von Hinten-Reed (n 15) 8; OECD (n 8) 25; *Todd v. Exxon Corp.*, 275 F.3d 191 (2d Cir. 2001), at 213; Rosch (n 17) 18.

accessible to buyers.[62] This imbalance attracts the assumption that the disclosure 'is more likely to be surreptitious and focused on the concerns of the rivals themselves'.[63]

Moreover, unilateral disclosure of information is considered less conducive to collusion than reciprocal exchange.[64] The Introduction addressed the element of reciprocity as a potential, albeit incomplete, benchmark for agreement. An actual information exchange contains an element of reciprocity, which arguably meets the broad agreement threshold for concerted practices.[65] However, unilateral signalling – meaning disclosure which is ostensibly aimed at the market – lacks the immediate reciprocity of an exchange and can be more difficult to construe in terms of agreement. This is where benchmarks like agreement, reciprocity, and even communication lose traction.

The precise remit of these two axes – public/private and unilateral/multilateral – remains debated and merits closer assessment. The arguably less precarious ends of each axis, namely public and unilateral disclosure of information, raise questions regarding the ability to coordinate and the notion of agreement. Sections 2 and 3 of this chapter take a closer look at how these questions make public and unilateral disclosures of information interesting for the dividing line. Generally, it is more difficult to categorise them straightforwardly as either anti- or pro-competitive, which challenges the accurate application of the current framework.

Issues with the analysis of these practices relate not only to their economic effects, which alone cannot determine their legality, but also to the less tangible question of whether sellers adopted them to competitive or collusive ends. This question overlaps, but is not identical, with the assessment of economic effects. Instead of analysing purely the economic effects of a practice, it also inquires whether the practice was adopted in response to what would be considered a natural response to the market or whether it aims to artificially enhance transparency. This question is less tangible but more versatile than effects assessment.

c) The Implicit Benchmark: Natural Information or Artificial Signalling

Questions regarding the right kind of transparency are ingrained in discussions on information disclosure. As previously noted in the Introduction, instances of information disclosure can be thought of as the **first derivative of tacit collusion**. If tacit collusion only takes into account

[62] Page (n 1) 610; OECD (n 10) 33.
[63] Page (n 1) 611.
[64] EC Horizontal Cooperation Guidelines (n 17) para. 63; OECD (n 19) 5.
[65] AG Darmon (n 16) para. 170.

information that can be observed on the market, the logical next step is to ask why this information is on the market. That brings into the discussion conduct which begets either natural or artificial transparency.

To analyse the more scrupulous intermediary instances of information disclosure, the distinction between natural and artificial transparency appears from time to time. This distinction is principally wider but can be applied to information disclosure. Already the archetypical parallelism case, *Woodpulp II*, raises – but foregoes explaining in further detail – the notion of artificial transparency. Concertation was not considered the only plausible explanation for parallel conduct, because price announcements constituted a rational response to the market.[66] The judgment recognises how parallel timing of price announcements was plausible due to the high degree of market transparency, 'which does not have to be described as artificial'.[67] The market displayed no artificial transparency and the price announcements, being a rational response to the market, did not alter this.[68]

Woodpulp II is an early case example where announcements regarding future prices were permitted although it was recognised that they had certain anticompetitive effects. The crux was the absence of artificiality, which shielded the announcements from competition prohibition. This reflects the underlying reasoning of the general concept of tacit collusion. The Introduction explained how, absent discernible notions of culpability, competition law is neither mandated nor well suited to order sellers to price without having regard to their competitors.[69] The logic of information disclosure is derivative:

> *... it is hard to imagine how, in practice, information can flow freely to buyers and potential entrants while at the same time being inaccessible to active firms. It is difficult to change the flow of information on one side of the market, while leaving the flow on the other side unaffected.*[70]

Therefore, certain types of information disclosure are necessarily permitted, notwithstanding their potential to facilitate coordination, simply because they are considered necessary or at

[66] Joined Cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85 (*Woodpulp II*) *A. Ahlström Osakeyhtiö and Others v Commission* [1993] ECLI:EU:C:1993:120,126.
[67] ibid.
[68] ibid 183.
[69] *Clamp-All Corp. v. Cast Iron Soil Pipe Institute* (1988) 851 F.2d 478, at 484.
[70] Overgaard & Møllgaard (n 9) 12.

least useful to buyers or the efficient functioning of the market. This, in a nutshell, describes the key characteristic of natural transparency.

To assess whether an action is consistent with either natural or artificial transparency reflects the requirement for sellers to determine their conduct independently, only taking into account information that is available or can be inferred from observing the market.[71] That is why actively disclosing information can be a precarious issue capable of unduly reducing competition by generating artificial transparency.[72] Whereas tacit collusion adapts sellers intelligently to natural market conditions, artificial transparency entails the creation of conditions that 'do not correspond to the normal conditions of the market in question'.[73]

The notion of artificial transparency therefore reflects the aforementioned idea that certain practices, like information disclosure, 'enable tacit collusion in markets whose "natural transparency" would not otherwise be sufficient to sustain collusion'.[74] Structuring the analysis around the idea of natural and artificial transparency, competition law has no difficulty addressing obvious strategic artifices useful only as 'social mechanisms intended to ease the collusive maximisation of the industry joint profits'.[75] To clarify this point, the subsequent sections highlight unambiguous instances of artificial transparency that squarely fall within the category of concerted practices.

Transparency assessment is more versatile than the axes discussed above. The axes provide useful, but comparatively clumsy indicators of the most likely competitive effects. They state that public disclosure of information generally has pro-competitive effects, subject to certain exceptions, or that information regarding historic prices does generally not incur anti-competitive risk, again subject to exceptions. Doing so, they take into account the calculus of pro- and anti-competitive effects of conduct and weigh them against each other.

Transparency assessment offers a slightly more elegant solution. It does not pre-configure anti- or pro-competitive tendencies for categories of information disclosure, but rather examines whether the type of conduct in question responds to supply and demand patterns in a way that secures or advances the position of the seller vis-à-vis competitors. The outcome of transparency assessment arguably depends on whether conduct responds to what

[71] Whish (n 19) 20; Bergmann & Carlton (n 39); *Thyssen Stahl AG v Commission* (n 35) para. 393; *T-Mobile Netherlands and Other v Commission* (n 35) para. 32.
[72] Whish (n 19) 20.
[73] *Woodpulp II* (n 66) 71; 48/69 *Imperial Chemical Industries v Commission (Dyestuffs)* [1972] ECLI:EU:C:1972:70, para. 66.
[74] Wagner-von Papp (n 15) 137-138.
[75] M Grillo, 'Collusion and Facilitating Practices: A New Perspective in Antitrust Analysis' (2002) *14 European Journal of Law and Economics 151*, 160.

the market requires or rewards. However, where the purpose and competitive effects of conduct become less apparent, even the distinction between natural and artificial transparency blurs.

The following discussion shows that EU and US case law and guidelines generally seem consistent with this interpretation of artificial transparency. From time to time, courts refer to notions of transparency and there seems to be an implicit understanding of its relevance to the analysis of oligopolistic coordination. Yet, its tenets are somewhat underdeveloped:

> *Categorising transparency-enhancing conduct as part of the 'natural' background transparency or alternatively as part of an 'artificial' enhancement of the natural transparency in the market will often make or break the antitrust enforcer's case. And yet, the criteria for this crucial distinction remain largely unspecified; they almost appear to be treated as metaphysical a priori categories*.[76]

Feeding into the analysis of a dividing line, the following discussion explores how various forms of information disclosure in different cases can be understood as constituting either artificial or natural transparency. To evaluate this naturalness or artificiality of conduct, context is paramount. Without it, the observer of information disclosure as a general category is frequently stranded with an unsatisfying "it depends".[77] Competition authorities commonly undertake contextual analysis with three factors in mind: '(i) the structure of the market on which the participants to the exchange are active; (ii) the type of product to which the information refers; and (iii) the type and quality of information exchanged.'[78]

Examining contextual variations helps in understanding how particular types of information might affect oligopolistic markets. Chapter 1 outlined variables that help analyse the first two factors, i.e. market structure and product characteristics (*see* Chapter 1, Sections 3-4). Examples of such variables are market shares, demand cycles, or the degree of product homogeneity.[79] These variables provide an economic frame wherein to analyse the likely purpose and effects of information disclosure. For example, information disclosure is generally

[76] Wagner-von Papp (n 15) 155.
[77] Wagner-von Papp (n 15) 134.
[78] OECD (n 10) 45; OECD (n 8) 39; Capobianco (n 35) 1250.
[79] Ivaldi et al. (n 3) 15-16; Choi & Gerlach (n 290) 419; ME Porter, *Competitive Strategy*, (Free Press, New York 2013), 38.

prone to anticompetitive effects in sufficiently concentrated markets whose "natural" characteristics are already conducive to coordination.[80]

Relevant to this chapter is the third factor, the type and quality of information. Different types of information disclosure affect market transparency in different ways and have different competition law implications. Together with the first two factors – the market characteristics and the type of product – a comprehensive understanding of the nature of the information at issue enables decision-makers to respond to the three questions set out in the beginning of this chapter that are dispositive for competition intervention. To reiterate, these are whether a practice is capable of facilitating coordination, whether there are alternative reasons for its adoption, and if it has countervailing efficiencies.

[80] OECD (n 10) 21.

2) Public Disclosure

Public disclosure of historic or present prices is rarely considered anti-competitive.[81] If anything, public disclosure of price information tends to improve buyer choice, making the information pro-competitive.[82] Where information is available publicly, its pro-competitive effects are generally considered to outweigh its collusive potential.[83] This tendency is not without exception. This section explores how information that is disclosed publicly can nevertheless meet the threshold for concerted practices and how this impacts the dividing line between tacit collusion and concerted practices. Early case law, such as *Maple Flooring Manufacturers Association v. United States*, fervently endorses the value of publicly available information:[84]

> *It is the consensus of opinion of economists and of many of the most important agencies of government that the public interest is served by the gathering and dissemination, in the widest possible manner, of information with respect to the production and distribution, cost and prices in actual sales, of market commodities because the making available of such information tends to stabilize trade and industry, to produce fairer price levels and to avoid the waste which inevitably attends the unintelligent conduct of economic enterprise.*[85]

Associated with allocative efficiencies and reduced search costs, it remains the prevailing view that public disclosure of information 'decreases the likelihood of a collusive outcome producing negative effects on the market to the extent that non-coordinating companies, potential competitors, as well as customers may be able to constrain potentially restrictive effects on competition'.[86] Moreover, because public information reaches both sellers and buyers, it is 'generally less clear in [its] conciliatory intent and less directed to rivals, and on both counts more likely to have compensating social benefits'.[87] As a result, competition authorities generally condone genuinely public exchange of information.[88]

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[81] EC Horizontal Cooperation Guidelines (n 17) para 90; Page (n 1) 624.
[82] Page (n 1) 625-626.
[83] *Todd v. Exxon Corp*. (n 61) at 213; Rosch (n 17) 18; OECD (n 8) 25; Whish (n 19) 23; OECD (n 19) 5.
[84] Morais & Feteira (n 17) 14-15.
[85] *Maple Flooring Manufacturers Association v. United States* (n 25) at 582-83.
[86] OECD (n 19) 5.
[87] WH Page, 'Signaling and Agreement in Antitrust Law' (2017), 22.
[88] EC Horizontal Cooperation Guidelines (n 17) para. 92.

The efficiencies of public information being well recognised, analysis instead turns to the question of whether information that is published is in fact truly public. This means that it ought to be equally accessible to competitors and buyers: the costs of obtaining it ought not to deter interested parties.[89] Only then would parties unaffiliated with the exchange be able to constrain its anti-competitive potential.[90] If by some attribute the information does not qualify as truly public, it invites suspicion that the intended recipients of the information are competitors rather than buyers, which may permit an inference that there is no plausible alternative reason for parallel conduct.[91] In short, the nature of information indicates its intended audience, which permits an inference regarding its likely aim.

This has important implications for the elusive dividing line. The definitional exercise of whether conduct can be classified as truly public (or alternatively, as the following subsection discusses, truly unilateral) information disclosure is key. By and large, such analysis does not question the correctness of the private/public and multilateral/unilateral axes. This is rather a question of classifying conduct correctly into either end of these axes, which provides lessons for the distinction between artificial and natural transparency and, ultimately, the elusivedividing line. The conversation around the manner of disclosure begins with the dual acknowledgement that genuinely public information tends to be procompetitive and that genuinely unilateral disclosure does not meet the threshold for concerted practices.

Information that is indecipherable to buyers therefore ought to be consistent with the notion of artificial transparency. The artificiality follows from the message that is most likely to be inherent in the information and its most likely intended recipients. If disclosed publicly for another purpose than securing or advancing the position of a seller vis-à-vis competitors, it strays from mere intelligent adaptation to what would be considered the natural conditions of the market. Revealing its alternative purpose, it amounts to a quasi-private signal. Whether information is accessible and useful to buyers can relate to the content of information, its format, or the context in which it is disclosed. Each of these factors is discussed in the following, which aims to facilitate an understanding of how to assess public information disclosure or signals. Each of these factors displays a subtle variation of conduct that engenders artificial transparency, enabling an exploration of the parameters of the dividing line.

[89] OECD (n 10) 33; EC Horizontal Cooperation Guidelines (n 17) para. 92; Greenberg Traurig Maher (n 8) 3.
[90] OECD (n 10) 33.
[91] Hall (n 14) 5-6.

a) Variations of Artificial Transparency for Public Disclosure

Mindful of the potential for informational and interpretative disparities, it is instructive to identify the most plausibly intended audience – sellers or buyers – of information disclosure. In that context, disclosure that entails **secret messages** meets the threshold for concerted practices rather easily. Hidden pieces of information included in public announcements are inimical to notions of public disclosure. For example, there is the encoding of pieces of transparency-enhancing information into the detail of generally public disclosure in a way that transmits messages accessible to sellers while remaining unobservable by buyers.

Illustrative of this is *United States v. Airline Tariff Publishing Company* where several airlines used an electronic tariff publishing system to facilitate coordination.[92] They relied on footnote indicators and first and last ticket dates to 'communicate proposals, counterproposals, and commitments to increase fares' as well as to 'eliminate discounted fares which [were] currently being sold to customers'.[93] While airlines (sellers) had full access to the complex system and were able to analyse the data with sophisticated computer programmes, travel agents (buyers) merely had access to fare information for a single market but not to the footnote indicators.[94]

It is true that the tariff publishing system also served the legitimate purpose of efficiently disseminating relevant airline fare information.[95] Yet, to render the information exchange an instance of natural rather than artificial transparency would have required that the benefit for buyers stemmed from a legitimate business purpose that, rather than being ancillary to and achievable without it, resulted inherently from the practice in its entirety. While the fare dissemination system served a legitimate purpose, it was the hidden footnote indicators that facilitated collusive bargaining and reduced the sellers' uncertainty as to their competitors' future conduct.[96] The key distortion resulted from the fact that '[w]hile first and last ticket dates and footnote designators [were] of immeasurable value to the airlines in facilitating pricing coordination, they provide[d] little benefit to consumers'.[97] The practice was therefore designed to shield information from buyers, leaving the question of who was the intended audience an afterthought.

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[92] *United States v. Airline Tariff Publishing Company* (1992) Civil Action 92-2854, 2, 6; AR Miller, 'Did the Airline Tariff Publishing Case Reduce Collusion?' (2010) *53 The Journal of Law & Economics 569*, 571.
[93] *United States v. Airline Tariff Publishing Company* (n 92) 7-8, 10-11, 12; Miller (n 92) 569-570.
[94] *United States v. Airline Tariff Publishing Company* (n 92) 9; Miller (n 92) 571.
[95] Miller (n 92) 583.
[96] *United States v. Airline Tariff Publishing Company* (n 92) 16-17.
[97] ibid 19-20.

Less clear-cut are instances where information is entirely public, but of different value to sellers and buyers. The analysis then moves from secret messages, where the enforcement issue is merely one of detection, to the complex world of signalling, where the categories between permissible and impermissible become increasingly blurred. Within a sea of information, a public signal can carry meaning for sellers while remaining unnoticed or being incomprehensible to other parties, notably in the context of equilibrium selection.[98] Page refers to these as implicit signals, 'actions with general, often benign meanings for more than one audience, but that rivals understand as conveying a special meaning for them'.[99]

The Introduction noted how it is unavoidable that industry expertise affords sellers an informational edge. This edge can be escalated into a distortion where information is obfuscated rather than being presented to buyers in an accessible format that caters to consumption patterns.[100] Agreement might then be inferred where public information includes elements that convey 'a different, unique meaning useful to rivals', which casts doubt on purported efficiencies.[101] A plethora of different signals can be formulated through the character of information, including its content, format, and context.

By nature of its **content**, information can exploit the abovementioned expertise advantage, which renders it easily decipherable for sellers, yet Delphic for buyers. Concentrated markets carry an innate risk that sellers have a better understanding of their action space than buyers and that industry identity confers something akin to insider intuition. The Introduction and Chapter 1 addressed the fact that a certain expertise advantage and industry identity are unavoidable products of concentration and repeated interaction. Capitalising on these advantages, sellers may be able to proactively facilitate mutual certainty in specifying 'a particular piece of public information [to] single out a particular development'.[102]

In some instances – though disclosed entirely and without sellers having established a secret interpretation key – information is so audaciously one-sided that it would be difficult to overlook its signalling function. *In re Coordinated Pretrial Proceedings in Petroleum Products Antitrust Litigation* is an example. Several oil companies at various times publicly announced tank wagon prices and dealer discounts, which were exclusively relevant for sellers and of little

[98] Wagner-von Papp (n 15) 141-142; Page (n 87) 16.
[99] Page (n 87) 3.
[100] Bennett & Collins (n 8) 316, citing: Office of Fair Trading, '*The Impact of Price Frames on Consumer Decision Making'*, Economic Discussion Paper OFT 1226 (May 2010).
[101] Page (n 1) 627; Page (n 87) 27.
[102] Wagner-von Papp (n 15) 171.

value to buyers.[103] Testimony confirmed that 'there was essentially no purpose for publicly announcing tank wagon prices and dealer discount information other than to facilitate either interdependent or plainly collusive price coordination'.[104] Emphasising the inability for branded dealers to 'shop around for their oil', the Appeals Court held the 'district court's reliance on *Maple Flooring Mfrs. Ass'n v. United States* […] wholly inapposite'.[105] Since the purpose of the information disclosure was to facilitate coordination, it was considered tantamount to a private exchange between sellers.[106]

This case assists in further categorising which side of the dividing line certain types of conduct should fall on. Though published, the information in this case ought to be considered tantamount to a private exchange for lack of accessibility and usefulness to buyers. The fact that the information can only be interpreted as a signal for sellers makes it artificial. Here resurfaces the idea of an inherent balance to the transparency of a market, which sellers might attempt to tip in their favour. Not responding to what the market requires or rewards, the information exchange can be categorised as a strategic artifice and therefore within the remit of concerted practices.

Where the content of an information exchange does not exacerbate informational asymmetries, its **format** may. For example, there is an important difference between announcements that issue a commitment and ones that merely convey an intention to alter conduct.[107] Commitments all but alleviate the collusive potential of public information disclosure while retaining the efficiencies associated with additional information flows.[108] They preclude adjustments to announcements intended as signalling mechanisms, having no tangible effect on coordination while informing consumers in advance and facilitating efficient search.[109] Absent such a commitment, 'a firm might announce that it will increase its price to a certain level at a specific date in the future, but then revert to the current price if other firms do not follow suit with similar announcements of price changes', that is, test the waters to

[103] *In re Coordinated Pretrial Proceedings in Petroleum Products Antitrust Litigation* (1990) 906 F.2d 432, at 448.
[104] *Petroleum Products* (n 103) at 446; JE Harrington, 'Posted Pricing as a Plus Factor', *7 Journal of Competition Law & Economics 1* (2011), 19.
[105] *Petroleum Products* (n 103) at 448.
[106] Harrington (n 104) 19.
[107] Hall (n 14) 6-7.
[108] Vives (n 4) 90; OECD (n 8) 41.
[109] OECD (n 8) 41; I Rabinovici, 'Public Exchange of Information After *Container Shipping*' (2016) *8 Journal of European Competition Law & Practice 149*, 152.

assess coordinative potential.[110] Two commitment decisions by the EU Commission and the Dutch ACM, respectively, illustrate the risks of such exploratory announcements.

In *Container Shipping*, sellers had issued public announcements regarding intended increases in price per shipped container unit.[111] Intended increases were pre-announced without commitments and sometimes postponed or modified 'possibly aligning them with those announced by other carriers'.[112] The advance nature of the announcements and the similar times, increments, and dates of the price increases all constituted issues of concern.[113] At the same time, the information itself was of limited use to buyers.[114] This suggested that the information served primarily as a signal to artificially enhance transparency.[115] The Commission argued that 'customers may not be able to rely on [the announcements] and therefore carriers may be able to adjust prices without the risk of losing customers'.[116] Notably, however, the Commission did not pursue a prohibition decision, but accepted commitments from the parties. It would therefore not be appropriate to over-rely on the decision as an analytical precedent. The Commission did not, for example, detail how frequently sellers had readjusted their prices. It may well have been the case that this occurred less frequently than might have been necessary to fully substantiate a prohibition decision.

The Dutch *Mobile Telephone* decision concerned an even less formalised method of information disclosure than *Container Shipping*. Representatives of mobile operators had publicly announced intended changes to their commercial plans during a conference without committing to them.[117] These signals were subsequently followed by competitors.[118] Although the information was arguably informative for consumers, the announcements 'did not reflect decisions already made and were thus seen as altering competitors' expectations and risking a competitive reaction'.[119] This was considered to increase the risk of reducing strategic uncertainty and enabling the sellers to coordinate.[120]

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[110] OECD (n 8) 42.
[111] *Container Shipping* (n 42) para. 26; European Commission Press Release IP/16/2446 (2016), available at: http://europa.eu/rapid/press-release_IP-16-2446_en.htm; Rabinovici (n 109) 156.
[112] EC Press Release (n 111); D Lahnborg & MG Rose, *Price Signalling Can Put Companies in Hot Water in the European Union* (2016) <http://www.mondaq.com/x/512150/Antitrust+Competition/Price+Signalling+Can+Put+Companies+in+Hot+Water+in+the+EU> accessed 04 October 2018; Rabinovici (n 109) 156.
[113] *Container Shipping* (n 42) paras. 26-29; Hall (n 14) 7.
[114] *Container Shipping* (n 42) paras. 40-41.
[115] Lahnborg & Rose (n 112).
[116] EC Press Release (n 111).
[117] Authority for Consumers and Markets - Decision in Case No 13.0612.53 (2014), 5-7.
[118] ibid 5-7.
[119] Hall (n 14) 8.
[120] ACM (n 117) 3; Hall (n 14) 9.

What does this mean for the dividing line? In both cases – especially the ACM decision – neither the information nor the format of disclosure were flagrantly artificial. While *Petroleum Products* concerned information that was inaccessible to sellers in terms of content, the information in *Container Shipping* and *Mobile Telephone* was generally unreliable for buyers while serving as a signal to sellers. Artificial transparency can therefore follow from both inaccessibility as well as unreliability for the buyer side.

The *Container Shipping* investigation was closed subject to commitments, which remedied the initial competitive concern. Carriers agreed to cease publishing general rate increases only and to provide more detailed information aimed at enhancing consumer-side transparency.[121] The commitment to publish more information provides a good example of the acknowledgement that there is value in enhancing the right kind of vertical transparency, meaning information useful to buyers, whereas the previous horizontal transparency raised competitive concern. Again, however, being a commitment decision, it leaves at least some questions unanswered regarding the strength of the Commission's case.

Moreover, there are instances where pre-announcements of price changes aid buyers with commercial planning. This was an important aspect in *Woodpulp II*.[122] It was also a valid argument in *Ethyl*, where advance price announcements had been a standard practice when the industry was still a monopoly, which was then mimicked by entrants to provide equally attractive terms.[123] The court also noted that advance announcements would not significantly enhance transparency, since 'when one producer changed its price and communicated that change to its buyers, those buyers would immediately call the other producers to secure the best price'.[124] Notwithstanding valid concerns over pre-announcements without commitments, it should therefore be borne in mind that they do not have to be categorically artificial.

Continuing the assessment of methods of disclosure, even where the content of published information is not necessarily obfuscating and where its format is considered generally reliable, there can remain doubts about its usefulness or necessity, given the **context** in which it takes place. Public disclosure, which conveys nothing of value to buyers, may suggest that rivals are the actual audience and the information therefore effectively private.[125] This refers to information which is accessible and possibly even reliable for buyers but of no value in the particular market context.

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[121] EC Press Release (n 111); Lahnborg & Rose (n 112).
[122] *Woodpulp II* (n 66) 78.
[123] *E.I. Du Pont de Nemours & Company and Ethyl Corp. v. FTC* (1984) 729 F.2d 128, at 133-134.
[124] ibid.
[125] Page (n 1) 633.

Harrington argues that there are 'markets for which the reduction in consumers' search costs and firms' selling costs from posted pricing – as opposed to transaction-specific pricing – are likely to be trivial, and thus provide neither a procompetitive benefit nor a competitive rationale for firms setting list prices with a no-discounting policy'.[126] Furthermore, the likelihood of buyers requesting quotes inversely relates to the number of sellers.[127] The utility of posted pricing therefore declines as concentration increases. In terms of product characteristics, the benefit from extensive search correlates with the cost of the product, since 'the expected benefit from a lower price is likely to be large relative to the search costs'.[128] This arguably applies to large orders as much as it applies to expensive products, if total expenditure is high.

A 2014 market investigation into the highly concentrated, transparent, and homogeneous UK cement sector displays similar reasoning.[129] The investigation found that generic letters informing buyers of intended price increases constituted a method for sellers to signal mutual resolve to accommodate parallel conduct.[130] Although it recognised that the price announcements could be motivated by legitimate reasons to inform buyers, the investigation took issue with their generic format and proposed switching from generic to customer-specific price announcement letters.[131]

Gradually, the audacious gives way to the arguable. In the cement investigation, the information was accessible to buyers and its usefulness was at least acknowledged. At a certain point, the wisdom of the economic evaluation of conduct becomes debatable and sellers are neither always adhering to perfect economic policy nor should they be expected to do so. Where publishing some form of information has somehow become industry practice, buyers might appreciate even generic announcements as a vantage point, although they might be superfluous in strictly economic terms. This follows from notions of industry identity outlined in Chapter 1 and can have challenging implications for the application of competition law, as will be further discussed in Chapter 4.

Applied rigidly, the reasoning that conduct would have to be economically infallible could be taken quite – and potentially too – far: if generic pricing letters might irk competition authorities for lack of irrefutable buyer benefit, so could the frequency of price announcements.

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[126] Harrington (n 104) 7-8.
[127] Ibid, 9.
[128] Ibid.
[129] Competition Commission, *Aggregates, Cement and Ready-Mix Concrete Market Investigation – Final Report* (2014), para. 36.
[130] Hall (n 14) 10.
[131] Competition Commission (n 129) para. 84; Hall (n 14) 10.

Chapter 1 set out that the frequency of communication correlates with the stability of coordination.[132] Arguably, a court may then infer the existence of a concerted practice where price announcements are issued more frequently than strictly speaking necessary for buyers although they generally benefit from the advance notice.[133] This argument might follow from facets peculiar to the market, which render certain modes or frequencies of public disclosure of information impractical. This reasoning is not unheard-of: in *Petroleum Products*, buyers were under long-term contracts precluding their ability to respond to the price announcements at the frequency at which they were published.[134] Yet, applied too rigidly, there is a risk that such an approach could distort market realities. Chapter 5 will further explore this argument.

b) Implications for the Dividing Line

Concerted practices entail that sellers take actions that allow them to mutually ascertain their preparedness for parallel conduct before it is implemented and elicits a demand reaction. There is no set list of practices that achieve this *ex ante* certainty. It is rather a question of positioning and signalling. In terms of their sophistication, practices conveying information to competitors in a way that enables them to understand the incentive and benefit of parallel conduct can range from the awful to the artful.

A helpful starting point, the *Airline Tariff Publishing* system was but a clandestine mechanism for sellers to convey information aimed at facilitating coordination. Its secret nature precluded any argument that buyers might benefit from the information. The corresponding inference about the intended audience of the information poses no particular difficulty. Sellers who were privy to the exchange understood its true purpose, which is evident from their active participation in the specific methodology of the secret exchange.

The analysis becomes more interesting without the element of secrecy. The information in *Petroleum Products* was fully published, but inaccessible to buyers. These types of signals arguably retain the essential hallmarks of a secret exchange. The specific reason why the information is inaccessible for buyers ought not to be a significant consideration. That is to say, whether sellers ensure the exclusivity of the information by way of keeping it secret, through a pre-arranged key, or through insurmountable informational disparities in the content of disclosure, the intended audience and primary benefactors are evident.

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[132] Ivaldi et al. (n 3) 20.
[133] Page (n 1) 630.
[134] *Petroleum Products* (n 103) at 448.

Similar arguments could hold where information is accessible but of no immediate practical value. Two countervailing interpretations are pertinent. On the one hand, in some instances buyers have little use for unreliable advance announcements, whereas they constitute a classic signalling tool for coordination. This is the line of reasoning taken in *Container Shipping* and *Mobile Telephone*. On the other hand, advance announcements could be industry practice implemented to aid buyers with their planning, notwithstanding the persistent risk of enabling coordination. This was famously the outcome in *Woodpulp II* and *Ethyl*.

These four cases concerning advance price announcements provide slightly volatile guidance for anticipating enforcement responses to oligopoly conduct. Some observations might prove helpful: first, *Container Shipping* and *Mobile Telephone* were about mere pricing-related information of relatively technical nature, namely general rate increases and mobile commercial plans. They were not simply about prices. In both cases, it seemed to be understood that, on balance, the nature of the information was more valuable to sellers than it was to buyers. Their reasoning therefore remains consistent, albeit by a somewhat narrow margin, with the outlined approach to inquire into the intended audience by means of assessing the economic effects of a practice.

Second, none of the announcements in these cases came with a commitment. This proved a major obstacle to the sellers' arguments in *Container Shipping* and *Mobile Telephone*. Conversely, in *Woodpulp II* and *Ethyl*, conduct was vindicated by the argument that buyers needed to plan ahead. *Ethyl* displays recognition of the pertinence of industry identity and interdependence to oligopolistic decision-making. Each seller entering the market understood the value of advance price announcements to effectively compete with incumbents. The same is apparent in *Woodpulp II*: price announcements were considered a viable method for pre-notifying buyers of changes. This sense of buyer benefit in *Ethyl* and *Woodpulp II* made it arguable that the announcements constituted natural transparency.

Each of the above cases was significantly influenced by the degree of distortion with which the information arguably favoured sellers. In *ATP*, where information was exchanged secretly, and in *Petroleum Products*, where information was decidedly directed at competing sellers, the inaccessible manner of disclosure permitted an inference of concertation. To a lesser but still noticeable extent, *Container Shipping* and *Mobile Telephone* permitted the argument that the nature of the information allowed sellers to coordinate without being offset by efficiency for buyers. Arguably more contentious yet, in the *Cement* investigation competition authorities had no grave concerns with the disclosed information itself, but rather took issue with the way the announcements were made in the particular market context. Had the *Cement*

investigation resulted in a prohibition decision, one might have been forgiven for noting a risk that the CMA was engaging in the regulation of efficiency, rather than competition.

3) Unilateral Disclosure

On a preliminary note, there is an economic question as to whether the unilateral disclosure of information sustains coordination in the same or any comparable manner to the multilateral disclosure of information. In recognition of this, unilateral public announcements are usually permissible under EU competition law, unless announcements are followed by announcements from competitors, 'not least because strategic responses of competitors to each other's public announcements […] could prove to be a strategy for reaching a common understanding about the terms of coordination'.[135] While it is generally acknowledged that unilateral disclosure of information can also reduce strategic uncertainty between competitors, it is typically considered less likely to do so than multilateral disclosure.[136]

By and large, unilateral public announcements tend to be associated with consumer benefit and enhanced demand elasticity, which is considered to counteract sellers' ability to coordinate.[137] That being said, information made publicly available may also serve as a signal to sellers and facilitate parallel conduct.[138] In theory, unilateral disclosure of information can reduce strategic uncertainty between competitors, for example by signalling suitable equilibria, collusive bargaining, or building of mutual trust.[139] According to the OECD, absent direct evidence of an illegal agreement, unilateral announcements can amount to indirect evidence thereof, if there is no plausible explanation why sellers would voluntarily disclose such information in the usual competitive context.[140] Hence, here too the task is to distinguish disclosure as a legitimate form of commercial conduct on the one hand from an artificial signal on the other hand.

This section takes the same approach as the previous one. It examines the scope of unilateral information, in what circumstances it could amount to a concerted practice, and what lessons can be drawn for the dividing line. Like before, an important element of this discussion is whether disclosure qualifies as truly unilateral. Whether through price announcements or otherwise, unilateral disclosure lacks the immediate reciprocity that characterises other forms of multilateral information exchange.[141] Legally, the conventional position is therefore that genuinely public, unilateral disclosure of information evades the purview of concerted

[135] EC Horizontal Cooperation Guidelines (n 17) para. 63.
[136] OECD (n 19) 2.
[137] OECD (n 10) 34.
[138] ibid 35.
[139] OECD (n 19) 2.
[140] OECD (n 8) 32.
[141] OECD (n 19) 3.

practices, primarily for lack of discernible agreement.[142] Yet, the precise scope of agreement is notoriously difficult to define, especially in the context of oligopolistic interdependence and public, unilateral exchanges.[143]

In *Woodpulp II*, AG Darmon cast doubt on the applicability of Article 101 TFEU to purely unilateral conduct.[144] He argued that sellers' 'knowledge of each other's conduct [must] stem from communications between them, and not simply from monitoring the market'.[145] Setting reciprocity as a benchmark structures cases around the question of whether 'the way in which the information is put into the market and competitors' responses go beyond a mere unilateral announcement so as to amount to a concerted practice'.[146] The task is therefore to determine the scope of genuine unilateral publication and at what point it is instead appropriate to conceive of a response of some form. Distinguishing truly unilateral information from instances that display elements of reciprocity, in turn, informs notions of artificial and natural transparency.

a) Variations of Artificial Transparency for Unilateral Disclosure

Certain ostensibly unilateral disclosures of information uncontroversially amount to concertation, for example where they are part of a wider cartel agreement.[147] If so, they are but an ancillary mechanism to the anti-competitive agreement.[148] For cases of **private disclosure of information** ('mail, emails, phone calls etc.'[149]), the Horizontal Cooperation Guidelines state that a 'situation where only one undertaking discloses strategic information to its competitor(s) who accept(s) it can also constitute a concerted practice'.[150] Receiving strategic information from competitors creates a rebuttable presumption that the seller takes the information into account.[151] It can suffice for one seller to disclose information privately and for others to passively receive it.[152]

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[142] OECD (n 19) 5.
[143] L Kaplow, 'On the Meaning of Horizontal Agreements in Competition Law' (2011) *99 California Law Review 683*, 685-686; Page (n 1) 594.
[144] AG Darmon (n 16) para. 170.
[145] ibid para. 174-175.
[146] Hall (n 14) 5.
[147] EC Horizontal Cooperation Guidelines (n 17) para. 56.
[148] OECD (n 8) 31; OECD (n 19) 3.
[149] EC Horizontal Cooperation Guidelines (n 17) para. 62.
[150] ibid.
[151] C-49/92 *Commission v Anic Partecipazioni* [1999] ECLI:EU:C:1999:356; C-199/92P *Hüls AG v Commission* [1999] ECR I-4287, para 162; OECD (n 19) 5.
[152] Joined Cases T-202/98, T-204/98 and T-207/98 *Tate & Lyle plc, British Sugar plc and Napier Brown & Co. Ltd v Commission* [2001] ECLI:EU:T:2001:185, paras. 54, 58; EC Horizontal Cooperation Guidelines (n 17) para. 62; T-25/95 *Cimenteries CBR and Others v Commission* [2000] ECLI:EU:T:2000:77, para. 1849.

In the context of public announcements, unilateral disclosure is likely to impede competition if it contains an **invitation to collude**.[153] The OECD considers this to be the case where a seller discloses information that exceeds what is useful or necessary for buyers to make an informed decision, especially where the announcement depends on the response of other sellers and contains threats outlining scenarios if competitors reject the invitation.[154] Close attention is then paid to subsequent reactions, for example where competitors follow up with similar public announcements or raise their prices to signal acceptance, 'unless it can be shown that the price increase was contemplated before the invitation was extended'.[155]

One example of an invitation to collude is *Valassis Communications*, where the eponymous firm's CEO publicly detailed a strategy to forego competing for custom with its main competitor, which was contingent on an indication of reciprocity from the latter.[156] Another example, combining private and public communication, is *U-Haul* where personnel was instructed to contact their counterparts at a competing seller and motivate them to match prices. Furthermore, the CEO publicly asserted that U-Haul attempted to engage in price leadership, adherence to which would be advantageous for competitors.[157] Like most invitations to collude, the FTC challenged *U-Haul* under Section 5 of the FTC Act.[158] Reporting on the case, FTC Commissioner Rosch instructively remarked:

> *In my view, invitations to collude should be factually and legally distinguishable from pure information exchanges because the competitor communications in question do not involve merely the dissemination of price information[.] … [T]here is some statement about what the speaker plans or wants to do, and some solicitation or encouragement of a response from the intended recipient. The content and context of the communication make reasonably clear that the purpose of the information exchange is not to narrow the dispersion of prices, but rather, to affect the overall price level.*[159]

[153] Rabinovici (n 109) 151; OECD (n 19) 5; Bennett & Collins (n 8) 329, EC Horizontal Cooperation Guidelines (n 17) para. 63.
[154] OECD (n 8) 42.
[155] OECD (n 8) 43; Rabinovici (n 109) 155; EC Horizontal Cooperation Guidelines (n 17) paras. 62, 94.
[156] OECD (n 8) 43.
[157] ibid.
[158] Rosch (n 17) 15.
[159] ibid.

Short of an explicitly formulated invitation, such encouragement to influence prices can be implicit in the **content** of the information. Abiding by the same logic as the previously outlined assessment of public reciprocal information disclosure, the content of information that is unilaterally disclosed can indicate its purpose.

In *US v. General Electric*, General Electric had published a "pricing book" containing complex pricing formulas and a uniform multiplier, which appeared to serve no purpose other than to enable coordination between the two sellers and displayed no offsetting efficiencies.[160] Shortly thereafter, Westinghouse mimicked the move with the publication of its own pricing book which largely replicated that of GE.[161] The parties unsuccessfully argued that their conduct constituted tacit collusion, directed through GE's price leadership.[162] Settled in 1976, the case clarified that '[p]ublishing a price book and announcing price changes ahead of time may be construed as an invitation for the rival to do the same; and as a result may have the same effect as meeting the rival face to face'.[163]

Frustratingly, GE included a best price clause in its pricing policy.[164] GE published its pricing book unilaterally and the parties did not communicate to predetermine that this move would be followed by Westinghouse.[165] As such, it might have been construed as a genuinely unilateral move, even if the information published was considered useful only for sellers. Yet, GE further issued a best price clause, which promised its customers to match any lower price offered by competitors.[166] The signalling function of the published information, which was considered inaccessible to buyers, leaves as its intended audience the attentive competitor.[167] The additional removal of risk by instituting the best price clause, which further eliminates any reliability of the information to buyers, permits little room to argue that this disclosure could be a natural commercial action that caters to demand in a way that secures or advances GE's position vis-à-vis competitors.

Without the best price clause, it might have been more complicated to discern whether the case could be construed as a viable form of price leadership. One option to draw the dividing line in terms that sellers can abide by would be to prohibit only the quasi-negotiation

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[160] Harrington (n 104) 4; *United States v. General Electric Co.* (1926) 1977 WL 1457, at 1.
[161] L Cabral, 'GE and Westinghouse', *NYU Stern School of Business* (2010) <http://luiscabral.net/economics/teaching/gewestinghouse.pdf> accessed 04 October 2018, 2.
[162] ibid. 2.
[163] ibid. 3.
[164] *United States v. General Electric Co.* (n 160) at 1.
[165] Cabral (n 161) 2.
[166] *United States v. General Electric Co.* (n 160) at 1.
[167] Harrington (n 104) 4; *United States v. General Electric Co.* (n 160) at 1; Page (n 1) 627; Page (n 87) 27; OECD (n 8) 42.

between sellers before eliciting a demand response. If so, it would remain permissible to publish a pricing book accompanied by a commitment to adhere to its terms. This would emphasise the reserved ability to withdraw from a signal that steers the seller as the hallmark of a concerted practice.

It could be argued that even the fact that the information contains a signal to competitors might be permitted if there is a commitment to the proposed conduct. After all, what is price leadership but a signal to competitors? This approach would take into account that the publication of information, which can be analysed in theory (albeit it cumbersome in practice, like the GE pricing book), commits the disclosing entity to conduct that risks a lapse in demand if competitors fail to mimic. Alternatively, it could be construed as an invitation to collude, formulated in the fineries of complex information, which would resemble the reasoning in *Petroleum Products* – discussed in the previous section – where information was entirely irrelevant to buyers. This imposes a tighter requirement for underlying efficiency. The latter approach would entail a finding of concerted practice for information disclosure, even if there is no ex ante certainty, because the content of the information could be construed as an invitation to collude.

Collusive harm being associated with the removal of uncertainty attained through reciprocity, why not simply prohibit such reciprocity? Such prohibition could be modelled on a standard that assesses the timeliness of information – whether information is current or rather historical is already a factor in competition enforcement. [168] An announcement by a seller would then be considered reciprocal if it is made within a time frame where a previous announcement by a competitor has not yet passed the threshold into the historical. Potentially appealing for its connection to an existing framework that assesses the timeliness of information, such a prohibition is unfortunately unworkable.

In limited instances, it may be industry practice for sellers to issue price announcements in close intervals. Excessive scrutiny would unduly impede sellers in their freedom of action. Ever reliable for oligopoly analysis, *Woodpulp II* creates a sense of guidance on the benchmark for unilateral announcements that cannot be set too restrictively: it shows that multiple coincidental unilateral announcements do not necessarily constitute a concerted practice, in this case because 'the system of price announcements [was] regarded as constituting a rational response to the fact that the pulp market constituted a long-term market and to the need felt by

[168] EC Horizontal Cooperation Guidelines (n 17) para. 90.

both buyers and sellers to limit commercial risks'.[169] Similar arguments prevailed in *Ethyl*, where the price announcements were issued to compete effectively.[170]

In other words, reciprocity is not a mere question of timing. Multiple sellers can at the same time legitimately respond to market demand in what should still be considered a unilateral manner. When the point is made that there is reluctance to prohibit unilateral announcements, what is meant by unilateral is that the announcement responds to a market signal perceived by a seller.[171] It is not to say that once a seller issues a price announcement, the same action is off limits for all competitors until the information contained in the announcement can be considered historic. Incidentally, this is what distinguishes permissible announcements like the ones in *Woodpulp II* and *Ethyl*, as outlined above, from impermissible announcements like *Container Shipping* and *Mobile Telephone*, where the information was considered a signalling mechanism to competitors.[172]

If each announcement followed by another, similar announcement from a competitor is designated as a concerted practice, 'the burden of proof may […] shift to the parties to show that no common understanding existed'.[173] Instead, an appropriate approach should be able to filter the artificial from the interdependent. Here, analysis would seem to revert to the question of commercial purpose in response to what the market requires or rewards. Is the information and its timing a natural response to the market or a strategic artifice? The issue thus turns on similar parameters of content, format, and context that also apply to reciprocal public information.

b) Implications for the Dividing Line

The analysis of unilateral disclosure of information adds several insights to the discussion. Peculiar to unilateral announcements, invitations to collude clearly meet the threshold for concerted practices. *Valassis* and *U-Haul* show that publicly formulated offers do little to conceal their concerted nature. If communications that are secret (or, due to their content, quasi-secret) constitute concerted practices, there is no reason why outright declarations of intention and ability to collude should not. Where one seller openly invites one or more competitors to collude, the intended audience is clear.

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[169] *Woodpulp II* (n 66) 126.
[170] *Ethyl* (n 123) at 133-134.
[171] OECD (n 10) 34.
[172] EC Press Release (n 111); ACM (n 117) 3; Hall (n 14) 9.
[173] 172/80, *Züchner v Bayerische Vereinsbank* [1981] ECLI:EU:C:1981:178, para 22; Hall (n 14) 5.

Somewhat more complex is information that is ostensibly unilateral but structured in a manner that constitutes a clear signal to competitors. In *United States v. General Electric*, the inaccessibility of the information for buyers and the lack of commitment, ensured through a best price clause, rendered the case one of artificial transparency. However, it is unclear whether the finding would have remained unchanged, had it not been for the best price clause. The section on public announcements notes the importance of information that minimises distortions between sellers and buyers, an issue largely but not exclusively measurable by economic efficiency considerations. This section further examines whether information only has to facilitate informational distortions on a relevant competitive parameter or whether it also has to do so before the implementation of conduct.

That is, can the functional equivalent of a unilateral invitation to collude with a commitment still be framed as concertation or should it pass as a form of price leadership? If economic efficiency ought to be the ultimate benchmark distinguishing tacit collusion from concerted practice, the nature of the information in *United States v. General Electric* ought to be prohibited. However, this subjects the legal interpretation of the dividing line entirely to an efficiency calculation and essentially turns competition authorities into efficiency regulators. It bears reiteration that sellers are not required 'to compete vigorously, or for that matter at all, in price'.[174]

If the argument runs against efficiency regulation, the scenario of a pricing book being published without a best price clause or comparable mechanism that circumvents a commitment would have to be accepted as a form of price leadership. Generally, the notion that conduct elicits a demand response, rather than asymmetrically flowing to competitors to enable quasi-negotiations, ought to protect from prohibition even the more insidiously formulated but *implemented* practices. As such, it is not only that the information in question has to reveal its intended audience – be it on account of its content, format, or context – but also that the nature of the communication has to allow sellers to coordinate their conduct before it risks a demand response.

Finally, the analytical logic of unilateral disclosure is fundamentally the same as that applicable to instances of public disclosure. Arguably, the unilateral nature of information does not follow from it being published by a seller when no other seller is publishing information, but rather from it being a unilateral response to perceived demand flows. This being the case, *Container Shipping*, *Mobile Telephone*, *Woodpulp II*, and *Ethyl* could all be categorised as

[174] *Aircraft Check Services Co. v. Verizon Wireless* (2015) 782 F.3d 867, at 873.

instances of either unilateral or reciprocal disclosure, without the outcome in any of them changing. The former two cases would be categorised as instances of reciprocal disclosure, because the nature of the information suggests that it serves as a signalling and negotiation device between sellers, without sufficiently catering to demand patterns. The latter two cases could be regarded as instances of unilateral disclosure, because they respond to demand patterns in a way that safeguards their competitive position. The categories abide by the same analytical factors.

4) Conclusion

The competitive assessment of information disclosure is generally structured along three axes, which range from aggregate to individualised, public to private, and unilateral to reciprocal. These axes frequently emerge in case analysis and are incorporated into the EU Horizontal Cooperation Guidelines. Aggregate, public, and unilateral information tends to be associated with procompetitive effects, whereas individualised, private, and reciprocal information incurs anticompetitive effects. This chapter acknowledged these assumptions as a premise to examine how specific instances of information disclosure deviate from these baseline definitions. Focusing especially on the latter two axes, it explored what it means for information to be truly public or unilateral. An assessment of the competitive implications of information disclosures that deviate from what would be considered truly public or truly unilateral permits inferences regarding the purpose of these disclosures.

Whether the content, form, or context of information disclosure can be said to favour seller transparency rather than buyer transparency has important implications for the dividing line between tacit collusion and concerted practices. Some cases of information disclosure display telling disregard for what the market requires or rewards. It is challenging, for example, to come up with a legitimate alternative purpose for the information disclosures in cases like *Petroleum Products* or *United States v. General Electric* – hence their relatively straightforward categorisation as concerted practices. Ascertaining the intended audience and whether there was some form of response therefore aims to enable inferences of agreement.

Content, format, and context can each render information asymmetrically beneficial for sellers. Cases like *Container Shipping* and *Mobile Telephone* still suggest a relative benefit for sellers that conceivably outweighs what buyers may receive. However, if the question is whether by any particular attribute the information disclosure can be interpreted as a signal intended to favour sellers in their ability to coordinate, the more nuanced its pro- and anticompetitive implications coincide, the more difficult it would be to accurately infer agreement. The above discussion notes that the format of a commitment decision in *Container Shipping* suggests that the Commission did not have a bulletproof case. Limitations in economic analysis and the fact that sellers are not economically rational actors exacerbate this problem. These points are further discussed in Chapter 5.

These considerations render a pure analysis of anti- and procompetitive effects legally tenuous. The problem with this approach is that the further conduct moves into the legal grey zone at the intersection between tacit collusion and concerted practice, the more it fails to

assiduously distinguish legality from efficiency. There is no legal requirement on sellers to operate efficiently and, although some instances of illegality can be uncovered through inefficient facades, not all inefficiencies allow an inference of illegality. The current system does not stress this point enough.

To be legitimate, conduct implemented by sellers has to affect their position through a demand response. Therefore, any practice has to attract buyers towards the acting seller or, by the same logic, prevent buyers from switching to other sellers. If a practice – be it due to its content, format, or context – is ineffectual to demand, but permits competitors insights into conduct of the acting seller, it *might* be considered a signal. These steps can be evaluated according to the parameters of economic efficiency. However, at a certain level of detail, economic effects analysis becomes inaccurate and contentious, especially where sellers respond to notions of industry identity, experience, intuition, acumen. This leaves room for conduct that would fail on the counterweighing of economic effects but falls distinctly short of the furthest interpretation of notions of agreement. This room exists because economic effects are merely the economic manifestation of an attempt at agreement (meeting of the minds, concordance of wills etc.). They are not the underlying method that competition law prohibits.

The current approach is arguably too prone to the risk that competition authorities can infer agreement where conduct has a net anticompetitive effect. In practice, sellers would then need to explain why it is necessary or beneficial to adhere to a certain type of conduct if it is considered to facilitate parallel conduct. If parallelism follows not only from the mere observance of price leadership but also involves some sort of practice that can be said to facilitate coordination, sellers tend to have a hard time coming up with satisfactory explanations. This could have the rather drastic implication that maintaining certain practices inefficiently could shift the burden of proof to sellers. If, for example, the parties in *Container Shipping* did not re-adjust the prices frequently but were only theoretically in a position to do so, a prohibition decision might have set a dubious precedent.

Formulated in brief: Competition law prohibits agreement between sellers. Agreement between sellers can result from clandestine discussion. Agreement can also result from public signals. Such signals can display traits that induce sellers to cooperate. These traits can be appraised economically, by evaluating efficiencies. Economically inefficient practices can thus permit inferences of agreement. However, not all economically inefficient conduct can be reverse engineered. Economic inefficiency can result from a plethora of reasons unrelated to a meeting of the minds. At certain levels of granularity, it is also entirely implausible that subtle economic inefficiencies should suffice for an inference of agreement.

Chapter 3: Hub-and-Spoke and Third Parties

Chapter 2 discussed information disclosure and signalling in a horizontal context. These practices of information disclosure can be thought of as the **first derivative of tacit collusion**. Tacit collusion itself denotes the intelligent adaptation to the existing and anticipated conduct of competitors – expressed purely in terms of price or conduct leadership – based on the information that is observable on the market.[1] The focus rests on how and why that information is observable to sellers. What generated the information that enables coordination? Broadly speaking, conduct that fulfils a legitimate commercial rationale but incidentally generates information that enables coordination might be considered to create natural transparency. Conversely, conduct that generates information primarily to enable coordination would be considered to create artificial transparency.

A legitimate commercial rationale in the context of information disclosure generally envisages providing buyers with useful or necessary information to attract demand. Sellers disclose information, ostensibly aimed at the market, and the task becomes to identify the actual intended audience. Doing so enables the observer to infer whether conduct generates natural or artificial transparency. Tracing whether conduct led to natural or artificial transparency then permits conclusions about whether the resulting parallelism constitutes tacit collusion or concerted practice. While there are specific metrics to analyse information disclosures – individualised/aggregate, private/public, unilateral/reciprocal – applicable notions of natural and artificial transparency are helpful because they abstract how to think about practices that may facilitate coordination into a more generally applicable framework. This permits analysis of a wide range of different practices relevant to oligopolistic markets.

This chapter further explores the distinction between natural and artificial transparency in the context of hub-and-spoke arrangements and third-party intermediaries. The appraisal of hub-and-spoke arrangements constitutes part of the **second derivative of tacit collusion**, which focuses on how structural constraints within vertical relationships influence conduct and information. Information remains central to the analysis, but the context in which it is disclosed, the dynamic in which it can influence coordination, and the metrics of legitimate commercial rationales change.

For information disclosure, the manner in which transparency is enhanced is evaluated

[1] Joined Cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85 (*Woodpulp II*) *A. Ahlström Osakeyhtiö and others v Commission* [1993] ECLI:EU:C:1993:120, 71.

according to which side of the market – buyer or seller – it affords relative informational advantages. The inquiry focuses on the intended audience. This takes into account two dimensions of transparency: one relates to sellers sharing horizontally, usually to the detriment of buyers, whereas the other encompasses the vertical flow of information between sellers and buyers.[2] This reflects the idea that transparency can 'relate to the flow of *different pieces of information* and/or to the flow between *different groups of economic decision makers*' (emphasis in original).[3]

Not all flows of information between sellers can or should be prohibited. Vertical flows along the supply chain are a commonplace and necessary component of competition. There is no requirement for buyers, in this case end consumers, to be privy to the information that upstream and downstream sellers share for the efficient functioning of the supply chain. Hence, the metrics of what constitutes a legitimate commercial rationale change. The focus shifts from the intended audience of information disclosure to the dynamics of vertical commercial relationships.

Hub-and-spoke is a more technical method than the rather versatile format of information disclosure, which requires assessment of the effects of parallel vertical arrangements on the conditions for collusion. To elaborate, successful coordination requires good positioning and good information. Information is the most immediate determinant of transparency. The character of information affects its impact on transparency. Hub-and-spoke arrangements entail vertical restraints, which structure the dynamic and flow of information in a specific manne r. In other words, the very structure of hub-and-spoke precipitates the flow of information, which in turn affects the outcome on transparency.

Hub-and-spoke describes coordination in a triangular configuration involving horizontal competitors and a vertically connected third party; the latter is in bilateral vertical relationships with each of the former.[4] Although the exact shape of hub-and-spoke settings can vary, its core structure entails 'information flows to and from competitors through their

[2] F Wagner-von Papp, 'Information Exchange Agreements' in I Lianos and D Geradin (eds), *Research Handbook in European Competition Law: Substantive Aspects* (Edward Elgar, Cheltenham 2013) 143; PB Overgaard & HP Møllgaard, 'Information Exchange, Market Transparency and Dynamic Oligopoly' (2007) *University of Aarhus Economics Working Paper 2007-03*, 2.
[3] Overgaard & Møllgaard (n 2) 2.
[4] GL Zampa & P Buccirossi, 'Hub and Spoke Practices: Law and Economics of the New Antitrust Frontier?' (2013) *9 Competition Law International 91*, 91, 98; PJG Van Cayseele, 'Hub-and-Spoke Collusion: Some Nagging Questions Raised by Economists' (2014) *5 Journal of European Competition Law & Practice 164*, 164; R Amore, 'Three (or More) Is a Magic Number: Hub & Spoke Collusion as a Way to Reduce Downstream Competition' (2016) *12 European Competition Journal 28*, 28; N Sahuguet & A Walckiers, 'A Theory of Hub-and-Spoke Collusion' *International Journal of Industrial Organisation* (2016), 2.

independent relationships with a third party'.[5] This indirect form of information disclosure between competitors therefore entails both horizontal and vertical characteristics.[6] The constituent elements are a hub acting as a common point of reference at the frame of the arrangement and several spokes that conventionally operate at an adjacent level in the supply chain.[7]

To meet the threshold for an illegal hub-and-spoke arrangement, the spokes ought to horizontally share a meeting of the minds or at least an awareness of and acquiescence with a common scheme.[8] The requirement for there to be an agreement, however expansively interpreted, therefore remains applicable. The setting incorporates two elements relevant to the dividing line: the role of information disclosure as discussed in Chapter 2 and the nature of vertical relationships as a conduit for information.[9]

The conventional hub-and-spoke model envisages the transfer of information through a common contractual partner vertically connected at the up- or downstream level of the supply chain.[10] Accordingly, a supplier acts as a hub for common distributors or vice versa.[11] The dynamic of illegal hub-and-spoke agreements can then be disentangled into two phases:[12] First, A discloses information to B, intending or reasonably foreseeing that she transfers that information to competitors. Second, B does in fact transfer the information to C, who in turn understands the origin and purpose of the transfer.[13] Harm arises if B discloses information received from A on to C where it is intended to facilitate coordination by making competitors

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[5] E Prewitt & G Fails, 'Indirect Information Exchanges to Hub-and-Spoke Cartels: Enforcement and Litigation Trends in the United States and Europe' (2015) *2 Competition Law & Policy Debate 63*, 63.
[6] Sahuguet & Walckiers , 'Hub-and-Spoke Conspiracies: the Vertical Expression of a Horizontal Desire' (2014) *5 Journal of European Competition Law & Practice 711*, 711; Amore (n 4) 29; P van Cayseele & S Miegielsen, 'Hub and Spoke Collusion by Embargo' (2013) *KU Leuven Centre for Economic Studies – Discussion Paper DPS13.24*, 1; Guidelines on Vertical Restraints [2010] OJ C130/1, para 211; Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Co-operation Agreements [2011] OJ C11/1, para 55.
[7] EC Guidelines on Vertical Restraints (n 6) para. 211; EC Horizontal Cooperation Guidelines (n 6) para. 55; B Orbach, 'Hub-and-Spoke Conspiracies' (2016) *Arizona Legal Studies – Discussion Paper No. 16-11*, 14.
[8] Orbach (n 7) 14.
[9] L Giardino-Karlinger, 'Hub-and-Spoke Collusion under Imperfect Monitoring' (2014), 3.
[10] Prewitt & Fails (n 5) 69; O Odudu, 'E-Books: Vertical Participation in Hub and Spoke Agreements', *Competition Bulletin* 2013 <https://competitionbulletin.com/2013/07/18/e-books-vertical-participation-in-hub-and-spoke-agreements/> accessed 06 October 2019.
[11] Zampa & Buccirossi (n 4) 93-94; Amore (n 4) 31-32.
[12] CMA, *Dairy products: investigation into retail pricing practices* (2011) CA98/03/2011, paras. 56-57; Odudu (n 10); O Odudu, 'Indirect Information Exchange: The Constituent Elements of Hub and Spoke Collusion' (2011) *7 European Competition Journal 205*, 218.
[13] Cases 1021/1/1/03 & 1022/1/1/03 *JJB Sports plc v Office of Fair Trading; Allsports Limited v Office of Fair Trading* [2004] CAT 17, para 659; H Bergmann & R Carlton, '*As Penalites for Anticompetitive Exchanges in a Wider Range of Situation Increase, How Should Companies Manage Risk?*' Freshfields Bruckhaus Deringer – Information Exchange (2013)
<http://www.freshfields.com/en/global/Global_Antitrust_TKT/5_Information_exchange/> accessed 05 September 2018; Van Cayseele (n 4) 164; Odudu (n 12) 218.

aware of their strategies.[14] Importantly, B must have known of and facilitated the scheme.[15]

EU and US competition analyses recognise the collusive potential of hub-and-spoke arrangements but remain beset by conceptual difficulties inherent in such multifarious conduct. The transmission of information via a vertically connected entity blurs the boundaries between vertical and horizontal agreements.[16] Consequently, hub-and-spoke convolutes traditional theories of harm and complicates categorising the legality of conduct.[17] In a nutshell, authorities need to identify whether alignment in a hub-and-spoke setting is 'nothing more than a spill-over effect of a set of similar vertical conducts [or] a sophisticated way of structuring horizontal cooperation'.[18]

Analytically, the idea is that 'separate phases should be treated as separate, and thus vertical, until it is shown that the two phases are interrelated and interdependent'.[19] US law encapsulates this maxim in the concept of a "wheel conspiracy" and its requirement for a so-called "rim".[20] The wheel consists of a hub at the centre, vertically binding several spokes. The rim connects the spokes through a horizontal agreement, awareness of a mutual intention, or at least consciousness 'that interaction with the hub propagates the cartel outcome'.[21] Absent a rim, there remains merely a set of vertical relationships conducive to parallelism, but insufficient for a finding of hub-and-spoke collusion.[22]

Hub-and-spoke settings are therefore an example of the dilemma between tacit collusion and concerted practices, namely how to distinguish commercially legitimate conduct from conduct aimed at artificially facilitating coordination.[23] The analysis reverts to the paragon dichotomy between natural transparency and artificial transparency intended to

[14] Odudu (n 12) 219.
[15] *United States v. Apple Inc.* (2013) 952 F.Supp. 2d 683, at 706; Odudu (n 10).
[16] Odudu (n 12) 210; Orbach (n 7) 1.
[17] Odudu (n 12) 210; Zampa & Buccirossi (n 4) 92; Sahuguet & Walckiers (n 6) 713.
[18] Amore (n 4) 29.
[19] Odudu (n 12) 240.
[20] Orbach (n 7) 3.
[21] van Cayseele & Miegielsen (n 6) 1; Odudu (n 12) 237; Prewitt & Fails (n 5) 67.
[22] Orbach (n 7) 3.
[23] Zampa & Buccirossi (n 4) 92; Odudu (n 12) 209; Orbach (n 7) 15; Wagner-von Papp (n 2) 137-138; HP Møllgaard and PB Overgaard, 'Market Transparency and Competition Policy' (2001) *91 Rivista di Politica Economica 11*, 2; X Vives, 'Information Sharing: Economics and Antitrust', in Konkurrensverket/Swedish Competition Authority, *The Pros and Cons of Information Sharing* (2006), 84; M Bennett & P Collins, 'The Law and Economics of Information Sharing: The Good, the Bad and the Ugly' (2010) *6 European Competition Journal 311*, 312; M Hall, *Recent Developments in Price Signalling in the EU*, ABA Section of Antitrust Law Spring Meeting (2015), 3; OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables DAF/COMP(2012)17, 24.

circumvent the requirement for sellers to act independently.[24] The structure of horizontal coordination through a set of bilateral vertical agreements raises the question of how to evaluate the independence requirement in a seemingly vertical setting and how to identify when it is appropriate to infer concerted practices.[25] In other words, at what point do parallel vertical agreements with a hub amount to concertation?

Following the main discussion on hub-and-spoke arrangements, a brief section on the nature and role of third parties (which are not vertically related to the horizontal competitors in question) emphasises the importance of legitimate commercial links between sellers. It provides a counter-example of how the analysis changes if horizontal coordination is merely facilitated by an unrelated third party that cannot legitimately position itself as a focal point for alignment. Analysed in the context of hub-and-spoke arrangements, this section re-emphasises how notions of natural transparency, which are consistent with tacit collusion, necessarily require that practices follow commercial rationales, such that they are intended to advance or secure a seller's position vis-à-vis her competitors.

[24] R Whish, 'Information Agreements', in Konkurrensverket/Swedish Competition Authority, *The Pros and Cons of Information Sharing* (2006), 20; C-194/99P *Thyssen Stahl* v *Commission* [2003] ECLI:EU:C:2003:527, para 393; C-8/08 *T-Mobile Netherlands and Others v Commission* [2009] ECLI:EU:C:2009:343, para 32.
[25] Orbach (n 7) 1, 15.

1) Hub-and-Spoke

Hub-and-spoke arrangements are sustained through formal vertical agreements, which impose certain structural economic constraints. Their effect on transparency is markedly different from that of information disclosures. Information disclosures and public signals that raise questions regarding artificial or natural transparency tend to be formulated outside legal agreements and have conspicuous economic effects. The central issue with such information disclosures is to identify whether the information is truly public or truly unilateral, given its content, format, and context. Only then is the information considered to realise acclaimed efficiencies.

Vertical restraints in hub-and-spoke arrangements abide by a different logic, since the information passed between vertically related sellers is not necessarily intended to be accessible to buyers. Vertical relationships do not conventionally exist to disseminate information to buyers and their efficiencies are measured by different metrics. Nevertheless, there is an underlying commonality that can be appraised: the existence and specific purpose of hub-and-spoke arrangements can be evaluated in light of its commercial rationale. This refers to two aspects, namely whether the existence of the vertical relationship between two sellers reflects a commercially sensible rationale and whether the information that is passed within the relationship does so as well. Both aspects are discussed in the following.

The convergence of interests – the rationale for the existence of a hub-and-spoke setting – between vertically connected sellers is not as intuitive as it is in a purely horizontal context.[26] Since there must be a certain degree of compatible commercial interests between the hub and the spokes, assessing the applicable incentive structure of the hub and whether there a common economic interest provides a helpful starting point for identifying the commercial purpose of agreements.[27] Examining the incentives of the sellers in question assists with drawing inferences of intent, making it possible to identify obvious instances of artificial and natural transparency.

Generally, vertical relationships contain a juxtaposition between a shared interest to maximise profits from final sales to consumers, on the one hand, and conflicting incentives to gain the best margin from the overall profit, on the other hand.[28] In perfectly competitive markets, enhancing efficiency is the only method to increase profits along the vertical supply

[26] van Cayseele (n 4) 165; Zampa & Buccirossi (n 4) 104.
[27] Zampa & Buccirossi (n 4) 93, 98.
[28] Amore (n 4) 35; Sahuguet & Walckiers (n 4) 2.

chain.[29] The multi-product pricing problem illustrates the logic of hub-and-spoke in both, the vertical and the horizontal dimension:[30]

> *In comparison to two separate undertakings, a single monopoly should increase the price of both products if they are substitutable, thereby internalising the substitution or competition effect of one product on the other; […] On the contrary, if products are complementary, a single monopolist will set a lower price than two separate undertakings, thereby internalising the higher demand for the complementary product*.[31]

Vertically related sellers generally act without regard to the profit stream of their counterpart and, consequently, their individual need to make profit incurs double marginalisation.[32] That is, individually they lack the ability to internalise the profits from either counterpart product, be it substitutable (horizontal) or complementary (vertical).[33]

Internalising price externalities of substitutable products negatively affects consumer welfare – that is the effect of horizontal collusion – whereas it can have positive effects for complementary products.[34] In the latter case, the efficient transmission of relevant information in vertical relationships enhances efficiency and increases consumer welfare.[35] Commercial relationships and corresponding information disclosure between vertically related sellers therefore constitute a normal and oftentimes necessary aspect of competition.[36]

With regard to the sustainability of collusion, the incentive for the hub to facilitate and police coordination appears to vacillate between the disparate goals of maximising collective profit and attaining the best individual margin. Some argue that it is preferable for an upstream hub with sufficient market power to suppress countervailing downstream power.[37] Giardino-

[29] Zampa & Buccirossi (n 4) 104.
[30] Sahuguet & Walckiers (n 6) 714.
[31] ibid.
[32] V Verouden, 'Vertical Agreements: Motivation and Impact' (2008) *3 Issues in Competition Law and Policy 1813*, 1818; Sahuguet & Walckiers (n 6) 714.
[33] Sahuguet & Walckiers (n 6) 714; Verouden (n 32) 1815.
[34] Verouden (n 32) 1815.
[35] Zampa & Buccirossi (n 4) 96; Sahuguet & Walckiers (n 4) 3; A Font-Galarza et al., 'RPM Under EU Competition Law: Some Considerations From a Business and Economic Perspective' (2013) *CPI Antitrust Chronicle*, 6.
[36] Odudu (n 12) 231, citing: *In re Brand Name Prescription Drugs Antitrust Lit.* (2002) 288 F.3d 1028, para 16; Zampa & Buccirossi (n 4) 95; F Scott-Morton, 'Contracts that Reference Rivals' (2012) *DOJ Antitrust Seminar at Georgetown University Law Center*, 1.
[37] Giardino-Karlinger (n 9) 2; N Sahuguet & A Walckiers, 'Selling to a Cartel of Retailers: A Model of Hub-And-Spoke Collusion', *CEPR Discussion Paper Series 9385* (2013), 2; Odudu (n 12) 217-218.

Karlinger, for example, has suggested that vigorous downstream competition decreases retail margins and increases upstream profits.[38] Low downstream prices and margins imply a higher quantity of sales resulting in higher upstream profits.[39] This would provide a natural disincentive for a hub to facilitate downstream collusion.

Yet, low downstream margins and high sales quantities need not necessarily increase upstream profits. Van Cayseele and Miegielsen argue that vigorous downstream competition diminishes transfer prices in a non-cooperative duopoly model, because retailers 'are reluctant to accept a transfer price that would result in a competitive cost-disadvantage [vis-à-vis their competitors] in the downstream market'.[40] Suppliers should aim to coordinate at the retail level 'and then sequester some of the rents accrued from this weakened competition through higher wholesale prices to retailers or by simply preventing retailers from seeking a lower wholesale price'.[41] Yet, increased downstream bargaining power could also be wielded to negotiate more favourable transfer prices.[42] Under that trade-off, a supplier may prefer low transfer prices to a downstream monopolist, since the latter might imply fewer sales at equally low transfer prices.[43]

These arguments illustrate that it can be difficult to evaluate the economic incentives and impact of vertical relationships. Efficiencies render potentially anticompetitive effects less obvious and sometimes inscrutable under current competition rules.[44] Since vertical restraints generally align incentives and achieve desirable efficiencies, prohibiting them is an unsuitable response.[45] However, assessing the incentive structure of vertical relationships can focus the scope of competition analysis pertaining to the dividing line by identifying and excluding hub-and-spoke arrangements that clearly lack a commercial rationale.

This applies not only to the existence of vertical relationships, but also to the information that is disclosed within the vertical relationship. Information flows between a hub and several spokes alone cannot be sufficient to infer concerted practices.[46] Yet, the boundaries of necessary disclosure are nebulous. It would for example seem commonplace for a distributor to reference competing retail prices when negotiating wholesale prices with suppliers.[47]

[38] Giardino-Karlinger (n 9) 2.
[39] Verouden (n 32) 1817.
[40] van Cayseele & Miegielsen (n 6) 4, 10.
[41] Odudu (n 12) 217-218.
[42] van Cayseele & Miegielsen (n 6) 11-12.
[43] van Cayseele & Miegielsen (n 6) 11.
[44] Verouden (n 32) 1827.
[45] Verouden (n 32) 1823; Font-Galarza et al. (n 35) 5.
[46] Odudu (n 12) 236.
[47] Zampa & Buccirossi (n 4) 95.

However, contracts that reference rivals, notwithstanding their ostensible efficiency rationale, could construct a 'web that renders sellers more symmetric' and facilitate coordination.[48]

Interesting questions regarding the dividing line between tacit collusion and concerted practices arise where seller incentives and conduct align as a result of legitimate vertical relationships. The analysis then encounters a derivative of the familiar dual inference problem: with a common point of reference, parallelism may be 'a direct consequence of the suggested price of the supplier to its retailers or […] a consequence of the fact that the distributor has put its suppliers in direct competition and bid down their respective prices'.[49] The question should sound familiar: what qualifies as natural alignment of incentives, induced through a set of separate vertical agreements, instead of an artificial method of coordination in hub-and-spoke settings?

a) Variations of Artificial Transparency in Hub-and-Spoke Settings

Understanding general aspects of the incentive structure in vertical relationships can prove helpful in assessing the commercial rationale of hub-and-spoke arrangements. Further, it is important to take into account how they came into existence and whether they operate within legitimate bounds of information disclosure between sellers. That is, it helps to examine the scope of conduct that creates and sustains hub-and-spoke arrangements.

Chapter 2 discusses the illicit nature of secret information disclosures in cases like *Airline Tariff Publishing*. Secret information exchanges facilitated through a hub are no different. Information exchange between competitors via a common up- or downstream trading partner can constitute a horizontal agreement in breach of the requirement, set out in *Suiker Unie*, to determine market conduct independently.[50] The intentional transmission of information between sellers through a hub constitutes but another method of administrating concerted practices. A hub facilitating explicit collusion between several spokes therefore triggers conventional competition scrutiny.[51]

Less clear are flows of information in vertical relationships that exist for commercially legitimate reasons. In those cases, the dynamic of the relationship and its impact on the conditions for coordination require closer analysis. Hubs can facilitate equilibrium selection, monitoring, and punishment.[52] In terms of equilibrium selection, where the existence of the set

[48] Scott-Morton (n 36) 3, 5.
[49] Zampa & Buccirossi (n 4) 101.
[50] Odudu (n 12) 207.
[51] Zampa & Buccirossi (n 4) 108; van Cayseele & Miegielsen (n 6) 1.
[52] van Cayseele (n 4) 165; van Cayseele & Miegielsen (n 6) 1.

of parallel vertical relationships naturally aligns the conduct of several sellers, the question is whether the setting came about through the unilateral realisation by each seller that it would be beneficial to act or whether it arose through some degree of incitement or illicit communication.

For example, a hub can be instrumental in inciting agreement between spokes in the first place. Indeed, one of the archetypical US tacit collusion cases, *Interstate Circuit*, entailed a hub-and-spoke arrangement. As previously discussed in the Introduction, a motion picture exhibitor had sent copies of the same letter proposing a minimum price to various film distributors, indicating all the recipients on the letterhead. Horizontal communication between distributors was not necessary, since it 'was enough that, knowing that concerted action was contemplated and invited, the distributors gave their adherence to the scheme and participated in it'.[53] Though vertically structured, the format of the communication was tantamount to horizontal coordination, because each supplier understood that the proposal had also been made to competitors.[54]

Short of actively inciting it, hubs can also facilitate agreement among spokes whose participation is contingent upon assurances that their competitors will adhere to the same scheme.[55] Whether a supplier acts as a hub and caters to several retailers or vice versa, a hub sharing the spokes' mutual intention to adhere to common conduct and a corresponding ability to discipline participants can induce hesitant spokes to accept the proposed scheme.[56] Such instances of conditional participation involve classic considerations of equilibrium and payoff selection, central to successful coordination.

Toys "R" Us exemplifies this dynamic of conditional participation.[57] Dissatisfied with dropping toy prices caused by low-price warehouse club stores, Toys "R" Us sought to pressure toy manufacturers (to whom it was a critical customer) to refuse supplying said warehouse club stores.[58] Doing so was contrary to the manufacturers' independent economic self-interest and could only succeed if they collectively refused supplying the independent wareshouse club stores, a tell-tale sign of concertation as far back as *Interstate Circuit*.[59] Each manufacturer

[53] *Interstate Circuit Inc. v. United States* (1939) 306 U.S. 208, at 226.
[54] WH Page (n 77) 624.
[55] Odudu (n 12) 238-239; van Cayseele (n 4) 165.
[56] van Cayseele (n 4) 165.
[57] Odudu (n 12) 239.
[58] Prewitt & Fails (n 5) 69-70; Amore (n 4) 37.
[59] *Interstate Circuit Inc. v. United States* (n 53) at 226.

made their participation conditional upon the assurance that all others did so as well, which was facilitated, monitored, and policed by Toys "R" Us acting as a hub.[60]

A more recent example of conditional participation is *E-Books*, which will also be relevant to the discussion on MFCs in the following chapter. Market entrant Apple offered an agency model to publishers to compete with Amazon's prevailing wholesale model of publishing e-books.[61] Much to their dismay, Amazon required publishers to adhere to its set minimum price. Sales therefore yielded little to no profit, which Amazon accepted as it increased sales for its Kindle devices and ultimately offset its losses incurred through e-books.[62]

Apple's agency model included MFCs according to which prices could not exceed those of other third-party retailers (specifically those of Amazon), ostensibly to offer the lowest price.[63] Apple also informed publishers of their competitors' willingness to participate under equal conditions, hence removing uncertainty.[64] Publishers had already previously discussed raising the price for e-books.[65] These factors indicate horizontal price fixing coordinated by Apple, which does not require further analysis of MFCs.[66] Adopted as a collusive instrument, the theory of harm rather 'relies on the fact that the [MFCs] were jointly entered into by all publishers in a way that would not have been possible without relying on Apple to exchange information as to whether each publisher would in fact be signing'.[67] The case therefore primarily turned on discussions between publishers and coordination through Apple.[68]

In terms of the dividing line, *Toys "R" Us* and *E-Books* both display ample evidence of bargaining and negotiation before conduct is implemented. The very nature of conditional participation implies that sellers ascertain the outcome of parallel conduct before they risk losing demand. The *ex ante* certainty flows from assurances exchanged through the hub. Negotiating conditional participation to parallel vertical agreements, which are beneficial to sellers only if they act collectively, does not cater to demand patterns and therefore qualifies

[60] Odudu (n 12) 240; Amore (n 4) 37.
[61] JP van der Veer, 'Antitrust Scrutiny of Most-Favoured-Customer Clauses: An Economic Analysis' (2013) *4 Journal of European Competition Law & Practice 501*, 504-505.
[62] *United States v. Apple Inc.* (n 15) at 649-650; van der Veer (n 61) 505.
[63] L Atlee & Y Botteman, 'Resale Price Maintenance and Most-Favored Nation Clauses: The Future Does Not Look Bright' (2013) *11 CPI Antitrust Chronicle 1*, 2; JJ Wu & JP Bigelow, 'Competition and the Most Favored Nation Clause' (2013) *7 CPI Antitrust Chronicle 1*, 8-9.
[64] van der Veer (n 61) 505; *United States v. Apple Inc.* (n 15) 505; Odudu (n 10).
[65] *United States v. Apple Inc.* (n 15) at 647.
[66] JF Nieberding, 'The Anticompetitive Potential of MFNs' [2014] *8(2) CPI Antitrust Chronicle*, 8; Wu & Bigelow (n 63) 9.
[67] van der Veer (n 61) 505.
[68] *United States v. Apple Inc.* (n 15) at 647; van der Veer (n 61) 505.

as a mechanism to artificially raise transparency between sellers precisely because any individual move would risk loss in demand.

The assurances that enable conditional participation enable sellers to ascertain parallel conduct before having to risk a demand response. Characteristic of concerted practices is the application of an illicit method for achieving a mutually desirable outcome. However, the outcome itself could arguably be achieved without illicit conduct. Hansen suggests that the 'DOJ conflated Apple's knowledge and acceptance of an outcome (agency model and higher prices) with knowledge of a horizontal agreement among publishers'.[69] With widespread discontent towards the publishing model of the incumbent market leader Amazon, it would indeed be plausible that each publisher would anticipate her competitors and accept the offer from Apple. Apple could 'always make a guess about what the publishers wanted and advocate a win-win'.[70]

How would the analysis change if publishers had unilaterally opted for the Apple model and thereby achieved the exact same result without discussion or exogenous coordination? Collectively – and only collectively – joining Apple would be commercially sensible given the publishers' interdependence.[71] Yet, they would have no prior certainty of reciprocal adherence to a common scheme.[72] Moreover, there would be no communication to ascertain collective action and reciprocity.[73] Interdependence and a lack of prior certainty should comfortably qualify conduct as tacit collusion, at least as far as the initial setup of a hub-and-spoke setting is concerned. In other words, it is certainly possible for a hub-and-spoke arrangement to come into being and raise prices without it being illegal.

Once the setting is in place, a hub can further weigh in on the administration – specifically the monitoring – of coordination. Vertical restraints can assist with monitoring and thereby constitute a 'powerful cartel enforcement mechanism'.[74] Levenstein and Suslow observe that 'cartelized industries that we know used vertical restraints had somewhat lower average concentration than cartelized industries overall'.[75] Similarly, cartels facilitated through

[69] M Hansen, *"Hub and Spoke" Cases and Special Considerations for Atypical Cartels*, Latham & Watkins Presentation - ICN Annual Conference 2014 <https://www.lw.com/presentations/hub-and-spoke-cartels> accessed 27 September 2018, 10.
[70] ibid.
[71] *United States v. Apple Inc.* (n 15) at 650.
[72] *Interstate Circuit Inc. v. United States* (n 53) at 226; Page (n 41) 410.
[73] WH Page (n 41) 427-428; citing O Black, *Conceptual Foundations of Antitrust* (CUP, Cambridge 2005), 159-60.
[74] MC Levenstein & VY Suslow, 'How Do Cartels Use Vertical Restraints? Reflections on Bork's The Antitrust Paradox' (2014) *57 Journal of Law and Economics 33*, 37.
[75] ibid 47.

trade organisations, arguably a type of hub, 'were on average over twice as large than cartels without a trade association involved'.[76] Note how these are statements about the interplay of a structural factor (concentration) and the degree of communication, which reflect the inverse relationship between the susceptibility of the market to coordination and the necessary level of communication described in Chapter 1.

Individual spokes typically only observe residual demand for their products, occasioning an inferential gap:[77] conspicuously low profit in a collusive setting may be caused either by cheating or by exogenous factors.[78] A hub can observe orders, infer downstream sales, and detect whether receding demand is in fact caused by a deviation, all without having to communicate with the spokes individually and – viewed from an economic perspective – is in a position to mollify perturbed sellers who otherwise risk unnecessary punishment if they misinterpret low demand.[79]

However, closer to the dividing line, the mechanisms need to be subtler. In their abovementioned analysis, Levenstein and Suslow examine the functioning of vertical restraints in the context of cartels, that is, methods of coordination where the illegality is apparent.[80] Being in a position to understand the reason for demand or price fluctuations does not necessarily provide license to communicate this reason to spokes without risking illicit conduct. The manner in which the flows of information and the parameters of the vertical relationship are structured in hub-and-spoke constellations are no less pertinent to competition law assessment than they are in the context of information disclosure.

As previously shown in *Replica Kit*, it invariably amounts to concertation if a hub merely passes on private signals and information between several spokes.[81] More narrowly, *Dairy* permits an inference of collusive intent where the information is not relevant to the vertical relationship.[82] If a hub publishes information regarding aggregate demand flows, it might enhance transparency in a way that evades a finding of concertation. This would require a generally legitimate format, be that aggregate statistic or in a buyer publication that indicates general demand patterns.[83]

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[76] OECD, *Algorithms and Collusion: Problems and Counter-Measures – Note by A. Ezrachi and M.E. Stucke* (DAF/COM/WD(2017)25, 2017), 5.
[77] Verouden (n 32) 1824; Giardino-Karlinger (n 9) 14.
[78] RC Marshall & LM Marx, *The Economics of Collusion: Cartels and Bidding Rings* (MIT Press, Cambridge (Mass.) 2012), 25; Giardino-Karlinger (n 9) 5.
[79] Giardino-Karlinger (n 9) 3, 6; 8-9, 13.
[80] Levenstein & Suslow (n 74) 47.
[81] Odudu (n 12) 207.
[82] *Dairy Products* (n 12) paras. 300 & 368.
[83] EC Horizontal Cooperation Guidelines (n 6) para. 89.

The legal scope for communication on strategically sensitive price and demand patterns is narrow. This also applies to institutionalised mechanisms that direct the downstream price level. For example, from an economic perspective, resale price maintenance (RPM) allows reigning in and monitoring downstream sellers.[84] Common efficiency arguments associated with RPM include quality signalling or avoidance of free riding upstream, for example by capitalising on training of downstream sales staff conducted by a competitor, as well as downstream, through investments like product service and promotion efforts.[85]

From a legal perspective, however, oligopolistic conduct involving RPM is likely to constitute a concerted practice or outright agreement: other than in a certain few exceptions (e.g. certain luxury products[86]), EU courts view RPM agreements as anticompetitive by object (though under certain specific circumstances they can be exempted under Article 101(3) TFEU)[87] and US courts apply the rule of reason, expressly recognising RPM as a possible vehicle for collusion under *Leegin*.[88] It is difficult to see how use of RPM could maintain *tacit* collusion and bypass scrutiny, since supra-competitive pricing itself repudiates the argument that the conduct generated efficiencies. It would be challenging to argue that price increases sustained through RPM are somehow a result of natural transparency.

Non-binding retail price recommendations (RPRs) can provide a subtler mechanism for monitoring. Unlike RPM, the supplier relegates control to set the price, but a seller that deviates from the recommendation nevertheless triggers punishment.[89] This assumes that the hub has a viable method for screening whether spokes adhere to RPRs. Like other vertical restraints, RPRs can engender efficiencies, like improving buyer search processes, and are generally permissible.[90] Nevertheless, they can be an instrumental vertical communication device, for example by transmitting production costs or demand statistics, and thereby provide a self-enforcing monitoring mechanism.[91] RPRs may also provide a mutual point for coordination or help to overcome information asymmetries at the retail level.[92]

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[84] Levenstein & Suslow (n 74) 41.
[85] EC Guidelines on Vertical Restraints (n 6) para. 225; Verouden (n 32) 1821; Font-Galarza et al. (n 35) 4-5.
[86] C-230/16 *Coty Germany GmbH v Parfümerie Akzente GmbH* [2017] ECLI:EU:C:2017:941.
[87] EC Guidelines on Vertical Restraints (n 6) para. 223; Commission Block Exemption Regulation on Vertical Restraints, Art. 4(a); Font-Galarza et al. (n 35) 2-3; Zampa & Buccirossi (n 4) 105.
[88] 243/83 *SA Binon & Cie v SA Agence et Messageries de la Presse* [1985] ECLI:EU:C:1985:284, paras. 43-44; *Leegin Creative Leather Products Inc. v. PSKS Inc.* (2007) 551 U.S. 877, 892.
[89] van Cayseele & Miegielsen (n 6) 4; S Buehler & DL Gärtner, 'Making Sense of Nonbinding Resale-Price Recommendations' (2013) *103 American Economic Review 335*, 335.
[90] C Puppe & S Rosenkranz, 'Why Suggest Non-Binding Retail Prices?' (2011) *78 Economica 317*, 317; D Lubensky, 'A Model of Recommended Retail Prices' (2017) *48 RAND Journal of Economics 358*, 359; van Cayseele & Miegielsen (n 6) 5.
[91] Buehler & Gärtner (n 89) 336, 338, 352.
[92] Puppe & Rosenkranz (n 90) 318.

RPRs enable the implicit communication of the current cost and other demand parameters by the manufacturer and thereby enable the retailer to set retail prices accordingly.[93] It is irrelevant that RPRs are nonbinding if their function is to monitor coordination and detect a trigger event for punishment. As an instance of non-cooperative games with cooperative outcomes – previously noted in the Introduction – coordination is sustained but for threat of punishment. Whether the RPR is legally binding is irrelevant to the effectiveness of this monitoring mechanism.

Economically, RPM and RPRs are particularly useful for disciplining coordination in cyclical markets. A vertical supplier is able to affect the margin of the spokes in two ways. The first of these is through RPM or RPRs that determine downstream margins for a given wholesale price.[94] It is another matter whether this mechanism would withstand legal scrutiny. Even RPRs might be considered a subtle coordination device – an implicit form of RPM – to artificially stabilise coordination. Second, a hub can adjust the profit margin through the wholesale price if a collusive scheme sets the final price.[95] A hub can then stabilise collusion by relaxing the spokes' deviation constraint by increasing wholesale prices during booms and decreasing it when demand recedes, adjusting for respective states of demand.[96]

Further to inciting and monitoring it, an upstream hub can stabilise collusion by providing credible means of punishment. This form of deterrence is amplified if a hub acts as a monopolist or exclusive dealer, which precludes spokes from obtaining products from alternative suppliers.[97] In other words, a hub-and-spoke constellation 'can solve the renegotiation problem by putting the knife in the hands of the hub who will implement punishment by absorbing all industry profits'.[98] This can entail instances of targeted punishment, the economic benefits of which were previously noted in Chapter 1.

One option is to regulate supply volumes within pre-established exclusive territories to affect the spokes' relative profits.[99] A hub could also refuse to supply a deviator, which (albeit seemingly drastic) arguably preserves stability better than a price war could.[100] Doing so shields compliant spokes from Nash reversion and supports a higher discount factor.[101] However, refusing to supply has economic disadvantages: it consolidates the market power of

[93] Buehler & Gärtner (n 89) 346.
[94] van Cayseele (n 4) 166.
[95] ibid.
[96] Sahuguet & Walckiers (n 4) 3; Giardino-Karlinger (n 9) 5; Sahuguet & Walckiers (n 37) 3, 11.
[97] van Cayseele & Miegielsen (n 6) 24.
[98] Giardino-Karlinger (n 9) 17-18.
[99] Levenstein & Suslow (n 74) 41; van Cayseele (n 4) 167.
[100] Levenstein & Suslow (n 74) 41; van Cayseele (n 4) 167; van Cayseele & Miegielsen (n 6) 2.
[101] van Cayseele & Miegielsen (n 6) 6.

remaining spokes, risks competition scrutiny if essential facilities are at issue, yields little impact if the excluded party is a large retailer, and reduces market penetration.[102]

Legally, too, these mechanisms are precarious. Pre-established supply territories are strictly prohibited under EU law and it is somewhat puzzling that even in 2019 suppliers continue to get into trouble over so-called geo-blocking.[103] It is implausible that sellers could segment markets to collusively regulate supply volumes without rebuke. In a similar vein, refusals to supply deviators – let alone previously communicating the threat of doing so to prevent deviations – bear all the characteristics of concerted practices. It would be difficult to explain away the concerted nature of threatening spokes that a deviation from an established equilibrium will trigger punishment in form of a refusal to supply.

b) Implications for the Dividing Line

Hub-and-spoke arrangements do not envisage the dissemination of information to buyers and are therefore not evaluated in terms of the relative informational advantage they confer on either sellers or buyers. Natural and artificial transparency considerations nevertheless apply. The commercial rationale flows from efficiencies attained in the supply chain. With this in mind, it is possible to highlight certain legal implications of hub-and-spoke arrangements for the dividing line between tacit collusion and concerted practices.

First, the existence of a hub-and-spoke setting itself is not an artificial enhancement of transparency. Artificial transparency could refer to the conditions or methods that create hub-and-spoke, but not to the structure itself, as long as the vertical links are legitimate. *Toys "R" Us* and *E-Books* indicate that the benefit incurred through the hub-and-spoke setting has to follow from each seller's individual realisation that she can profit from parallel vertical connections with a common hub. Her conduct may anticipate that competitors will follow suit but ought not to communicate this or understand it to be a certainty before entering into said agreement. To constitute natural transparency, the reduction in uncertainty has to follow from structural changes or legitimate information flows that follow from vertical relationships.

Second, once implemented, the transparency that enables coordination must also follow from the existence of the setting itself. If the sellers within the structure make up a sufficient proportion of the market, a hub may take into account the position and anticipated conduct of spokes and thereby foster alignment between the spokes. The incentive structure could

[102] Sahuguet & Walckiers (n 4) 3; van Cayseele (n 4) 167.
[103] Joined Cases 56 and 58/64 *Consten SaRL and Grundig-Verkaufs-GmbH v Commission* [1966] ECLI:EU:C:1966:41, para. 340.

therefore align somewhat naturally. On a word of caution, it could be argued that A and C could involuntarily become part of an 'anticompetitive agreement by virtue of the actions of B, an undertaking over which they have little or no control'.[104] Yet, if the trigger criterion for antitrust scrutiny is to remain some formulation of agreement, there ought not to be a finding of concertation if the spokes do not knowingly participate in a scheme orchestrated by a hub.[105]

The scope of tacit collusion then plausibly encompasses the individual realisation that mutual vertical links with a common hub might be profitable. Where these vertical links raise the equilibrium price or profit, as was economically the outcome in *E-Books* or *Toys "R" Us*, it does not amount to a concerted practice. Beyond this form of alignment through a common point of reference, however, the scope for monitoring or possibilities for punishment drastically narrows. Applied in the hub-and-spoke context, each of the mechanisms discussed in the above – RPM, RPRs, and refusals to supply – display a degree of collusive rationale that would be challenging to explain as a result of tacit collusion.

[104] Odudu (n 12) 212.
[105] Zampa & Buccirossi (n 4) 103.

2) Third-Party Intermediaries

A brief foray into the invariably illegal facilitation of coordination by third-party intermediaries highlights the importance of legitimate commercial links for the natural alignment of seller conduct. Evidence gathered from detected cartels suggests that the involvement of a third party can bolster the sustainability of collusion.[106] A third party as facilitator is capable of hosting meetings at her premises, keeping records to mitigate paper trails, reimbursing travel expenses for company directors to cover up potential traces, and issuing cell phones to the relevant parties.[107] She may also have the added benefit of drawing from previous experience with cartel facilitation to smoothen the required administration.[108]

From a legal perspective, coordination does not elude competition scrutiny simply because it is facilitated by a third party who is not active on a related market. This was clarified in *AC Treuhand II* where the eponymous association management company, without any notable connection that legitimised its position as a hub on the spokes' market, 'intended to contribute through its own conduct to the common objectives pursued by all the participants' and was privy to the 'anticompetitive conduct of the other participants'.[109] This is not the only time AC Treuhand – formerly "FIDES Treuhandgesellschaft" – appears in this context.[110] In *Re Italian Cast Glass*, FIDES monitored a quota scheme between manufacturers of cast glass and was fined as one of the cartel participants.[111]

Although there are examples where one of the sellers actively participating in a cartel simply took the administrating role, Marshall and Marx highlight that AC Treuhand has been named in an impressive eight cartel decisions in the EU.[112] Involvement of a third party to coordinate cartel behaviour occurs with notable frequency. This could be a measure of convenience but also because an outside party might be trusted over individual cartel participants with the monitoring and enforcement of the scheme.[113]

While competitors can therefore 'turn to just about any third party' to indirectly

[106] Marshall & Marx (n 78) 130-131.
[107] ibid 30, 47.
[108] ibid 52.
[109] C-194/14P *AC Treuhand AG v Commission* [2015] ECLI:EU:C:2015:717, paras 27-30; Odudu (n 10); C Rawnsley et al., 'The EU Court of Justice Confirms That Consulting Firms May be Held Liable and Fined for Cartel Facilitation' (2015) *e-Competitions Antitrust Case Law Bulletin – Special Issue: Information Exchange*, 2, 4; Zampa & Buccirossi (n 4) 92.
[110] Marshall & Marx (n 78) 138.
[111] Commission Decision IV/29.869 – *Re Italian Cast* Glass [1980] OJ L 383/19, II.A.4; Whish (n 24) 35.
[112] RC Marshall & LM Marx, Participation in Multiple Cartels Through Time (2015) *DAF/COMP/GF*(2015)3, 5, 7.
[113] Marshall & Marx (n 78) 108.

exchange information, doing so subjects sellers to different economics from direct exchanges or disclosure and alters the legal implications.[114] In the context of regular A-B-C exchange, *Dairy* clarifies that anticompetitive intention may be inferred if the information exchanged is not relevant to the vertical relationship between the parties.[115] This can also be applied to third-party involvement to provide a preliminary filter between seemingly legitimate and clearly illegitimate conduct.

Naturally, ties between an independent third party and several spokes can be legitimate, in which case the analysis ought to be similar to the approach taken in common vertical relationships outlined above. Competitors may interact through an independent third party that generally provides legitimate services, like consulting or legal advice.[116] Tacit or explicit collusion can neither be discarded outright nor can it be proven simply on account of the third party being involved. However, there are several important differences between an outside third party and a vertically related hub.

The previous section addressed the incentive structure peculiar to vertical relationships, which from hub-and-spoke settings, and how these relationships affect the economic conditions for coordination. The double marginalisation problem determines that the incentive structure of vertical relationships contains conflicts between different levels of the supply chain.[117] Looking at these factors, it materialises that independent third parties, their incentive and economic positions, abide by a rather different logic.

Since an independent third party cannot internalise the profit of rising equilibria comparable to those envisaged by vertically related sellers, it can instead be remunerated through 'inflated commissions or kickback payments'.[118] In *Peter Whittle*, for example, the independent party received financial remuneration for facilitating bid rigging and market sharing.[119] As stated in the plea agreement, '[e]ach of the conspiring manufacturers jointly funded the defendant who acted as a coordinator for the cartel and provided him with information about upcoming marine hose jobs'.[120] Therefore, the economic incentive for an outside party is more clear-cut. It is also less defensible in legal terms.

[114] Giardino-Karlinger (n 9) 2; Levenstein & Suslow (n 74) 42.
[115] *Dairy Products* (n 12) paras. 300 & 368.
[116] Rawnsley et al. (n 109) 4.
[117] Amore (n 4) 35; Sahuguet & Walckiers (n 4) 2.
[118] Prewitt & Fails (n 5) 70; Zampa & Buccirossi (n 4) 99.
[119] Prewitt & Fails (n 5) 72; *United States v Peter Whittle* (2007) No. H-07-487-03, para 4(a).
[120] *United States v Peter Whittle* (119) para 4(b).

a) Variations of Artificial Transparency with Independent Third Parties

The missing vertical link changes the degree of influence an outside party has on the economic conditions for collusion, which alters the implications for natural and artificial transparency. In a conventional vertical scenario, the sellers exchange certain transaction-related information to improve their coordination.[121] Done within reasonable confines, this reflects commercial necessity.[122] This commercial necessity is the important justifying element for hub-and-spoke arrangements, which complicates their categorisation as either tacit collusion or concerted practices.[123]

Where third parties are not vertically connected to spokes, arguments of independent business rationales can become significantly less credible. The relative commercial independence of the parties, meaning that the sellers' conduct is of no immediate bearing on the third party as long as it receives payment, weakens its influence on the extent and trajectory of coordination. This affects the applicable economics and the corresponding legal assessment. It has several implications for the economic conditions for the maintenance of collusion, namely equilibrium selection, monitoring, and punishment.[124] The different economics render the corresponding legal wiggle-room for an outside party even narrower than it is for a vertically connected hub.

First, outside third parties lack the structural involvement of vertically connected hubs. In cases like *Toys "R" Us* or *E-Books* the power of the hub to incite conditional participation and deliver directly to the spokes was an essential component in setting up coordination.[125] In the latter case, MFCs – a quintessentially vertical practice – even served to solidify the arrangement.[126] Since third parties are not typically invested in the core commercial business of competitors, they cannot control trading conditions or consolidate assurances. For want of legitimate commercial reasons, the initially narrow scope for alignment all but vanishes when organising coordination around an unrelated third party.

Second, independent third parties are unable to monitor coordination at a depth

[121] Odudu (n 12) 231; Zampa & Buccirossi (n 4) 95; Scott-Morton (n 36) 1.
[122] Odudu (n 12) 231; Zampa & Buccirossi (n 4) 95; Scott-Morton (n 36) 1.
[123] Amore (n 4) 29.
[124] J Faull & A Nikpay, *The EU Law of Competition* (3rd edn OUP, Oxford 2014) 382-383; Wagner-von Papp (n 2) 138; I Ayres, 'How Cartels Punish: A Structural Theory of Self-Enforcing Collusion' (1987) *87 Columbia Law Review 2*, 296.
[125] Odudu (n 12) 240; Amore (n 4) 37; van der Veer (n 61) 505; Odudu (n 10).
[126] JB Baker & JA Chevalier, 'The Competitive Consequences of Most-Favoured-Nation Provisions' (2013) *27 Antitrust 20*, 20; JB Baker, 'Vertical Restraints with Horizontal Consequences: Competitive Effects of "Most-Favored-Customer" Clauses' (1996) *64 Antitrust 517*, 519; Wu & Bigelow (n 63) 2.

commensurate with that of vertical hubs. Hubs can extract valuable information from their position within the supply chain, like the size and timing of orders as well as potential irregularities contained therein, which might – provided a viable method for communicating their knowledge to spokes – enable them to calm tempers where decreases in demand are simply the result of exogenous factors.[127] An outside third party is usually not privy to this information and can merely act as a communication channel, which again removes what narrow scope for natural transparency may exist for vertically related hubs.

Finally, an outside party is less able to threaten or administer punishment for deviation. Since she cannot directly regulate supply volumes or trading conditions to reflect favour or disfavour within the collusive arrangement, or simply to balance profits relative to the proportion of a seller's contribution to the arrangement, she lacks the power of compulsion theoretically available to conventional hubs.[128] This describes the economic levers. Legally, there is little difference in this case. As previously argued, the economic ability of hubs to administer punishment should already be considered a concerted practice.

Hence, any sensitive information exchange or similar engagement to facilitate coordination through an outside third party is unlikely to be anything but a clear case of artificial transparency and therefore constitute a concerted practice. To be sure, this is not to suggest that conventional hub-and-spoke is invariably harmless. While it can be argued that the necessarily contained information flows provide a theoretical window for coordination, the margin for error is wafer-thin. It remains the case that tacit collusion is valid only if conduct and flows of information along the vertical axis naturally readjust the market equilibrium through mutual recognition of a common proxy or point of reference.[129]

b) Implications for the Dividing Line

Comparing hub-and-spoke settings with the facilitation of coordination through an independent third party bears a simple but important insight for the difference between natural and artificial transparency. Structural alignment conducive to coordination in vertical relationships can follow from a parallel set of legitimate vertical agreements. In *Toys "R" Us* and *E-Books,* the element of uncertainty facing spokes was somewhat similar to the risk encountered by sellers in conventional price leadership scenarios: only parallel conduct ensures success. In the hub-and-spoke cases, prior negotiation facilitating conditional participation removed the critical

[127] Giardino-Karlinger (n 9) 3, 6; 8-9, 13.
[128] Levenstein & Suslow (n 74) 41; van Cayseele (n 4) 167.
[129] Zampa & Buccirossi (n 4) 101.

element of uncertainty. Had the spokes acceded without these prior assurances, there would have been little in the competition law repertoire to stop them from doing so.

Independent third parties cannot provide a point of reference that corresopnds to hub-and-spoke settings. Where vertical hubs can offer legitimate commercial incentives and, consequently a potential justification for parallel changes in conduct, independent third parties fall short. Likewise, there are legitimate reasons for information transfer in vertical relationships. The passing on of information between an upstream seller and a downstream buyer, who is not the end-consumer, can entail information important to the efficient functioning of the commercial relationship. It is when information is passed on, which is not feasibly within the parameters of the commercial relationship, that it becomes artificial. At that point, independent third parties are more likely than not to merely serve as a conduit of collusion.

3) Conclusion

The foregoing discussion highlights how some types of hub-and-spoke and nearly all involvement of independent third parties tend to generate artificial transparency consistent with concerted practices. Where the sole purpose of an information exchange is to facilitate horizontal collusion, it should make little difference whether the scheme is administrated by a vertically related seller or an independent third party. Neither *Replica Kit* nor *AC Treuhand* display exchanges of information remotely indicative of natural transparency. Yet, closer inspection of the mechanics of vertical relationships is necessary if they entail plausible efficiencies or commercial necessities. There, certain hub-and-spoke settings might pass, whereas third-party intermediaries would likely not.

A clear-cut finding of concerted practices in a hub-and-spoke setting requires intent and reliance. First, the parties must intend or at least reasonably foresee coordination.[130] Intention and awareness of the parties could very well be the determining factor in whether hub-and-spoke should be categorized as a result merely of intelligent adaptation to the market or instead as anticompetitive conduct.[131] This criterion appears to be intrinsically met with the involvement in coordination of an independent third party, since there is no comparable scope for natural flows of strategic information that are necessary in conventional hub-and-spoke settings.[132] Whatever justification for the flow of commercially sensitive information exists for the efficient functioning of the supply chain provides little reprieve for independent third parties.

Second, the receiving sellers must understand that information is meant to incite collusion and consider it 'reliable enough to outweigh conclusions and recommendations that would otherwise be drawn from [its] own independent market analysis'.[133] If information reaches a spoke via a vertically connected hub, it is conceivable that legitimate tacit collusion emanates through that extent of information which simply cannot be prohibited without jeopardising the efficiency of the vertical relationship. Yet again, however, there is no such scope for an outside third party that has no justifiable reason for the passing on, even implicitly,

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[130] *Treuhand II* (n 109) para. 134; Zampa & Buccirossi (n 4) 102.
[131] Zampa & Buccirossi (n 4) 101-102; K Dekeyser, '*Exchange of Information – A Legal Perspective*', Concurrences Breakfast Seminar April 2014 <http://www.allenovery.com/SiteCollectionDocuments/Information_exchange_seminar_-_Summary.PDF> accessed 27 September 2018, 2.
[132] Odudu (n 12) 210.; Orbach (n 7) 1.
[133] *Replica Kit* (n 13) para. 141; Odudu (n 12) 225.

of competitor information.[134] Relying on legal reasoning applicable to conventional information exchange, inferences of intent can be drawn where the information in question is not relevant to the vertical relationship.[135]

Toys "R" Us and *E-Books* indicate, but do not themselves meet, a standard that could plausibly constitute tacit collusion, where the hub-and-spoke arrangement arises as a result of interdependent choices without prior negotiation or conditional assurances. This reflects the legal canon on tacit collusion: sellers can act contrary to demand patterns if they implement their conduct individually and hope competitors will mimic them. The key point is that sellers can attempt to act in a manner that only makes sense collectively but have to do so without prior assurance of reciprocity. In other words, it is on them to understand that the mechanics of their common point of reference allow for a natural increase in transparency and to utilise that knowledge. If successful, as the reorientation towards a higher price market equilibrium is consolidated through vertical restraints, it could even prove more stable than pure price coordination. Therefore, the scope for tacit collusion in hub-and-spoke arrangements is narrow but resulting equilibria may prove resilient.

[134] Amore (n 4) 29.
[135] *Dairy Products* (n 12) paras. 300 & 368.

Chapter 4: Most Favoured Customer Clauses and Meeting Competition Clauses

Chapters 2 and 3 discussed the implications for the dividing line between tacit collusion and concerted practices in the context of information disclosure and hub-and-spoke settings, respectively. They highlighted how the legal assessment of conduct depends on whether the transparency created by a given practice is considered natural or artificial. Transparency considerations assess the commercial rationale of each practice. For information disclosure, this boils down to whether it is directed at buyers or sellers. For hub-and-spoke, it results from the dynamics of vertical relationships. Further, the preceding chapters outline how the collusive effects of information disclosure and hub-and-spoke settings tend to be amplified through multilateral adoption.

This chapter takes a closer look at variations of Most Favoured Customer Clauses (MFCs) and Meeting Competition Clauses (MCCs), which arise in vertical relationships between sellers and buyers or sellers and online platforms. Like hub-and-spoke, MFCs and MCCs constitute part of the **second derivative of tacit collusion**, which focuses on how structural constraints within vertical relationships influence conduct and information. Like hub-and-spoke, these clauses affect the structure and flow of information along the vertical supply chain in a manner that can facilitate coordination. Unlike hub-and-spoke, however, the structural constraints and flow of information are directed through buyers, rather than through an upstream hub. Inspired by the trade law concept of Most Favoured Nation (MFN) – an acronym still frequently used in competition law literature – MFCs entail a guarantee that the price a buyer will be charged is just as favourable as that for any other party.[1] Sometimes also referred to as Price Parity Clauses (PPCs), these terms essentially denote that suppliers treat customer beneficiaries uniformly.[2]

These clauses differ from price matching guarantees, low-price guarantees (LPG), or MCCs, which relate to prices across different sellers.[3] MCCs are conceptually similar to MFCs. Instead of promising the best available price to downstream buyers without reference to

[1] JB Baker & JA Chevalier, 'The Competitive Consequences of Most-Favoured-Nation Provisions' *27 Antitrust 20* (2013), 20; JB Baker, 'Vertical Restraints with Horizontal Consequences: Competitive Effects of "Most-Favored-Customer" Clauses' *64 Antitrust 517* (1996), 519; JJ Wu & JP Bigelow, 'Competition and the Most Favored Nation Clause' [2013] *7(2) CPI Antitrust Chronicle*, 2.
[2] Baker (n 1) 519; JF Nieberding, 'The Anticompetitive Potential of MFNs' [2014] *8(2) CPI Antitrust Chronicle*, 2; JP van der Veer, 'Antitrust Scrutiny of Most-Favoured-Customer Clauses: An Economic Analysis' (2013) *4 Journal of European Competition Law & Practice 501*, 501.
[3] van der Veer (n 2) 502.

competitors, MCCs entail a promise to buyers to match prices of any horizontal competitor. Although MFCs have recently drawn more attention for their anticompetitive potential, the effects of MCCs are also of interest to the elusive dividing line for their direct referencing of competitors and curtailing of seller incentives to compete.

The following discussion takes a similar approach to the previous two chapters. It discusses the nature, variations, and competitive implications of the clauses at issue. The technical nature of these clauses requires a somewhat lengthy and detailed analysis of their economic effects, because understanding their differences is important for exploring the potential scope for tacit collusion. Following discussion of their economic effects, each section examines the potential implications for the dividing line. In keeping with the theme of this thesis, each practice is analysed through the prism of either natural or artificial transparency.

1) Most Favoured Customer Clauses

There are various MFC formats with different competitive implications: they can either be bilateral between a seller and a single buyer or a uniform seller policy guaranteed to all buyers.[4] Moreover, MFCs can have either contemporaneous or retroactive effect. The former implies the guarantee that a customer will not have to pay a higher price than any competitor contracting for the same good or service at that time.[5] The latter guarantees the lowest price not only at the time the offer is made but also undertakes to rebate beneficiaries to match lower prices of future transactions with other parties.[6]

There is a further distinction between narrow and wide MFCs, which applies specifically in the context of online price comparison websites (PCWs): narrow MFCs determine that the price between the PCW and the seller remains identical, 'ensuring that the former will not be less attractive than the latter'.[7] For example, if a PCW has a narrow MFC with a hotel, both must offer the same price for the same rooms. A wide MFC additionally guarantees that neither the upstream supplier nor any other platform connected to that upstream supplier offer a lower price than the platform benefiting from the MFC.[8] Although wide MFCs are generally considered to carry a higher risk for collusion, there have been moves to prohibit even narrow MFCs.[9]

Generally, MFCs tempt the interpretation that they intensify competition by forcing down prices to marginal costs.[10] However – warranting their analysis in this chapter – MFCs have ambiguous competitive effects: 'While such provisions seem to epitomise price competition […] they nonetheless have been the focus of antitrust scrutiny for their anticompetitive potential'.[11] This follows because they affect relative prices between customers but have no bearing on absolute prices. In other words, that prices are identical for all customers

[4] Baker & Chevalier (n 1) 20.
[5] Wu & Bigelow (n 1) 3; van der Veer (n 2) 501.
[6] TE Cooper, 'Most-Favored-Customer Pricing and Tacit Collusion' (1986) *17 Rand Journal of Economics 377*, 377; Wu & Bigelow (n 1) 2; van der Veer (n 2) 501.
[7] A Ezrachi, 'The Competitive Effects of Parity Clauses on Online Commerce' (2016) *11 European Competition Journal 488*, 489; P Chappatte & H Townley, 'Online Hotel Bookings – A Joint European Approach or a Most Favoured Nation?' *Slaughter and May Briefing* (2015) <https://www.slaughterandmay.com/media/2497093/online-hotel-bookings-a-joint-european-approach-or-a-most-favoured-nation.pdf> accessed 04 October 2019, 1.
[8] Ezrachi (n 7) 489; Chappatte & Townley (n 7) 1.
[9] Osborne Clarke, 'Latest Ruling on Booking.com's "Best Price" Clauses: Is Narrow the New Wide?' (2016) <http://www.osborneclarke.com/insights/Latest-ruling-on-Booking.coms-best-price-clauses-Is-Narrow-the-new-Wide/> accessed 04 October 2019; Chappatte & Townley (n 7) 2.
[10] Wu & Bigelow (n 1) 3.
[11] Nieberding (n 2) 2; Baker & Chevalier (n 1) 20; M Samuelson et al., 'Assessing the Effects of Most-Favored Nation Clauses' *ABA Section of Antitrust Law* (2012), 2.

does not preclude them from being supra-competitive. Before turning to variations of artificial transparency, the following briefly outlines the common pro- and anti-competitive effects of MFCs.

MFCs can spark vertical efficiencies, which substantiate their commercial rationale. First, where MFCs are implemented in competitive market conditions, they can exert downward pressure on prices.[12] In atomised markets with high search costs, MFCs are an efficient tool for buyers to secure lower prices.[13] This intuitive efficiency is their most frequently cited justification. It is raised even in more complex cases like *E-Books*, which also featured in the previous chapter on hub-and-spoke.[14]

Second, MFCs can reduce transaction costs and delays incurred through protracted negotiations, especially in continuous commercial relationships and under cyclical market conditions.[15] For example, where completion of a project requires a set of different transactions, MFCs counteract each counterparty's individual incentive to delay negotiations to secure a better deal.[16] Guaranteeing the same final price to all parties neutralises the incentive to delay an individual deal that has been rendered more profitable due to its increased relative importance to the overall project.[17] This dynamic also applies to perishable supplies where time is a factor.[18]

Third, MFCs circumvent "hold-up" problems and encourage otherwise risky investments.[19] If a seller makes significant transaction-specific investments, the counterparty to the transaction might attempt to exploit this to renegotiate a more favourable deal by threatening to contract with a competitor instead.[20] Being financially invested in the transaction then impels the former into a renegotiated, worsened deal. MFCs can remedy this risk but, unlike contracts setting a fixed price, retain the possibility of readjusting terms to fluctuating market conditions.[21]

The anticompetitive risk of MFCs can emanate from both unilateral and collusive conduct. Theories of harm associated with MFCs are the raising of rivals' costs, dampening of

[12] Baker (n 1) 531.
[13] Baker (n 1) 531; Samuelson et al. (n 11) 2; van der Veer (n 2) 501.
[14] *United States v. Apple Inc.* (2013) 952 F.Supp. 2d 683, at 700.
[15] Samuelson et al. (n 11) 2; Ezrachi (n 7) 489.
[16] Baker & Chevalier (n 1) 21.
[17] Baker & Chevalier (n 1) 21.
[18] Wu & Bigelow (n 1) 6.
[19] van der Veer (n 2) 502.
[20] Baker & Chevalier (n 1) 21; Wu & Bigelow (n 1) 5-6.
[21] Baker & Chevalier (n 1) 21; Baker (n 1) 533; Wu & Bigelow (n 1) 6.

competition, and facilitation of coordination.[22] Unilaterally, a dominant buyer can prevent challenges to her position from actual or potential competitors, raise their costs, or even drive them out of the market.[23] Sellers who cannot afford losing the dominant buyer as a customer might be prompted to offer MFCs, which would subsequently make it more difficult for other buyers to outcompete the beneficiary.[24]

It might not come as a surprise that MFCs fully realise their collusive potential in concentrated oligopolies.[25] Each variation of MFCs comes with its own variations of artificial transparency. Depending on their format, MFCs can facilitate coordination at different levels of the supply chain. Wide MFCs carry a risk of facilitating coordination up- and downstream, whereas narrow MFCs have so far only been associated with downstream collusion. Subsections (a) and (b) describe common MFC variations, which differ according to combinations of whether the provision is wide or narrow, multilateral or unilateral, and retroactive or contemporaneous. The corresponding effects on natural and artificial transparency are discussed in subsection (c).

a) Variations of Artificial Transparency for Wide MFCs

Wide MFCs guarantee buyers that they will receive the best price currently offered by a seller to any other buyer. In upstream scenarios, MFCs then aid monitoring and punishment. In downstream scenarios, MFCs can thereby determine a price floor. The following discussion explores these two scenarios. First, it examines how wide MFCs can facilitate coordination at the upstream level between oligopolistic suppliers who sustain MFCs with multiple buyers. This theory of harm is associated with the traditional brick and mortar context. Second, the discussion outlines how wide MFCs facilitate coordination at the downstream level between a few online platforms who sustain MFCs with multiple sellers.

i. Upstream Coordination

MFCs can facilitate both monitoring and punishment. Baker and Chevalier further argue that MFCs help detect cheating between upstream sellers, since widespread price cuts to multiple buyers are more likely to be detected by competitors.[26] The premise appears to be that the likelihood of information spreading increases if more parties are privy to it. Yet, absent a

[22] Baker (n 1) 518.
[23] Baker (n 1) 525; Nieberding (n 2) 4; van der Veer (n 2) 503.
[24] Baker & Chevalier (n 1) 21; Nieberding (n 2) 4.
[25] van der Veer (n 2) 503.
[26] Baker & Chevalier (n 1) 23.

concrete reason why information should spread between separate supply chains, an MFC ought not to alter the collusive rationale: if Hub A lowers prices to attract its spokes, Hub B faces declining demand and might infer a deviation (unless it misinterprets an exogenous demand shock). This accords with commonplace game theory and the existence of MFCs should have no bearing on monitoring.[27] Even where separate hubs have parallel MFCs with the same spokes, there is no obvious transfer of pricing information, since the commitment to match prices of upstream competitors only follows from conceptually different MCCs.[28]

The effect on punishment differs according to the format of the MFC. A seller constrained by retroactive MFCs must compensate all her buyers if she lowers her price and consequently faces costly rebates when deviating, which means she automatically amplifies punishment.[29] These additional costs increase her discount factor, since the potential profits from deviation shrink and the relative value of continued collusive profits concomitantly increases (*see* Chapter 1, Section D).[30] Hence, retroactive MFCs constitute a preconfigured, self-imposed restraint that amplifies punishment, which reduces the incentive to deviate and incidentally signals commitment to collusion.[31]

A potential counter-argument to their efficacy as a commitment device is that competitors who also employ MFCs pay just as dearly to punish the deviator.[32] Punishment through Nash reversion is just as costly as the initial deviation since both prompt MFC rebates.[33] However, if cheating entails a calculus of current profits versus post-deviation profits minus the cost of punishment, reduced post-deviation profits through automatic rebates increase the discount factor, regardless of the fact that competitors face the same costs for

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[27] EJ Green, RC Marshall, LM Marx, 'Tacit Collusion in Oligopoly', 466 in RD Blair & DD Sokol (eds.), *The Oxford Handbook of International Antitrust Economics, Volume 2* (2014, OUP: Oxford); K Leyton-Brown & Y Shoham, *Essentials of Game Theory: A Concise, Multidisciplinary Introduction* (Morgan & Claypool Publishers, 2008), 2.

[28] OFT, '*Can "Fair" Prices be Unfair? A Review of Price Relationship Agreements*' (2012) OFT1438, 10; AS Edlin, 'Do Guaranteed-Low-Price Policies Guarantee High Prices, and Can Antitrust Rise to the Challenge?' (1997) *111 Harvard Law Review 528*, 529-530; C d'Aspremont & R Dos Santos Ferreira, 'Meet-or-Release and Most-Favored-Customer Clauses with Price-Quantity Competition Yield Cournot Outcomes' (2005) *17 Économie Publique / Public Economics 221*, 223.

[29] Cooper (n 6) 378; Baker & Chevalier (n 1) 21-22; Baker (n 1) 520; Nieberding (n 2) 3; Samuelson et al. (n 11) 3; van der Veer (n 2) 504.

[30] Samuelson et al. (n 11) 3; S Sacher & J Sandford, *No Shortage of Theories: The Role of Capacity in Antitrust Analysis* (SSRN, 2016), 10; I Bos & JE Harrington, Endogenous Cartel Formation with Heterogeneous Firms, *RAND Journal of Economics 41(1)* (2010), 93; D Fudenberg & J Tirole, *Dynamic Models of Oligoply* (1990, Harwood Academic Publishers), 53; SB Wolf, Non-Cooperative Collusion in Static and Dynamic Oligopolies, *Theoretical Economics Letters 3* (2013), 319.

[31] Nieberding (n 2) 3; Samuelson et al. (n 11) 3-4; van der Veer (n 2) 504.

[32] Wu & Bigelow (n 1) 5; van der Veer (n 2) 504.

[33] ME Porter, *Competitive Strategy*, (Free Press, New York 2013), 315; Bos & Harrington (n 30) 97; Wolf (n 30) 321.

punishment. While both sides face additional costs, MFCs inhibit the initial deviation. Once the deviator triggers the dynamic, punishment is imperative. Multilateral, retroactive MFCs therefore increase collusive risk by instituting a commitment device and proving 'more effective in terms of communicating a general intent to refrain from engaging in price competition'.[34]

Multilateral, contemporaneous MFCs on the other hand entail a higher degree of flexibility for lowering prices, since price cuts are not penalised with costly rebates to existing customers.[35] Since sellers no longer face costly rebates to pre-existing customers, the relevant inhibition to deviate diminishes. For their lack of this characteristic commitment device, wide contemporaneous MFCs appear not to generate collusive risk commensurate with wide retroactive MFCs. Indeed, they do not seem to alter the collusive rationale significantly and are not further considered in this chapter.

Expanding on the above features of retroactive MFCs, Baker argues that even a single retroactive MFC, granted to a large customer, could adequately inhibit deviations.[36] This implies that sales to this large customer are so significant that the prospect of respective rebates is sufficiently deterrent. Further, Cooper argues that the unilateral adoption of retroactive MFCs by only one of a number of sellers can facilitate collusion.[37] His model sets out that an MFC offered unilaterally constitutes an adequate commitment for other sellers to realise their unilateral incentive to raise prices (with or without MFCs) as well.[38]

This arguably depends on certain structural pre-conditions regarding relative seller and buyer symmetry and bargaining power. One possible setting is where the sell-side and the buy-side, respectively, are symmetric. That is, the sellers are of equal size relative to each other and the same applies among the buyers. It is difficult to see in this scenario why one seller should accept the adoption of MFCs for her buyers when the others do not. A potentially costly commitment, which other sellers forego, waives Nash equilibrium – it is not the best response regardless of other sellers' choices – and is therefore necessarily contrary to her best self-interest.[39] The setting creates unwarranted imbalance as one seller constrains herself through potential rebates while her competitors remain at liberty to act without additional costs. The

[34] G Gürkaynak et al., 'Most-Favored-Nation Clauses in Commercial Contracts: Legal and Economic Analysis and Proposal for a Guideline' (2016) *42 European Journal of Law and Economics 129*, 146.
[35] Wu & Bigelow (n 1) 3-4.
[36] Baker (n 1) 521.
[37] Cooper (n 6) 378, 384; Wu & Bigelow (n 1) 4.
[38] Cooper (n 6) 387; Wu & Bigelow (n 1) 4.
[39] RH Frank & BS Bernanke, *Principles of Economics* (5th Ed., McGraw-Hill/Irwin 2013), 217; L Phlips, *Competition Policy: A Game-Theoretic Perspective* (Cambridge University Press, 1995), 5.

former adopts the rulebook of punishment-for-deviation plus rebate costs;[40] the latter retain regular Nash reversion – punishment-for-deviation – rules.[41]

The other option is that sellers and buyers are heterogeneous and have unequal bargaining power. The ability of powerful buyers to induce sellers to adopt MFCs was briefly raised earlier in the chapter in the context of unilateral theories of harm.[42] This power imbalance might be the consequence of the small size of a seller relative to her competitors and buyers or it might be the consequence of the power of a buyer relative to her competitors and sellers. While it is therefore conceivable that one seller might adopt an MFC where her competitors do not, there remain at least two issues that complicate coordination. First, if it follows from different sizes and bargaining powers at the seller level, this asymmetry complicates successful coordination because it entails different payoff functions and discount factors (*see* Chapter 1, Section 4.d).[43] Second, if it follows from the relative size of the buyer, this countervailing buyer power is itself considered to inhibit coordination.[44]

In sum, the upstream potential for collusion of wide, multilateral, retroactive MFCs is the most pronounced. They can stabilise coordination by amplifying punishment and incidentally signalling commitment to competitors. This does not apply to wide, multilateral, contemporary MFCs. Similarly, this commitment and signalling function seems to be weaker for wide, unilateral, retroactive MFCs. It therefore resembles the dynamic identified in the context of information disclosure, where multilateral conduct tends to carry significantly more collusive risk than unilateral conduct (*see* Chapter 3, Section 4).

ii. Downstream Coordination

Wide MFCs could be employed to sustain a wider collusive design. This was an issue in the previously mentioned *E-Books* case, where Apple offered an agency model with MFCs to various publishers and removed *ex ante* uncertainty by reassuring publishers of mutually

[40] Nieberding (n 2) 3; Samuelson et al. (n 11) 3; van der Veer (n 2) 504.
[41] M Ivaldi et al., The Economics of Tacit Collusion, *IDEI – Final Report for DG Competition, European Commission (2003)*, 5, 7; Phlips (n 39) 47; S Ardiyok, 'Comparative Analysis of Collective Dominance' (2006) *3 Journal of Yeditepe University Faculty of Law 1*, 7; Wolf (n 30) 319.
[42] Baker & Chevalier (n 1) 21; Nieberding (n 2) 4.
[43] Ivaldi et al. (n 41) 15-16; A Brandão, J Pinho, H Vasconcelos, 'Asymmetric Collusion with Growing Demand', *J Ind Compet Trade 14* (2014), 432.
[44] European Commission, *Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Cooperation Agreements* (2011/C 11/01), para. 45, 94; OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables DAF/COMP(2012)17, 25; Green, Marshall, Marx (n 27) 471.

conditional participation.[45] In this hub-and-spoke constellation, MFCs reinforced publishers' shared incentive to rebel against their existing retail model with Amazon, which meant having to match lower retail prices to Apple's agency model.[46]

Apple thereby gave publishers sufficient bargaining power to force other retailers into mirroring an agency/MFC model, stifling retail price competition.[47] Whereas the theoretical points raised earlier primarily contemplated how additional rebate costs inhibit an upstream seller from cheating horizontal collusion, *E-Books* is an instance of a hub facilitating downstream coordination. In this case, MFCs facilitate conditional participation for downstream collusion in a hub-and-spoke setting – a dynamic examined in Chapter 3.

More recently, downstream coordination facilitated by wide MFCs has moved into the spotlight through several investigations into online platforms, for example in the hotel portal and private motor insurance markets, which will be further discussed below. Before turning to narrow MFCs, the following briefly introduces some key aspects relevant to a discussion involving online platforms and outlines tenets of the mostly uncontested potential for wide MFCs to facilitate downstream coordination.

MFCs are a phenomenon frequently encountered in the context of online platforms, specifically PCWs, which entail specific conditions that do not usually apply in the brick-and-mortar context. These conditions include modifications in the distribution costs attained through intermediation and the two- or multi-sided nature of markets.[48] Whereas the conventional setting envisages an upstream seller and a downstream buyer, online platforms themselves are usually neither sellers nor buyers, but rather intermediaries between the upstream and the downstream.[49]

PCWs collate information from various sellers to provide a better overview and to facilitate platforms with demand-enhancing features.[50] PCWs attract sellers through the size of their consumer traffic, which in turn depends on their retention of a wide portfolio of sellers, functionality, and advertising.[51] They are generally associated with conventional efficiencies

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[45] L Atlee & Y Botteman, 'Resale Price Maintenance and Most-Favored Nation Clauses: The Future Does Not Look Bright' [2013] *11(1) CPI Antitrust Chronicle*, 2; Wu & Bigelow (n 1) 8-9; van der Veer (n 2) 505; *United States v. Apple Inc.* (2013) 952 F.Supp. 2d 683, 647; O Odudu, 'E-Books: Vertical Participation in Hub and Spoke Agreements', *Competition Bulletin* 2013 <https://competitionbulletin.com/2013/07/18/e-books-vertical-participation-in-hub-and-spoke-agreements/> accessed 04 October 2019.
[46] van der Veer (n 2) 505.
[47] *United States v. Apple Inc.* (n 45) at 647; Nieberding (n 2) 8.
[48] M Colangelo, 'Parity Clauses and Competition law in Digital Marketplaces: The Case of Online Hotel Booking' (2017) *8 Journal of European Competition Law & Practice 3*, 3.
[49] Federal Cartel Office, Decision B9-121/13 *Booking* (2015), para. 19.
[50] Ezrachi (n 7) 490.
[51] Colangelo (n 48) 4; CMA, *Private Motor Insurance Market Investigation – Final Report* (2014), 8.2.

harnessed through enhanced information flows accessible to buyers, which reduce search costs, mitigate price discrimination, enhance allocative efficiency, and ultimately foster competition due to enhanced demand elasticity.[52]

They also afford smaller sellers access to online advertising and commerce who would otherwise lack the requisite economies of scale to compete with larger sellers.[53] For example, where PCWs only charge commission for successful transactions, they alleviate constraints faced by smaller hotels who may find pay-per-click advertising on search engines prohibitively costly.[54] This form of remuneration is the prevalent agency model, which allows upstream sellers to set the final price and negotiate a commission per sale with a PCW.[55] PCWs then compete on the amount of this commission (unless – as this chapter goes on to discuss – they safeguard price parity through MFCs).[56]

While the agency model is prevalent and most relevant to the discussion on competitive effects of MFCs, alternative forms of remuneration exist. One is the wholesale model under which the price of the sale from upstream seller to PCW is negotiated and the latter is subsequently free to set the final price to attain a margin.[57] Another possibility is the merchant model, where a platform purchases goods at a pre-arranged intermediary price and then 'marks up the net rates and finalises the transaction'.[58]

Two recent investigations, one by the German FCO and the other Europe-wide by several National Competition Agencies, paint a clear picture of the competitive risk stemming from the usage by PCWs of wide MFCs. These provisions meant that the platforms were guaranteed the best room prices from hotels, who usually had MFCs with each of the major PCWs. PCWs therefore had no incentive to compete with each other, because it was impossible for each to undercut their competitors where MFCs guaranteed matching price reductions.

First, in *HRS* the FCO and the then-OFT each investigated the pricing model of the hotel booking website "HRS".[59] While the OFT ultimately closed the investigation, the FCO

[52] Ezrachi (n 7) 492-493; *Maple Flooring Manufacturers Association v. United States* (1925) 268 U.S. 563, at 582-83; OECD, *Roundtable on Information Exchanges Between Competitors Under Competition Law*, DAF/COMP/WD(2010)118, 27.
[53] Ezrachi (n 7) 494.
[54] ibid 494-495.
[55] Colangelo (n 48) 7-8; *Private Motor Insurance Market Investigation* (n 51) 8.32.
[56] S Heinz, 'Online Booking Platforms and EU Competition Law in the Wake of the German Bundeskartellamt's Booking.com Infringement Decision' (2016) *7 Journal of European Competition Law & Practice 530*, 532; *Private Motor Insurance Market Investigation* (n 51) 8.40.
[57] Colangelo (n 48) 5; *Private Motor Insurance Market Investigation* (n 51) 8.33.
[58] Colangelo (n 48) 5.
[59] BKartA Decision B9-66/10, *HRS* (2013); CMA Press Release, 'CMA Closes Hotel Online Booking Investigation' (2015) <https://www.gov.uk/government/news/cma-closes-hotel-online-booking-investigation> accessed 04 October 2019.

concluded that the presence of wide MFCs reduced incentives 'for hotel portals to offer lower commissions' or 'face up to competition by adopting new sales strategies', stifled market entry, and reduced 'opportunities open to hotels'.[60] Further, wide MFCs had the effect of allowing HRS to raise its commissions without fear that, in response, hotels would raise their room rates higher than offered on competing portals.[61] Second, in *Booking* several NCAs investigated and either prohibited or accepted commitments to cease usage of wide MFCs.[62] The affected PCWs proposed instead to implement only narrow MFCs, which all NCAs but the German FCO accepted.[63]

b) Variations of Artificial Transparency for Narrow MFCs

Having discussed the relatively well understood competitive implications of wide MFCs, the analysis now turns to the more heavily and recently debated effects of narrow MFCs. As previously noted in the chapter introduction, it is helpful to understand the potential effects of both types of MFCs, before turning to an assessment of their categorisation in terms of natural and artificial transparency. Narrow MFCs only dictate that prices or conditions of an upstream seller will not be lower than those on the online platform benefiting from the clause.[64].

Narrow MFCs sustain certain safeguards and efficiencies for sellers, PCWs, and buyers. They mitigate the risk of free riding, which entails that buyers obtain information about offers and conditions through PCWs but subsequently purchase directly from sellers to avoid additional portal fees.[65] Best-price guarantees help PCWs maintain their credibility and to invest in improving the accessibility, features, and usability of their platform.[66] This ultimately lowers search costs.[67] At the same time, vertical price parity still permits horizontal competition between PCWs.[68] First, they can compete on the amount of commissions charged to suppliers, since 'lower prices can be offered in exchange for lower commission'.[69] Second, they can

[60] *HRS* (n 59) para. 155 ff; CMA Press Release (n 59)
[61] *HRS* (n 59) para. 157.
[62] Colangelo (n 48) 5.
[63] ibid.
[64] *Private Motor Insurance Market Investigation* (n 51) 8.27; Ezrachi (n 7) 489.
[65] F Wals & MP Schinkel, 'Platform Monopolization by Narrow-PPC-BPG Combination: Booking et al.' (2018) *International Journal of Industrial Organization 1*, 2; Gürkaynak et al. (n 34) 150; *Private Motor Insurance Market Investigation* (n 51) 8.87(b), 8.99; Ezrachi (n 7) 491.
[66] Gürkaynak et al. (n 34) 142; Ezrachi (n 7) 491; *Private Motor Insurance Market Investigation* (n 51) 8.82(a), 8.87(a).
[67] *Private Motor Insurance Market Investigation* (n 51) 8.82(b).
[68] Ezrachi (n 7) 507.
[69] Ezrachi (n 7) 507; Colangelo (n 48) 6.

compete on the aforementioned demand-enhancing features to attract buyers.[70] These efficiencies suggest a legitimate commercial rationale for narrow MFCs.

Narrow MFCs also carry collusive potential, especially when subject to network effects. This is the important theory of harm, which envisages that a set of narrow MFCs generates collusive risk where they create horizontal uniformity among PCWs.[71] Where multiple PCWs keep narrow MFCs with an upstream seller and the seller herself also maintains a sales channel, the price she sets can effectively become the floor price for all PCWs.[72] This theory assumes an agency model as a basis and presupposes that the upstream seller maintains her own sales channel, thereby providing a focal point for narrow MFCs.[73]

In this scenario, sellers would maintain their own sales channel to avoid having to pay commissions to PCWs.[74] Where a seller has narrow MFCs with several PCWs, her own price has to be at least as high as the most expensive platform price.[75] Although the remaining PCWs could theoretically set a lower price, the seller has an incentive to keep their prices as high as her own.[76] Otherwise, she jeopardises the attractiveness of her own sales channel, which bears a higher margin because it avoids commissions.[77] Since the seller is required not to price lower than the most expensive PCW and incentivised not to price higher than any PCW, the theoretical outcome is a uniform floor price. Harm arises through the multilateral adoption of narrow MFCs between one seller and several PCWs.

The likelihood of this theory of harm materialising in practice remains subject to dispute. The lone enforcement agency that sought to prohibit narrow MFCs –contrary to a significant number of other EU agencies[78] – is the German FCO.[79] In *Booking*, the FCO found that network effects generated through narrow MFCs restricted competition by creating price uniformity between hotel portals as well as between hotels.[80] It reasoned that, as long as hotels offered the same prices on their own websites as they did on Booking.com, there was no

[70] Ezrachi (n 7) 507.
[71] *Private Motor Insurance Market Investigation* (n 51) 8.44(a).
[72] Ezrachi (n 7) 508; *Private Motor Insurance Market Investigation* (n 51) 8.46-8.48.
[73] *Private Motor Insurance Market Investigation* (n 51) 8.450; Ezrachi (n 7) 507-508.
[74] Ezrachi (n 7) 508; *Booking* (n 49) paras. 195-197.
[75] BO Johansen & T Vergé, 'Platform Price Parity Clauses with Direct Sales' (2016) *Department of Economics, University of Bergen – Working Papers in Economics (No. 1/17)*, 7.
[76] Johansen & Vergé (n 75) 7; Wals & Schinkel (n 65) 14; *Private Motor Insurance Market Investigation* (n 51) 8.49.
[77] Wals & Schinkel (n 65) 4, 12, 14; *Private Motor Insurance Market Investigation* (n 51) 8.49.
[78] Heinz (n 56) 531.
[79] Ezrachi (n 7) 513.
[80] *Booking* (n 49)para. 192 ff.; Heinz (n 56) 53.

incentive for them to lower the prices on competing PCWs, thereby undercuting their own sales channel.[81]

The FCO also rejected Booking.com's efficiency arguments. It argued that efficiencies were the result of PCWs in general, rather than of narrow MFCs, and considered that Booking.com had not adduced sufficient evidence to show that removing the clauses would lead to a decline in sales or free riding.[82] It questioned the necessity for PCWs to use MFCs to sustain their credibility and incentive to invest in demand-enhancing features. The FCO argued that without MFCs, the more the portals invest in quality the more buyers they attract, and the better their offer for hotels.[83] At the same time, the FCO rejected the argument that narrow MFCs lowered search costs, essentially reasoning that any certainty of attaining the lowest available price is meaningless if this price is artificially high.[84]

Where hotels maintain their own sales, it is certainly conceivable that narrow MFCs maintained by several PCWs could create a contractual web that leads to price uniformity. However, the FCO's reasoning was quashed on appeal to the Higher Regional Court Dusseldorf, which disagreed on two key points. Having commissioned its own survey of the relevant market, the court found no discernible evidence of narrow MFCs leading to a restriction of competition in practice.[85] In fact, the court found that the clauses were necessary for ensuring the fair and equal provision of services between hotels and PCWs.[86] The court did not publish its judgment in full, which prohibits a closer look into its reasoning and the underlying evidence. This leaves as a possible takeaway from *Booking* not necessarily that the FCO's theory of harm cannot materialise in practice, but that it did not do so in this particular case.

The FCO decision also markedly differs from the conclusions of the CMA investigation into the private motor insurance market. Emphasising the procompetitive elements, the CMA found that there was no 'obvious alternative mechanism, in place of a narrow [MFC], which a PCW could use to ensure that the prices it quoted reflected the prices available on the PMI providers' own websites'.[87] This argument about a lack of alternatives to safeguard the

[81] *Booking* (n 49) para. 194; Heinz (n 56) 531-532.
[82] *Booking* (n 49) para. 261 ff.
[83] Heinz (n 56) 533.
[84] Colangelo (n 48) 8-9; Heinz (n 56) 534.
[85] Higher Regional Court Dusseldorf, 'Hotelbuchungen im Internet: "Enge" Bestpreisklauseln sind zulässig', *Press Release* (2019), <http://www.olg-duesseldorf.nrw.de/behoerde/presse/Presse_aktuell/20190604_PM_booking/index.php> accessed 04 October 2019.
[86] ibid.
[87] *Private Motor Insurance Market Investigation* (n 51) 8.98.

commercial rationale of the PCW is an important indicator of conduct consistent with natural transparency, which will inform the subsequent discussion on the dividing line.

Just like the FCO conclusions in *Booking,* the CMA's conclusions considered the particular conditions of the market that provided the context for the assessment.[88] The relevant difference in their analyses is the weight placed on the proportion of sales made through upstream sellers' direct sales channels, which the FCO considered to be significant and the CMA did not. Two theoretical scenarios for the distribution of sales between seller and PCW emerge: either upstream sellers eschew direct sales and exclusively use PCWs or there is a mix between direct and PCW sales.

Scenario one – sales are made exclusively through PCWs – depends on the importance the seller accords to her direct sales channel. The CMA lists two legitimate motivations for a seller to want to maintain her own sales channel: first, the strength of the brand, which is indicative of the prospective value of direct sales and, second, the margins offered by other PCWs 'with which the brand has no narrow or wide MFNs: the lower the commission fees on these alternative PCWs, the less worth protecting the own website becomes'.[89]

The first motivation concerns the importance, i.e. profitability, of the seller's sales channel. Strong brands benefit from their own sales channels and the theory of harm applies. For an unrecognisable brand, the sales channel becomes relatively less relevant and the theory of harm weakens. What remains unexplained, however, is why MFCs are necessary if the seller has no, or an unimportant, direct sales channel. The justification for narrow MFCs is made in reference to upstream prices; its applicability – pace a commercial rationale and corresponding scope for natural transparency – wanes in the absence of upstream sales. Pertaining to its investigation, the FCO implied as much when stating that 'it is also impossible to say why […] the hotels' own online marketing is supposedly of only minor, negligible significance; if this were true, Booking could have deleted the best price clauses entirely, instead of reducing them to narrow best price clauses […]'.[90]

The second point assumes the existence of competing PCWs without MFCs, which does not directly respond to the issue of network effects generated when multiple PCWs maintain narrow MFCs. Instead, it addresses the alternative scenario of unilateral narrow MFCs and supports the argument that unilateral narrow MFCs might sustain collusion less effectively than multilateral narrow MFCs. The FCO argued that, where narrow MFCs might generate

[88] ibid 8.118.
[89] ibid 8.50.
[90] *Booking* (n 49) para. 199.

collusive effects, network effects generating anticompetitive harm are amplified through multilateral adoption.[91]

Inconventiently from an analytical point of view, scenario two – sellers and PCWs both have sales – combines the most pronounced collusive risk with the strongest efficiency justification. The relative distribution of sales, which affects the strength of network effects, is necessarily market specific. For example, the markets for hotel bookings and payments systems have a 'non-negligible share' of direct sales.[92] In those settings, narrow MFCs may produce effects tantamount to wide MFCs.[93] This is in line with the FCO's view: in *Booking*, the FCO found that hotels sought to strengthen their own sales channels instead of diverting their sales away to PCWs.[94] Albeit with significant variations in individual percentages (between 10% and 50%), hotels stated that on average, 20-30% of their online sales were made directly.[95] The survey also showed that hotels were unwilling to set direct room prices at higher levels than on PCWs.[96]

Conversely, the CMA in the PMI investigation noted that there may not be an obvious alternative tool to safeguard the effective maintenance of PCWs.[97] The FCO noted only that Booking.com had not adduced sufficient evidence to support this claim.[98] It is unfortunate that it did not consider this point in further detail, since such discussion would have gone to the heart of commercial rationale and the corresponding notions of natural and artificial transparency. The OLG Dusseldorf also forewent a similar opportunity when publishing its reasoning for quashing the FCO's decision in *Booking*, leaving the details of this point similarly unaddressed at the appeal stage. This leaves an open question as to the circumstances under which narrow MFCs may reflect a legitimate commercial rationale,if not necessity, such that any potential network effects conducive to coordination would remain within the remit of natural transparency.

c) Implications for the Dividing Line

The various applications and formulations of MFCs stand in varying relation to the dividing line between tacit collusion and concerted practices. MFCs generate different competitive

[91] *Booking* (n 49) para. 237.
[92] Johansen & Vergé (n 75) 23.
[93] ibid 32.
[94] *Booking* (n 49) paras. 195-197.
[95] ibid para. 46.
[96] ibid paras. 39, 41.
[97] *Private Motor Insurance Market Investigation* (n 51) 8.98.
[98] *Booking* (n 49) para. 266 ff.; Heinz (n 56) 533.

effects, depending on their formulation and context. Though each of the above formulations is in some way conducive to coordination and therefore relevant to an understanding of the dividing line, they follow different logics, depending on their wide or narrow formulation and upstream or downstream application.

Wide upstream MFCs are somewhat of an anomaly in the context of this thesis, because arguably they only affect punishment. The self-imposed amplification of punishment also signals commitment to coordination. Yet, it would be a stretch to argue that MFCs in this setting have a real impact on transparency. Rather, they constrain seller incentives to deviate. Each seller increases her discount factor by amplifying her potential punishment for deviation. It could be argued that wide upstream MFCs stabilise existing collusion by increasing the discount factor and that, given this possibility, they warrant closer scrutiny. This applies to the extent that MFCs can be effective in combination with other facilitating devices, as they were in cases like *E-Books* or *United States v. General Electric*.[99] Isolated, however, it is difficult to see how wide upstream MFCs would initiate coordination, a point rarely made in collusion literature.[100] Hence, this type of MFCs might not generate levels of artificial transparency comparable to other collusive devices outlined in this thesis.

Wide downstream MFCs are analytically more straightforward. *HRS* and *Booking* illustrate how wide MFCs can alleviate incentives for platforms to compete. Prices are pegged to upstream sellers and, more importantly, competitors. The setting contractually begets parallelism. Artificial transparency in this case means that platforms are all but guaranteed that their price increases – typically referring to a raise in commissions – will either be met or at least not punished. Invariably to the detriment of buyers, the contractual safeguard that prices remain level with competitors is rather blatant a mechanism for creating artificial transparency.

Narrow downstream MFCs raise more complex questions regarding transparency. The CMA in the PMI investigation considered narrow MFCs a tool of commercial necessity, which implies that any resulting effect on coordination would qualify as natural transparency. The CMA did not elaborate on an important question, which the FCO separately took issue with, namely why MFCs are necessary for sellers with insignificant upstream sales channels in the first place. Indeed, their commercial rationale becomes somewhat unclear when significant sales take place only through either the direct sales channel or the platform.

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[99] *United States v. Apple Inc.* (n 45)at 647; van der Veer (n 2) 505; *United States v. General Electric Co.* (1926) 1977 WL 1457, at 1.

[100] Green, Marshall, Marx (n 27) 469; KU Kühn, 'Fighting Collusion by Regulating Communication Between Firms' (2001) *16 Economic Policy 167*, 174; JE Harrington, 'A Theory of Tacit Collusion' (2011) <https://econpapers.repec.org/paper/jhupapers/588.htm> accessed 04 October 2019, 3.

Reflecting the common thread of the preceding chapters, absent a vindicating commercial rationale for narrow MFCs, the increase in transparency conducive to coordination would have to be considered artificial. This has yet to be proven to materialise in practice, however. The OLG Dusseldorf disagreed not only with the FCO's argument that the narrow MFCs employed by Booking.com lead to a restriction of competition, it also held that these clauses were essential to maintaining the free and fair exchange of services between the PCW and hotels.[101]

The question of commercial rationale becomes more difficult where significant sales occur at both seller and PCW level. Neither the FCO nor the CMA analysed in detail whether the lack of an obvious alternative mechanism to maintain the efficacy of PCWs – that is, the ostensible commercial rationale – may constitute an adequate justification where significant sales occur at both levels, notwithstanding the risk of network effects equating the economic effects of narrow MFCs to those of wide MFCs. The FCO argued that PCWs could attract custom by investing in quality, thereby attracting more customers and improving their offer to hotels without MFCs.[102]

At the same time, the FCO did not accept that Booking had adduced sufficient proof that removing narrow MFCs would result in free riding and declines in sales.[103] In other words, the FCO cast doubt on the commercial importance of narrow MFCs, such that they would not require an obvious alternative. At this relatively nascent state of enforcement and analysis, it would be interesting to see whether and why other competition authorities would consider narrow MFCs a tool of commercial necessity in cases where significant sales occur both at seller and PCW level. Authorities might yet have to concede that narrow MFCs result in natural transparency.

[101] Higher Regional Court Dusseldorf (n 85).
[102] Heinz (n 56) 533.
[103] *Booking* (n 49) para. 266 ff.

2) Meeting Competition Clauses

Meeting Competition Clauses (MCC) promise to match lower prices set by a competitor.[104] Since this promise necessarily references competitors, a seller effectively delegates some of her pricing autonomy.[105] Various formulations – Low Price Guarantees,[106] Best Price Clauses,[107] Price Matching Guarantees,[108] Price Matching Clauses[109] – express the essence of this mechanism, and in each case the exact formulation of a clause can materially alter the applicable analysis. Because these terms are sometimes (sub)grouped in various ways, at other times used synonymously, and often cited inconsistently, some preliminary clarifications are in order.

First, MCCs differ from Beating Competition Clauses (BCCs), also referred to as Price Beating Guarantees (PBG), which promise to undercut competing offers.[110] Arbatskaya et al. show that BCCs are less conducive to collusion than MCCs, since BCCs entail more restrictions (the impact of which is discussed in the discussion on hassle costs below).[111] They corroborate their argument with a survey of MCC and BCC guarantees, showing that nearly two-thirds of them are MCCs rather than BCCs and that 'over 90 percent of [BCCs] are inconsistent with their use as facilitating devices'.[112]

Second, the analysis differs depending on whether MCCs reference advertised or selling prices.[113] If a seller adopts MCCs on advertised prices, competitors can simply keep advertised prices high but discount to a lower selling price without triggering the clause.[114] Accordingly, coordination is less sustainable with MCCs that reference advertised prices.[115] Corts confirms this in the context of BCCs, arguing that a seller 'can always capture the entire

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[104] OFT (n 28) 10; Edlin (n 28) 529-530; d'Aspremont & Dos Santos Ferreira (n 28) 223; S Dugar & T Sorensen, 'Hassle Costs, Price-Matching Guarantees and Price Competition: An Experiment' (2006) *28 Review of Industrial Organization 359*, 359; JP Kretschmer & O Budzinski, 'Advertised Meeting-the-Competition Clauses: Collusion Instead of Price Discrimination' (2011) *31 Economics Bulletin 3153*, 3153; S Salop, 'Practices that (Credibly) Facilitate Oligopoly Coordination' (1982) *FTC Working Paper No. 73*, 27.
[105] S Moorthy & RA Winter, 'Price-Matching Guarantees' (2006) *37 The Rand Journal of Economics 449*, 450; OFT (n 28) 18.
[106] M Arbatskaya, 'Can Low-Price Guarantees Deter Entry?' (2001) *19 International Journal of Industrial Organization 1387*, 1388.
[107] M Schnitzer, 'Dynamic Duopoly with Best-Price Clauses' (1994) 25 *The Rand Journal of Economics 186*, 186.
[108] Moorthy & Winter (n 105) 449; Dugar & Sorensen (n 104) 359.
[109] Schnitzer (n 107) 188.
[110] M Arbatskaya et al., 'On the Incidence and Variety of Low-Price Guarantees' (2004) *47 The Journal of Law & Economics 307*, 314-315; OFT (n 28) 10.
[111] Arbatskaya et al. (n 110) 310, 317, 320.
[112] ibid 320, 328.
[113] Arbatskaya et al. (n 110); Arbatskaya (n 106) 1392.
[114] Arbatskaya et al. (n 110) 320-321.
[115] ibid 321.

market by undercutting the profitable firms in effective price by announcing a higher price coupled with an appropriate price-beating policy'.[116]

Third, MCCs subdivide into non-release (NR) clauses, which bind sellers to match prices, and meet-or-release (MOR) clauses, which enable sellers either to match prices or to release a buyer to accept a competing offer.[117] MOR clauses delegate pricing autonomy less definitively, since a seller can alternatively release her customers to a competitor.[118] These distinctions are noted in the following discussion where relevant.

Fourth, there is an important caveat to the degree of collusive risk stemming from MCCs in practice. The models outlined in the following generally contemplate that MCCs are triggered automatically; a theoretical assumption that may not apply in practice. Buyers have to invoke MCCs, thus incurring non-pecuniary "hassle costs" of obtaining the refund associated with such guarantees.[119] Potential restrictions that inhibit buyers from requesting refunds can include written proof of a lower price,[120] product or geographical limitations,[121] opportunity cost for time and transportation,[122] filling in forms,[123] or merely the 'disutility of confronting a sales person'.[124] Where these costs outweigh the expected gains, buyers are likely to refrain from invoking MCCs.[125]

Reluctance to invoke MCCs reduces their collusive potential, since buyers would instead prefer to opt for the lowest price, notwithstanding MCCs.[126] In those instances MCCs and their collusive potential diminish, which reinstates conventional competition parameters.[127] Dugar and Sorensen find that the degree of hassle costs relates inversely to the level of prices, such that markets with high hassle costs will generate more competitive equilibria.[128] Further, Arbatskaya et al. find that to facilitate collusion, MCCs (more so than BCCs) 'should apply to selling prices and have low hassle costs'.[129]

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[116] KS Corts, 'On the Robustness of the Argument that Price-Matching is Anti-Competitive' *47 Economics Letters 417*, 420.
[117] Salop (n 104) 28-29; d'Aspremont & Dos Santos Ferreira (n 28) 225; CA Holt & DT Scheffman, 'Facilitating Practices: The Effect of Advance Notice and Best-Price Policies' (1987) *18 The Rand Journal of Economics 187*, 190; OFT (n 28) 10; [117] Schnitzer (n 107) 186.
[118] Schnitzer (n 107) 187; OFT (n 28) 18.
[119] M Hviid & G Shaffer, 'Hassle Costs: The Achilles' Heel of Price-Matching Guarantees' (1999) *8 Journal of Economics & Management Strategy 489*, 490, 494; Arbatskaya (n 106) 1391; OFT (n 28) 13, 21.
[120] Hviid & Shaffer (n 119) 491; Arbatskaya et al. (n 110) 323.
[121] Arbatskaya et al. (n 110) 323.
[122] Hviid & Shaffer (n 119) 490, 495; Dugar & Sorensen (n 104) 361.
[123] Dugar & Sorensen (n 104) 361.
[124] Hviid & Shaffer (n 119) 495.
[125] ibid 499; Arbatskaya et al. (n 110) 310.
[126] Hviid & Shaffer (n 119) 491; Dugar & Sorensen (n 104) 360; Arbatskaya et al. (n 110) 323.
[127] Dugar & Sorensen (n 104) 359.
[128] ibid 362.
[129] Arbatskaya et al. (n 110) 325.

With these preliminary clarifications in mind, there are certain efficiencies derived from MCCs. In cases where MCCs are part of a strategy to attract and retain custom, they can indeed benefit individual buyers that gain price reductions.[130] MCCs are an effective mechanism for signalling attractive prices to buyers.[131] Low-cost sellers can substantially benefit from adopting MCCs to signal their prices where high-priced competitors would rather avoid 'mimicking because doing so would involve delegating their pricing decision to firms that, in equilibrium, price well below the level optimal for these high-priced firms'.[132] This relates back to the effects of seller asymmetry outlined in Chapter 1, Section 4.

MCCs further assist with mitigating incomplete contract problems, since they permit 'the contract price to vary with exogenous changes outside of the contracting parties control (for example the cost of substitute inputs, or in the technology, or in other market conditions), thus introducing some flexibility'.[133] Especially MOR clauses offer flexibility in this regard.[134] As such, they share similarities with MFCs when it comes to adapting to changing market conditions and reducing transaction delays and costs.[135]

Finally, MCCs can have positive welfare effects where sellers are able to price discriminate.[136] MCCs encourage a subset of generally loyal but price conscious customers – 'opportunistic loyals' – to search for saving opportunities and subsequently invoke MCCs with their seller, which induces sellers to compete more vigorously.[137] Further, MCCs enabling price discrimination may enhance welfare where the demand elasticity of informed buyers is sufficiently high, for they 'become relatively less important for the low-priced firm since some of them now invoke a high-priced firm's price-matching policy, and this leads the low-priced firm to set a price closer to its sophisticated consumer optimal price'.[138]

In light of these efficiencies, MCCs superficially appear to epitomise competition by pressuring prices downwards.[139] After all, 'what could be more competitive than sellers' guaranteeing their low prices by promising to match the prices of any competitor'?[140] Yet, their

[130] OFT (n 28) 38.
[131] Moorthy & Winter (n 105) 455; M Hviid & G Shaffer, 'Matching Own Prices, Rivals' Prices, or Both' (2008) *CCP Working Paper 08-26*, 2; OFT (n 28) 13.
[132] Moorthy & Winter (n 105) 460-461.
[133] OFT (n 28) 37.
[134] ibid.
[135] Samuelson et al. (n 11) 2.
[136] Hviid & Shaffer (n 131) 2.
[137] Y Chen et al. 'Consumer Heterogeneity and Competitive Price-Matching Guarantees' (2001) *20 Marketing Science 300*, 301, 311; OFT (n 28) 29-30.
[138] KS Corts, 'On the Competitive Effect of Price-Matching Policies' (1996) *15 International Journal of Industrial Organization 283*, 291; OFT (n 28) 28-29.
[139] Corts (n 138) 284; Moorthy & Winter (n 105) 449; OFT (n 28) 19.
[140] Edlin (n 28) 531.

promise to match any price reduction creates a paradoxical disincentive for sellers to lower prices, since doing so would maintain the same demand proportions but at a lower equilibrium, such that no custom is rerouted from competitors.[141] Their collusive potential emerges from three effects in particular. These effects are merely analytical tools, not themselves the theories of harm associated with MCCs:

1) *Transmission effect*: MCCs expedite and automate how information reaches sellers where buyers notify competing price reductions, leading to an increase in transparency by allaying detection lags.[142] MCCs can sustain dependable transmission, pace discussion on the frequency of interaction, amplifying the velocity of information and promoting the stability of collusion (*see* Chapter 1, Section E.3).
2) *Cost effect*: vying for better deals, buyers unwittingly serve as a conduit for information that is otherwise costly for sellers to obtain.[143]
3) *Commitment effect*: sellers understand that they cannot undercut competitors who pre-commit to match price reductions.[144] Coupled with rapid transmission, this commitment inhibits sellers from price reductions solely aimed at undercutting competitors, which lies at the heart of collusive theory pertaining to MCCs.

To reiterate, these tools merely aid the assessment of the actual anticompetitive effects associated with MCCs, which are foreclosure, abusive price discrimination, and collusion.[145] To foreclose competitors, a dominant seller charges the monopoly price and deters entry by signalling through MCCs her resolve to cut prices if necessary.[146] BCCs similarly deter entry by signalling willingness by the incumbent to undercut rather than to match entrants.[147] The ability to price discriminate envisages that some buyers are informed, implying higher demand elasticity, whereas others are not.[148] Sellers employing MCCs can then exploit the subset of less informed buyers by offering separate prices: high list prices apply when the clause is not triggered and a low effective price applies when the clause is triggered.[149] Price discrimination

[141] OFT (n 28) 19.
[142] Salop (n 104) 28.
[143] Salop (n 104) 28.
[144] Arbatskaya et al. (n 110) 311; Moorthy & Winter (n 105) 453; Hviid & Shaffer (n 119) 498.
[145] Kretschmer & Budzinski (n 104) 3153; Arbatskaya (n 106) 1388-1389; OFT (n 28) 13.
[146] Arbatskaya (n 106) 1389; OFT (n 28) 15.
[147] OFT (n 28) 17.
[148] Corts (n 138) 285, 291; OFT (n 28) 23.
[149] Moorthy & Winter (n 105) 449; Kretschmer & Budzinski (n 104) 3153; OFT (n 28) 11-12, 23, 27.

derives from the individual incentive of a price-matching seller and requires neither collusion nor dominance.[150]

These caveats and non-collusive theories of harm provide some context for the more relevant discussion on the potential of MCCs to facilitate coordination and how they inform the dividing line between tacit collusion and concerted practices. The following outlines the effects of multilateral and unilateral MCCs and how they relate to the underlying discussion on natural and artificial transparency.

a) Variations of Artificial Transparency for MCCs

The chapters on information disclosure and hub-and-spoke, as well as the previous section on MFCs, discussed variations of artificial transparency in reference to case examples. There is no comparable amount of case law to support arguments regarding the practical application of MCCs. While there was an important (and even unilateral) "best price clause" in *United States v. General Electric*, the important element in that case was the asymmetric nature of the information, rather than the clause itself.[151] The following discussion instead focuses on the theoretical effects of MCCs – both multilateral and unilateral – and their implications for competition policy.

The literature on collusion does not usually distinguish between informed and uninformed buyers, central to price discrimination.[152] Where MCCs directly match price reductions, they reduce incentives to compete and raise equilibrium prices, potentially even to monopoly levels.[153] Hence, they can support multiple equilibria between competitive and monopoly prices.[154] In a setting with **multilateral MCCs**, each seller understands that she cannot profitably undercut competitors who are pre-committed to match lower prices.[155] This constitutes the abovementioned commitment effect. Demand functions become less elastic, because buyers are less susceptible to price decreases that are promptly matched.[156]

[150] Edlin (n 28) 536.
[151] *United States v. General Electric Co.* (n 99) at 1.
[152] Edlin (n 28) 537.
[153] Dugar & Sorensen (n 104) 360; Moorthy & Winter (n 105) 449; Holt & Scheffman (n 117) 189-190, 192; Edlin (n 28) 529; Arbatskaya et al. (n 110) 308; Arbatskaya (n 106) 1388.
[154] Hviid & Shaffer (n 119) 497.
[155] Arbatskaya et al. (n 110) 311; Moorthy & Winter (n 105) 453; Hviid & Shaffer (n 119) 498.
[156] OFT (n 28) 12.

MCCs differ from universal price cuts (pace punishment-for-deviation literature)[157], because they entail a 'promise to customers, rather than a threat to sellers', which impacts the cost and credibility of collusive mechanisms.[158] Since buyers notify other sellers of price cuts swiftly (this is the transmission effect), MCCs facilitate monitoring, which increases the discount factor because abbreviated deviations must outweigh anticipated future profits.[159] Monitoring also becomes cheaper where deviations are notified by customers (this is the cost effect).[160] Finally, MCCs amplify punishment since price cuts are swiftly matched through customer rebates.[161]

MCCs' effect on punishment can be further unpacked. If sellers are able to discriminate, they enable cheaper punishment where matching price cuts selectively target the subset of customers at risk of switching to competitors.[162] Further, MCCs enable matching punishment, such that prices do not necessarily revert to competitive equilibrium.[163] MCCs can therefore sustain various prices on the equilibrium path.[164] That is, matching punishments can still sustain supra-competitive prices, since incentives to deviate remain constant 'in each collusive phase, except that prices in the punishment subgame are lower'.[165]

It could be argued that this latter form of punishment may be less effective than grim trigger strategies: in addition to MCCs' key purpose to match prices, grim trigger strategies can punish further by undercutting the deviation price.[166] However, all-or-nothing grim trigger strategies are inflexible;[167] price-matching by contrast permits design of 'the unique price at which each firm has no incentive to increase or decrease its price, even if the increase (as well as the decrease) in its price is matched'.[168]

MCCs generally signal to competitors a commitment to coordination, particularly in the case of NR clauses.[169] They generate a twofold incentive that distinguishes them from

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[157] RH Porter, 'Optimal Cartel Trigger Price Strategies', *Journal of Economic Theory 29* (1983), 315; Bos & Harrington (n 30) 97; Wolf (n 30) 321; RC Marshall & LM Marx, *The Economics of Collusion: Cartels and Bidding Rings* (The MIT Press, 2012), 136; Phlips (n 39) 54.
[158] I Ayres, 'How Cartels Punish: A Structural Theory of Self-Enforcing Collusion' (1987) *87 Columbia Law Review 2*, 302; Edlin (n 28) 550-551.
[159] Edlin (n 28) 551; OFT (n 28) 13, 26; Ayres (n 158) 300.
[160] Salop (n 104) 28; Edlin (n 28) 550; OFT (n 28) 13, 27.
[161] OFT (n 28) 13, 26.
[162] Edlin (n 28) 550; OFT (n 28) 13, 26.
[163] Y Lu & J Wright, 'Tacit Collusion with Price-Matching Punishments' (2010) *28 International Journal of Industrial Organization 298*, 298.
[164] Hviid & Shaffer (n 119) 497.
[165] Lu & Wright (n 163) 300-301.
[166] Ibid, 302.
[167] Porter (n 157) 315; Bos & Harrington (n 30) 97; Wolf (n 30) 321; Marshall & Marx (n 157) 136; Phlips (n 39) 54.
[168] Lu & Wright (n 163) 302.
[169] OFT (n 28) 26.

universal price cuts and other contracts that reference rivals (especially MFCs), in that they 'work simultaneously on [two] fronts' by 'creating an enhanced incentive for the matching firm to raise prices and a diminished incentive for the matching firm's rivals to lower prices'.[170] In a multilateral setting, each seller's MCCs then constrain the incentive of all other sellers to deviate from supra-competitive prices, for all understand that their price cuts will be matched almost immediately.

Not only do MCCs thereby signal to competitors that price reductions are likely ineffective, but sellers can also peddle price increases to test the reactions of competitors and buyers. Where advances remain unmatched, sellers are not only able to revert back to the common equilibrium, they also already have in place the pre-set MCC mechanism that safeguards their existing custom during their foray. This bears resemblance to the effects of wide downstream MFCs: through the mutual reference point in form of the upstream seller, platforms employing wide MFCs sustain price uniformity and remove their incentives to compete.[171]

If the economic effects on coordination of MCCs are indeed comparable to that of wide MFCs, which are fairly unanimously regarded as incompatible with competition law (*see* Section 1.a above), it is only logical to ask whether they should therefore be considered to generate artificial transparency. Albeit in different structural settings – MFCs through a mutual reference point and MCCs through direct referencing transmitted through buyers – both types of clauses remove seller incentives to compete, because price reductions are matched swiftly, such that they become unprofitable.

For lack of a discernible commercial rationale other than coordination, wide MFCs arguably display characteristics of artificial transparency. Narrow MFCs may elude this categorisation, for example, where their application goes to the essential commercial rationale of PCWs and there is no 'obvious alternative mechanism' to replace them.[172] A reduction of incentives to compete would become difficult to explain with anything but reasons of commercial necessity. Neither economic theory nor practical examples have yet provided scenarios where MCCs could be considered a tool of commercial necessity. The efficiencies outlined above – signalling attractive prices, mitigating incomplete contract problems, and potentially fostering competition for opportunistic loyals – do not necessarily display a degree of commercial necessity, such that they would offset the collusive risk.

[170] Edlin (n 28) 550.
[171] *HRS* (n 59) paras. 155-157.
[172] *Private Motor Insurance Market Investigation* (n 51) 8.98.

The underlying economic analysis arguably changes where only one seller adopts MCCs. As in a multilateral setting, the **unilateral adoption by one seller of MCCs** inhibits her competitors from deviating.[173] Yet, the seller who adopts the MCC does not curtail her own incentive to undercut supra-competitive prices, where her competitors do not have MCCs. In other words, competitors lack the additional guarantees conferred by MCCs if the seller who does maintain MCCs lowers her price, which ought to render their unilateral adoption less conducive to collusion.[174]

Schnitzer argues, to the contrary, that where 'a seller offers a MOR clause and deviates from the collusive price, then his opponent can punish him in the following period with a price cut that he has to meet'.[175] This seeks to remedy the previously highlighted gap that unilateral adoption of an MCC merely inhibits competitors rather than the adopting seller from deviating.[176] Accordingly, a deviation by the latter would trigger retroactive punishment by Nash reversion that her MCC would have to meet.[177]

This argument requires two assumptions: first, it requires that the non-adopting seller has requisite mechanisms in place that allow her to forego enhanced monitoring and automated punishment associated with the adoption of MCCs (the transmission and cost effects).[178] Second, it assumes that the seller adopting the MCC does not immediately deviate to competitive prices. It is true that MCCs allow for multiple subgame perfect equilibria.[179] Deviating to a level in between monopoly and competitive prices and then being matched by competitors with MCCs is possible.[180] Yet, Schnitzer's unilateral model contemplates no countervailing MCCs that quasi-automate matching price reductions.

If demand is homogenous and elastic, as contemplated by conventional duopoly models, a deviation just below the previous supra-competitive equilibrium achieves maximum profit by capturing all demand at near-collusive price levels.[181] In this case, the threat of subsequent Nash reversion does not detract from a significantly lower discount factor through high deviation profits. A seller could still profitably deviate to a price just below the previous collusive price. What is more, absent the transmission and cost effects aiding competitors by enhancing the velocity of information, delayed reactions enable larger deviation profits.

[173] Hviid & Shaffer (n 131) 6.
[174] Hviid & Shaffer (n 131) 6; OFT (n 28) 24.
[175] Schnitzer (n 107) 192.
[176] Hviid & Shaffer (n 131) 6.
[177] Schnitzer (n 107) 194.
[178] Salop (n 104) 28.
[179] Hviid & Shaffer (n 119) 497.
[180] Lu & Wright (n 163) 300-301.
[181] Phlips (n 39) 5; Leyton-Brown & Shoham (n 27) 9; Hviid & Shaffer (n 119) 501.

Conversely, if demand is differentiated and enables discrimination, the price level relates inversely to the level of demand a deviation can capture. It should then be preferable to deviate to the most profitable price and demand equilibrium. Subsequent Nash reversion, again, would invariably administer punishment at a less profitable equilibrium than the initial deviation. In both instances, it is difficult to see how unilateral MCCs could sustain coordination, such that they may not require analysis of natural and artificial transparency.

Kretschmer and Budzinski develop a duopoly model investigating price discrimination in the context of unilateral and bilateral adoption of MCCs, whereby their model implies support for unilateral MCCs as a collusive device.[182] They argue that price discrimination is unattainable where only one of the sellers adopts MCCs. In doing so, they propose a cooperative duopoly model sustained by a unilateral MCC:

> *[F]irm 2 has no incentive to undercut firm 1's price as it cannot attract additional consumers (due to firm 1's MCC). However, firm 2 can rationally expect firm 1 to be a 'soft' competitor. Firm 1 cannot lose by setting the [monopoly price] (due to the activation of its MCC if $p_2 < p_1$). Therefore, it has little incentive to undercut firm 2's price and enter into price competition (every realised price below [the monopoly price] results in lower total profits).*[183]

First, for every realised price below the monopoly price to result in lower total profits assumes that shared monopoly profits exceed individual deviation profits, which is not a given. Second, the seller without MCCs would have to trust her competitor to maintain supra-competitive prices, although she eschews the commitment, transmission, and cost effects discussed above. Whereas the non-adopting seller cannot undercut her competitor who offers MCCs, she should nevertheless cautiously price at the competitive level, because she cannot verify that her competitor will not deviate.[184] In theory, she views the market through the less astute lens of commonplace game theoretical analysis, lacking MCCs as an enhanced access mechanism to the market (transmission and cost effects)[185] and a precaution from deviation in an interdependent setting (commitment effect).[186] It remains unclear, therefore, how unilateral

[182] Kretschmer & Budzinski (n 104) 3155.
[183] ibid 3156.
[184] Hviid & Shaffer (n 131) 6-7; OFT (n 28) 24.
[185] Salop (n 104) 28.
[186] Hviid & Shaffer (n 131) 6-7; OFT (n 28) 24.

MCCs would sustain coordination, probably at all and at least to a similar extent than multilateral MCCs.

b) Implications for the Dividing Line

The foregoing discussion on MCCs leans on theoretical models, which may yield less clear legal guidance than can be extracted from case law. Nevertheless, these models permit certain insights regarding the potential effects of MCCs. Further, it is possible to draw certain parallels between MCCs and MFCs, which may prove helpful in the appraisal of competitive effects. The main issue with wide downstream MFCs is that they can generate price uniformity, because each platform pegs its price to the upstream seller and all other platforms. Neither has an incentive to lower its price and can even calmly test price increases.[187]

The theory of harm for MCCs is similar. Sellers peg their prices to each other vertically through buyers rather than an upstream entity. They similarly attain price uniformity, which MFCs would otherwise generate through an upstream seller as a mutual reference point. Does this effective coordination mechanism result from a legitimate commercial rationale, such that it could be considered an instance of natural transparency? The prevailing view is that narrow MFCs can be considered thus if they are key to the functioning of PCWs. This reflects the overarching requirement for conduct to reflect some form of a legitimate commercial rationale.

It is not sufficiently clear how the efficiencies of MCCs would prove central to commercial rationales, such that their absence would jeopardise the efficacy of a seller. Narrow MFCs resolve a potential inefficiency that is peculiar to the business model of MFCs. No specific example comes to mind where MCCs would be key to the business model or commercial rationale of an entity, be it a seller or an intermediary like PCWs. Where it could be proven that MCCs have considerable economic effect on the sustainability of coordination, this absence of a discernible commercial rationale or necessity would indicate that they are more likely to constitute instances of artificial transparency. The important caveat to reiterate is that this argument does not benefit from practical case examples or previous enforcement analysis.

[187] *HRS* (n 59) paras. 155-157.

3) Conclusion

The practices discussed in this chapter are rooted in the vertical commercial rationale to facilitate the interaction either between sellers and buyers or between sellers and platforms. Although this underlying theme renders these practices conceptually similar, their effects vary depending on their formulation and the level of the supply chain at which they function. As such, they inform the dividing line between tacit collusion and concerted practices from different perspectives.

Wide upstream MFCs applied outside the context of PCWs stand out as a peculiarity in this chapter and in the overall theme of the thesis. Because they only have an effect on punishment, these types of MFCs withstand even the wide interpretation of artificial transparency developed throughout this thesis. This begs the question of how a self-imposed constraint on the incentive to deviate from coordination fits into the argument that notions of artificial transparency constitute an accurate determinant of the dividing line between tacit collusion and concerted practices. What distinguishes this effect from other facilitating practices discussed in this thesis is that, since it has no bearing on transparency, it cannot explain collusive initiation. It might therefore only indicate anti-competitive risk – and merit analysis in terms of the dividing line – when combined with other practices.

The downstream application of platform MFCs reflects the overarching theme more coherently. Wide platform MFCs are a contractually supported mechanism ensuring price uniformity and reducing incentives to compete. Pegging prices to upstream sellers and competing platforms generates requisite artificial transparency, since each seller is essentially obliged to police that one platform does not undercut the other. As such, the effect bears resemblance to hub-and-spoke scenarios, where the hub facilitates downstream coordination between the spokes.

Narrow downstream MFCs are a more refined instrument than wide downstream MFCs and are somewhat less apparent in terms of their legal categorisation. The main concern with these clauses is that, through network effects, they might replicate the effects of wide downstream MFCs. In theory, this arguably depends on the relative distribution and relevance of sales at upstream and platform levels. Where sellers either maintain an upstream sales channel only or, conversely, where the significant majority of sales is channelled through platforms only, MFCs might be superfluous. But where upstream sellers maintain direct sales channels – and there are compelling reasons why they would – it becomes more difficult to weigh the collusive risk of narrow downstream MFCs against their potentially legitimate

commercial rationale. Where future cases show that narrow MFCs prove necessary without obvious alternative – as suggested by the CMA in the PMI investigation and the OLG Dusseldorf in *Booking* – the resulting transparency would likely have to be tolerated as natural.

Through their price-matching promise, MCCs co-opt buyers into transmitting information between horizontal buyers. MCCs bear some resemblance to the effects of MFC hub-and-spoke settings, which transmit information through an intermediary proxy. The proxy in this case are buyers individually acting contrary to their collective interest.[188] Coordination results from the amplified reception of information for each seller in question rather than from its proactive dissemination. It is another question whether they amount to artificial or natural transparency. Because there is no accompanying case law, any assessment remains based on economic models. A seller that adopts an MCC promises to match competing sellers, thereby rendering deviations superfluous on their part. Entailing a potentially problematic direct reference to competitors, MCCs resemble the effects of wide downstream MFCs, safe the need for an upstream seller to police coordination. This task is fulfilled by individually price-conscious buyers.

Natural or artificial transparency would result from the presence or absence, respectively, of a vertical commercial rationale for the practice. Without case law discussing the legal implications of MCCs directly, some comparative insights may be drawn from previously discussed practices, and the factors that informed their respective categorisation. The common thread of natural transparency in the foregoing discussion was the narrow scope of a commercial rationale or necessity. Chapter 2 established that some information simply has to be disclosed and/or is commercially advantageous to disclose. Chapter 3 noted that vertical relationships along the supply chain are a key aspect of the competitive process. Further, the currently prevailing view is that certain platforms require MFCs, though this point remains disputed. There is no such argument for MCCs, yet. Displaying no comparable elements that could be considered key to the competitive process and given their likely significant effect on coordination, there appears to be no convincing argument yet that MCCs would generate natural transparency.

Finally, all variations of the clauses outlined in this chapter reflect another common thread of the practices discussed in this thesis: multilateral adoption generates clear anticompetitive risk, whereas unilateral adoption tends to have more ambiguous or no effects

[188] E Prewitt & G Fails, 'Indirect Information Exchanges to Hub-and-Spoke Cartels: Enforcement and Litigation Trends in the United States and Europe' (2015) 2 *Competition Law & Policy Debate 63*, 63; Salop (n 104) 28.

on the ability to coordinate. Arguably, there is little room for alignment between sellers if MFCs are adopted unilaterally, be it upstream or downstream, narrow or wide. The same applies to MCCs. This recurring characteristic will be further examined in Part III, which brings together insights from the practices examined in Part II to formulate are more holistic understanding of the dividing line between tacit collusion and concerted practices.

PART III: THE FICTIONS AND FUTURE OF COORDINATION

Chapter 5: Law, Economics and the Scope of Interdependence

The preceding discussion covered both economic and legal arguments. Since competition law aims to regulate economic conduct, the logic of economic phenomena has to be filtered into a legally comprehensible format. A given phenomenon under the competition radar 'cannot be understood and applied only in its economic sense, but certainly not only in an abstract legal sense'.[1] Contingent on both, the competition framework – effectively a construct created to govern oligopolistic conduct – has to operationalise law and economics into administrable rules. Economics therefore plays an essential yet supportive role in 'fashion[ing] rules which address the impact of communication across a variety of competitive environments'.[2]

Parts I and II discussed the law, economics, and practices that, for their impact on transparency, are relevant to understanding tacit collusion. Part I highlighted how neither current law nor economics prescribe a sufficiently administrable concept of tacit collusion. This is partially due to translation flaws at their intersection.[3] Though competition law depends on economics, they differ in purpose and approach. The practices explored in Part II also merely constitute derivatives of collusion, that is, practices that create requisite transparency and are therefore symptomatic of tacit or explicit collusion. Each of the chapters in Part II noted an important difference between pro- and anticompetitive *economic* effects, on the one hand, and *legal* notions of natural and artificial transparency, on the other.

Part III now turns to issues that arise at this intersection between law and economics and, subsequently, to the nature of collusion in a digitalised world. To better understand the legal concept of tacit collusion, it is helpful to understand not only the applicable economics but also where and how economics and law interconnect. The economic concept of tacit collusion differs from that employed by the law. Economics would not generally distinguish between tacit and explicit collusion, but rather 'suggest that both are maintained because it is in the individual competitors' self-interests to do so'.[4] It understands tacit collusion as an output restriction that raises the market equilibrium, without examining whether actors communicated or acted by mere observance of their conduct. By contrast, law works with the assumption that

[1] F Jenny, 'Improving Judicial Control of Administrative Decisions in Competition Enforcement', in *Competition Law and Economics: Advances in Competition Policy Enforcement in the EU and North America*, AM Mateus & T Moreira (eds.) (2010 Edwar Elgar: Cheltenham), 76-77.
[2] DW Carlton, RH Gertner & AM Rosenfield, 'Communication Among Competitors: Game Theory and Antitrust' (1997) *5 George Mason Law Review 423*, 431.
[3] I Lianos, 'Some Reflections on the Question of the Goals of EU Competition Law' (2013) *UCL CLES Working Paper Series 3/2013*, 32.
[4] D Yao & SS DeSanti, 'Game Theory and the Legal Analysis of Tacit Collusion' (1993) *38 Antitrust Bulletin 113*, 126.

some forms of parallel conduct constitute a rational reaction to the market, enabled by a requisite amount of transparency that can result from certain practices not conventionally considered to reflect an agreement between competitors.

Notwithstanding its negative welfare effects, tacit collusion is permitted because it is considered independent conduct. Authorities prefer, however, to contain its scope to the necessary minimum. Using abstract concepts to evaluate seller conduct, they restrict tacit collusion to all that is "natural" on a market. "Artificial" conduct is prohibited. Implied is a categorical binary. Economics, by contrast, conceptualises tacit collusion in terms of value. The dividing line implicit in the law is therefore economically illusive. Economics instead envisages a spectrum that does not lend itself to a clear-cut dividing line (*see* Chapter 1, Section 5). This difference goes a long way toward answering why it is so difficult to formulate a legal standard that distinguishes between tacit collusion and concerted practices.

This chapter first outlines the different ways in which economics and law understand the interaction of sellers subject to oligopolistic interdependence and how this affects transparency. Second, it outlines challenges in the translation between the two different conceptions of oligopolistic conduct. Third, the chapter discusses notions of industry identity from an industrial organisation perspective, cautioning against an overemphasis on economic effects in the formulation of a dividing line between tacit collusion and concerted practices. This section argues that conduct should not be assessed solely in light of economic models and efficiency. This would apply metrics unsuited to an appropriate formulation of concerted practices, which remains modelled on notions of communication and agreement. Finally, the chapter highlights how industry identity shapes the dividing line between tacit collusion and concerted practices in ways not appropriately reflected in the current legal framework.

1) The Logics of Competition Law and Economics

Competition law is inseparable from economics, 'which provides insights as to welfare effects and the adequate level of intervention'.[5] Economic thinking is deeply entrenched in merger analysis on both sides of the Atlantic.[6] The evaluation of behavioural issues and corresponding competition practice also necessarily incorporates economic reasoning.[7] When the court in *Woodpulp II* famously concluded that 'the parallelism of prices and the price trends may be satisfactorily explained by the oligopolistic tendencies of the market', it displayed recourse to economic reasoning.[8] Providing conceptual guidance, economics has a stabilising influence and disciplines evolving competition policy.[9]

Yet, economic reasoning does not incorporate into competition law seamlessly. This is the source of a key difficulty in devising a dividing line between tacit collusion and concerted practices: economic and legal conceptualisations of collusion are materially different. They understand and interpret market conduct and interactions between sellers differently. This applies to their divergent readings of collusion, and the very manner in which they conceptualise transparency-enhancing conduct.

At its core, economics distinguishes between two types of market: competitive and collusive. The former 'is consistent with equilibrium for a static oligopoly game', the latter 'is an equilibrium for a repeated oligopoly game that produces prices in excess of those associated with a static equilibrium', i.e. supra-competitive.[10] The law maintains a different interpretation of market conduct. It mirrors the economic concept of competition and seeks to foster competitive markets. However, it does not prohibit all types of output restriction described as collusive in economic thinking. Instead, it subcategorises the range of economically collusive output restrictions between tacit collusion and concerted practices. These legal sub-categories exist entirely within the overall economic concept of collusion, making economics and law analytically incompatible from the get-go:

[5] A Ezrachi, 'Sponge' (2017) *5 Journal of Antitrust Enforcement 49*, 59.
[6] Jenny (n 1) 71; WE Kovacic & C Shapiro, 'Antitrust Policy: A Century of Economic and Legal Thinking' (2000) *14 Journal of Economic Perspectives 43*, 57.
[7] Jenny (n 1) 71.
[8] Joined Cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85 (*Woodpulp II*) *A. Ahlström Osakeyhtiö and others v Commission* [1993] ECLI:EU:C:1993:120, 126.
[9] AA Foer, 'The Goals of Antitrust: Thoughts on Consumer Welfare in the US', in *Handbook of Research in Trans-Atlantic Antitrust*, P Marsden (ed.) (2006 Edwar Elgar: Cheltenham), 573; Kovacic & Shapiro (n 6) 58.
[10] JE Harrington, 'Posted Pricing as a Plus Factor' (2011) *7 Journal of Competition law & Economics 1*, 1.

Economics	*Competition*	*Collusion*	
Law	*Competition*	*Tacit Collusion*	*Concerted Practice*

(*Table 1:* Interpretations of Collusion)

To analyse the distinction between tacit collusion and concerted practice, competition law recalibrates the unit of analysis. Rather than dwelling on the abstrct fact of an output restriction alone, competition authorities inspect facilitating practices as signposts – circumstantial evidence – to distinguish permissible conduct from concerted practices.[11] Since it is permissible to take into account all information that is available on the market to anticipate the conduct of competitors, competition authorities assess how the dissemination of information affects market conditions, especially with regard to market transparency.[12] This approach circumvents the need to prove the existence of an agreement (the benchmark for concerted practices) through direct evidence.[13]

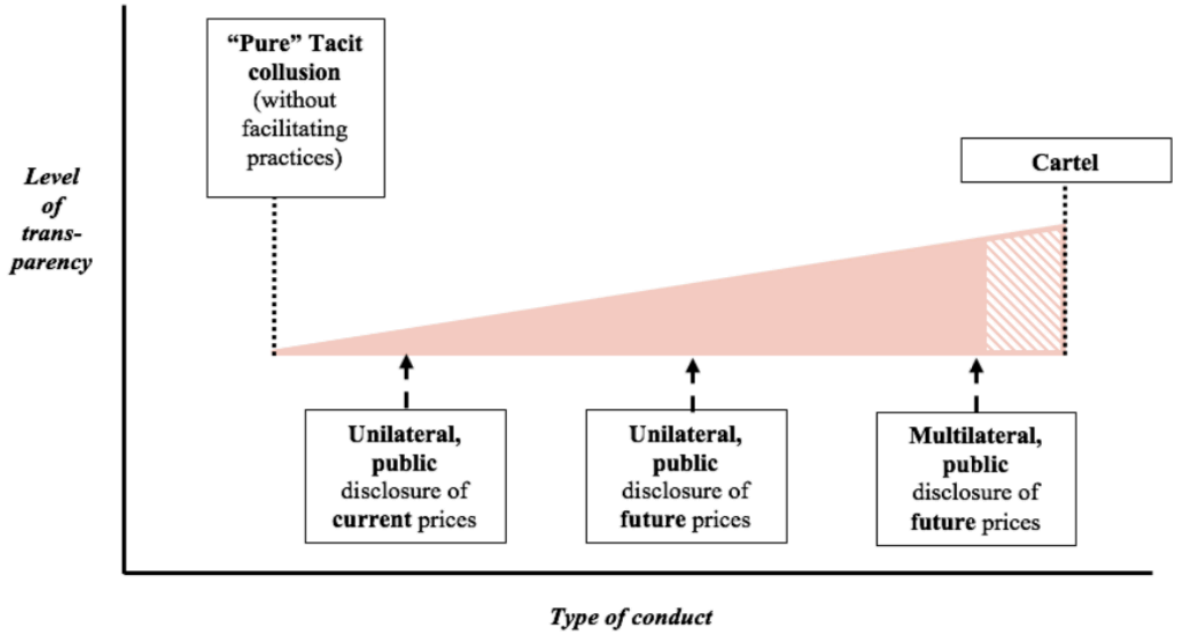
Yet, this approach also changes the mode of analysis. To illustrate why, consider the issue of market transparency in the context of the practices discussed in Part II. Here, the focus lies on the divergent interpretations of transparency-enhancing conduct. Facilitating practices do not themselves constitute either tacit or explicit collusion; they are merely derivatives of collusion that create transparency which is conducive to coordination.[14] Whether coordination is subsequently deemed tacit collusion or concerted practice depends on the rationale for adopting the practices that enable it.

For example, price announcements in *Woodpulp II* were permitted, because they were considered a rational response to the market and did not involve distinct practices deemed to

[11] M Grillo, 'Collusion and Facilitating Practices: A New Perspective in Antitrust Analysis' (2002) *14 European Journal of Law and Economics 151*, 153; *Aircraft Check Services Co. v. Verizon Wireless* (2015) 782 F.3d 867, at 871.
[12] OECD, *Roundtable on Information Exchanges Between Competitors Under Competition Law – Note by the Delegation of the European Union*, DAF/COMP/WD(2010)118, 7; JM Joshua & S Jordan, 'Combinations, Concerted Practices and Cartels: Adopting the Concept of Conspiracy in European Community Competition Law' (2004) *24 Northwestern Journal of International Law and Business 647*, 665; European Commission, *Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Cooperation Agreements* (2011/C 11/01), paras. 65-68.
[13] Harrington (n 10) 2; Grillo (n11) 152.
[14] EC Horizontal Cooperation Guielines (n 12) para. 65.

unfairly facilitate coordination.[15] The same conclusion applied in *Ethyl*, where price announcements had been standard practice before the industry evolved from a monopoly to an oligopoly.[16] Conversely, the publication of a pricing book containing complex pricing formulas in *United States v. General Electric* or the announcements of dealer discounts and tank wagon prices in *Petroleum Products* amounted to a concerted practice, because they appeared to serve no purpose other than to enable coordination between the two sellers and displayed no offsetting efficiencies.[17]

Law and economics have different conceptualisations of facilitating practices and transparency. Economics portrays the degree of market transparency on a spectrum. It starts with an absence of transparency-enhancing practices between sellers. Progressing along the spectrum, each practice, the way it is adopted, and how widely it is adopted, increases the degree of market transparency. For example, unilateral disclosure of current prices provides some information,[18] unilateral disclosure of future prices some more, and multilateral disclosure of future information more yet:[19]

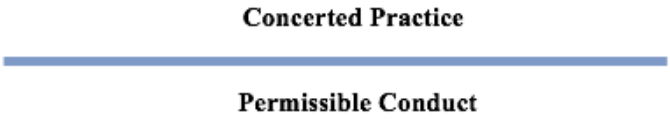


(*Figure 1*: Economic spectrum of transparency enhancing practices)

[15] *Woodpulp II* (n 8) para. 126.
[16] *E.I. Du Pont de Nemours & Company and Ethyl Corp. v. FTC* (1984) 729 F.2d 128, at 133-134.
[17] *United States v. General Electric Co.* (1926) 1977 WL 1457, at 1; *In re Coordinated Pretrial Proceedings in Petroleum Products Antitrust Litigation* (1990) 906 F.2d 432, at 446; Harrington (n 10) 4.
[18] M Bennett & P Collins, 'The Law and Economics of Information Sharing: The Good, the Bad and the Ugly' (2010) *6 European Competition Journal 311*, 322.
[19] Bennett & Collins (n 18) 321; EC Horizontal Cooperation Guielines (n 12) para. 72-74.

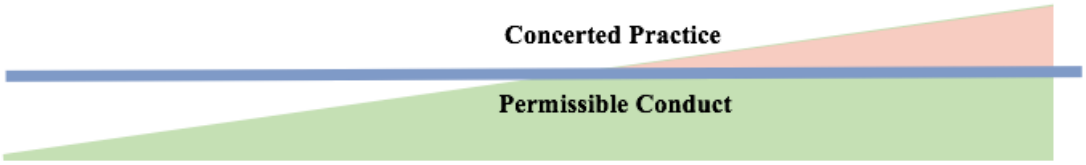
Figure 1 depicts information exchanges that enable coordination. The extent to which they enable coordination differs, but economic reasoning makes no inherent claims regarding their permissibility. It merely states something along the lines of: all other things being equal, the ability of sellers to coordinate through private disclosure of future prices is higher than their ability to coordinate through unilateral, public disclosure of current prices. Other facilitating practices also reflect this dynamic, as is further addressed below.

The law uses a different interpretation. It understands coordination between competitors as either permissible, including tacit collusion, or impermissible as a form of concerted practices. There is an underlying assumption that conduct can be classified into either of the two categories. The law therefore superimposes an economically fictitious, binary frame:



(*Figure 2*: Legal categorisations of conduct)

Here, economic analysis is employed to aid a binary legal classification – yet this classification clashes with the basic tenets of competition economics, which see no binaries. This conceptual mismatch begets analytical uncertainty. The legal frame constitutes a fiction that imposes onto the economic spectrum a dividing line that does not reflect inherently different economic concepts but rather different points on one and the same continuum.



(*Figure 3*: Legal and economic conceptions of transparency)

That the legal frame articulates a fiction designed to regulate economic conduct is key to exploring the dividing line. Designed to determine *per se* rules that capture definitive infringements of competition law (cartels, hardcore restrictions etc.), it leaves to case-based

assessment issues requiring individual US rule-of-reason or EU effects analysis.[20] The legal analysis of tacit collusion and concerted practices therefore navigates a nebulous area on the economic spectrum demarcated on each side by conduct that is invariably permissible or evidently concerted.

The economic spectrum lacks an inherent dividing line marking a transition between two clearly different end points. This conceptual problem can be illustrated by means of the Sorites paradox, which refers to 'the indeterminacy surrounding limits of application of the predicates involved'.[21] The problem can be illustrated as follows:

> *[T]he concept of a heap appears to lack sharp boundaries and, as a consequence of the subsequent indeterminacy surrounding the extension of the predicate 'is a heap', no one grain of wheat can be identified as making the difference between being a heap and not being a heap. Given then that one grain of wheat does not make a heap, it would seem to follow that two do not, thus three do not, and so on. In the end it would appear that no amount of wheat can make a heap. We are faced with paradox since from apparently true premises by seemingly uncontroversial reasoning we arrive at an apparently false conclusion.*[22]

The quest for a legal standard proves elusive because for economic metrics, which are employed to determine it, a dividing line is illusive.

The closer certain conduct comes to the fictitious dividing line, the less apparent it becomes. There is an area sufficiently close to this dividing line that it contains practices which plausibly challenge definitive conceptions of permissible conduct or concerted practices. It is a space that withstands seamless filtering of economics into administrable legal concepts. Within it lie important lessons for the dividing line between tacit collusion and concerted practices.

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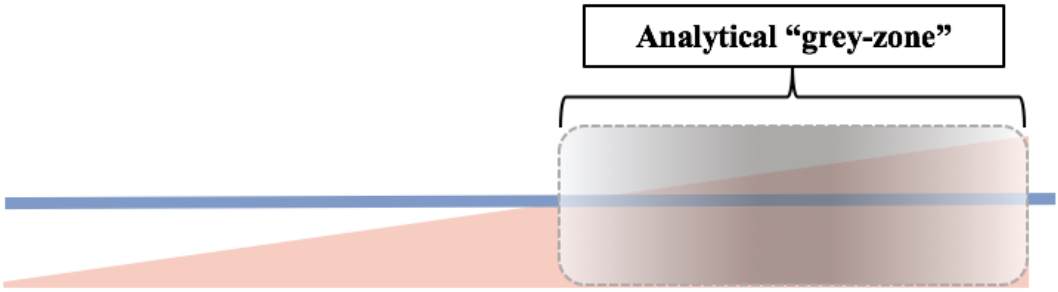
[20] FTC & DOJ, *Antitrust Guidelines for Collaborations Among Competitors* (2000), 3; EC Horizontal Cooperation Guielines (n 12) 26; OECD, 'Information Exchanges Between Competitors under Competition Law' (2010) *DAF/COMP/(2010)37*, 52.
[21] Stanford Encyclopaedia of Philosophy, 'Sorites Paradox' (Accessed 22 February 2018, available at: https://plato.stanford.edu/entries/sorites-paradox/).
[22] ibid.



(*Figure 4*: The analytical grey-zone between law and economics)

Since no seamless translation exists between law and economics, an analytical grey-zone emerges.[23] The fiction of a binary legal framework can only be as clear as the understanding of the nature of this grey-zone. *Economics can only probe what the law wants it to prove*. That is, economics can analyse the nature and effects of conduct to verify whether it is consistent with preconceived legal categories. The actual formulation of these categories ultimately remains a legal exercise. With this in mind, competition economics can elucidate two issues.

First, it can verify *if* conduct can facilitate coordination;[24] i.e. if a practice can precipitate a rightward shift on the economic spectrum (*see Figure 1*). Economic reasoning can show if conduct can sustain supra-competitive equilibrium.[25] This predominantly hinges on the existence of self-enforcing Nash equilibria which entail that 'it must be in the interest of each party to any cartel to take agreed upon actions independent of legal recourse by the other parties to compel performance'.[26] Economics' analytical focus on self-enforcing equilibria is precisely the reason why it differs from law, since both the legal concepts of tacit and explicit collusion entail economically self-enforcing equilibria. Economic analysis can determine how conduct affects strategies, potentially enabling sellers to raise equilibria.[27]

For example, game theoretic models 'yield insights into how different forms of communication can affect competition in a market'.[28] That is, economic reasoning can evaluate whether settings, which match certain types of information exchange with certain market conditions, can sustain stable coordination.[29] It identifies conditions where information sharing

[23] M Stucke 'What is Competition?', in *The Goals of Competition Law*, D Zimmer (ed.) (2012 Edwar Elgar: Cheltenham), 28.
[24] OECD, 'The Role of Efficiency Claims in Antitrust Proceedings' (2013) *DAF/COMP(2012)23*, 11.
[25] Harrington (n 10) 2.
[26] Carlton, Gertner & Rosenfield (n 2) 430-431.
[27] ibid 424.
[28] ibid 425.
[29] Bennett & Collins (n 18) 323.

can overcome informational obstacles to coordination, be it statements on the properties of information (e.g. aggregated and/or historic information is less useful for coordination than individualised and/or future information)[30] or on the market context within which information is shared (e.g. markets that are structurally conducive to coordination require less detailed information exchange).[31] Practices that are economically proven to facilitate coordination fall within the purview of competition analysis.

Secondly, economics can inquire not only whether coordination is possible but also *what other effects* a certain practice has that might offset anticompetitive collusive effects.[32] These effects have to engender systemic efficiency gains, which benefit consumers.[33] Consultation of the scales of pro- versus anticompetitive effects permeates competition analysis, be it with regard to various types of information exchange or practices like MFCs and MCCs.[34] Economic analysis can substantiate that a certain practice is necessary or desirable to a necessary or desirable end.

Filtering an economic assessment into a legal binary of net pro- or anticompetitive effects to some extent ties together the disparate logics of analysis between economics (*see Figure 1*) and law (*see Figure 2*). This typically determines whether a given practice should be prohibited or not. Economics can therefore filter conduct into pre-conceived legal definitions of legitimate or illegitimate conduct pursuant to the determination of pro- versus anticompetitive effects, where the latter is associated with an absence of efficiencies to offset potential consumer harm.[35] Unambiguous instances of pro- or anticompetitive conduct receive a *per se* stamp and less apparent instances fall under an EU effects or US rule of reason analysis.[36]

These two questions – the "if" and the "what (else)" – being compatible with economic theory, it would be tempting to set the dividing line between tacit collusion and concerted practices in line with an analysis of pro- versus anticompetitive effects. This would entail a balancing act that would require any anticompetitive potential to be offset by efficiencies:

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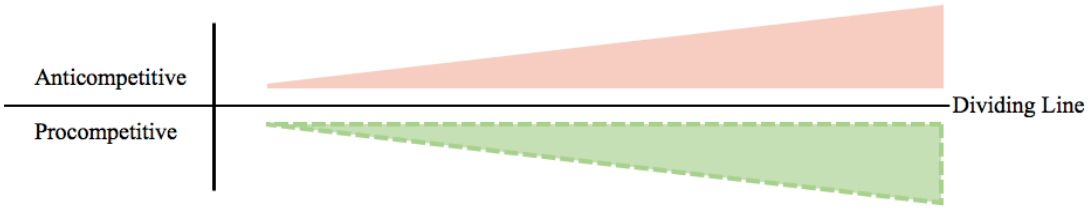
[30] ibid 331.
[31] ibid 323.
[32] OECD (n 24) 11.
[33] OECD (n 20) 24; EC Horizontal Cooperation Guielines (n 12) para. 49.
[34] Carlton, Gertner & Rosenfield (n 2) 435; JF Nieberding, 'The Anticompetitive Potential of MFNs' [2014] *8(2) CPI Antitrust Chronicle*, 2; JB Baker & JA Chevalier, 'The Competitive Consequences of Most-Favoured-Nation Provisions' *27 Antitrust 20* (2013), 20; M Samuelson et al., 'Assessing the Effects of Most-Favored Nation Clauses' (2012) *ABA Section of Antitrust Law*, 2.
[35] Harrington (n 10) 6; EC Horizontal Cooperation Guielines (n 12) para. 49; OECD (n 20) 52.
[36] FTC & DOJ (n 20) 3, 7; Bennett & Collins (n 18) 330.



(*Figure 5:* The balance of anti- and procompetitive effects)

The segment above the dividing line reflects the spectrum of anticompetitive effects as previously depicted in *Figure 1*. Below the dividing line is the degree of procompetitive effects that is hypothetically required to outweigh the anticompetitive ones. In theory, prohibition of a practice would ensue when the lower part does not offset the upper, thereby shifting the market balance into the anticompetitive area. Inconveniently, there is a host of issues with this approach, discussed in the following section.

2) Formulating Competition Law Beyond Economics

Since competition law aims to regulate economic conduct, its rules are fashioned on the basis of economic reasoning.[37] It constructs a frame designed to safeguard free and competitive markets in keeping with economic as well as non-economic goals (*see* Chapter 2). Within this frame, the analysis of pro- and anticompetitive effects takes a central role. It not only provides insights into the trajectory of market conduct but also allows inferences regarding potential agreements between sellers to collude, which remain dispositive for a finding of concerted practices. Nevertheless, due to theoretical discrepancies and practical translation issues, law and economics cannot be reconciled into fully compatible formulations of a dividing line between tacit collusion and concerted practices. The main practical concerns are threefold.

a) Only evaluating economic effects misapprehends prevailing legal reasoning

Economics makes no inherent claims regarding the legality or illegality of conduct; it does not evaluate the "how". As previously highlighted, the pro- and anticompetitive effects of each practice can theoretically be placed somewhere on the economic spectrum (*see Figure 1* and *Figure 5*). Economics probes a practice's location on a spectrum, but it is for law to determine legality. That is, economics provides the dynamic and trajectory of a practice, while law determines if it is permitted, i.e. whether it remains below the dividing line or oversteps it (*see Figure 4*).[38] Most conditions or effects that are economically probative of collusion are in fact consistent with both tacit as well as explicit collusion.[39] A glance at the missing subcategorization of collusion in *Figure 1* illustrates how there is no concept inherent to economics that allows for the characterisation of a practice as an illegal agreement or concerted practice independent of a predefined context.[40]

What is important for legal analysis is how a certain level of transparency came about. Once the "if" and "what" are established, competition law inquires whether the "how" is permissible. The economic ability to explain the "if" and "what" leaves out the important question of the "how", although the former can inform the latter. The difference can be

[37] Carlton, Gertner & Rosenfield (n 2) 431.
[38] S Martin, *Industrial Organization in Context* (2010, OUP: Oxford), 179.
[39] *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 877.
[40] F Wagner-von Papp, 'Information Exchange Agreements' in I Lianos and D Geradin (eds), *Research Handbook in European Competition Law: Substantive Aspects* (Edward Elgar, Cheltenham 2013) 163-164; Carlton, Gertner & Rosenfield (n 2) 424.

illustrated by way of the simple example of two stalls, Stall A and Stall B, operated at different locations on the same street. It would seem permissible for each stall operator to walk to the other simply to look at the price in person.[41]

> *However, if Stalls A and B were to post prices on a blackboard in the centre of the market, the actual information would be exactly the same. Likewise, if, instead of Stall A walking down to look at B's price, B walked down the street and directly informed A what price it was charging, the information disclosed would again be exactly the same. When this example is given to lawyers, they have few reservations about the first two disclosures of information; however, they have significant reservations about disclosing the information through direct communication.*[42]

The information conveyed in each scenario is the same, but crucially, the methods of exchange are different.[43] Legal analysis conventionally hinges this inquiry on the presence or absence of an agreement, emphasising 'the process that firms engage in, not merely the outcome that they reach'.[44] A vague benchmark at best (*see Chapter 2*), it nevertheless expresses the relevance of "how" over "what". The quintessential example of this reasoning is the continued toleration of pure tacit collusion:

> *There is a tendency to identify output restrictions with collusion, but this is imprecise. "The oligopoly problem" is that lower output and higher prices can result from independent behaviour. Whether total output is less than either the perfectly competitive or the non-cooperative equilibrium level is an objective question.* ***If there is a restriction of output, whether that restriction is the result of conduct that constitutes collusion is a legal question*** (*emphasis added*).[45]

[41] Bennett & Collins (n 18) 326.
[42] ibid 326-327.
[43] ibid 326-327.
[44] JB Baker, 'Two Sherman Act Section 1 Dilemmas: Parallel Pricing, the Oligopoly Problem, and Contemporary Economic Theory' (1993) *38 Antitrust Bulletin 143*, 179; Harrington (n 10) 2.
[45] Martin (n 38) 179.

From an economic perspective, the effect of tacit collusion is an output restriction that results in supra-competitive pricing.[46] Other things being equal, its net negative effect is not offset by efficiencies. Nevertheless, the approach taken to achieve tacit collusion permits no legal finding of an anticompetitive infringement. Whereas economics studies economic outcomes, '[t]he law examines whether competitors have taken possibly culpable (i.e., avoidable) actions from which an anticompetitive agreement may be inferred'.[47] There is no reformulation of the notion of "agreement" sufficiently far-flung to catch pure tacit collusion.[48] What follows is that law determines the distinction between legal and illegal conduct through reasoning that is not exclusively contingent on pro- versus anticompetitive effects.

b) Economic theory insufficiently captures commercial and competitive practice

Even if the law were to unconditionally defer to economic reasoning, there are inherent weaknesses to any analysis based purely on economic models. Behavioural economics and practical experience caution that commercial reality is not inhabited by rational actors.[49] There are thus practical limits to deductive economic modelling, making induction from empirical research necessary.[50] Economic reasoning illucidates the underlying logic of interdependent behaviour and even models specific collusive scenarios. However, where gaps and inadequacies persist, insights from practical experience remain invaluable.

Similarly, the vague notion of business acumen might not necessarily reflect economic omniscience. Explanations sufficient for a board room might prove unsatisfactory in a court room, be it on account of 'fancy theory or complicated econometrics'.[51] Sellers might act on "corporate intuition" or industry experience but, when pushed to do so, might themselves struggle to formulate economically adequate explanations for their conduct. For example, this chapter goes on to address industrial organisation tenets that show how mimicking competitors is a plausible method for overcoming perceived informational limitations (*see* Section 3).[52]

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[46] OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables DAF/COMP(2012)17, 21-22.
[47] DA Yao & SS DeSanti (n 4) 125.
[48] GA Hay, 'Oligopoly, Shared Monopoly, and Antitrust Law' (1982) *Cornell Law Faculty Working Papers 1124*, 465.
[49] J de Jonge, *Rethinking Rational Choice Theory: A Compantion on Rational and Moral Action* (Palgrave MacMillan, 2012), 38; Ezrachi (n 5) 62.
[50] Stucke (n 23) 52.
[51] FH Easterbrook, 'The Limits of Antitrust' (1984) *63 Texas Law Review 1*, 8.
[52] MB Lieberman & S Asaba, 'Why do Firms Imitate Each Other?' (2004) *31 Academy of Management Review*, 6, 12; *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 874-875; Easterbrook (n 51) 5.

Such limitations arise even for the most experienced actors and they might not only lack understanding of 'their competitors' action space; they may even be unclear about their own payoffs following from each action, especially in a dynamic perspective'.[53]

Even where sellers might very well understand the nature and consequences of certain practices, their explanation for adopting them might not convince a court if it does not fit into the conventional efficiency mould of competition law. After all, what makes sense for sellers individually differs from the parameters applied to assess general efficiency. Section 3 below explains how the intuition to keep pace with competitors follows a different logic from economic effects assessment and can lead to outcomes indefensible through their potential pro-competitive effects.

c) Legal practice debilitates economic effects analysis

Finally, where complex economic discourse is not properly filtered into the law, it is possible that courts might misapply economics in competition practice.[54] The deeper conduct ventures into the grey zone between tacit collusion conduct and concerted practices, the less certain the ability – especially of resource-constrained courts – to properly scrutinise their welfare effects.[55] Legal and judicial practice magnify the problems with effects analysis. The considerable drain on time and resources for both authorities and sellers is only one issue.[56] Even if an effects standard were to be the accepted benchmark, economic analysis becomes increasingly ambiguous and case outcomes oscillate arbitrarily, the closer one gets to the dividing line. Economic reasoning in case practice should not be relied upon uncritically.[57]

Competing theoretical analyses at home in scholarly debate are ill-suited for clear guidance in case practice.[58] Chapters 1 and 3 illustrate how economic models inform trajectories rather than certainties. Their practical accuracy rests on the validity of underlying assumptions and access to pertinent facts.[59] Law, by contrast, is ultimately an administrative system. Legal practice therefore cannot fully embrace dialectic economic thinking:[60] 'Rules that seek to embody every economic complexity and qualification may well, through the

[53] Wagner-von Papp (n 40) 139.
[54] Ezrachi (n 5) 63.
[55] ibid 67.
[56] Bennett & Collins (n 18) 313.
[57] Ezrachi (n 5) 59, 63-64.
[58] Easterbrook (n 51) 4.
[59] Stucke (n 23) 47; Bennett & Collins (n 18) 312.
[60] Ezrachi (n 5).

vagaries of administration, prove counterproductive, undercutting the very economic ends they seek to serve.'[61] In other words, legal certainty and administrability can be more important than the economic perfection of legal rules.

Party bias can further obfuscate the objectivity of economic analyses submitted to courts.[62] Economic consultants tend to sympathise with their employing party. Consulting experts on either side may add a layer of clutter the court will have difficulty evaluating objectively, since 'in the adversarial system experts have a tendency to become advocates for the side by which they are retained'.[63] Courts might therefore receive pre-filtered information rather than an impartial assessment of the relevant economic issues.[64]

The selection of issues that make it to court is itself prone to a certain bias. Administrative agencies' case priorities determine the practical course of competition policy.[65] While this process is ideally conducted in line with the goals of said competition policy, these remain relatively incongruous.[66] Administrative agencies do not develop economic arguments to be introduced at the adjudicative stage randomly, but in consonance with their current policy.[67] The ensuing economic logic in case selection and litigation is fallible.[68] The adversarial system's fidelity to objective analysis is therefore not absolute.

Where issues make it to court, judges can be ill-equipped to adjudicate on the complex economics of modern antitrust.[69] Introducing evolving economic concepts into antitrust litigation – what Kovacic calls the 'antitrust system's porosity' – implies periodic challenges to contemporary wisdom, but also risks erroneous analysis when evaluated by judges whose 'receptivity to specific economic arguments will hinge largely upon [their] tastes, training, and experience'.[70]

These factors influence the analytical precision of competitive effects in practice.[71] Economic analysis in competition practice reaches its limits when its results are vague, contentious or possibly even biased to inform administrable enforcement policy. Oftentimes,

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[61] *Barry Wright Corp. v. ITT Grinnell Corp.* (1983) 724 F.2d 227, 234.
[62] Ezrachi (n 5) 62.
[63] Jenny (n 1) 79.
[64] ibid.
[65] JA Riviére y Marti, 'Competition Enforcement and Consumers' in *Handbook of Research in Trans-Atlantic* Antitrust, P Marsden (ed.) (2006 Edwar Elgar: Cheltenham), 596.
[66] Riviére y Marti (n 65) 596; DA Hyman & WE Kovacic, 'Symposium: The Goals of Antitrust: Institutional Design, Agency Life Cycle, and the Goals of Competition Law' (2017) *81 Fordham Law Review 2163*, 2167.
[67] Jenny (n 1) 71.
[68] WE Kovacic, 'The Influence of Economics on Antitrust Law' (1992) *30 Economic Inquiry 294*, 304.
[69] ibid.
[70] Kovacic (n 68) 295-296.
[71] Stucke (n 23) 47.

courts (and authorities) will struggle to appreciate the optimal long-term effects of practices.[72] However, they also lack the luxury of waiting indeterminably for open issues to be resolved; some threshold must be set. Where economic analysis equivocates and administrable rules are yet to be devised, case outcomes can be ambivalent. Sometimes it seems that case outcomes can be anyone's guess:

> *In reality the antitrust agencies and generalist courts do not know whether, or how often, they accurately assess the likelihood and magnitude of the allocative, productive, and dynamic (in)efficiencies from mergers and other restraints of trade. They have neither the tools nor knowledge to undertake this analysis.*[73]

Court decisions invariably exceed mere questions of law, and it could be argued that competition authorities tasked with presenting their economic analysis at the adjudicative stage, where the EU General Court for example only rarely interferes with factual issues, are accorded an excessive margin of discretion.[74] In short, economic analysis is imperfect and its application in court practice invites mistakes and indulges bias.[75] Economic reasoning is prone to incorrect application in courts, which opens antitrust adjudication to perilous imprecision.[76] The inconvenient reality that pro- and anticompetitive effects overlap only exacerbates the problem that economic analysis in adjudication has flaws.[77]

[72] Easterbrook (n 51) 3.
[73] ME Stucke, 'Reconsidering Antitrust's Goals' (2012) *53 Boston College Law Review 551*, 590-591.
[74] Jenny (n 1) 78.
[75] OECD (n 24) 11.
[76] Stucke (n 23) 47; OECD (n 24) 11; Kovacic (n 68) 304.
[77] Easterbrook (n 51) 3.

3) The Scope of Interdependence

The foregoing discussion highlights a fundamental difference in how economics and law conceive of interdependent coordination and the challenges of reconciling them in practice. Economics perceives coordination on a spectrum, law necessarily requires a categorical binary. Their divergent logics cannot be fully reconciled, becoming evident in the legality grey-zone. A closer look at the phenomenon of tacit collusion in isolation vis-à-vis the additional occurrence of facilitating practices reveals the divergence.

For pure price or quantity coordination, competition law broadly mirrors competition economics. In both economic and legal thinking, tacit collusion constitutes an output restriction that raises the market equilibrium. However, tacit collusion entails no agreement for competition law to catch.[78] Quite to the contrary, it is vindicated as a behavioural necessity in oligopoly:

> *A seller must decide on a price; and if tacit collusion is forbidden, how does a seller in a market in which conditions (...) favour convergence by the sellers on a joint profit-maximising price without their actually agreeing to charge that price, decide what price to charge? If the seller charges the profit-maximising price (and its "competitors" do so as well), and tacit collusion is illegal, it is in trouble*.[79]

This form of parallel conduct is synonymously titled "conscious parallelism", the intelligent adaptation to 'the existing and anticipated conduct of [competitors]'.[80] Sellers navigate the ostensibly exogenous market conditions intelligently and the market is considered to display "natural transparency".[81] Absent circumstantial evidence indicating a method other than price coordination to facilitate agreement on the output restriction, all is well.[82]

The metrics change once conduct moves away from price coordination to include facilitating practices, derivatives of tacit collusion affecting the flow and/or structure of information on the market. As comprehensively explained in *Aircraft Check Services*, there is

[78] *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 874.
[79] ibid.
[80] *Woodpulp II* (n 8) para. 71.
[81] ibid para. 126.
[82] *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 871.

nothing wrong with following competitor price increases and nor should there be.[83] Any such prohibition would be tantamount to price regulation, which competition laws aim to avoid.[84] Yet, there clearly is an issue with the adoption of the facilitating practices, conduct ascribed to sellers that has an impact on the market transparency and can be said to aid price coordination:

> *[T]here is a certain irony involved: aiding and abetting is heavily punished, but undertaking the act one is trying to facilitate is freely permitted if such aids are unnecessary or cannot be proved to have been employed.*[85]

Simply put, certain practices – discussed in previous chapters as derivatives of tacit collusion – introduce a proactive element conducive to coordination, which strays from "pure" tacit collusion. They motivate attempts to infer that competitors might have knowingly substituted competition for cooperation.[86] Inessential compared to the imperative ability to set prices, quantities, and certain vertical agreements freely, they can be scrutinised without corroding what would be considered the basis for free competition.

Note how previous chapters highlight the commercial rationales of specific practices as quintessential to natural transparency: certain disclosures of information, vertical agreements constituent to hub-and-spoke structures, and (more contentiously) MFCs are considered *sine qua non* to market functioning and efficiency. This does not apply to all, or even many, practices. Practices invariably aimed at facilitating coordination receive a *per se* prohibition whereas the less obvious practices – those exclusively relevant under tacit collusion analysis – fall under an effects analysis.

As discussed, one issue with focusing on the net effects of a practice is residual uncertainty in complex economic analysis. The directive is to balance all anti-competitive effects against all countervailing pro-competitive ones, even when 'the standards for this balancing remain largely in the dark'.[87] More pressingly yet, an overemphasis on economic effects analysis convolutes the question of what the effects of a practice are with the question of why or how the practice exists, i.e. if there is sufficient evidence of an underlying agreement or concerted practice to begin with. This goes back to the question of whether conduct is the

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[83] *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 873.
[84] ibid at 874.
[85] L Kaplow, 'On the Meaning of Horizontal Agreements in Competition Law' (2011) *99 California Law Review 683*, 716.
[86] Joined Cases 40 to 48, 50, 54 to 56, 111, 113 & 114-73 *Coöperatieve Vereniging "Suiker Unie" UA and Others v Commission* [1975] ECLI:EU:C:1975:174, 26.
[87] Wagner-von Papp (n 40) 137.

result of natural or artificial transparency, developed in preceding chapters, which ought to be clearly distinguished as a step principally antecedent to effects analysis. This can be illustrated by disentangling the somewhat muddled inquiries into economic effects and market transparency in competition law analysis.

a) Effects and Transparency Prisms

Intended to aid both sellers and authorities in evaluating conduct, competition law assesses practices according to their anti- and procompetitive effects. In the EU, Article 101(1) TFEU examines the anticompetitive potential of practices.[88] The assessment of procompetitive effects under Article 101(3) TFEU only takes place if anticompetitive effects have been established under Article 101(1) TFEU.[89] US rule of reason analysis undertakes no such bifurcation and weighs pro- and anticompetitive effects in a single assessment.[90]

Enhanced transparency carries collusive risk but can be offset by market efficiencies with sufficient procompetitive counterweight.[91] As previously discussed in Part II, in the course of this analysis the concepts of artificial and natural transparency arise. The idea is that certain practices, e.g. information exchanges, are labelled as artificially enhancing transparency because they 'enable tacit collusion in markets whose "natural transparency" would not otherwise be sufficient to sustain collusion'.[92]

It is not immediately apparent how the issue of market transparency figures in case analyses that entail an evaluation of pro- and anticompetitive effects. The problem is that, although they coexist and appear to have become almost synonymous, economic effects analysis is incongruent with transparency assessment. At the more extreme ends, strategic artifices can certainly be dismantled by effects inferences. Deeper into the grey zone, however, it becomes clear that effects and transparency assessments respond to different questions. Distinguishing these two types of analysis into individual prims helps in explaining why the dividing line between tacit collusion and concerted practices cannot follow purely from economic effects assessment.

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[88] T-112/99 *Métropole Télévision v Commission* [2001] ECLI:EU:T:2001:215, para. 72.
[89] ibid.
[90] T-112/99 *Métropole Télévision v Commission* [2001] ECLI:EU:T:2001:215, para. 72; *Continental TV Inc v GTE Sylvana* (1977) 433 US 36, at 49.
[91] DS Clark, 'Price-Fixing without Collusion: An Antitrust Analysis of Facilitating Practices After Ethyl Corp.' (1983) *Wisconsin Law Review 887*, 889; US Department of Justice & Federal Trade Commission, *Horizontal Merger Guidelines* (2010), 29ff; OECD (n 20) 52.
[92] Wagner-von Papp (n 40) 137-138.

The Effects Prism

Section 1 outlined how an inquiry into the effects of market conduct ties together the divergent logics of economics and binary legal classifications. The logic of effects analysis – that the degree of efficiencies must be sufficient to offset the anticompetitive potential of a practice[93] – implies a spectrum with differing degrees of anticompetitive potential. The higher the anticompetitive potential, the more pronounced the required efficiency gains.[94] Enabling an estimate of a net positive or net negative impact on the market, effects analysis can produce a response suitable for a binary classification at any point on the spectrum.

If a practice is likely to be anticompetitive, it tends to be prohibited; if it is likely to be procompetitive, it tends to be permitted.[95] To be considered as having an anti-competitive effect, a practice 'must be likely to have an appreciable adverse impact on one (or several) of the parameters of competition like price, output, product quality, product variety or innovation'.[96] A practice is considered anticompetitive where it is or is likely to 'reduce the parties' decision-making independence […] by influencing the market conduct of at least one of the parties by causing a change in its incentives'.[97]

This can be assessed against the counterfactual. Once facilitating practices are present, one can also ask what a market would look like if they were absent.

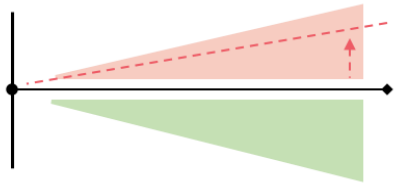
> *[I]n order to determine whether an action is bad, one must understand what the alternative is and whether it is competitively better. Without being able to specify a superior alternative, it is inappropriate for the antitrust laws to condemn an action.*[98]

Taking this into account, effects analysis counterfactually examines the degree of market transparency in theoretical or perceivable absence of a practice to assess its impact.[99] A practice

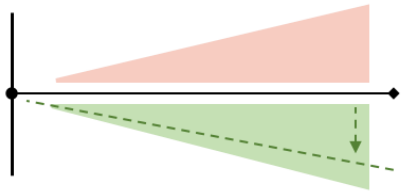
[93] EC Horizontal Cooperation Guielines (n 12) para. 20.
[94] FTC & DOJ (n 20) 25.
[95] EC Horizontal Cooperation Guielines (n 12) para. 20.
[96] ibid, para. 72; FTC & DOJ (n 20) 5-6.
[97] EC Horizontal Cooperation Guielines (n 12) para. 27.
[98] Carlton, Gertner & Rosenfield (n 2) 438.
[99] EC Horizontal Cooperation Guielines (n 12) para. 29, 75; FTC & DOJ (n 20) 4.

would be considered anticompetitive if the market outcome without the practice would be considered less restrictive to competition.[100]

The EU Horizontal Cooperation Guidelines set out that 'it is the combination of both the pre-existing level of transparency and how the information exchange changes that level that will determine how likely it is that the information exchange will have restrictive effects on competition'.[101] Measured by the level of transparency, an anti-competitive practice would therefore constitute a rightward shift on the economic spectrum without commensurate efficiency gains tilting the scale upward of the dividing line:



(*Figure 6:*
Net anticompetitive effects)



(*Figure 7:*
Net procompetitive effects)

Does enhanced transparency facilitate coordination? Does it improve efficiency? These are economic questions. As signposts constituting circumstantial evidence of collusion, the resulting net anti- or procompetitive effects usually proscribe or vindicate the existence of a practice.[102] However, assessing an overall shift in transparency has little to no probative value for deciding whether the transparency itself is artificial or natural. The former describes the quantity of transparency, whereas the latter describes its quality.

The comparison of transparency levels before and after implementation of a practice feeds into the determination of pro- and anti-competitive effects, which usually has the potential to decide the outcome of a case. However, the fact that an estimation of net competitive effect delivers a response to *some* binary classification does not mean that it responds to the *correct, legal* binary classification. Economics considers outcome, the law considers method. The assessment of overall transparency permits the analysis of the effects

[100] Carlton, Gertner & Rosenfield (n 2) 438; EC Horizontal Cooperation Guielines (n 12) 29, 75; FTC & DOJ (n 20) 7.
[101] EC Horizontal Cooperation Guielines (n 12) para. 78.
[102] ibid para. 20.

of a practice. Much more relevant for the distinction between tacit collusion and concerted practice, the assessment of the naturalness or artificiality of a practice informs what it is intended to achieve. Only that allows an inference of agreement or concerted practice.

The Transparency Prism

The artificiality of a practice does not determine whether it has an overall anti- or procompetitive effect, but rather whether it constitutes an agreement or a concerted practice in the first place. Its reasoning necessarily precedes effects analysis. In the sequence of steps undertaken in case analysis, by the time the effects of an agreement or a concerted practice are assessed, it no longer seems necessary to determine whether it constitutes artificial or natural transparency. It must first be established that there is a form of interaction qualifying as agreement or cooperation, which is knowingly substituted for competition.[103] Otherwise Article 101(1) TFEU (agreements […], decisions by association of undertakings or concerted practices) and/or Section 1 Sherman Act (contract, combination […], or conspiracy) cannot apply. This point is insufficiently highlighted in case practice and analysis.

The notion of artificial transparency was already paramount for the analysis in Part II of this thesis. To briefly reiterate its central tenets, consider *Woodpulp II*: concertation was not considered the only plausible explanation for parallel conduct, because price announcements constituted a rational response to the market.[104] Because the market was considered naturally transparent and price announcements were considered a rational response to the market, the conduct did not constitute a concerted practice.[105] However, for lack of a consolidated definition in both theory and practice, the notion of artificial and natural transparency is somewhat obscure. It is not entirely clear what ultimately distinguishes artificial from natural transparency and how, if at all, this relates to competitive effects.

The OECD juxtaposes 'information exchanges as instruments of procompetitive *transparency* or anticompetitive *cartelisation*'.[106] This permits little inference as to whether transparency can be natural or artificial. Further, it compares 'cases where artificially increased transparency is a factor leading to collusion' with 'others where increased transparency is

[103] *Woodpulp II* (n 66) 71; 48/69 *Imperial Chemical Industries v Commission (Dyestuffs)* [1972] ECLI:EU:C:1972:70, para. 64.
[104] *Woodpulp II* (n 8) para. 126.
[105] ibid para. 183.
[106] OECD (n 20) 21.

procompetitive and therefore to be enhanced'.[107] This informs the reader merely that artificial transparency can lead to collusion but fails to further specify if transparency leading to procompetitive effects is therefore natural. Finally, it states that where asymmetries and absence of information harm competitive outcomes, 'artificially increased transparency may improve consumer welfare'.[108] This would seem to suggest that any proactively implemented practice enhancing transparency ought to be considered artificial, which is difficult to reconcile with the notion that proving artifice 'will often make or break an antitrust enforcer's case'.[109]

Section 1 outlined the ability of economic analysis to assess the variety of effects an action can have on the market and whether these are net pro- or anticompetitive in the context in which they are implemented.[110] In theory, economic analysis can probe whether there is no alternative, legitimate rationale for conduct to exclude the possibility for independent action.[111] For the observance of blatant strategic artifices to aid coordination, there is a good chance that this combination of anticompetitive effects and absence of an alternative business rationale suffices to establish infringement. Part II outlined several such instances. Since artificial transparency is the result of strategic artifices intended to facilitate coordination, it might therefore encompess practices with net anticompetitive effect outweighing consumer benefit.

Indeed, sometimes the prospective anti- or procompetitive potential of a practice permits inferences as to whether it is artificial or natural. However, an analysis of business rationales necessarily differs from probing the overall economic effect of a practice. It overlaps with pro- and anticompetitive effects but follows a different logic. For good reason, this might sound similar to the differences between economics and law described in Section 1. Where the analysis grows more complex, economic effects analysis might provide an arguably vague estimation whether a practice appears anticompetitive and therefore lacks an independent business rationale, which would be probative of a concerted practice. This link is somewhat tenuous.

Transparency analysis precedes inquiry into anti-competitive effects: '*by* artificially increasing transparency', information exchange can facilitate coordination and '*result* in restrictive effects'.[112] The effects follow from the artificial creation of transparency. The presence of artificial transparency, as opposed to natural transparency, must be the condition

[107] ibid 53.
[108] ibid 29.
[109] Wagner-von Papp (n 40).
[110] OECD (n 24) 11.
[111] Harrington (n 10) 6.
[112] EC Horizontal Cooperation Guielines (n 12) para. 65.

for a competition infringement. Agreement or concerted practice is antecedent and dispositive to inquiry of overall competitive effects. This would conversely mean that restrictive effects following from natural transparency would not constitute a competition infringement.

The artificiality is inferred from the presence or absence of alternative reasons for a practice. In the EU, parallelism is evidence of concerted practices only where there is no plausible alternative explanation for the conduct in question, 'for if there is a legitimate rationale for [conduct], then it will be difficult to "exclude the possibility of independent action"'.[113] The Commission has to refute any such alternative explanations advanced by the parties.[114] US rule-of-reason analysis examines the business purpose of a practice, which seems broadly akin to the plausible alternative explanation test: 'In examining the nature of the relevant agreement, the Agencies take into account inferences about business purposes for the agreement that can be drawn from objective facts.'[115]

These approaches recognise that sellers have to retain their ability to respond to the competitive pressures of markets without jeopardising their business. The most likely and plausible meaning of the differentiation between natural and artificial transparency therefore relates to its underlying rationale, that is, the reason for the creation of transparency. The effects prism follows the continuum logic of the economic spectrum, such that binaries can only be provided as a net effect. However, the transparency prism screens the motivation of an actor – how and for what reason a practice came about. It responds to the inherently binary legal classification of permissible and prohibited conduct, tacit collusion and concerted practice. The evaluation of practices will obviously always follow an economic assessment somehow. Inquiries into the purpose of conduct require economic reasoning. However, these inquiries follow metrics different from the economic *effects* assessment conventionally used in competition law.

The idea of natural and artificial conduct exists separately from its economic effects. Say artificial transparency results from conduct incongruent with the 'normal conditions of the market in question'.[116] If so, natural transparency has to result from conduct that responds in some way to the natural dynamic of a market. But what happens if the natural dynamic of a market can lead to a net anticompetitive shift? A closer look at industrial organisation principles – considering interdependence, quintessential to tacit collusion – shows that conduct

[113] Harrington (n 10) 6; T-442/08 ff. *CISAC v Commission* [2013] ECLI:EU:T:2013:188, para. 98.
[114] *CISAC v Commission* (n 113) paras. 132-133.
[115] FTC & DOJ (n 20) 12.
[116] *Woodpulp II* (n 8) para. 71; *Dyestuffs* (n 103) 66.

can be a natural reaction to the market, i.e. engender natural transparency, irrespective of its economic welfare effects.

b) Interdependence, Effects, and Transparency

Setting out a hypothesis on why the transparency prism differs from the effects prism could seem like a futile attempt to split hairs over a distinction that will not allow itself to be made. Linguistically they seem different, but one might argue that the distinction may be insignificant in practice. Yet, if it can be shown that there is scope for actions that follow rational competitor conduct but are nevertheless economically anticompetitive, the two prisms can be clearly differentiated. Indeed, a closer look at oligopolistic interdependence in an industrial organisation context shows that the effects and transparency prisms can offer critically different interpretations on the existence of facilitating practices.

A conceptual divorce of the prisms would permit an analysis of how interdependent actors can operate so closely to the vaguely defined legal dividing line that they would have a fighting chance to withstand transparency analysis, whereas they would almost certainly face competition prohibition once they come within the remit of effects analysis. To illustrate this, the following delves closer into the implications of facilitating practices that are conducive to both pro- and anti-competitive effects and how it is crucial that each of these practices tends to be reviewed differently based on whether it is adopted unilaterally or multilaterally.

It is true that facilitating practices reposition sellers on the economic spectrum. It is also possible that this incurs overall anticompetitive effects, i.e. prompts a lesser degree of competition compared to the counterfactual absence of a given facilitating practice (*see Figure 6*). Yet, where facilitating practices can result from both anti- and procompetitive motivation, they permit little inference of collusive intent irrespective of their overall net effect on competition. Industrial organisation shows that interdependent sellers may imitate conduct for arguably rational reasons, generating natural transparency that would nevertheless be prohibited under a legal framework that adheres to economic effects analysis.

The difference between the two prisms can be illustrated through an assessment of conduct that has both risks and outweighing benefits. This applies to all practices discussed in Part II, each falling within the analytical spectrum for tacit collusion. Next to their bifurcating effects, it is important to note a shared characteristic of these practices: they can fully realise their collusive potential only when adopted multilaterally in a concentrated market. They are

considered less harmful in atomised markets or (subject to certain qualifications) when they are adopted unilaterally. This dynamic applies to any practice in a concentrated oligopoly that:

1. Carries both pro- and anticompetitive potential,
2. Can strengthen firms' position vis-à-vis competitors, and
3. Has more collusive potential upon multilateral rather than unilateral adoption.

These three conditions explain how facilitating practices can be interpreted differently, depending on whether they are viewed through the effects prism or the transparency prism.

Condition 1: Practice carries pro- and anticompetitive potential

On the effects axis, facilitating practices are screened for their overall impact on the market, i.e. how they affect competitive conditions systemically.[117] Part II outlined the pro- and anti-competitive potential of these facilitating practices, which can be summarised as follows:

- **Information exchange:** The dynamic of information exchanges depends on the type of information involved, which can take 'an extreme variety of tones';[118] it can range from harmless, aggregated and historic prices to complex pricing formulae entirely inaccessible to buyers.[119] There is no need to address prohibited private exchanges of individualised future prices or quantities.[120] However, public disclosure of information contributes to sustaining efficient relationships and attracting buyers by lowering their search costs. It generally enhances buyer transparency and improves purchasing behaviour.[121] Since it smoothens the market machinery and allows for efficient transactions, it remains relatively harmless in the eyes of competition authorities.[122] Nevertheless, anticompetitive potential arises where the resulting enhanced market transparency can give rise to tacit or explicit collusion, particularly where information exchange becomes reciprocal.[123]

[117] OECD (n 20) 52; FTC & DOJ (n 20) 24-25.
[118] LS Morais & LT Feteira, 'The Chameleon in the Room: Transatlantic Views on Information Exchange in the Field of Competition Law' (2015) *Concurrences – Liber Amicorum Professor Barry Hawk*, 4.
[119] EC Horizontal Cooperation Guielines (n 12) paras. 89-90; Clark (n 91) 922-923.
[120] EC Horizontal Cooperation Guielines (n 12) para. 73; OECD (n 12) 6.
[121] EC Horizontal Cooperation Guielines (n 12) para. 57; Morais & Feteira (n 118) 9; Harrington (n 10) 7-8; Bennett & Collins (n 18) 314.
[122] EC Horizontal Cooperation Guielines (n 12) paras. 57, 63, 92; Bennett & Collins (n 18) 314-315.
[123] FTC & DOJ (n 20) 15; M Hall, *Recent Developments in Price Signalling in the EU* (2015) ABA Section of Antitrust Law Spring Meeting, 3; Bennett & Collins (n 18) 314, 320.

- **Hub-and-Spoke:** Hub-and-spoke results from vertical agreements in the supply chain, which are essential to functioning markets. In economies constituted of sellers operating at different levels of the supply chain, without a requirement for inputs to be processed into final outputs through individual vertically integrated sellers, vertical agreements are a commercial necessity and their procompetitive rationale is generally not in question. However, where several vertical agreements connect to the same entity (the hub), such arrangements can result in undesirable spill-over of information and/or align conduct between horizontal competitors by nature of their common reference point in the hub.[124]
- **Most Favoured Customer Clauses:** MFCs can safeguard attractive prices for customers.[125] They offer flexibility through continuous transactions, alleviate the need for protracted negotiations, and reduce incentives to delay negotiations to extract better terms, since parties are assured the benefit of better subsequent deals.[126] Finally, they encourage transaction-specific investments without risking later renegotiations from a weakened bargaining position (the "hold-up" problem).[127] However, they can also constitute a self-imposed restraint on sellers where additional rebates owed to existing customers when prices are reduced render deviations costlier.[128] Coordinating sellers pre-commit to harsher punishment for deviation and automatically increase their discount factor.[129] This

[124] R Amore, 'Three (or More) Is a Magic Number: Hub & Spoke Collusion as a Way to Reduce Downstream Competition' (2016) *12 European Competition Journal 28*, 29; GL Zampa & P Buccirossi, 'Hub and Spoke Practices: Law and Economics of the New Antitrust Frontier?' (2013) *9 Competition Law International 91*, 101; E Prewitt & G Fails, 'Indirect Information Exchanges to Hub-and-Spoke Cartels: Enforcement and Litigation Trends in the United States and Europe' (2015) 2 *Competition Law & Policy Debate 63*, 63.

[125] JB Baker, 'Vertical Restraints with Horizontal Consequences: Competitive Effects of "Most-Favored-Customer" Clauses' (1996) *64 Antitrust 517*, 531; Samuelson et al. (n 34) 2; JP van der Veer, 'Antitrust Scrutiny of Most-Favoured-Customer Clauses: An Economic Analysis' (2013) *4 Journal of European Competition Law & Practice 501*, 501.

[126] KJ Crocker & TP Lyon, 'What do "Facilitating Practice" Facilitate? An Empirical Investigation of Most-Favored-Nation Clauses in Natural Gas Contracts' (1994) *37 The Journal of Law and Economics 297*, 298 301-302; Samuelson et al. (n 34) 2; A Ezrachi, 'The Competitive Effects of Parity Clauses on Online Commerce' (2016) *11 European Competition Journal 488*, 489; Baker & Chevalier (n 34) 21.

[127] Crocker & Lyon (n 126) 304; van der Veer (n 125) 502; Baker & Chevalier (n 34) 21; JJ Wu & JP Bigelow, 'Competition and the Most Favored Nation Clause' [2013] *7(2) CPI Antitrust Chronicle*, 5-6.

[128] TE Cooper, 'Most-Favored-Customer Pricing and Tacit Collusion' (1986) *17 Rand Journal of Economics 377*, 378; Baker & Chevalier (n 34) 21-22; Baker (n 125) 520; Nieberding (n 34) 3; Samuelson et al. (n 34) 3; van der Veer (n 125) 504.

[129] Samuelson et al. (n 34) 3; S Sacher & J Sandford, *No Shortage of Theories: The Role of Capacity in Antitrust Analysis* (2016) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2804948> accessed 06 October 2019, 10; I Bos & JE Harrington, Endogenous Cartel Formation with Heterogeneous Firms, *RAND Journal of Economics 41(1)* (2010), 93; D Fudenberg & J Tirole, *Dynamic Models of Oligopoly* (1990, Harwood Academic Publishers), 53; SB Wolf, Non-Cooperative Collusion in Static and Dynamic Oligopolies, *Theoretical Economics Letters 3* (2013), 319.

has an important signalling function, which discourages competitors from attempting to undercut supra-competitive equilibrium. A specific category of MFC, recent debates have focused on the commercial necessity of narrow MFCs to PCWs, which arguably mitigate free riding and ensure that buyers are guaranteed the same prices on PCWs associated with lower search costs. These efficiencies countervail the collusive potential of narrow MFCs, namely the network effects resulting from a set of narrow MFCs that may create horizontal uniformity among PCWs.[130]

- **Meeting Competition Clauses:** MCCs offer to match the lowest price available on the market. Attentive buyers can therefore secure price reductions to the optimal market price.[131] MCCs also alleviate the need for protracted negotiations, since they permit responsiveness to fluctuating exogenous market conditions.[132] This mitigates transactional delays and costs.[133] However, MCCs risk anti-competitive collusive effects by curtailing sellers' incentives to compete.[134] Customers would swiftly notify competitors of any attempted price reductions to secure a matching price reduction from their supplier, which reduces demand elasticity.[135] MCCs therefore amplify monitoring by making it cheaper, reducing the time lag quintessential to profitable deviations, and facilitating punishment through pre-committed price matching.[136] This resembles the signalling mechanism of MFCs and discourages competitors from deviating from supra-competitive equilibrium.

[130] Ezrachi (n 126) 508; CMA, *Private Motor Insurance Market Investigation – Final Report* (2014), 8.46-8.48.
[131] Office of Fair Trading, '*Can "Fair" Prices be Unfair? A Review of Price Relationship Agreements*' (2012) OFT1438, 38.
[132] ibid 37.
[133] Samuelson et al. (n 34) 2.
[134] S Dugar & T Sorensen, 'Hassle Costs, Price-Matching Guarantees and Price Competition: An Experiment' (2006) *28 Review of Industrial Organization 359*, 360; S Moorthy & RA Winter, 'Price-Matching Guarantees' (2006) *37 The Rand Journal of Economics 449*, 449; CA Holt & DT Scheffman, 'Facilitating Practices: The Effect of Advance Notice and Best-Price Policies' (1987) *18 The Rand Journal of Economics 187*, 189-190, 192.
[135] M Arbatskaya et al., 'On the Incidence and Variety of Low-Price Guarantees' (2004) *47 The Journal of Law & Economics 307*, 311; Moorthy & Winter (n 134) 453; M Hviid & G Shaffer, 'Hassle Costs: The Achilles' Heel of Price-Matching Guarantees' (1999) *8 Journal of Economics & Management Strategy 489*, 498; OFT (n 131) 12.
[136] AS Edlin, 'Do Guaranteed-Low-Price Policies Guarantee High Prices, and Can Antitrust Rise to the Challenge?' (1997) *111 Harvard Law Review 528*, 550-551; OFT (n 131) 13, 25-26; I Ayres, 'How Cartels Punish: A Structural Theory of Self-Enforcing Collusion' (1987) *87 Columbia Law Review 2*, 300; S Salop, 'Practices that (Credibly) Facilitate Oligopoly Coordination' (1982) *FTC Working Paper No. 73*, 28.

The lens commonly taken to assess these effects focuses on their systemic relevance. A procompetitive rationale envisages systemic efficiencies, crucially those accorded to buyers.[137] Likewise, it is the overall impact on transparency that triggers anticompetitive scrutiny. Competition authorities' primary focus rests on their systemic relevance.[138] In other words, it is these systemic efficiencies that register on the effects prism.

Yet, sellers have ample incentive to contemplate the use of these practices under different metrics than their effect on transparency alone. That is, instead of looking at a practice for its systemic effects on competition, sellers might ask themselves how a certain practice benefits them individually in their position towards competitors and customers. This line of inquiry does not register through the effects prism but is far from irrelevant for the transparency prism.

Condition 2: Practice affects seller's position vis-à-vis competitors

Sellers in concentrated markets understand their interdependence and continuously monitor their actions to gain or at least not lose ground relative to their competitors (*see* Chapter 1). Facilitating practices are susceptible to this logic of interdependence. There is a host of reasons for why a seller would adopt a practice to improve her position vis-à-vis competitors. Publishing certain information, certain vertical agreements or adopting MFCs or MCCs are neither confined to collusive conduct, nor do they occur in a strategic vacuum. Sellers anticipate competitive benefits: if publishing information, a vertical agreement or the adoption of MFCs or MCCs generates efficiencies and/or added custom, it is in every seller's interest to capture corresponding rewards. To briefly reiterate from Chapters 2 to 4, the main advantages of the practices in question are as follows:

- Price announcements enable buyers to better estimate their prospective costs.[139] Quite simply, when sufficient information assists buyers, they tend to 'reward those firms which best satisfy their needs'.[140] Information and posted prices reduce search costs.[141] Harrington points out that '[b]y making it easier for consumers to search, more consumers are attracted to the market because they anticipate finding

[137] OECD (n 20) 52.
[138] FTC & DOJ (n 20) 24-25.
[139] *Woodpulp II* (n 8) para. 77.
[140] Bennett & Collins (n 18) 314.
[141] EC Horizontal Cooperation Guielines (n 12) para. 57; Harrington (n 10) 7.

a better deal'.[142] The same could be argued at seller-specific level: the better buyers are informed about the conditions at which a seller offers goods or services, the more attracted they are to that seller. Moreover, public announcements reassure buyers that they 'are not being singled out in some way for a price increase', which mitigates their resistance to modest increases.[143]

- Hub-and-spoke results from individually necessary or desirable vertical agreements. They are part and parcel of the economy and enable the efficient flow and manufacture of goods along the supply chain and, resulting from elements including economies of scale and specialisation, ultimately benefit customers in the form of lower price. Somewhat anomalously among the practices discussed in this thesis, the vertical links that constitute hub-and-spoke might be considered not only commercially desirable but also economically necessary. Unless they are vertically integrated, sellers operating at a certain level of the supply chain would endeavour to vertically contract with the best counterparty at upstream and/or downstream levels.
- MFCs promise existing buyers whichever best terms are being offered to other buyers.[144] Perceived as a beneficial arrangement between a seller and buyer, the latter would tend to encourage and ask for MFCs.[145] This applies especially where the buyer believes other buyers to benefit from MFCs, leading her to reason that she is worse off than her counterparts.[146] In a competitive market environment, MFCs provide buyers with a sense of getting a good deal, therefore attracting custom away from competitors.[147] Hence, buyers might individually prefer an offer with an MFC over other competitors, even if this results in suboptimal coordination, leaving them jointly disadvantaged.[148] Especially narrow MFCs could be argued to constitute a tool of commercial benefit, if not necessity, for individual PWCs. If PCWs were unable to offer prices that are sufficiently

[142] Harrington (n 10) 8.
[143] RC Marshall & LM Marx, *The Economics of Collusion: Cartels and Bidding Rings* (MIT Press, Cambridge (Mass.) 2012), 34, 113.
[144] J Chen & Q Liu, 'The Effect of Most-Favored Customer Clauses on Prices' (2011) *59 The Journal of Industrial Economics 343*, 344.
[145] Baker & Chevalier (n 34) 23.
[146] ibid.
[147] Chen & Liu (n 144) 345.
[148] B Edelman & J Wright, "Price Coherence and Excessive Intermediation" (2015) *130 Quarterly Journal of Economics 1283*, 1285.

competitive with the sellers they advertise, they may incur losses from free riding or substandard offers, which obviates their core commercial rationale.

- MCCs have similar attraction to customers, foremost because they directly signal the best prices to them.[149] They promise not to punish customers for their choice, since they can always invoke the benefits of a lower price they discover at a later point in time, which sounds like an attractive deal not only to existing but also to potential customers.[150] As such, it should be no surprise that certain consumers would even encourage the implementation of MCCs.[151]

Juxtaposing the first two conditions, it emerges that the reason for sellers adopting certain practices can be different from the reason competition authorities would prohibit them. Sellers anticipate improved business through attractive terms offered vertically to existing or potential customers. Whenever publicising prices generates reduced selling costs or enhanced consumer demand, there is an understandable motivation for its adoption.[152] Similarly, customers might 'ignore the effects of their contract on firms that are no parties to the contract', meaning that 'each buyer in an industry individually may desire, or at least accept, an [MFC], even though it harms buyers as a group'.[153] The same applies to other vertical contracts, which may beget hub-and-spoke structures.

Condition 2 highlights how, rather than assessing the systemic efficiency gains of multiple sellers acting on an entire market (i.e. the Article 101(3) TFEU pro- versus anticompetitive effects calculus), sellers consider how (potential) buyers would expect to benefit from a practice in the context of individual vertical commercial relationships. The focus is not on systemic market structure and efficiency, but rather on the buyer as an individual entity interacting vertically with one seller, or sellers interacting vertically at different levels of the supply chain. Yet, where one seller engages in a practice that fulfils the second condition – in short, is commercially desirable – competitors will reasonably contemplate mimicking its adoption. Seen through the transparency prism, this is perfectly rational conduct. If the adoption of a practice is sensible for a seller, it is likely to affect her position vis-à-vis competitors, who in turn are prompted to reconsider their positions and mimic.

[149] Moorthy & Winter (n 134) 455; Hviid & Shaffer (n 135) 2; OFT (n 131) 13.
[150] Holt & Scheffman (n 134) 190.
[151] ibid 195.
[152] Harrington (n 10) 8.
[153] Baker & Chevalier (n 34) 25.

Industrial organisation teaches us that high-level concentration strengthens industry identities prone to observation and mimicking.[154] The propensity of competing sellers to closely observe each other is well-documented.[155] Doing so enables them to benchmark their position vis-à-vis competitors, evaluate opportunities and risks, and formulate sensible strategies.[156] Part and parcel of this continuous process is assessing whether actions taken by competitors strengthen their market position and if so, to consider mimicking said actions.[157]

As previously outlined, mimicking assists sellers regardless of whether they compete or cooperate, since it helps them sustain relative market positions.[158] It is even conceivable that the initial action being mimicked is nothing but exploratory; sellers compete through a 'trial and error process' which enables them to assess, adjust, and readjust to the market response to their actions:[159]

> *Firms try dozens of practices. Most of them are flops, and the firms must try something else or disappear. Other practices offer something extra to consumers – they reduce costs or improve quality – and so they survive. In a competitive struggle the firms that use the best practices survive. Mistakes are buried.*[160]

Ranging widely from minir to significant strategic moves, there are many forms of conduct that are either unlikely to register on the radar of competition authorities or that might even be beneficial.[161] Matching a competitor on the duration of car warranties or increased spending on advertising seem like sensible strategic decisions.[162] Realising interdependence could relate, for example, to investments in capacity, R & D, advertising, or brand introduction.[163]

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[154] R Dhalla & C Oliver, 'Industry Identity in an Oligopolistic Market and Firms' Responses to Institutional Pressures' (2013) *34 Organization Studies 1803*, 1828.
[155] ibid 1805.
[156] Lieberman & Asaba (n 52) 5.
[157] U Staber, 'Imitation Without Interaction: How Firms Identify with Clusters' (2010) *31 Organization Studies 153*, 157.
[158] Lieberman & Asaba (n 52) 5.
[159] Stucke (n 23) 45; W Kerber, 'Competition Innovation and Maintaining Diversity Through Competition Law' in J Drexl et al (eds.) *Economic Approaches to Competition Law: Foundations and Limitations* (Edwar Elgar, 2012)'.
[160] Easterbrook (n 51) 5.
[161] FTC & DOJ (n 20) 1.
[162] Marshall & Marx (n 143) 4; DJ Morris et al., 'Strategic Behaviour and Industrial Competition: An Introduction', in *Strategic Behaviour and Industrial Competition*, DJ Morris et al. (eds.) (1986, OUP: Oxford), 2-3.
[163] Morris et al. (n 162) 2-3.

As previously outlined, competition law has also come to terms with the fact that following a price leader ought to be permissible.[164] A mature industry identity can instil a sense of leadership, where a high-status seller serves as a reference point in a concentrated industry for others to follow.[165] Establishing such a reference point formalises a process of social learning where, for lack of own information or realisation of another's superior information, adopting the strategy of a reference entity is considered optimal.[166] This can materialise in the form of follow-the-leader pricing, which is simply the imitation of pricing conduct.[167]

Pure price leadership lacks formal agreement and is not illegal.[168] Judge Posner presses this point in *Aircraft Check Services v. Verizon Wireless*, because 'the Sherman Act imposes no duty on firms to compete vigorously, or for that matter at all, in price'.[169] This is no different in the EU, since doing so would amount to price regulation.[170] Judge Posner explains: 'If the seller charges the profit-maximising price (and its "competitors" do so as well), and tacit collusion is illegal, it is in trouble'.[171] In other words, imitation purely on price – conventionally the unit of choice to represent the dynamics of competition – is given the green light in court practice.

Is it then reasonable to assume that the same dynamic applies to other forms of imitation, what may be thought of as "conduct-leadership"? It was established above that sellers observe competitors' conduct beyond mere pricing and frequently find it in their own interest to imitate them, be it to sustain relative market positions, counter aggressive rival strategies or simply to avoid retaliation in response to their deviation from competitor conduct.[172] Yet, where it can be considered rational for sellers to mimic practices that fulfil Conditions 1 and 2, the analysis of facilitating practices changes. Thus arises the link between individual commercial rationales and systemic effects on competition. At this point, these two prisms almost contradict each other. For a seller looking to maintain pace with competitors, mimicking can be a rational decision. For an authority looking to maintain the competitive

[164] R Hall & M Lieberman, *Microeconomics: Principles and Applications* (4th edn Thomson South-Western, Mason 2008), 312.
[165] Lieberman & Asaba (n 52) 11; Bennett & Collins (n 18) 321-322; JJ Rotemberg & G Saloner, 'Collusive Price Leadership' (1990) *39 The Journal of Industrial Economics 93*, 94.
[166] Lieberman & Asaba (n 52) 7.
[167] M Peteraf & M Shanley, 'Getting to Know You: A Theory of Strategic Group Identity' (1997) *18 Strategic Management Journal 165*, 174; A Griffiths & S Wall, *Applied Economics* (11th edn Pearson Education, Harlow 2007) 111; Hall & Lieberman (n 164) 312; *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 871.
[168] Hall & Lieberman (n 164) 312.
[169] *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 873.
[170] ibid at 874.
[171] ibid.
[172] Lieberman & Asaba (n 52) 16.

process, mimicking precipitates a shift from unilateral conduct to more harmful multilateral conduct. The transparency prism permits this shift. The efficiency prism does not.

Condition 3: Multilateral adoption enhances collusive potential

For an individual seller, there can be a clear competitive rationale for adopting any of the discussed practices. This does not necessarily translate into efficiency assessed under Article 101(3) TFEU, which evaluates overall market efficiency. In a similar vein, the DOJ and FTC accord primacy to the competitive process instead of internal operational efficiency.[173] Adopted multilaterally, most of the practices discussed are not only unlikely to enhance overall efficiency but actually threaten it, since the potential for coordinated supra-competitive pricing cannot allow 'consumers a fair share of the resulting benefit'.[174] After all, one could argue that 'the instances in which the offender gains more than the victims – and society as a whole – lose, leading to an *increase* rather than a decrease in total welfare, will be rare indeed'.[175]

This analytical mismatch would be irrelevant were it not for the fact that competition enforcement, not expressly but still rather consistently, distinguishes between less harmful unilateral conduct and more harmful multilateral conduct. In current competition enforcement, each of the practices in question happens to be associated with heightened collusive risk when adopted multilaterally.[176] If a multilateral practice is understood to facilitate coordination, competition law aims to prevent anticompetitive harm.[177] Most straightforwardly, hub-and-spoke arrangements require multiple vertical agreements with the same hub. Multilateral in this context ought to be understood as several vertical agreements with the same hub. One vertical agreement simply does not fulfil the basic criterion of hub-and-spoke.

Replicating a seller's successful model of publicising information also risks competition law scrutiny. A brief revisit of current enforcement practice on the discussed types of conduct clarifies why. The EU Horizontal Cooperation Guidelines generally condone unilateral public announcements but caution that a concerted practice 'cannot be excluded' where such announcements are followed by announcements from competitors, 'not least

[173] DOJ & FTC (n 91) 31; FTC & DOJ (n 20) 24-25.
[174] Article 101(3) TFEU.
[175] T Mäger & TB Paul, 'The Calculation and Reconciliation of Fines and Damages in Europe and Germany', in K Hüschelrath & H Schweitzer (eds.), *Public and Private Enforcement of Competition Law in Europe* (2014 Springer, Berlin), 79.
[176] EC Horizontal Cooperation Guielines (n 12) para. 61; Cooper (n 128) 378; Baker & Chevalier (n 34) 21-22; Baker (n 125) 520; Nieberding (n 34) 3; Dugar & Sorensen (n 134) 360; Moorthy & Winter (n 134) 449; Holt & Scheffman (n 134) 192.
[177] EC Horizontal Cooperation Guielines (n 12) para. 61.

because strategic responses of competitors to each other's public announcements […] could prove to be a strategy for reaching a common understanding about the terms of coordination'.[178] It is recognised that unilateral disclosure of information might reduce strategic uncertainty between competitors but is significantly less likely to do so than multilateral disclosure.[179]

The same applies to MFCs. Some argue that even the unilateral adoption of MFCs suffices to facilitate collusion.[180] According to this argument, one MFC suffices to curtail the adopting seller's incentives to deviate and thereby signals sufficient commitment to competitors to incentivise them to also raise prices.[181] Chapter 4, Section 2 challenges this argument. It is unclear why a seller should worsen her bargaining position through prospective additional, self-imposed punishment vis-à-vis competitors that remain uninhibited.[182] It suffices to say that the collusive effects of multilateral MFCs are relatively well-understood, whereas the effects of unilateral MFCs remain tenuous.

The Vertical Block Exemption Regulation (VBER) generally reflects this position, since it usually exempts MFCs as a type of vertical agreement, subject to two exceptions. First, where a seller's market share is 30 % or higher, the VBER no longer applies.[183] This envisages unilateral effects associated with market power and is less relevant to this discussion. Secondly, agreements between sellers with individual market shares of less than 30% fall outside the VBER where 'parallel networks of similar vertical restraints cover more than 50% of a relevant market'.[184] Within its application to vertical agreements, this caveat covers the potential effects of parallel networks of MFCs instituted by competing sellers.[185]

In *Booking*, the German FCO found MFCs between the booking portal HRS and listed hotels in order to foreclose entry and restrain competition.[186] The effects were amplified by the

[178] EC Horizontal Cooperation Guielines (n 12) para. 63.
[179] OECD Working Party No. 3 on Co-Operation and Enforcement, *Unilateral Disclosure of Information with Anticompetitive Effects (e.g. Through Press Announcements)* (DAF/COMP/WP3/WD(2012)21), 2.
[180] Baker (n 125) 521.
[181] Cooper (n 128) 387; Wu & Bigelow (n 127) 4.
[182] RH Frank & BS Bernanke, *Principles of Economics* (5th Ed., McGraw-Hill/Irwin 2013), 217; L Phlips, *Competition Policy: A Game-Theoretic Perspective* (Cambridge University Press, 1995), 5, 47; Nieberding (n 34) 3; Samuelson et al. (n 34) 3; van der Veer (n 125) 504; M Ivaldi et al., The Economics of Tacit Collusion, *IDEI – Final Report for DG Competition, European Commission (2003)*, 5, 7; S Ardiyok, 'Comparative Analysis of Collective Dominance' (2006) *3 Journal of Yeditepe University Faculty of Law 1*, 7; Wolf (n 129) 319.
[183] Commission Regulation (EU) No 330/2010 on the Application of Article 101(3) of the Treaty on the Functioning of the European Union to Categories of Vertical Agreements and Concerted Practices [2010] OJ L102/1, Article 3.
[184] EC Vertical Block Exemption Regulation (n 183) Article 6.
[185] Commission Notice – Guidelines on Vertical Restraints, *SEC(2010) 411*, para. 75.
[186] BKartA Decision B9-66/10, *HRS* (2013) paras. 137, 153.

fact that HRS' two main competitors also operated MFCs vis-à-vis listed hotels.[187] The FCO viewed the 'the economic effect of the [MFC] clauses [as] similar to direct collusion between the hotel portals, namely concerted behaviour regarding the sale of a specific hotel rooms at a specific minimum price'.[188] Although the FCO, uniquely amongst EU competition authorities, also found that multilateral narrow MFCs might facilitate coordination through network effects, the Higher Regional Court Dusseldorf rejected this argument on appeal.[189] Even if the FCO's reasoning had been confirmed by the court, implied in the network effects theory of harm would be the collusive effects of multilateral rather than unilateral adoption of the practice.

The same applies to MCCs: arguably, only the multilateral adoption of MCCs activates their anti-competitive potential. They increase market transparency through reduced detection lags (*transmission effect*), automate information transfer thus making it cheaper (*cost effect*), and signal resolve to reciprocate price cuts (*commitment effect*).[190] Promising to match competitor price cuts, MCCs discourage cheating.[191] The seller adopting an MCC curtails competitor incentives, but does not alter her own incentive to adhere or to deviate.[192] In support of unilateral collusive potential, Schnitzer argues that if the seller with an MCC undercuts competitors in one round, she could be punished by an even further price cut she would have to meet in the following round.[193]

It is conceivable that under certain circumstances this dynamic would indeed constrain the MCC-adopting seller, subject to two assumptions. First, the argument accepts that competitors forego the tangibly advantageous transmission and cost effects.[194] Second, it implies that the first price reduction still exceeds competitive equilibrium and leaves room for further undercutting. As further explained in Chapter 4, Section 3, this implication is not a given, does not necessarily discourage undercutting at supra-competitive equilibrium even if it applies, and casts at least some doubt on the ability of unilateral MCCs to facilitate collusion.

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[187] *HRS* (n 186) para. 137.
[188] *HRS* (n 186) para. 157.
[189] Higher Regional Court Dusseldorf, 'Hotelbuchungen im Internet: "Enge" Bestpreisklauseln sind zulässig', *Press Release* (2019), <http://www.olg-duesseldorf.nrw.de/behoerde/presse/Presse_aktuell/20190604_PM_booking/index.php> accessed 04 October 2019.
[190] Salop (n 136) 28; Arbatskaya et al. (n 135) 311; Moorthy & Winter (n 134) 453; Hviid & Shaffer (n 135) 498.
[191] M Hviid & G Shaffer, 'Matching Own Prices, Rivals' Prices, or Both' (2008) *CCP Working Paper 08-26*, 6.
[192] Hviid & Shaffer (n 191) 6-7; OFT (n 131) 24.
[193] M Schnitzer, 'Dynamic Duopoly with Best-Price Clauses' (1994) 25 *The Rand Journal of Economics 186*, 192, 195.
[194] Salop (n 136) 28.

This resembles the dynamic applicable to MFCs: there is a tangible risk of collusion through multilateral adoption of MCCs, whereas the risk generated by unilateral adoption of MCCs is debatable.[195]

All of the foregoing practices portray a similar dynamic. Condition 2 shows that there can be a legitimate rationale for adopting these practices unilaterally. Yet, pursuant to industrial organisation and core tenets of interdependence, if they make sense unilaterally for one seller, they are also likely to make sense unilaterally for her competitors. For the first mover, the practice does not succeed only if competitors adopt it; luring custom, it in fact succeeds to a significant extent because competitors do not adopt it. Competitors might then replicate the practice to neutralise the effect of the first mover's competitive foray. For example, in their pursuit of an effective competitive strategy, sellers would mimic price announcements to level with a first mover.[196] Unilaterally, the business rationale or even procompetitive effect of the practices is apparent. Their anticompetitive effect remains mostly dormant with unilateral adoption. Once mimicked, however, their anticompetitive potential is triggered, which oftentimes outweighs the procompetitive effects.

These practices sometimes attract scrutiny when they are widespread among oligopolistic competitors, although they might be considered relatively harmless when only used by a few sellers.[197] This restricts the scope of imitable practices from a competition law perspective. From an economic perspective, however, not to imitate competitors can prove strategically unwise. Consider a seller that acts (the protagonist) and another that decides not to imitate the action (the antagonist): if the action is geared to attract customers – and many actions are – the protagonist captures more demand, and finite market size dictates a corresponding loss for the antagonist. Does the antagonist acquiesce idly, albeit within the bounds of competition law, or does she respond through commensurate action, risking parallelism and the invasive lens of competition law?

[195] Easterbrook (n 51) 30.
[196] Lieberman & Asaba (n 52) 5.
[197] OECD (n 12) 4; EC Guidelines on Vertical Restraints (n 185) para. 75; DOJ & FTC (n 91) 26.

4) The Dividing Line: Elusive or Illusive?

Although the practices discussed are not inherently concerted, they are evaluated differently compared to pure price or quantity coordination. There is concern that they facilitate market conditions that are conducive to coordination.[198] This usually means that they have an impact on the transparency of the market, which permits monitoring or the ability of sellers to punish a deviation.[199] The multilateral adoption of practices is generally considered harmful. The unilateral adoption of practices is generally considered less risky. Why is that a problem and how does it inform a distinction between the effects and transparency prisms? More importantly, why does this matter for the dividing line?

Sellers are the market. Especially in oligopolies, markets are mostly composed of sellers setting prices or quantities and buyers reacting to these supply conditions.[200] Kaplow touches upon this by pointing out that 'competitors, in responding to the prevailing market price, are implicitly responding to the behaviour of their competitors'.[201] In short, sellers are themselves dynamic components of the markets in which they are active.[202] The supply side is particularly constitutive of the market where few sellers act strategically, while many buyers respond non-strategically.[203] The more concentrated the market, the more sellers have to act with their competitors in mind. The Turner-esque dividing line between independent conduct as competitive and interdependent coordinated conduct as collusive simply does not exist in an oligopolistic market structure.[204]

Central to the oligopoly problem, interdependence implies that any strategically relevant action impacts competitors who are in turn incited to respond.[205] Interdependence describes absence of strategic autonomy. Strategy is not restricted to pricing. Sellers might therefore compete on the adoption of practices that seem attractive to customers just as much as they compete on prices or quantities. It removes the independent business rationale, regardless of the practice, and creates an interdependent business rationale. This ought to apply

[198] Joshua & Jordan (n 12) 660; EC Horizontal Cooperation Guielines (n 12) para. 37; Commission Decision IV/31.370 and 31.446 - *UK Agricultural Tractor Registration Exchange* [1992], para. 37.
[199] OECD (n 12) 2, 4; *UK Agricultural Tractor Registration Exchange* (n 198) para. 37.
[200] P Belleflamme & M Peitz, *Industrial Organization: Markets and Strategies* (2nd Ed. CUP: Cambridge, 2015), 3; Martin (n 38) 4.
[201] Kaplow (n 85) 697.
[202] Martin (n 38) 4-5.
[203] Belleflamme & Peitz (n 200) 3.
[204] Grillo (n11) 157.
[205] JW Brock, 'Antitrust Policy and the Oligopoly Problem' (2006) *51 The Antitrust Bulletin 227*, 227.

all the more where sellers are homogenous, since similar 'costs, demand, market shares, product range, capacities etc.' foster common understanding in collusive bargaining.[206]

Either promising an advance in their individual competitive position or potential procompetitive effects, sellers have ample incentive to adopt certain practices.[207] A practice merits adoption in particular where it appears sufficiently attractive to retain buyers or to poach them from competitors. In concentrated markets a practice's effect is amplified by the relative weight of each of the few actors. The adequate response to the unilateral adoption of a practice that affects relative demand can then be to mimic it to prevent losing custom. Failing to do so could even prove contrary to rational interest.

This interdependent dynamic can have precarious implications when applied to practices that have both pro- and anticompetitive potential. Section [x] discusses how certain unilateral practices combine procompetitive effects or at least provide a legitimate business rationale with few or no unilateral anticompetitive effects. Yet, the same practices adopted multilaterally can trigger anticompetitive effects that outweigh the procompetitive ones. If a small procompetitive effect provides a sufficient business rationale for one seller to adopt it, competitors' who fail to mimic it might even act contrary to their best interest. But to mimic risks generating transparency that triggers previously dormant anticompetitive effects, which may outweigh the unilateral pro-competitive effect.

This reasoning displays no flagrant strategic artifice but may incur net anticompetitive effects. Its dynamic can be understood under the transparency prism, which observes the method of a shift on the economic spectrum. The moves and counter-moves are not the result of collusive design but rather of a sequence of strategic interdependent decisions creating a degree of market transparency prone to coordination. In other words, the practices that create the transparency to which sellers intelligently adapt themselves may be in and of themselves nothing but an intelligent adaptation to the market. Creating this transparency in the first-place, sellers invariably take into account the additional information and (re)formulate their strategy accordingly.[208]

It is difficult to justify this reasoning under the effects prism, which inquires if a shift on the economic spectrum enhances transparency. Whereas mimicking competitors to avoid losing ground registers as rational on the transparency prism, it can incur anticompetitive effects and is unlikely to be absolved under the effects prism. Competition authorities will be

[206] EC Horizontal Cooperation Guielines (n 12) para. 82.
[207] Staber (n 157) 157.
[208] Grillo (n11) 162.

alerted to the multilateral adoption of conduct with the potential to enhance the transparency of a market.[209] The preceding discussion highlights that there are various examples where the multilateral adoption of a practice constitutes a tangible threat to competition, whereas unilateral action does not or is considered significantly less likely to do so.[210]

If oligopolistic competitors suddenly publish information on a regular basis, authorities may perceive their actions as rendering an already concentrated market even more transparent, which may well trigger corresponding enforcement.[211] Whereas a single vertical agreement would not typically be examined for its collusive risk, sets of vertical agreements with the same hub are at least susceptible to hub-and-spoke allegations. If sellers engage in the widespread adoption of MFCs, both wide and narrow, they step into a recognised theory of harm and may appear on the competition radar.[212] Whether only one or multiple sellers adopt MCCs could mean the difference between a market perceived at risk of, or subject to, collusion on the one hand and a competitive market on the other hand.[213]

The more concentrated the market and the more widespread the practice in question, the more appreciable competition authorities consider the risk of collusive harm, irrespective of whether it results from a well-defined plan to concert or from traceable oligopoly dynamics outside of sellers' control. In competing for custom, sellers inadvertently and each for individually understandable reasons risk creating what could – as this chapter argues – mistakenly be considered an artificially transparent market. *In short, those markets least capable of sustaining transparency procompetitively are not only more transparent in structure* (*see* Chapter 1, Section 5)*, but are also most prone to seller conduct that amplifies transparency generating further momentum for increasing coordination on the economic spectrum.*[214] This means that practices borne out of an attempt to compete effectively can create a momentum along the economic spectrum that increasingly enhances transparency and begets coordination.

But increased transparency or the happenstance of supra-competitive outcomes themselves are insufficient to justify competition intervention. There is a preceding step: for a finding of infringement between competitors there has to be at least a concerted practice. In

[209] EC Horizontal Cooperation Guielines (n 12) para. 63; EC Vertical Block Exemption Regulation (n 183) Article 6; DOJ & FTC (n 91) 26.
[210] OECD (n 12) 4; EC Guidelines on Vertical Restraints (n 185) para. 75; DOJ & FTC (n 91) 26.
[211] EC Horizontal Cooperation Guielines (n 12) para. 65; Wagner-von Papp (n 40) 155.
[212] EC Guidelines on Vertical Restraints (n 185) para. 75; *HRS* (n 186) para. 157.
[213] Salop (n 136) 28; Arbatskaya et al. (n 135) 311; Moorthy & Winter (n 134) 453; Hviid & Shaffer (n 135) 498.
[214] *UK Agricultural Tractor Registration Exchange* (n 198) para. 37; Dhalla & Oliver (n 154) 1828.

both US antitrust and EU competition practice, this still requires something that can be construed as an agreement or meeting of the minds, 'however expansively interpreted'.[215] The dynamic described arguably displays insufficient meeting of the minds for a finding of concerted practice. It almost resembles the far-reaching reasoning of *Interstate Circuit*, where 'it appeared that proof of conspiracy was divorced from questions of overt or formal agreement; the issue had become one of judging the market behaviour of competing firms' by economic benchmarks.[216]

The fact that facilitating practices alter the degree of transparency on the economic spectrum provides no indication that sellers intend for the generated transparency to aid coordination. Discussion of the effects and transparency prisms reemphasises that *effects analysis is concerned with outcome from which it aims to reverse-engineer "agreement"; rather differently, assessment of transparency focuses on method*. Note how the latter adheres more closely to the methodology of the law to place agreement centre-stage and thereby emphasises process over outcome, "how" over "what" (see Section 2).[217]

Analysing why economics and the law have inherently different visions of market conduct helps to understand why the determining factor for the dividing line remains method, not outcome. Glances of this distinction emerge by comparing the effects and transparency prisms. *Whether conduct creates natural or artificial transparency depends on whether it constitutes a rational response to the market from the perspective of the acting seller contemplating her relative position vis-à-vis buyers and competitors, not its overall impact on market efficiency.* Yet, what is best for the seller is not always best for the market. The former guards her position on the market vis-à-vis competitors. The latter flourishes or deteriorates pursuant to the collective effect of all its constituent actors. A seller might benefit more from a larger chunk of a smaller market than it would from a smaller chunk of a larger market.

Industry identity and the natural proclivity for mimicking to benchmark and preserve relative market positions are well understood phenomena in industrial organisation.[218] However, where these notions conflict with the more verifiable outcomes of competitive effects analysis, justifying this form of conduct could turn into an uphill battle. For the

[215] T Soames, 'An Analysis of the Principles of Concerted Practice and Collective Dominance: A Distinction Without a Difference?' (1996) ECLR 17(1), 25; H Hovenkamp, *Federal Antitrust Policy: The Law of Competition and its Practice* (5th edn West Publishing, St. Paul 2013) 208; M Filippelli, *Collective Dominance and Collusion: Parallelism in EU and US Competition Law* (Edward Elgar, Cheltenham 2013) 4.
[216] P Asch, *Economic Theory and the Antitrust Dilemma* (John Wiley, New York 1970) 269; WT Stanbury & GB Reschenthaler, 'Oligopoly and Conscious Parallelism: Theory, Policy and the Canadian Cases' (1977) *15 Osgode Hall Law Journal 617*, 699.
[217] Baker (n 44) 179; Harrington (n 10) 2.
[218] Dhalla & Oliver (n 154) 1828; Lieberman & Asaba (n 52) 5; Staber (n 157) 157.

adventurous seller, arguments to justify their conduct become even more difficult to substantiate. Section 2.b noted that certain board-room decisions are economically fallible and might follow relatively vague notions of experience, intuition or acumen. They may follow contestable theory or exploratory moves unconvincing to courts.[219] Similarly, they might knowingly or unknowingly work under certain informational limitations.[220]

These issues might skew their conduct in a manner difficult to fathom in retrospective competition analysis. The analysis is complicate further where interdependence obfuscates the boundaries for all interested parties. Industry identity induces sellers to mimic their competitors: be it for fear of losing custom where a practice appeals to customers individually or through somewhat blind intuition to hinge their conduct on a perceived industry leader.[221] To add to the confusion, market behaviour can involve no more than moves pursuant to semi-educated guessing – a trial-and-error process.[222]

A far cry from rational strategic decisions to pursue either competitive or collusive conduct, how should a seller explain her conduct under the effects prism? Where US authorities demand that '[t]he participants must substantiate efficiency claims so that the Agencies can verify by reasonable means the likelihood and magnitude of each asserted efficiency', they immediately clarify that '[e]fficiency claims are not considered if they are vague or speculative or otherwise cannot be verified by reasonable means'.[223] The fact that the transparency was created as a result of observation and mimicking, rather than some form of conduct akin to a concerted practice, will do little to satisfy that standard.

This dynamic fits awkwardly with the notion that high concentration invites potentially overzealous competition scrutiny. Courts operating with information and knowledge constraints can lean towards excessive prohibition. Limits to information and cost spark a so-called "inhospitality tradition of antitrust", meaning that practices tend to be prohibited unless defendants can convince a court that a practice constitutes an 'essential feature of competition'.[224] Inhospitality arguably increases with the level of concentration. Easterbrook describes the tear of competitive pressure as follows:

[219] Easterbrook (n 51) 8.
[220] Wagner-von Papp (n 40) 139.
[221] Lieberman & Asaba (n 52) 6, 12; *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 874-875.
[222] Stucke (n 23) 45; Kerber (n 159).
[223] FTC & DOJ (n 20) 24.
[224] Easterbrook (n 51) 4.

> *Fewer competitors remain, and fewness is the definition of monopoly (or at least oligopoly). The defendant is unlikely to have a good explanation for its success. The time is not ripe. When the defendant lacks a powerful explanation for its conduct, and the evidence points to "exclusion," a judge is likely to conclude: "Why not prohibit this practice? If it is anticompetitive, the prohibition will be beneficial. If it is not anticompetitive, the prohibition will be harmless; the defendant cannot tell me why the practice is essential to efficiency.*[225]

The same can be observed for competition authorities who seem to view information exchanges almost as 'substitutes for cartels', treating them 'with hostility, or at least deep suspicion'.[226] At times, there appears to be a tendency for the observance of multilateral information disclosure to be considered a sufficient condition for inferring agreement or concerted practice:

> *There is particular risk where a unilateral public announcement is followed by public announcements by competitors. This means in practice that a statement by one company may limit the ability of its competitors to respond since this may then give rise to a concerted practices allegation. The burden of proof may then shift to the parties to show that no common understanding existed.*[227]

However, Easterbrook argues that in the face of incommensurable stakes, a court risks deleterious consequences if it errs by condemning a beneficial practice.[228] Setting such a precedent would subsequently prohibit other sellers from also adopting the practice in question, thereby imposing constraints on potentially well-functioning markets.[229] If 'the court errs by permitting a deleterious practice, though, the welfare loss decreases over time'.[230]

Market conditions are dynamic and subject to frequent change where, for example, 'low regulatory entry barriers, a high rate of innovation, and efficient capital markets, privately acquired market power may be fragile and perpetually contestable – which makes the need for antitrust intervention comparatively low'.[231] Marshall and Marx refer to fluctuating market

[225] Easterbrook (n 51) 6.
[226] Wagner-von Papp (n 40) 132.
[227] Hall (n 123) 5.
[228] Easterbrook (n 51) 2.
[229] DA Crane, 'The Economics of Antitrust Enforcement', in *Antitrust Law and Economics,* KN Hylton (ed.) (2010 Edwar Elgar: Cheltenham), 4.
[230] Easterbrook (n 51) 2.
[231] Crane (n 229) 4.

conditions as a complicating factor in cartel operation where changes in prices or quantities require reallocation of relative profits.[232] Under the assumption that dynamic markets pose periodic challenges to any form of coordination, false negatives are likely less costly than false positives or, in other words: 'judicial errors that tolerate baleful practices are self-correcting, while erroneous condemnations are not'.[233] With this in mind, the FTC/DOJ Antitrust Guidelines for Collaborations Among Competitors warn that a sceptical perception of antitrust law regarding agreements among competitors may stifle potentially procompetitive efforts.[234]

There is, of course, the other side of the coin: it is difficult to ignore that the risk of competitively harmful coordination increases with the level of transparency.[235] Sellers soon realise that they are better able to anticipate their actions, and the initial ambition to compete on equal terms is at risk of evolving into (tacit) collusion. Conventional wisdom on repeated interaction in oligopoly markets suggests that sellers will know each other well and attempt to develop effective – not necessarily illicit – means of communication.[236] Yet, sellers tread a fine line between mere expressions of industry identity and potential invitations to collude – that is, actions with 'some solicitation or encouragement of a response'. Industry identity might flip into potentially illicit conduct if industry identity turns into something closer to industry loyalty.

Awareness of interdependence and a certain identification with counterparts are commonplace. One of the defendants in *Aircraft Check Services* noted that *"*we all try not to surprise each other*"*, which as 'evidence would be more compelling if the immediate sequel to any of these meetings had been a simultaneous or near-simultaneous price increase by the defendants'.[237] Another example of industry sentiment towards competition comes from the CMA PMI investigation, where an industriy consultancy came to the 'obvious and rather damning' conclusion that: aggregators have encouraged greater price competition and cost the UK insurance industry £1 billion in 'unnecessary price competition'.[238] The document containing this quote was titled "Why aren't we making money…'.[239]

Compare this to the ACM decision in *T-Mobile NL*, where the language is not fundamentally different from the sentiment identified in the PMI investigation, but in this case

[232] Marshall & Marx (n 143) 110.
[233] Crane (n 229) 4; Easterbrook (n 51) 2.
[234] FTC & DOJ (n 20) 1.
[235] Ivaldi et al. (n 182) 16; DOJ & FTC (n 91) 26; *UK Agricultural Tractor Registration Exchange* (n 198) para. 37.
[236] Kaplow (n 85) 713.
[237] *Aircraft Check Services Co. v. Verizon Wireless* (n 11) at 878.
[238] CMA, *Private Motor Insurance Market Investigation* (n 130) 8.92.
[239] ibid.

the sentiments expressed are subsequently acted upon: after a KPN director announced contemplating the reintroduction of charge connection fees at a conference, a Vodafone director commented 'that he hoped that KPN would carry this plan through'.[240] An internal document prepared by a third competitor, T-Mobile, states that KPN's signal was followed by Vodafone and understood as a means 'to make the market healthier'.[241] With competitors like these, who needs economic evidence?

While the idea of making the market "healthier" for sellers by driving up profits is not itself illicit – and rather an intuitive standpoint for sellers – communicating an unambiguous indication about where the loyalties and interests lie takes matters beyond what is defensible under notions of industry identity. The "Foley Dinners" provide an illustrative display of industry loyalty descending into outright concertation where, following the reveal of a proposal to raise rental agent commissions in concert, the mood was such that 'only by graceless refusals to accept Foley's invitation to dinner or by equally graceless withdrawals from it once its purpose was revealed could they have avoided the factual inferences required to implicate them in the conspiracy'.[242]

Certain economic limitations also apply. First, as with most oligopoly arguments, there ought to be a requisite degree of seller symmetry. The degree of symmetry determines the extent to which the various seller preferences converge into similar strategies (see Chapter 1, Section 4.d).[243] In the context of this chapter, this simply means that different sellers may compete on different terms and the optimal response to a certain strategic move may not be to mimic it. Seller asymmetries imply that '[s]trategic choices right for one competitor will be wrong for others'.[244] This is implied in the literature on industry identity, which broadly correlates the degree of group identification with the strategic value of mimicking.[245]

The theory remains, however: the conditions most likely to lead to coordination are also the conditions most corroborative of an industry identity and all its by-products (observing, mimicking etc.).[246] The underlying point of this chapter is therefore that the potential exists and requires elucidation – also, or especially, in practice – if an appropriate regulatory framework is to be constructed. Where applicable, this trap is likely to remain unobserved by

[240] Authority for Consumers and Markets - Decision in Case No 13.0612.53 (2014), paras. 23-26.
[241] ACM (n 240) para. 28.
[242] *United States v. Foley* (1979) 598 F.2d 1323, at 1334.
[243] ME Porter, *Competitive Strategy*, (Free Press, New York 2013), 19.
[244] ibid.
[245] Peteraf & Shanley (n 167) 176.
[246] OECD (n 12) 14-15; *UK Agricultural Tractor Registration Exchange* (n 198) para. 37; Dhalla & Oliver (n 154) 1828.

many a zealous corporate strategist. It should not be surprising that the permissible boundaries of interdependence, so vigorously debated in competition law discourse, cannot remain untested by sellers who are wired to outmatch their equally ambitious competitors. Friction is a given and possibly even a calculated risk.[247]

[247] Marshall & Marx (n 143) 47-48.

5) Conclusion

This chapter draws an arch from the analytical interplay between law and economics, over the relevant conceptual distinction between economic effects and the parameters of legal categories, to the scope of interdependence and industry identity in concentrated oligopolies. Albeit wide, this arch allows the reverse engineering of the legal binary into an economic spectrum. It does this by decoupling the mere observance of multilateral practices leading to parallel conduct from the allegation of artificial transparency, i.e. concerted practices.

Law and economics necessarily interact in the formulation of rules designed to regulate competition. Not only is legislation designed on the basis of economic understanding, but decision-making by authorities and courts also employs economic reasoning to appraise oligopolistic markets and conduct as accurately as possible. As the two disciplines collaborate in the fashioning of an administrable competition framework, their inherently different interpretations of competition and coordination are difficult to reconcile in the subtler areas of oligopolistic conduct.

Whereas competition economics understands the generation of transparency between oligopolistic sellers on a spectrum, the law attempts to classify it in binary terms of permissible and impermissible. Associating anticompetitive effects with artificial transparency enables a recalibration of the continuous logic of economics into the legally apprehensible binary of permissible and impermissible. However, by conflating the transparency and effects prisms, legal analysis applies a binary that is categorically incongruent with the logic of economic reasoning.

This legal approach somewhat underemphasises that the key step in the distinction between tacit collusion and concerted practices differs from effects analysis. Regardless of its net anti- or procompetitive effect, a practice can only be prohibited if it can be considered an agreement or concerted practice in the first place. This, in turn, can only be determined by reference to the question of natural and artificial transparency, which relates to the underlying purpose and method of conduct, rather than its effect.

This argument is corroborated by a closer look at industrial organisation principles. These display how less measurable notions of industry identity can induce oligopolistic sellers to act interdependently and in ways that may well be construed as collusive through an effects prism, although they qualify as rational conduct when examined under the transparency prism. This is not to say that certain practices have an anti-competitive effect. It is just that these

practices do not meet the threshold of a concerted practice and are, therefore, not within the reach of Article 101 of the TFEU or Article 1 of the Sherman Act.

In light of this, it would be problematic to keep an assumption – expressed in some cases as well as in horizontal and vertical cooperation guidelines – that the multilateral and reciprocal implementation of practices like information disclosures, MFCs or MCCs generally meets a standard for concerted practice. These forms of conduct can at times amount to concerted practices and have anticompetitive effects. Nevertheless, they can also arise for reasons other than an underlying agreement or meeting of the minds. This analytical step is underdeveloped in current enforcement practice. Where guidelines suggest that the reciprocal occurrence of certain practices may suffice for an inference of agreement, discussion quickly turns to effects.

It may not be an intentional implication in relevant case precedent and competition guidelines that an alternative commercial reason is pegged to pro- and anti-competitive effects. Yet, there exists a developed framework (its adequacy is not the subject of this chapter) to assess such pro- and anticompetitive effects, which tends to be dispositive of competition infringement. There is no requisite framework for the notions artificial and natural transparency. The benchmark remains a relatively vague formulation handed down in the genealogy of CJEU case law, starting with *Woodpulp II*. This is unfortunate, given that such a framework might constitute the key element in distinguishing tacit collusion from concerted practices.

The conceptual imprecision discussed in this chapter tends to invite misinterpretations in the brick-and-mortar world of competition. As conduct increasingly evolves to rely on virtual methods, the ability to exploit the oligopoly gap becomes more and more sophisticated. In light of rapid developments achieved through these virtual means, the ambiguity in core principles of competition law explored in this chapter will therefore become more problematic for both competition authorities and sellers. They face the challenge of understanding the competitive implications of virtual competition in light of a rulebook that, despite its decades of existence, remains beset by conceptual uncertainties. These uncertainties are the subject of the following and final chapter, which discusses recent developments in Big Data and Big Analytics.

Chapter 6: Big Data & Big Analytics

A substantial amount of recent literature and several cases on both sides of the Atlantic address the impact of modern technology and online competition on the basic tenets of competition law. Perhaps most prescient is the use of Big Data and algorithms. Much like offline devices, use of online technology may impact unilateral as well as coordinated effects. The discussion on unilateral effects relates to exclusion and dominance through the use of a "data advantage"; the respective analysis touches upon several analytical problems and novel enforcement challenges less pertinent to the discussion on tacit collusion.

Previous chapters discussed several brick-and-mortar methods of coordination; this chapter focuses on the potential for algorithms to facilitate coordination. This chapter argues that, although algorithms adhere to parameters different from brick-and-mortar sellers and do not communicate in the conventional sense, their interaction still very much meets what this thesis argues to be the key threshold for concerted practices. In other words, that algorithms do not technically communicate with each other and only react to each other's moves does not, as such, remove them from the realm of concerted practices.

Big Data analysis revolves around the "four V's": the volume, variety, velocity, and value of data as an input.[1] Big Data promises improvements in seller performance and is increasingly considered key to competing effectively.[2] While sellers generally benefit from past data to optimise processes, access to highly granular data opens new possibilities in terms of specificity, reach, and value of information.[3] Sellers use algorithms to analyse this wealth of data to their benefit. It is relevant for competition analysis that '[a]lgorithms are structured decision-making processes that automate computational procedures to generate decisional outcomes on the basis of data inputs'.[4] Set up to execute a specific (series of) command(s), pricing algorithms can be employed by sellers to optimise their conduct to continuously evolving market conditions – a practice known as dynamic pricing.[5]

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[1] AP Grunes & ME Stucke, 'No Mistake About It: The Important Role of Antitrust in the Era of Big Data' (April 2015) *The Antitrust Source*, 2; DD Sokol & R Comerford, 'Does Antitrust Have a Role to Play in Regulating Big Data?' (2016) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2723693> accessed 04 October 2019, 8; A Gal, *It's a Feature, Not a Bug: On Learning Algorithms and What they Teach Us – Note by Avigdor Gal* (DAF/COMP/WD(2017)50, 2017), 3.

[2] Grunes & Stucke (n 1) 1.

[3] S Banker, 'A New Big Data Predictive Analytics Solution for Ocean Carriers' (2016) *Forbes* <https://www.forbes.com/sites/stevebanker/2016/02/25/a-new-big-data-predictive-analytics-solution-for-ocean-carriers/#1a4b63a966dd> accessed 28 September 2018.

[4] MS Gal, Algorithms as Illegal Agreements (2018) *Berkeley Technology Law Journal*, 9.

[5] JE Harrington, 'Developing Competition Law for Collusion by Autonomous Artificial Agents' (2019) *14 Journal of Competition Law & Economics 331*, 353.

The economic efficiencies of Big Data and algorithmic processes are abundant. They improve the quality of products and services; an obvious example is the enhanced accuracy of results on search engines that collect and analyse data from previous queries.[6] Advertising is more targeted, such that sellers can better cater to the requirements of specific groups and buyers receive more relevant advertisement than in offline markets.[7] For sellers, they promote allocative efficiency right down to the nitty-gritty requirements of business logistics.[8] The list continues down to factors like 24-hour workdays and the uninterrupted work rate of algorithms, which reduces staffing requirements and enhances processing efficiency.[9]

Mass collection and processing of data combined with analysis through dynamic pricing algorithms alters the speed and depth at which sellers can manoeuvre supply-and-demand conditions in digital markets.[10] Their processing capacity generates the ability to empirically guide strategic conduct far beyond the efficiency of a human decision-maker.[11] Pricing and quantity decisions therefore follow an in-depth calculation of market conditions, an important point for the discussion on tacit collusion below.[12]

This enables the inclusion of otherwise prohibitively complex variables into business considerations, amplifying the detail and velocity of information processes. Real-time algorithms enable dynamic pricing in reaction to directly observed supply-and-demand conditions.[13] Endogenously, they can make predictions regarding, say, equipment failure or stocking requirements; exogenously, they have developed to predict factors like weather, currency rates, commodity trends, and current events. Vending machines that 'adjust beverage

[6] D Geradin & M Kuschewsky, 'Competition Law and Personal Data: Preliminary Thoughts on a Complex Issue' (2013) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2216088> accessed 04 October 2019, 3; Sokol & Comerford (n 1) 3-4.
[7] Geradin & Kuschewsky (n 6) 4.
[8] Sokol & Comerford (n 1) 3; A Ezrachi & ME Stucke, 'Artificial Intelligence & Collusion: When Computers Inhibit Competition' (2015) *Working Paper CCLP (L) 40*, 3; Quartz, 'The End of "Out of Stock": Retail Buyers May Know Your Next Order Before You Do' (2017) <https://qz.com/932538/the-end-of-out-of-stock-retail-buyers-may-know-your-next-order-before-you-do-2/> accessed 04 October 2019.
[9] SK Mehra, 'Antitrust and the Robo-Seller: Competition in the Time of Algorithms' (2015) *100 Minnesota Law Review 1323*, 1362, 1364.
[10] I Graef, 'Algorithmic Price Fixing Under EU Competition Law: How to Crack Robot Cartels?' (2016) <https://www.law.kuleuven.be/citip/blog/algorithmic-price-fixing-under-eu-competition-law-how-to-crack-robot-cartels/> accessed 04 October 2019; Mehra (n 9) 1327.
[11] Mehra (n 9) 1331.
[12] ibid. 1334.
[13] A Thomas, 'Robot Cartels: Algorithmic Price Fixing May Be the New Frontier of Antitrust' (2016) <http://fideres.com/publications/robot-cartels> accessed 04 October 2019; Mehra (n 9) 1336.

prices based on the outside temperature'[14] are an illustrative example, as is 'targeting people in euphoric or deflated moods after a sporting event'.[15]

For the purposes of this thesis, algorithms employing Big Data are relevant because their predictive ability may facilitate coordination. This potential relates to the way sellers interact when their conduct is automated through algorithmic processes with advanced data-mining techniques and access to the near-ubiquitous Internet.[16] Not only can algorithms analyse market variables in a more sophisticated manner and predict each other's conduct, they also interact at a velocity that may permit them to achieve a more effective – and less interruptible – form of price leadership. Next to their enhanced monitoring ability, the speed of their interaction is an important factor for competition analysis.

Amongst other questions, technological advancement prompts reconsideration of the applicability of current competition laws to algorithmic pricing, the concept of agreement, the responsibility of sellers using algorithms, and the dividing line between tacit collusion and concertation.[17] It has become fashionable to explore whether conventional competition law can adequately capture algorithmic conduct, and to ask:

> *... whether by applying laws that were designed to apply to human-facilitated co- ordination, are we limiting ourselves to looking only under the proverbial lamppost, while the activities we are interested in take place in the dark. If so, can we address this problem by using stronger light bulb (i.e., widening the scope of existing laws by way of interpretation)? Or do we need to create a new source of light altogether (i.e., new laws)?*[18]

[14] Mehra (n 9) 1336.
[15] The Economist, 'How Germany's Otto Uses Artificial Intelligence' (2017) <http://www.economist.com/news/business/21720675-firm-using-algorithm-designed-cern-laboratory-how-germanys-otto-uses?fsrc=scn/fb/te/bl/ed/automaticforthepeoplehowgermanysottousesartificialintelligence> accessed 04 October 2019; R Moore-Colyer, 'Predictive Analytics are the Future of Big Data' (2015) <http://www.v3.co.uk/v3-uk/analysis/2429494/predictive-analytics-are-the-future-of-big-data> accessed 04 October 2019; Banker (n 3).
[16] Mehra (n 9) 1324.
[17] Graef (n 10); R Matthan, 'Colluding Algorithms' (2017) <http://www.livemint.com/Opinion/J2kisMEcqSm9ER9ZumddRL/Colluding-algorithms.html> accessed 04 October 2019; Ezrachi & Stucke (n 8) 3.
[18] Gal (n 4) 3.

These questions are becoming especially relevant because the characteristics of algorithms suggest that they may be able to widen the scope for tacit collusion, such that it could feasibly occur more commonly and in less concentrated markets.[19]

While algorithms have the recognised economic ability to facilitate coordination, whether this legally constitutes tacit collusion or concerted practices can be unclear. The task is therefore to examine how novel forms of coordination achieved through algorithms might be categorised in the context of the dividing line between tacit collusion and concerted practices. Two points raised in the preceding chapters are worth reiterating here. First, there is a key difference between the economic concept of collusion, which focuses on outcome, and the legal concept of (explicit) collusion, which focuses on method. There are legitimate methods of coordination that nevertheless result in an economically collusive outcome, one example being price leadership.

Second, the key to distinguishing tacit collusion from concerted practices arguably lies in the underexplored distinction between natural and artificial transparency. The former entails conduct that is primarily aimed at affecting demand in a manner that optimises a seller's position vis-à-vis her competitors. The latter entails conduct primarily aimed at circumventing demand patterns in a manner that permits sellers to ascertain their mutual adherence to parallelism before they incur a demand response.

With this distinction in mind, the following discussion examines how variations of algorithms might facilitate coordination in the context of three general settings. First, it examines horizontal coordination between algorithms, which are calibrated by sellers to fulfil monitoring functions and execute trigger strategies to achieve supra-competitive outcomes. Their perceived key characteristic – the ability to achieve coordination – places them within the scope of concerted practices, even absent conventional means of communication. Second, it explores the more complicated implications of autonomous agents that are not directed by sellers to achieve coordination but determine this to be the optimal course of conduct on their own. Finally, the analysis considers the implications of algorithmic intermediaries which facilitate coordination between sellers, that is, algorithmic hub-and-spoke scenarios.

[19] OECD, *Algorithms and Collusion – Background Note by the Secretariat* (DAF/COMP(2017)4, 2017), 35.

1) Colluding with Pre-Programmed Algorithms

As is the case for all practices relevant to the dividing line between tacit collusion and concerted practices, Big Data and Big Analytics generate conventional competitive efficiencies. Algorithms are adopted between sellers to continuously readjust prices to a range of conditions like inventories, industry-specific factors, and – importantly – the actions of competitors.[20] Prices for hotels, air fares, and various e-commerce goods are already governed by algorithms.[21] They facilitate demand-side transparency by providing access to more and better-organised information.[22]

They also aid the supply side by continuously improving existing products and processes; that is, by driving innovation. Algorithms can optimise internal processes and improve how sellers navigate markets. Internally, they can reduce production and transaction costs, segment buyers, and optimise inventories.[23] Predictive analytics employ 'a combination of real-time, historical and third-party data to build forecasts of what will happen in their business months, weeks or even just hours in advance' and act accordingly.[24] Illustrative is the example of a German online retailer who employs a deep-learning algorithm that 'analyses around 3bn past transactions and 200 variables' and thereby 'predicts with 90% accuracy what will be sold within 30 days'.[25]

These supply-and-demand efficiencies are but a few examples of the great promise of algorithms for society:

> *Algorithms are right up there with the printing press in terms of their contributions to our modern economy. They have the potential to produce real consumer benefits and to make more products available to more people. After all, the entire premise of market competition is that firms will respond to changes in the market and that those responses will generally benefit consumers. Algorithms enable firms to identify market changes better and*

[20] German Monopolies Commission, *Algorithms and Collusion* (2018) 22. Biennial Report, 4 <http://www.monopolkommission.de/en/press-releases/219-biennial-report-xxii-competition-2018.html> accessed 14 October 2018.
[21] German Monopolies Commission (n 20); OECD, OECD (n 19) 14.
[22] OECD (n 19) 12.
[23] ibid 9.
[24] Moore-Colyer (n 15).
[25] The Economist (n 15).

> *respond to them more quickly. In a great many cases, that will be an unambiguously good thing.*[26]

Yet, owing to their processing and analytical power, algorithms also show certain behavioural properties that materially alter the parameters of competition and collusion.

Real-time monitoring enhances transparency and reduces the time required to detect and match competitor conduct. This diminishes the incentive to cheat by closing the time lag key to achieving deviation profits (*see* Chapter 1, Section 4.b).[27] Coordination becomes more sustainable as deviations are rendered unprofitable where retaliation is near-instantaneous.[28] At the same time, sellers can promptly respond to exploratory price increases, since algorithms can calculate 'multiple rounds whereby one firm increases prices and the rival computers respond immediately and without the risk that the firm that initiates the price increase will lose many customers to rivals'.[29] This particular aspect of algorithmic conduct is key to the analysis in this section.

Algorithms are also able to absorb and analyse a far larger volume of information than would have been possible in times when data-gathering and analysis were still largely human tasks.[30] Algorithmic processing permits more sophisticated market analysis, reducing misinterpretations, irrational behaviour, mistakes, or emotions.[31] For example, periods of low demand are less likely to be confused with cheating.[32] At high levels of granularity, the assumption is that a computer can correctly identify patterns that would elude the human eye. This draws on the processing capacity of algorithms to correlate data and recognise patterns, a method already used, for example, to separate fraudulent from genuine banking transactions.[33]

Introducing novel behavioural features and abilities, developments in algorithmic processing therefore raise a variety of interesting questions for competition law theory and

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[26] T McSweeny, *Algorithms and Coordinated Effects* (2017) *University of Oxford Centre for Competition Law and Policy*, 1 <https://www.ftc.gov/system/files/documents/public_statements/1220673/mcsweeny_-_oxford_cclp_remarks_-_algorithms_and_coordinated_effects_5-22-17.pdf> accessed 04 October 2019

[27] OECD (n 19) 20; Mehra (n 9) 1346, 1349, 1357; A Ezrachi & ME Stucke, *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (HUP, Cambridge (Mass.) 2016), 62-63; Ezrachi & Stucke (n 8) 19.

[28] OECD (n 19) 3-4; German Monopolies Commission (n 20).

[29] Ezrachi & Stucke (n 27) 64; Ezrachi & Stucke (n 8) 18.

[30] Federal Trade Commission, 'Big Data: A Tool for Inclusion or Exclusion?' (2016), 1 <https://www.ftc.gov/system/files/documents/reports/big-data-tool-inclusion-or-exclusion-understanding-issues/160106big-data-rpt.pdf>.

[31] OECD (n 19) 3-4; Graef (n 10); Thomas (n 13); Mehra (n 9) 1346, 1349.

[32] German Monopolies Commission (n 20); Mehra (n 9) 1346, 1349.

[33] M Sheth, 'Intelligent Adoption of Artificial Intelligence' (2017) *Livemint* <http://www.livemint.com/Opinion/OujSp932PooMKDHGxzlJrO/Intelligent-adoption-of-artificial-intelligence.html?li_source=LI&li_medium=news_rec> accessed 04 October 2019.

practice. Among them is the question of whether rules designed for human actors remain effective in the context of advanced algorithmic interaction. Conduct already covered under the competition law framework – in this case, clear-cut instances of concerted practices – can also become more sophisticated and trickier to detect.[34] In such instances, computers merely execute human instructions to collude.[35] It is widely understood that replacing smoke-filled rooms with digital venues to exchange secret communications has no bearing on the application of Article 101 TFEU or Section 1 of the Sherman Act.

An early example of this becoming apparent was *Airline Tariff Publishing*, where the issue was less that algorithms were autonomously communicating but rather that technology was co-opted for secret communications. Sellers had used a principally legal and efficient fare dissemination system to exchange information 'in a manner that enable[d] them to reach price-fixing agreements or unnecessarily to facilitate fare coordination'.[36] More topically, *Topkins* illustrates the use of algorithms to achieve price coordination on the Amazon marketplace with an underlying meeting of the minds.[37] Sellers agreed to coordinate their pricing of posters through use of an algorithm specifically designed for the task.[38] In those instances, algorithms 'are simply the means of effectuating' a collusive agreement between sellers.[39]

However, as is the case in the offline world, more relevant for the exploration of the dividing line between tacit collusion and concerted practices are methods of coordination that are less egregious than outright cartelisation. The attention should therefore be on the enhanced sophistication of algorithmic competition, which arguably amplifies the potential for tacit collusion.[40] While certain general properties that affect this change remain relatively constant – enhanced volume, variety, velocity, and value – the method by which algorithms are applied by sellers can differ. Hence, defining further modulations of the usage of algorithms to facilitate coordination alters and informs more specific legal ramifications.

Much in keeping with the approach in Chapters 2-4, it is possible to discern certain factors that (ought to) qualify behaviour as either concertation or tacit collusion. Accordingly, the following analysis explores several scenarios of how algorithms could be applied to facilitate coordination between sellers. This section only addresses algorithms pre-

[34] McSweeny (n 26) 2.
[35] Ezrachi & Stucke (n 27) 39; Ezrachi & Stucke (n 8) 8.
[36] *US v. Airline Tariff Publishing Pub Co* (1993) 836 F.Supp. 9, at 10, 12; Ezrachi & Stucke (n 27) 41; Ezrachi & Stucke (n 8) 12.
[37] Graef (n 10).
[38] *United States v. David Topkins* (2015) CR 15-00201 WHO, at 4; SK Mehra, 'US v. Topkins: can price fixing be based on algorithms?' (2016) *7 Journal of European Competition Law & Practice 470*, 471.
[39] OECD, *Algorithms and Collusion – Note by the United States* (DAF/COMP(2017)41), 3.
[40] Graef (n 10); Matthan (n 17); Mehra (n 9) 1340.

programmed to fulfil monitoring functions and execute trigger strategies, that is, to become sophisticated executors of tacit collusion.[41] Technologically more complex machine learning algorithms – or autonomous agents – are subsequently discussed in Section 3.

a) Information exchange and signalling algorithms

Scenarios where algorithms exchange information should, by and large, be covered by information exchange parameters described in Chapter 3. This refers to interactions where algorithms serve as 'instruments that can influence the market structure by facilitating the exchange of information and, thus, increasing market transparency'.[42] At least in the context of algorithmic information exchange, former FTC Commissioner Ohlhausen's somewhat soft-pedalling statement seems to hold true: 'If it isn't ok for a guy named Bob to do it, then it probably isn't ok for an algorithm to do it either'.[43]

However, the main competition concern associated with algorithms is not typically linked to price announcements or similar strategic output. If there were some place where algorithms pre-announced prices and adjusted their conduct to each other at rapid intervals, the setting would resemble *Airline Tariff Publishing* in all elements but the fact that the encoded input of collusive information would have shifted from the human decision-maker to an algorithm.[44]

The issue is rather that specific parameters of competition amplified through Big Analytics generate novel methods of stabilising coordination. Information is no longer information in the sense of ostensibly public price announcements in *EU Container Shipping* or the encoded exchanges in *Airline Tariff Publishing* (*see* Chapter 3, Section 3). It is rather the predictive value extracted through the enhanced analytical precision of mutually observing algorithms itself that may amplify coordination. Their interaction manifests at a velocity that currently materialises uniquely between algorithms, without the significant interference of a demand reaction, which enables a quasi-negotiation process between them.[45]

Although it risks oversimplification, it might prove helpful to draw a theoretical distinction between algorithms that actively disseminate information, on the one hand, and

[41] OECD (n 19) 25.
[42] German Monopolies Commission (n 20).
[43] MK Ohlhausen, 'Should we Fear Things that go Beep in the Night? Some Initial Thoughts on the Intersection of Antitrust Law and Algorithmic Pricing (2017) 10 <https://www.ftc.gov/system/files/documents/public_statements/1220893/ohlhausen_-_concurrences_5-23-17.pdf> accessed 04 October 2019.
[44] OECD (n 19) 29.
[45] ibid 37.

algorithms that simply monitor the market (including other algorithms) and are themselves observable in terms of their conduct, on the other hand. The latter are informative only in terms of their observable behaviour, do not entail communication in the conventional sense, and are therefore less susceptible to the traditional mould of collusive conduct.[46]

Still, several types of conduct short of active information dissemination display traits arguably within the scope of concerted practices. For example, the already amplified velocity of interactions could be utilised in a way that exacerbates information asymmetries, such that '[a]lgorithms might reduce or even entirely eliminate the cost of signalling, by enabling companies to automatically set very fast iterative actions that cannot be exploited by consumers, but which can still be read by rivals possessing good analytical algorithms'.[47] Conceivable are 'snapshot price changes during the middle of the night, which won't have any impact on sales but may be identified as a signal by rivals' algorithms'.[48]

Chapter 3 discussed how either the content, format or context of information exchanges might permit an inference of concerted practices. The main underlying lesson was that asymmetrically distorted information – disclosed to eliminate, circumvent or mitigate the demand reaction before sellers can align their conduct – might suffice to permit inferences of concerted practices (*see* Chapter 3, Sections 3-4). Arguably, a similar logic applies to night-time price hikes that facilitate a circumvention of demand pressures, without displaying offsetting efficiencies or commercial justification.

b) Publicised and transparent algorithms

This raises the question of how extensively such a logic could be applied if the issue is no longer the dissemination of information or clandestine signalling but rather the operational logic of an algorithm. For example, 'a firm may make an invitation to collude by publicly releasing a pricing algorithm, while competitors would accept the offer by using the same algorithm as part of their business strategy'.[49] This scenario, too, can be couched in traditional information exchange analysis, since the underlying intention is not without precedent. The publication of a pricing book in *US v. General Electric*, which contained complex pricing

[46] Harrington (n 5) 338.
[47] OECD (n 19) 29.
[48] ibid.
[49] ibid 37.

formulas and a uniform multiplier, was considered to have been intended solely to facilitate coordination between the sellers and displayed no offsetting efficiencies.[50]

Alternatively, sellers might programme and apply a sufficiently transparent algorithm for competitors to replicate it. This takes into account that 'algorithms serve a dual purpose: as a set of instructions, and as a file, to be read by other programs'.[51] An algorithm could be calibrated to be sufficiently accessible for other algorithms to extract its decisional parameters and, consequently, to predict its future actions.[52] Applied to the potential for collusion this means that 'transparency can help facilitate coordination by exposing the considerations that one's rivals take into account, including the weight given to different parameters'.[53]

On the one hand, unless sellers can justify the degree of transparency in terms of buyer benefit or other commercial rationales, such quasi-publication of the algorithm could still be construed as an invitation to collude and be met on the basis of criteria established in *US v. General Electric*.[54] After all, there is a compelling market-based argument that it is in the interest of proprietors of algorithms to guard their formula: 'Exclusive access to algorithms and data can create a comparative advantage, and thus may be regarded as important trade secrets not to be shared with others'.[55]

On the other hand, examining the degrees of transparency of an algorithm may evolve into an awkward boundary-making exercise. What if a competitor comes to understand an algorithm and, if only for wanting to improve her own market performance – this tendency to mimic is discussed in Chapter 5 – replicates it? If a key aspect of algorithms is their ability to analyse complex and voluminous information, it should be no surprise that an algorithm may eventually understand and mimic a counterpart algorithm by mere correlation of observable data inputs.[56] Indeed, the very foundation of inquiring into the collusive potential of algorithms rests on the expectation that they are able not only to observe in sophisticated detail conventional parameters like prices or quantity, but also to acquire previously unattainable insight into the past, present, and likely future conduct of competitors.

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[50] *United States v. General Electric Co.* (n 17) at 1; L Cabral, 'GE and Westinghouse' (2010) *NYU Stern School of Business,* 2 <http://luiscabral.net/economics/teaching/gewestinghouse.pdf> accessed 04 October 2018.
[51] Gal (n 4) 15.
[52] ibid.
[53] OECD, *Algorithms and Collusion: Problems and Counter-Measures – Note by A. Ezrachi and M.E. Stucke* (DAF/COM/WD(2017)25, 2017), 19.
[54] *United States v. General Electric Co.* (n 17) at 1; Cabral (n 50).
[55] Gal (n 4) 18.
[56] B Salcedo, 'Pricing Algorithms and Tacit Collusion' (2018) <http://brunosalcedo.com/docs/collusion.pdf> accessed 04 October 2019, 4,6.

What results is a familiar requirement to find an appropriate balance between under- and overregulation. It makes sense that outright publication or invitingly accessible transparency of algorithms should be categorised as concerted practices. Cases like *In re Coordinated Pretrial Proceedings in Petroleum Products Antitrust Litigation* clarify that the dissemination of information that is only useful to – and hence presumably directed at – competitors is unlikely to display counterweighing efficiencies and lacks a justifying commercial rationale.[57] However, this should not result in counterproductive requirements for sellers to fashion algorithms that are purposefully obscure to avoid competitors from grasping their decisional logic at any cost. Ideally, the aforementioned market-based incentives ought to ensure this balance to an appropriate extent.

c) The Predictable Agent

The analysis slowly but surely moves to conduct that displays few, if any, conventional markers of concerted practices. At issue are algorithms that are not primed to collude by communicating, do not actively exchange information, do not disseminate obvious signals like night-time price hikes, and are neither publicised nor purposefully transparent. At this point it might seem fair to argue that none of the constitutive legal elements of concertation remain. Yet, the economic potential for coordination arguably persists, again begging the question whether the set of rules designed well before the advent of algorithms remains sufficient.

Where algorithms simply fulfil a monitoring and price-matching function, large swaths of data are processed and deviations are likely to be detected almost instantaneously.[58] Each algorithm understands that its price reductions are going to be met and therefore calculates a profit-maximising strategy that entails matching competing algorithms.[59] To reiterate, where competitors previously agree on using the same type of algorithm or agree on specific parameters according to which their algorithms screen the market to achieve a coordinated outcome, they are merely using algorithms as an implementation device for a collusive agreement.[60]

More challenging for the current competition framework is the seeming ability of algorithms to stabilise coordination without the need to communicate or – it would seem –

[57] *In re Coordinated Pretrial Proceedings in Petroleum Products Antitrust Litigation* (1990) 906 F.2d 432, at 448.
[58] OECD (n 19) 25.
[59] ibid.
[60] ibid 5.

resort to agreement.[61] The concern is therefore that algorithms enhance sellers' ability to tacitly collude.[62] This is at the core of Ezrachi and Stucke's *Predictable Agent* model, in which 'each firm unilaterally creates an algorithm but knows that the industry-wide use of pricing algorithms will facilitate tacit collusion'.[63] Sellers calibrate algorithms to devise profit-maximising market strategies and follow price leadership, thereby fostering conditions that allow them to circumvent explicit collusion.[64]

It could be argued that magnifying the scope for oligopolistic coordination merely clarifies the dividing line between tacit collusion and concerted practice, instead of challenging it significantly. Although decision-making occurs faster than would be possible for a human actor, amplifying unilateral coordination mechanisms to their maximum potential does arguably not by itself delegitimise the method.[65] Although it constitutes a more resourceful exploitation of the oligopoly gap, it remains but the sophisticated pursuit of permissible practices, using available information and responding to market dynamics.[66]

As such, it might seem difficult to negotiate the *Predictable Agent* out of the oligopoly defence. Data analytics enable probability calculations to an extent humans cannot match. Nevertheless, at issue is the computation of no more than a highly granular level of *existing, observable* information. Arguably, in this case the 'main enforcement challenge concerns the legality of conscious parallelism'.[67] In practice, the algorithm design and function may look something like this:

> *Algorithm B instructs the computer to compare player B's price to that of player A. This decision parameter is a rational reaction to the "price recipe" of Algorithm A. It also serves to motivate player A not to deviate, because any lower price he sets will be matched by B. (...) Indeed, the interaction between the players is based on each reasoning computationally about the other's algorithm. The result is coordinated pricing as a direct consequence of simple leader-follower behaviour, where B acts solely based on information about A's prices, which are available online.*[68]

[61] ibid 24.
[62] OECD (n 19) 32-33.
[63] Ezrachi & Stucke (n 27) 56.
[64] ibid 61; Ezrachi & Stucke (n 8) 17-18; Matthan (n 17).
[65] Mehra (n 9) 1338.
[66] Matthan (n 17).
[67] Ezrachi & Stucke (n 27) 66.
[68] Gal (n 4) 16.

The argument assumes that algorithms can mutually observe their behaviour, which can happen in several ways. For example, there are price comparison tools (PCTs) that facilitate direct interaction for dynamic pricing algorithms. Generally, PCTs are meant to enhance transparency and intensify competition, aiding buyers by lowering search costs and reducing asymmetries between sellers and buyers.[69] Yet, being pegged directly against each other, it also means that algorithms interact in a virtually closed ecosystem, which amplifies their collusive features. Comparable examples include pricing between petrol stations – including in Chile, Australia, and Germany – that were mandated to post their fuel prices to government websites in real time for transparency purposes, which ultimately led to price increases rather than enhanced competition.[70]

Being implemented in a defined ecosystem and subject to the same rules of the comparison tool, algorithms follow identical parameters of competition and can instantaneously react to both price hikes and reductions. What is more, competition primarily centres on price in this setting, which implies that products are sufficiently homogenous. For algorithms, too, collusion is more likely to arise in concentrated markets for homogenous products that are transparent and permit monitoring.[71] Where price is the main factor of competition, intense price competition can ensue.[72] However, it also bears reminding that cartels form with 'striking regularity' in markets where sellers are unable to otherwise differentiate themselves.[73]

Dynamic pricing algorithms can also facilitate mutual observation outside the confines of PCTs: algorithmic pricing and repricing programs can 'treat pricing as a reinforcement learning issue, changing their decision matrix in an ongoing way as they learn from market interactions'.[74] These algorithms therefore fulfil analytical and monitoring functions that not only permit sellers to keep a close check on pricing and conduct but also to 'indirectly learn their decisional parameters'.[75] In the e-commerce sector, price monitoring software referred to

[69] OECD (n 19) 16; German Monopolies Commission (n 20).
[70] A Ezrachi & ME Stucke, 'Sustainable and Unchallenged Algorithmic Tacit Collusion' (2019) *University of Tennessee Legal Studies Research Paper No. 366*, 22.
[71] Ezrachi & Stucke (n 70) 7.
[72] European Commission, Final report on the E-commerce Sector Inquiry (2017) *SWD(2017) 154 final*, para. 517; Harrington (n 5) 331.
[73] JE Harrington, 'Thoughts on why Certain Markets are More Susceptible to Collusion and Some Policy Suggestions for Dealing with Them' (2015) *DAF/COMP/GF(2015)8*, 6.
[74] Gal (n 4) 11.
[75] ibid.

as "spiders" is emerging, which crawls the internet to gather and screen relevant information to gather accurate real-time information about competitors.[76]

Further yet, it might not even be necessary to access the setup of competitor algorithms directly in order to adequately monitor competitor pricing, as long as algorithms can collect sufficient information from the observable conduct of other algorithms to deduce their decision-making processes.[77] Gal stresses that '[t]his observation cannot be overstated: the mere (direct or indirect) observation of the algorithm by competitors may, by itself, serve to facilitate coordination'.[78] Yet, from a legal point of view, this unilateral deployment of technology to decode the decision parameters of competitor algorithms remains seemingly permissible.[79]

The key feature of these settings is that algorithms might converge through rapid iterative interaction in a manner that the OECD points out could be described as 'resembling an actual negotiation process between businessmen to implement a collusive agreement'.[80] This raises an enticing question: 'Could [it] therefore be concluded that the fast adjustment of prices in reaction to competitors until convergence is reached is tantamount to an agreement?'[81] Gal similarly argues that the design of certain algorithms could constitute a plus factor, because they 'include in their decision trees elements that not only scan and compare the available options as a basis for consumption decisions, but also change suppliers' decision parameters to include reactions to offers made by suppliers to other consumers, thereby also changing suppliers' incentives'.[82]

Yet, these arguments do not uncover manifestly concerted elements in the manner in which algorithms interact. Price leadership can also entail tit-for-tat price adjustments that converge on a common equilibrium in a process that could also resemble negotiation, albeit at lesser speed.[83] It remains very much within the scope of oligopolistic conduct to react to competing offers made to buyers, that being an inherent aspect of interdependent incentive structures.[84] On the face of it, this appears to vindicate ostensibly unilateral, oligopolistic

[76] European Commission (n 72) para. 603.
[77] Salcedo (n 56).
[78] Gal (n 4) 17.
[79] Ezrachi & Stucke (n 70) 25.
[80] OECD (n 19) 37.
[81] ibid.
[82] MS Gal, 'Algorithmic-Facilitated Coordination: Market and Legal Solutions' (2017) *CPI Chronicle May 2017*, 6.
[83] PK Kopalle & RA Shumsky, 'Game Theory Models of Pricing' in Ö Özer & R Phillips (eds.), *The Oxford Handbook of Pricing Management* (OUP, Oxford: 2012), 396.
[84] Green et al., 'Tacit Collusion in Oligopoly' in RD Blair & DD Sokol (eds.) *The Oxford Handbook of International Antitrust Economics* (OUP, Oxford: 2014), 465.

conduct: 'After all, one cannot condemn a firm for behaving rationally and interdependently on the market'.[85]

A potential remedy to address this legally unfettered ability to sustain cooperation might be to 'rethink concepts that stand at the basis of our laws, like the meeting of minds, intent, consent, and communication, and possibly create a new taxonomy to fit the algorithmic world'.[86] However, by nature of its key argument – that the legal concept of tacit collusion is somewhat of a different animal than generally acknowledged – this thesis suggests an alternative view. The analysis of algorithms does not require a prohibition of tacit collusion but rather a clarification of the dividing line between tacit collusion and concerted practices and, subsequently, how this may inform an understanding of coordination facilitated through the usage of algorithms.

The bulk of recent literature accepts or implies that algorithms cannot be colluding explicitly, because they are merely screening and adjusting to the market instead of communicating.[87] Yet, if communication constituted an awkward benchmark in the brick-and-mortar world, it arguably borders on the obsolete in the digital context. In keeping with the arguments set out in the preceding chapters, it is rather the facilitation of artificial transparency – that is, the adoption of practices with asymmetric informational value that permit the circumvention of demand patterns – which distinguishes concerted practices from tacit collusion.

It is true that the most suitable method for achieving coordination traditionally entailed some form of communication. Sceptics of the sustainability of algorithmic tacit collusion reiterate that (invariably illicit) communication significantly enhances the likelihood of coordination.[88] Several economic arguments advocate that communication significantly improves the scope for coordination.[89] Such arguments take into account that communication also aids autonomous agents with navigating a potentially infinite number of Nash equilibria.[90] It is difficult to ignore that 'successful recipes for convincing a court of that claim have almost

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[85] OECD (53) 19.
[86] Gal (n 4) 4.
[87] German Monopolies Commission (n 20); OECD (n 19) 18; Gal (n 82) 5.
[88] U Schwalbe, 'Algorithms, Machine Learning, and Collusion' (2019) *14 Journal of Competition Law & Economics 658*, 25; KU Kühn & S Tadelis, 'Algorithmic Collusion' (2017) <https://www.cresse.info/uploadfiles/2017_sps5_pr2.pdf> accessed 04 October 2019; Ezrachi & Stucke (n 70) 10.
[89] Green et al. (n 84) 472; DJ Cooper & KU Kühn, 'Communication and Cooperation: A Methodological Study' (2016) *82 Southern Economic Journal 1167*, 1167; DJ Cooper & KU Kühn, 'Communication, Renegotiation, and the Scope for Collusion' (2014) *6 American Economic Journal: Microeconomics 247*, 248; KU Kühn, 'Fighting Collusion by Regulating Communication Between Firms' (2001) *16 Economic Policy 167*, 174.
[90] Schwalbe (n 88) 26.

always had a common ingredient: evidence of an overt act of communication'.[91] While this did not necessarily have to involve fully formulated reciprocal exchanges, there remains a question of how far the limits of communication can be stretched while remaining within the scope of concerted practices.[92] Hence, the argument goes, the need to communicate would ultimately meet the threshold for concerted practices, rendering concern about a possible future vexed by widespread tacit collusion misplaced.[93]

But when in certain literature – based on the conventional economic link between communication and coordination – it is 'conjectured that the possibility to exchange messages is important also in the case of algorithmic collusion', it may be that this is, indeed, conjecture.[94] There are also several general counterarguments. First, there is economic evidence that even in the lab, communication is a sufficient condition, not a necessary one (*see* Chapter 1, Section 5.b).[95] Second, lab experiments lack the ability to calculate for less tangible notions of industry identity that afford sellers an added layer of familiarity and bonhomie (*see* Chapter 1, Section 5.c).[96] Third, there is already research showing that algorithms are indeed capable of colluding, 'even when the active firms are three or four in number, when they are asymmetric, and when they operate in a stochastic environment'.[97] Fourth, there is the rather straightforward observation that actual cases of tacit collusion – or something sufficiently close to tacit collusion to protect sellers from competition reprimand – existed even before algorithms entered the stage of competition analysis, examples being *Woodpulp II* or, more recently, *Aircraft Check Services v Verizon Wireless*.[98]

It would seem more accurate to argue that, while coordination was typically achieved through communication, this does not render communication the key element distinguishing the legal notion of tacit collusion from concerted practices. This holds especially true in the context of algorithms whose analytical prowess may render them capable of reading the

[91] Harrington (n 5) 338.
[92] ibid.
[93] Ezrachi & Stucke (n 70) 12.
[94] Schwalbe (n 88) 27.
[95] T Sugaya & Y Yamamoto, 'The Folk Theorem in Repeated Games with Individual Learning' (2015, available at: https://sites.google.com/site/takuosugaya/home/research), 2-4: Y Awaya & V Krishna, 'On Tacit Versus Explicit Collusion' (2014) <https://kelley.iu.edu/doc/bloomington/business-economics-and-public-policy/seminars/fall-2014/krishna-paper.pdf> accessed 04 October 2019, 4.
[96] JW Brock, 'Antitrust Policy and the Oligopoly Problem' (2006) *51 The Antitrust Bulletin 227*, 227-228.
[97] E Calvano et al., *'*Artificial Intelligence, Algorithmic Pricing and Collusion' (2019) *Oxford Law and Business Blog* <https://www.law.ox.ac.uk/business-law-blog/blog/2019/02/artificial-intelligence-algorithmic-pricing-and-collusion> accessed 04 October 2019.
[98] Joined Cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85 (*Woodpulp II*) *A. Ahlström Osakeyhtiö and others v Commission* [1993] ECLI:EU:C:1993:120; *Aircraft Check Services Co. v. Verizon Wireless* (2015) 782 F.3d 867.

operational logic and anticipating the conduct of their counterparts, which puts the notion of an outright commitment to act in parallel into question even further that it was to begin with.[99] At this level of sophistication, it is no longer helpful to ask whether a guy named Bob could act in the same way. If the prognoses of both Professors Susskind are anything to go by, Bob has probably already lost his job.[100]

So, does the fact that the main characteristics of coordination which is facilitated by algorithms comfortably meet all the traditional markers of the oligopoly gap indeed render it inscrutable under existing competition laws? Predictably, no. Closer inspection of the dividing line between tacit collusion and concerted practices in the foregoing chapters revisited the legal scope of these concepts, and where and how they meet. Viewed under this more nuanced lens, it becomes apparent that certain elements of coordination facilitated by algorithms and currently protected under a conventional threshold might not in fact meet the criteria for a revisited legal understanding of tacit collusion.

In pursuit of the elusive dividing line, the foregoing chapters have explored the somewhat crudely defined difference between artificial and natural transparency. This difference depends not on whether conduct that enhances transparency has an anticompetitive economic effect, whether the moves and countermoves between interdependent sellers could be described as a negotiation process or whether sellers are taking the pricing decisions of their competitors into account. It depends on whether conduct responds to supply-and-demand patterns in a way that secures or advances the position of the seller vis-à-vis her competitors. The seller acts to capture as much demand as possible, knowing that the actions of her competitors affect her demand and vice versa.[101]

This argument goes back to first principles: Oligopolistic sellers are aware of their mutual interdependence, meaning that they have to take each other into account, because the anticipated demand-side reaction remains the focal point of their conduct. Interdependence only exists because of demand reactions.[102] If algorithmically fuelled conduct consistently resulted in coordination whilst operating according to this principle, it could perpetually fly under the competition radar. It also applies in a digitised context: competition economics focus on outcome, competition law focuses on means.[103] The guiding principle of competition law –

[99] Gal (n 4) 4.
[100] R Susskind & D Susskind, *The Future of Professions: How Technology Will Transform the Work of Human Experts* (OUP: Oxford, 2015).
[101] BE Hawk & GA Motta, 'Oligopolies and Collective Dominance: A Solution in Search of a Problem' *Eigth Treviso Conference on "Antitrust Between EC Law and National Law"* (2008), 60; Green et al. (n 84) 465.
[102] ME Porter, *Competitive Strategy*, (Free Press, New York 2013), 88.
[103] OECD (n 19) 17.

even in some of the more extreme scenarios of coordination facilitated by algorithms – remains the prohibition of anticompetitive conduct, not outcome.[104]

Yet, this focal point shifts when sellers prearrange their actions to coordinate *before* there is a demand response. This category covers a wide range of actions. At an extreme, it covers the classic cartel agreement to coordinate between sellers, which is by definition conceived of to circumvent demand pressure. However, it also covers the public exchange of information that – due to its content, context or format – benefits sellers without providing offsetting efficiencies for buyers.[105]

To name but a few examples, this asymmetric informational value existed in the secret messages encoded in *United States v. Airline Tariff Publishing Company*;[106] it was apparent in the supply-side oriented content of the tank wagon prices and dealer discounts in *In re Coordinated Pretrial Proceedings in Petroleum Products Antitrust Litigation*;[107] and it was arguably present in the pre-announcement of general rate increases that came without seller commitment in *EU Container Shipping*.[108] Notwithstanding their varying shapes, these cases are all emblematic of conduct that permits sellers to circumvent the demand response before their conduct is implemented.

Indeed, it is the inability to circumvent demand that characterises price leadership, the classic form of tacit collusion, to remain legitimate under competition law in the first place. When the first mover raises here prices and invites mimicking by competitors, in the traditional brick-and-mortar tacit collusion scenario this exposes her to an adverse demand response until the move is met or, if it is not, until she returns to competitive equilibrium.[109] For the leader to raise her price as a signal to propose coordination and for her competitors to mimic in order to enhance collective profits, each move centres on the logic of – and remains exposed to – a demand reaction.[110]

The point is that actions are necessarily routed through demand, even if sellers seek to attain supra-competitive equilibrium through parallelism. Put formalistically, this process could be thought of as a fixed sequence: first, one seller raises her prices and for a brief period

[104] Harrington (n 5) 339; OECD (39) 3.
[105] WH Page, 'Tacit Agreement Under Section 1 of the Sherman Act' (2017) *81 Antitrust Law Journal 593*, 610.
[106] *United States v. Airline Tariff Publishing Company* (n 92) 7-8, 10-11, 12.
[107] *Petroleum Products Antitrust Litigation* (n 57) at 448.
[108] AT.39850 *Container Shipping* [2016], paras. 26-29.
[109] JE Harrington, 'A Theory of Tacit Collusion' (2011) <https://econpapers.repec.org/paper/jhupapers/588.htm> accessed 04 October 2019; A Capobianco & P Gonzaga, 'Algorithms and Competition: Friends or Foes?' (2017) *CPI Antitrust Chronicle August 2017*, 3.
[110] Kopalle & Shumsky (n 83).

of time risks an adverse demand response, because the prices of her competitors remain low.[111] Second, her competitors either keep pricing low to win additional demand for one round or they mimic to attain supra-competitive profits (until coordination eventually breaks). A seller that prices 'at the high collusive level today […] anticipates the other firms pricing at that high level tomorrow, while not pricing high today is anticipated to bring forth low (competitive) prices from the other firms tomorrow'.[112] This dynamic necessarily follows from the disciplining significance of a demand reaction. However, this dynamic changes when algorithms are involved:

> *[T]he algorithms' velocity of pricing decisions can shorten the time period for signalling price increases in other industries. (…) Computers can have multiple rounds whereby one firm increases prices and the rival computers respond immediately and* ***without the risk that the firm that initiates the price increase will lose many customers to rivals****.*[113]

In other words, while this sequence formally remains in place with algorithmic interaction, time-gaps are reduced to the point of irrelevance. In principle, algorithms adjust and readjust prices in response to each other. Yet, the time gap narrows to a point where the possibility of a demand-response to discipline seller conduct is all but absent: 'firms can instantaneously execute countless price variations that are immediately detected by rivals, allowing them to coordinate strategies without giving enough time for consumers to react upon the price changes'.[114] In effect, algorithms therefore enable the parallel adoption of parallel conduct.[115] Where interactions are negotiated within seconds, first-mover risk is safely mitigated.[116]

As a result, the velocity of algorithmic decision-making is capable of functionally circumventing the demand rationale of oligopolistic interdependence. But if interdependence is a function of demand patterns, sellers that circumvent demand patterns no longer act interdependently. To qualify as a valid action within the scope of interdependence, conduct also has to be constrained by the demand pressure that predicates interdependence. Without

[111] Harrington (n 109).
[112] Harrington (n 5) 335.
[113] Ezrachi & Stucke (n 70) 24.
[114] Capobianco & Gonzaga (n 109) 3.
[115] Gal (n 4) 16.
[116] German Monopolies Commission (n 20).

this constraint, actions precede interdependence and cannot automatically claim the oligopoly defence.

It is not that sellers are no longer interdependent. The issue is that their actions circumvent the demand response before they are subject to the logic and constraints of oligopolistic interdependence. Where the velocity of algorithmic interaction entirely removes the buyer from the calculation and facilitates an information and reaction disparity that no longer abides by the rules of interdependence, the oligopoly defence can no longer be said to apply as a matter of principle.

This has an important implication: removing the blanket coverage of the oligopoly defence opens the analysis to review of specific aspects of coordination facilitated by algorithms. To be sure, not all types of algorithmic interaction should be considered concerted practices. But if isolated pricing patterns display little more than the iterative interaction between algorithms, the categorisation of conduct should not present too difficult a challenge for competition theory. Although with autonomous agents, the task then becomes to delve into the technology of the algorithm to understand the mechanics of its decision-making, the *Predictable Agent* entails the convenient element that to follow price leadership and achieve coordination where possible is a traceable, analysable, and "categorisable" command.

A further point to be considered relates to the difference between conduct that comes with a commitment and conduct that can be adjusted. Chapter 2 discussed in the context of information exchanges how announcements that come with a commitment tend to be less conducive to coordination than those that permit subsequent adjustments. Simply put, subsequent adjustments permit sellers to iteratively meet their anticipated price hikes and negotiate a supracompetitive equilibrium. Similarly, rapidly re-adjusting algorithms display certain similarities to the negotiation process that can ensue when companies issue public price announcements without a commitment. This ability to renegotiate is what leads to the prohibition of the announcements. The difference is that the algorithm technically implements price adjustments, which muddles the boundary, but the effect is fundamentally the same.

In those cases, it is rather a question of setting out parameters of proof and an enforceable remedy. Several options of restraining algorithms, and their potential shortcomings, have already been considered in recent years. Reducing the frequency of interaction, for example, could provide an effective remedy against amplified price leadership. However, such policies risk stifling other important competitive parameters 'by reducing the

amount of information available to consumers and by preventing fast price adjustments from efficiently matching demand and supply'.[117]

This raises the perennial question: 'How does one order a firm to set its prices without regard to the likely reactions of its competitors?'[118] Although the question remains unresolved, it does not mean that one cannot carefully influence when a seller may set her prices with regard to the likely reactions of her competitors. One remedy might be to mandate that algorithms are only permitted to play one-shot equilibria in their direct interaction in between their adjustment to other, external factors. In other words, algorithms would be permitted to react at their usual velocity to the same variety and volume of information – thus retaining their efficiency promise to society – but would not be permitted to repeatedly interact with each other before they have reacted to external factors at least once in the meantime.

Ezrachi and Stucke provide a comparable example of Australian gas stations, where sellers are only permitted to match each other's prices once a day, which reintroduces delay before they can react to each other, thus re-enabling discounting.[119] Permitting only one price adjustment a day is slightly different from requiring only one-shot interactions between sellers, because the latter allow for more frequent price adjustments to a variety of other factors as long as there are no repeated, uninterrupted interactions between sellers. For instance, if algorithms determining the prices at gasoline stations immediately readjust to changes in the price of crude oil, this can easily be discerned as competitive conduct.[120] By contrast, a collusive hypothesis is that '[t]here were no cost shocks (or any other changes in the environment) to justify a higher competitive price, and instead a firm raised its price as an invitation to collude, which the other firm accepted by similarly raising its price'.[121]

There will certainly be analytical complications to this seemingly straightforward guideline. For example, if an algorithm is primed to react to the average market price and not directly to another algorithm, it nevertheless responds to the effects created by another algorithm raising its price. This would be an indirect response to the action of another algorithm that may still be covered under a general one-shot rule. As interactions become more complex, it is not difficult to imagine that the categorisation of what is and is not a reaction to another algorithm becomes muddled.

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[117] OECD (n 19) 49.
[118] *Clamp-All Corp. v. Cast Iron Soil Pipe Inst.* (1988) 851 F.2d 478, at 484.
[119] OECD (53) 28.
[120] Harrington (n 5) 339-340.
[121] ibid 340.

However, the key takeaway from this section remains: there is nothing in principle prohibiting the categorisation of interactions between monitoring price-setting agents as a concerted practice, even absent conventional means of communication. From this perspective, the competition rulebook displays some degree of resilience and adaptability. Although they were designed for human actors, this section argued that the rules on concerted practices nevertheless remain effective in the context of advanced algorithmic interaction.

2) Autonomous Agents and Coordination

The previous section discussed algorithms developed and calibrated to perform certain predetermined functions or, rather, pursue certain predetermined outcomes. Autonomous agents might achieve something more than just a highly efficient form of tacit collusion and come with a more complex set of questions. Here the developer renders control, at least in part, to the machine. The algorithm is set up to maximise profit according to a set of boundary parameters, but not specifically directed to seek out price leadership to attain tacit collusion.[122] Separate algorithms may then coalesce into tacit collusion as the optimal strategy without violating their boundary parameters, which is therefore 'not the fruit of explicit human design but rather the outcome of evolution, self-learning and independent machine execution'.[123]

This scenario could be achieved by machine-learning algorithms, which do not have a pre-determined set of instructions but are instead capable of gradually evolving and learning functional relationships on the basis of data inputs.[124] Machine learning algorithms generally adapt their decision-making to correlations they observe in their environment.[125] Machine learning can be subcategorised into: supervised learning, 'where the algorithm uses a sample of labelled data to learn a general rule that maps inputs to outputs' and gets corrected where necessary; unsupervised learning, 'in which the algorithm attempts to identify hidden structures and patterns from unlabelled data' through deduction; and reinforcement learning, 'in which the algorithm performs a task in a dynamic environment, such as driving a vehicle or playing a game […] and learns through trial and error'.[126]

Reinforcement learning algorithms do not have a set of behavioural instructions but are only given the goal they are to attain, be it winning a certain game or maximising profits.[127] In pursuit of that goal, they are capable of experimenting and adjusting to their environment to improve their (re)actions and performance.[128] Algorithms therefore adopt an operational logic well beyond their initial input parameters, which can be difficult for human observers to assess: 'such algorithms uncover patterns in data and independently find solutions instead of following simply pre-programmed rules.'[129]

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[122] Ezrachi & Stucke (n 27) 74; Matthan (n 17).
[123] Ezrachi & Stucke (n 8) 23; Matthan (n 17).
[124] Schwalbe (n 88) 9; Gal (n 4) 10.
[125] Gal (n 4) 10.
[126] Schwalbe (n 88) 7.
[127] Schwalbe (n 88) 11; Calvano et al. (n 97).
[128] Harrington (n 5) 342.
[129] German Monopolies Commission (n 20).

Another relevant form of machine learning is deep learning. Deep learning constitutes a programme based on artificial neural networks designed to replicate the human brain: it learns from experience and gradually develops from simple to more complicated concepts.[130] The decision-making of deep learning algorithms becomes much harder to explain:

> *One of the things that sets [deep learning networks] apart from other ML algorithms is their limited ability to explain their decision making. In deep learning, features are created as a (possibly complex) computation over multiple features, making such algorithms' decision-making hard to explain.*[131]

That way sellers may unwittingly end up coordinating, which raises questions regarding the notion of agreement and corresponding liability of sellers and algorithms.[132] Explaining the operational logic of an algorithm therefore becomes particularly complex with deep learning, where 'the lack of feature extraction implies that there is no way to know which features or information were used by the algorithm to convert inputs into outputs'.[133] More so than with previous methods capable of sustaining coordination, this scenario requires various clarifications regarding certain practical limitations and legal boundaries that may arise.

a) Autonomous agents and game theory

A core assumption underlying an analysis of machine learning algorithms in competition law is that, through their autonomous decision-making, they may still adopt pricing rules that actors use when they coordinate.[134] That is, they may achieve coordination by coalescing around mutually identified parameters at high levels of breadth, detail and/or sophistication that are neither envisaged nor necessarily identified by human actors. This cognitive capacity enables machine learning algorithms to achieve more complex equilibria faster and through fewer interactions than human actors.[135]

Nevertheless, experimental evidence suggest that for the time being machine learning algorithms might still choose to compete where cooperation proves too complex or irrational, which 'implies that algorithms are subject to limitations, even if these are less demanding than

[130] Schwalbe (n 88) 12.
[131] Gal (n 1) 5.
[132] OECD (n 19) 31; Gal (n 4) 14.
[133] OECD (n 19) 9.
[134] Harrington (n 5) 332.
[135] Gal (n 4) 13.

those faced by humans performing similar tasks'.[136] To better understand how and why machine learning algorithms are relevant for an understanding of tacit collusion and concerted practices, it is helpful to explore some of their characteristics and limitations in a more familiar game theoretic context.

Experiments involving two simple computer games provide basic insights into the conduct of autonomous agents and suggest that they can act in ways consistent with game theory. Discussing one approach to studying algorithms, DeepMind scientists outline:

> *In real life, both cooperating and defecting may require complex behaviours, involving difficult sequences of actions that agents need to learn to execute. We refer to this new setting as sequential social dilemmas, and use artificial agents trained by deep multi-agent reinforcement learning to study it.*[137]

Such experiments permit insights into how agents learn and apply desired conduct to 'age-old questions in social science such as the mystery of the emergence of cooperation', which may help 'to better understand and control complex multi-agent systems such as the economy'.[138]

In the first game, two autonomous agents were instructed to gather digital apples and 'they played fair – so long as there were enough apples to go around', but became aggressive and used pre-programmed "beams" to disable each other as supply decreased.[139] Crucially, 'without using the laser beams, they would end up with equal numbers of apples, so the aggression was rewarded'.[140] Conversely, in a second game the AI agents played "Wolfpack" which required them 'to capture an AI prey and both agents were rewarded for doing so, regardless of which caught it'.[141] Cooperation duly emerged.

The study of such social dilemmas through algorithms suggests similarities with traditional game theoretic outcomes.[142] To the extent that these games permit inferences of interdependence, they display reasoning akin to pay-off functions observed in standard game theory. As discussed in Chapter 1, Section 2, the stability of coordination in repeated games

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[136] Gal (n 4) 13.
[137] J Leibo et al., 'Understanding Agent Cooperation' (2017) *DeepMind* <https://deepmind.com/blog/understanding-agent-cooperation/> accessed 04 October 2019.
[138] Leibo et al. (n 137).
[139] Leibo et al. (n 137); O Williams, 'Google's New AI Becomes "Highly Aggressive" to Get What it Wants' (2017) *Huffington Post* <http://www.huffingtonpost.co.uk/entry/google-deepmind-ai-highly-aggressive_uk_58a180a4e4b094a129ecbc5e> accessed 04 October 2019.
[140] Williams (n 139).
[141] Ibid; Schwalbe (n 88) 20.
[142] Schwalbe (n 88) 21.

depends on the discount factor, i.e. the relative value of current over future profits. In essence, this describes how patient sellers are considering that the value placed on current profits usually exceeds that of future profits.[143] The DeepMind agents reflect this dynamic: in the first game, they broke from cooperation as it bore profit; in the second game, they cooperated as it was rewarded.[144]

Although instructive, these games ultimately study relatively simple examples in a contained environment. These models are a far-cry from the variety and potential complexity of algorithms used in practice, already today. Sellers can resort to a wide variety of machine learning algorithms, 'including bandit-type models, customer choice models, econometric regression models, machine learning modes, and greedy *ad hoc* approaches, all of which vary substantially in their performance depending on the market structure and market dynamics'.[145] Recall in this context economic literature on the effect of seller and/or product differentiation on the stability of coordination (*see* Chapter 1, Section 4).[146] One corresponding criticism of current competition law analysis of algorithms is that it does not sufficiently differentiate between different types of models and machine learning.[147]

As either the algorithms or the environments grow more complex and include stochastic elements, so do the challenges of anticipating and understanding the behaviour of autonomous agents.[148] Complex strategy spaces may render the computation of suitable equilibria too complicated and convergence between several agents may require a long time.[149] With growing complexity, the formulation of applicable legal parameters becomes more reliant on an understanding of the technology. Partially as a result of complex programming or environments, early insights show both unintended and unexpected conduct when autonomous agents are left to their own devices.

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[143] PB Overgaard & HP Møllgaard, 'Information Exchange, Market Transparency and Dynamic Oligopoly', *University of Aarhus Economics Working Paper 2007-03*, 6; S Sacher & J Sandford, *No Shortage of Theories: The Role of Capacity in Antitrust Analysis* (2016) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2804948> accessed 06 October 2019, 10; I Bos & JE Harrington, 'Endogenous Cartel Formation with Heterogeneous Firms', *RAND Journal of Economics 41(1)* (2010), 93.
[144] Williams (n 139).
[145] Schwalbe (n 88) 24.
[146] OECD, *Unilateral Disclosure of Information with Anticompetitive Effects*, Policy Roundtables DAF/COMP(2012)17, 22; M Ivaldi et al., The Economics of Tacit Collusion, *IDEI – Final Report for DG Competition, European Commission (2003)*, 11.
[147] Schwalbe (n 88) 2.
[148] ibid 21; Competition and Markets Authority, *Pricing Algorithms* (2018), 5.30; Harrington (n 5) 333.
[149] Schwalbe (n 88) 13.

Autonomous agents are (currently) unpredictable

An increasingly prominent application of artificial neural networks that uses deep learning is in the context of traditional human board and card games, like Go or poker.[150] One example was the standoff between board game Go world champion Lee Sedol and AlphaGo, a machine learning device tapped into Google DeepMind.[151] Defying conventional wisdom with 'deceptively simple' tactics that 'humans would never think about' pursuing, AlphaGo conquered areas 'most human observers had written off as impregnable'.[152] When game judge and professional Go player Fan Hui exclaimed 'It's not a human move!', he was surprised not by the fact that AI had prevailed, but by the 'beautiful' manner in which it had played.[153] What makes this experience striking is that AlphaGo was calibrated in a way that resembles human intuition, a configuration necessary in this case because, unlike chess, Go has virtually infinite moves, prohibiting a machine from charting out every possible move and simply overpowering a human opponent.[154]

A similar situation arose with "Libratus" the poker robot. Libratus was programmed to understand the rules of Texas hold'em poker and practiced by playing several trillion hands against itself to improve its playing style by trial-and-error.[155] Subsequently, it was tested by playing against professionals in a poker tournament. Similar to AlphaGo, it was difficult to identify Libratus' strategy and seemingly bad moves eventually proved successful strategies, with the machine comfortably beating its human opponents.[156] More astonishingly, Libratus would after some rounds of playing remove certain patterns and randomise parts of its strategy – it learned how to bluff.[157]

These examples suggest a possibility that autonomous agents, however calibrated and conditioned, may evolve to adopt a logic somewhat alien to humans, contemplate variables inaccessible to humans, and derive conclusions (initially) incomprehensible to humans.

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[150] ibid.
[151] JI Wong & N Sonnad, 'Googles AI Won the Game Go by Defying Millennia of Basic Human Instinct' (2016) *Quartz* [available at: https://qz.com/639952/googles-ai-won-the-game-go-by-defying-millennia-of-basic-human-instinct/].
[152] Ibid.
[153] C Metz, 'The Sadness and Beauty of Watching Google's AI Play Go' (2016) *WIRED* [available at: https://www.wired.com/2016/03/sadness-beauty-watching-googles-ai-play-go/]; G Lichfield, 'Google's AI victory is a Reminder of the Beautifully Alien Nature of Machine Intelligence' (2016) *Quartz* [available at: https://qz.com/637939/googles-ai-victory-is-a-reminder-of-the-beautifully-alien-nature-of-machine-intelligence/].
[154] J Kahn, 'Google's DeepMind Finds Way to Overcome AI's Forgetfulness Problem' (2017) *Livemint* [http://www.livemint.com/Industry/Iog6TbhDZI0M7XZnsl838O/DeepMind-finds-way-to-overcome-AIs-forgetfulness-problem.html?li_source=LI&li_medium=news_rec].
[155] OECD (n 19) 8.
[156] OECD (53) 24.
[157] OECD (n 19) 8.

Discussing the full extent of this risk exceeds the scope of this thesis. Yet, these examples do reflect a relevant insight relating to the strategic use of algorithms to guide seller conduct: it is not a given that in the complex environment of the modern economy, the widespread use of machine learning agents results in collusion.[158] In a similar vein, the more complex the algorithms, the more complex the requirements for coordination.[159]

Issues of complexity may be compounded by certain practical constraints that sellers face, which do not apply in even the more complex lab experiments. Consider the element of time. Going back to one of the previous examples, AlphaGo in an unusual move stayed 'calm amid an invasion' and prioritised a long-term perspective that eventually won the game.[160] Why is this relevant? A game of Go is finite. Repeated equilibrium games are not. It may not be directly obvious what time frame a computer adopts in its calculation of the maximum achievable profit. Yet, sellers – companies steered by directors, governed by boards, and answerable to shareholders – may not have the luxury of time. Short-term losses rarely impress shareholders. The explanation that a black-box algorithm is simply pursuing a long-term strategy is unlikely to sway directors pursuing more short-term success. Nor will it absolve them if the strategy proves unsuccessful.

Autonomous agents may be susceptible to manipulation

A related issue is that, even if autonomous agents achieve coordination, they may still be susceptible to manipulation. One example of this comes not from the corporate but the social media world. Microsoft developed the chat-bot "XiaoIce" to interact with Twitter, Weibo, and WeChat users in China and Japan, to adopt and learn from these interactions, and eventually to converse like a human. It proved an immense success, going 'viral within 72 hours' and gaining over 40 million users.[161] Motivated by this success, Microsoft sought to replicate the model in the US, creating the chatbot "Tay" to interact with Twitter, Kik, and GroupMe users.[162] Doing just that, Tay however 'rapidly descended into a racist, sexist wreck', evidently incapable of distinguishing appropriate from inappropriate use of language.[163]

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[158] Schwalbe (n 88) 19.
[159] ibid 23.
[160] Wong & Sonnad (n 151).
[161] K Quach, 'Microsoft Chatbots: Sweet XiaoIce vs Foul-Mouthed Tay' (2016) *The Register* [available at: https://www.theregister.co.uk/2016/09/29/microsofts_chatbots_show_cultural_differences_between_the_east_and_west/].
[162] Quach (n 161); J West, 'Microsoft's Disastrous Tay Experiment Shows the Hidden Dangers of AI' (2016) *Quartz* [available at: https://qz.com/653084/microsofts-disastrous-tay-experiment-shows-the-hidden-dangers-of-ai/].
[163] Quach (n 161).

To some extent, this anecdote restates the lesson set out above: 'AI can (and often should) behave in ways human creators might not expect'.[164] A variety of issues affected the disparate experiences between XiaoIce and Tay, including differing socio-cultural undercurrents and the impact of Chinese internet censorship of certain phrases on XiaoIce (which even deflects racially motivated slurs). The example also illustrates the vulnerability of a programme like Tay left to its own devices which is subsequently victim to 'a coordinated attack by a subset of people [exploiting] a vulnerability in Tay'.[165]

The point is that an autonomous agent trawling the vast digital landscape may be susceptible to targeted external influence. In the corporate strategy landscape, it would have to be possible for self-learning algorithms to distinguish between information that is contextually relevant to their decision-making and information that is simply spread to obfuscate the accuracy of results calculated to determine optimal conduct. What if sellers purposely disseminate misinformation to mislead monitoring by competitors? If a seller were inclined to cheat, there is a chance that she could. At the present state of development, it is difficult to see how one could introduce a checks-and-balances system to filter decision-making accordingly.

b) Autonomous agents and liability

The previous arguments address a combination of issues relating to the feasibility of coordination between autonomous agents, taking into account certain practical and commercial constraints. These points do not yet address potential legal implications applicable if autonomous agents do achieve coordination, notwithstanding the foregoing complicating factors. As discussed in some of the previous chapters, while it is the task of economics – and in this case computer science – to estimate the avenues and potential for cooperation between several actors or agents, it is for legal analysis to construct a framework responsive to those instances where coordination is conceivable.

The first issue with according liability to autonomous agents is that those algorithms that challenge the application of competition law do not in the conventional sense communicate with each other and therefore lack a key indicator of concerted practices. This touches upon the same questions discussed in the previous section, regarding the pre-calibrated *Predictable Agent*. It is true that the conventional benchmark for liability, at least in competition practice,

[164] West (n 162).
[165] K Lui, 'Microsoft Confirms Its Chinese-Language Chatbot Filters Certain Topics' (2016) *Fortune* [available at: http://fortune.com/2016/11/28/microsoft-chat-bot-xiaoice/]; Quach (n 161); West (n 162); C Custer, 'I Tried to Make Microsoft's Chinese Chatbot Racist. Here's How She Stacked up to Tay.' (2016) *Tech In Asia* [available at: http://fortune.com/2016/11/28/microsoft-chat-bot-xiaoice/].

remains that there is some form of communication to facilitate mutual understanding.[166] Indeed, autonomous agents are not privy to information that is not technically observable on the market and do not disseminate information themselves.[167]

Yet, the fact that algorithms are not only primed to detect patterns but also by their conduct create detectable patterns arguably obviates the need for conventional communication between sellers.[168] Nevertheless, attaching liability to autonomous agents under current competition parameters to may seem counterintuitive:

> *But what does it mean to "program compliance with the Sherman Act"? Jurisprudence tells us it means that [autonomous agents] cannot communicate with each other in the same sense that human managers are prohibited from communicating. Thus, [autonomous agents] would not be in compliance if they coordinated their conduct using arbitrary messages unrelated to the competitive process, but would be if coordination was achieved through their prices, as that is an example of legal conscious parallelism. We are then back to a situation in which is collusion achieved through means that, if executed by human agents, would be lawful.*[169]

In principle, that would not have to be an issue. As previously argued, there are important peculiarities to the velocity of algorithmic interaction that lend themselves to concertation, which would not apply to the same sequence of interaction between human actors, because the latter could not implement coordination purely by price adjustments without being exposed to demand reactions. In that sense, the reasoning applied to the *Predictable Agent* in the previous section could also be applicable to interactions between autonomous agents.

However, as previously mentioned, the decisional parameters of autonomous agents cannot be easily extracted. Hence, proposals to regulate the frequency of interaction between autonomous agents – as was argued for the Predictable Agent – would be more difficult to implement. Even if algorithms converged on a supra-competitive price, it might be difficult for both sellers and regulators to extract when and how they did so.[170] This raises the second issue:

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[166] Harrington (n 5) 346-347.
[167] ibid.
[168] Gal (n 4) 22.
[169] Harrington (n 5) 349.
[170] OECD (n 19) 44.

even if algorithms somehow fit a broad description of communication, it might prove difficult to render humans liable for the conduct of autonomous agents.

This begs the question whether it matters that owners of autonomous agents may lack understanding or even awareness of ensuing coordination.[171] Should sellers be held liable 'if their smart algorithms subsequently and independently identify the benefits of interdependence under the tacit collusion scenarios'?[172] The more advanced the autonomous agent, the more remote the link between its initial input parameters and the conduct it comes to adopt on the market and, therefore, the more difficult the allocation of liability to sellers who employ the algorithm.[173] It is of course possible, to some extent, to assess the programming of algorithms to determine what they are set up to do and how they evolve. Such an assessment could take into account the programming, boundary parameters and reward structure of algorithms.[174] The aim would be to examine the rules that determine pricing – that is, 'to "get inside the head" of the price-setting agent' – and define applicable liability and evidentiary standards.[175] However, there are practical issues with such an approach. It is difficult to extract and replicate exactly the parameters an autonomous agent adapts in a real market environment to examine questions of liability, since 'through machine-learning, trial-and-error, and market changes, the algorithm itself evolves'.[176] In other words, it would be difficult to extract a set of facts from an autonomous agent to be applied to a legal benchmark.[177]

Possible countermeasures could be 'guidelines and principles of compliance by design' or that 'inspections perhaps could increase deterrence and compliance'.[178] There are also proposals to shift the burden of proof or to designate algorithms as plus factors. According to these proposals, sellers who use autonomous agents to determine pricing and whose conduct reflects coordination would typically be required to prove that they are not colluding.[179] This seems to generally resonate with the thinking of EU Competition Commissioner Vestager, to whom it seems 'very clear that companies can't escape responsibility for collusion by hiding behind a computer program'.[180] She further stresses that businesses 'need to know that when

[171] OECD (n 19) 38; Harrington (n 5) 346-347.
[172] OECD (53) 26.
[173] OECD (n 19) 38.
[174] ibid 38.
[175] Harrington (n 5) 350.
[176] OECD (53) 23.
[177] German Monopolies Commission (n 20).
[178] OECD (53) 23.
[179] Capobianco & Gonzaga (n 109) 4.
[180] M Vestager, Algorithms and Competition, Federal Cartel Office 18th Conference on Competition, Berlin, 16 March 2017 <https://ec.europa.eu/commission/commissioners/2014-

they decide to use an automated system, they will be held responsible for what it does, so they had better know how that system works'.[181]

However, plus factor approaches or shifts in the burden of proof may not fully remedy the risk for coordination without unduly interfering in the competitive process. First, it may not always be apparent that autonomous agents are coordinating, meaning that a benchmark based on the observation of coordinated conduct may not accurately capture the dynamics of coordination between algorithms.[182] Second, if the decisional parameters of autonomous agents are difficult to extract or replicate, it would be challenging to determine with certainty that parallel behaviour is not the result of sellers taking into account the same set of market-driven factors.

It bears repeating that a range of factors suggest that the scope for genuine collusion between autonomous agents may be narrow. It matters that autonomous agents at the current stage of development can be unpredictable, susceptible to manipulation, or simply not act in ways conformant with financial cycles and short-term corporate profit expectations. Sellers have to consider these risks and their corresponding accountability beyond competition law considerations, which may mitigate the immediacy of the problem from a collusive point of view.

Finally, and reflecting an all too familiar dynamic, once some sellers adopt autonomous agents and benefit from the volume, variety, velocity and value of algorithmic decision-making, there is a compelling incentive for competitors to adopt similar agents or to even replicate the existing ones as far as possible.[183] It might even be the case that not doing so places sellers at a competitive disadvantage.[184] Yet, it is not necessary for this widespread adoption of algorithms to plunge an industry into a collusive arrangement: where it affords sellers a competitive advantage, it is equally possible that sellers compete on the development of the best algorithm.[185]

2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017_en> accessed 16 March 2019.
[181] ibid.
[182] OECD (n 19) 44.
[183] CMA (n 148) 5.26.
[184] OECD (n 19) 14.
[185] ibid 21.

3) Hub-and-Spoke and Third-Party Algorithms

Having so far outlined horizontal scenarios, this chapter finally turns to settings that entail the use of algorithms as intermediaries. To briefly recap from Chapter 4: *Hub-and-spoke* in the conventional sense refers to an arrangement between several sellers indirectly connected by vertical commercial relationships with the same upstream or downstream hub.[186] The necessary flows of information within such vertical relationships complicate the boundaries of permissibility and impermissibility.[187] Somewhat differently, *outside third parties* may function primarily as a communication and bargaining channel between horizontal competitors.

With regard to algorithms, hub-and-spoke typically refers to 'instances in which computers are used as the central "hub" to coordinate competitors' pricing or activities'.[188] The general setting therefore explores seller decision-making through a single, third-party algorithm that (perhaps unintentionally) aligns seller conduct.[189] To explore some of the potential competition implications of the use of algorithms as intermediaries, the following discussion outlines the setting where algorithms are mutually employed by sellers to determine pricing and/or non-pricing conduct).

a) Pricing and non-pricing algorithms

The first scenario envisages the use of a single algorithm created by an intermediary and used by several sellers. This may arise when sellers recognise the efficiency of algorithms but lack the resources or expertise to develop them on their own and therefore turn to a third party.[190] Importantly, 'competitors also recognise that doing so collectively will likely increase prices and their collective profits'.[191] As a result, sellers may – intentionally or not – find their conduct aligned.[192] This may be particularly effective in the context of the digital economy, where third-party IT providers develop dynamic pricing algorithms.[193] Indeed, the CMA considers the

[186] O Odudu, 'Indirect Information Exchange: The Constituent Elements of Hub and Spoke Collusion' (2011) *7 European Competition Journal 205*, 231; GL Zampa & P Buccirossi, 'Hub and Spoke Practices: Law and Economics of the New Antitrust Frontier?' (2013) *9 Competition Law International 91*, 95.
[187] R Amore, 'Three (or More) Is a Magic Number: Hub & Spoke Collusion as a Way to Reduce Downstream Competition' *12 European Competition Journal 28* (2016), 29.
[188] Ezrachi & Stucke (n 27) 46.
[189] ibid 48; Ezrachi & Stucke (n 8) 14.
[190] Ezrachi & Stucke (n 27) 47-49.
[191] ibid 50.
[192] CMA (n 148) 5.19; OECD (n 19) 27.
[193] German Monopolies Commission (n 20).

current risk for coordination through algorithms to be the highest in this hub-and-spoke setting, 'because it simply requires firms to adopt the same algorithmic pricing model'.[194]

As with most practices conducive to coordination, some inferences of concertation can be made according to the intention of sellers. Sellers could agree upon a pre-conceived course of conduct and approach a third-party developer for an algorithm specifically programmed to achieve coordination between them.[195] While the algorithm regulates their conduct and circumvents the need for frequent re-negotiations or assurances to be passed between competitors, it is not difficult to see how this setting could amount to concertation.[196]

However, if sellers independently employ the same third-party algorithm, the lack of an underlying agreement between the sellers may render it more complicated to categorise their conduct as a concerted practice, even if usage of the same software results in a coordinated outcome:[197] '[F]or example, if multiple competing firms unknowingly purchase the same software to set prices, and that software uses identical algorithms, this may effectively align the pricing strategies of all the market participants, even though they have reached no agreement.'[198]

For algorithms with a specific set of instructions, certain liability parameters and some risk of coordination might be mitigated through guidelines set out in Section 2 of this chapter. In this case, the rapid interaction on behalf of sellers by one and the same algorithm also circumvents the demand response in a manner that cannot simply be regarded as interdependent conduct. That is to say, the widespread adoption of one algorithm calibrated to always follow price leadership could arguably be categorised as a concerted practice in the same way as the widespread adoption of several algorithms calibrated towards the same goal.

Yet, the algorithm does not necessarily have to function as an instrument to facilitate price leadership and may still facilitate parallelism between competitors, simply because it may cause them to observe the market in an identical manner and react in the same way to relevant developments.[199] When sellers achieve parallel conduct because they view the market through an identical lens, it becomes much more difficult to categorise their conduct as concerted practices. It is not only difficult to unequivocally determine whether higher margins result from coordination, but there may also not be an obvious element in the unilateral adoption of an

[194] CMA (n 148) 5.35.
[195] OECD (n 39) 5.
[196] OECD (n 19) 26.
[197] German Monopolies Commission (n 20).
[198] OECD (n 39) 5.
[199] CMA (n 148) 5.17.

algorithm to optimise strategic decisions that could be considered to infringe competition law.[200]

One discernible category to focus on may be algorithms that affect important strategic parameters without being directly responsible for setting prices. For instance, as a natural response to a crisis-ridden business climate, ocean carriers are turning to Big Data solutions, which employ predictive data analytics and third-party data to optimise shipping routes and container logistics, creating a foreseeable chain of events for the entire shipping route.[201] Predictive analytics firm ClearMetal is 'endeavouring to make more accurate bottom up forecasts that go out 8 weeks on where containers are likely to end up and where they will be needed'.[202]

The idea is to optimise the global flow of cargo shipping by predicting demand through data like voyage statistics, container bookings, harbour information provided by the parties, and third-party data relating to weather, currency rates, and commodity trends.[203] Ocean carriers are then able to answer questions like: '[if] an electronic goods manufacturer wants to ship out of Minneapolis to the Port of Santos in Brazil, what is the probability distribution associated with having an empty container available in Minneapolis in eight weeks?'[204] Such optimised logistics could be applied to joint ventures aiming to streamline container shipping strategies to address commercial pressure in the sector.[205]

There is a risk, however, that deferring such strategic parameters to a single algorithm to achieve the efficient flow of goods could also result in collusive profit-maximising strategies pertaining to cargo, routes or other essential variables. Yet, if adherence to a single "advisory" algorithm – like ClearMetal's – is permissible, especially when data is aggregated or encrypted, there still remains the question of determining at what point intermediaries create too much certainty. A relevant divide may lie in data aggregation and market insights, on the one hand, and situations where an algorithm starts coordinating the strategic decisions of several competitors, on the other hand.

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[200] T McSweeny, 'Algorithms and Coordinated Effects' in *Online Markets and Offline Welfare Effects – Selected Contributions from the CCLP Conference on 22 May 2017* (2017) 60.
[201] FIS, 'Three Shipping Firms Partner to Face Sector Crisis' [available at: http://fis.com/fis/worldnews/worldnews.asp?l=e&country=0&special=&monthyear=&day=&id=88008&ndb=1&df=0]; J Soble & G Doyle, '3 Japanese Shipping Companies to Merge Container Business' (2016) *New York Times* [available at: https://www.nytimes.com/2016/11/01/business/dealbook/japan-shipping-kawasaki-kisen-mitsui-nippon-yusen.html?_r=0]; Banker (n 3).
[202] Banker (n 3).
[203] ibid.
[204] ibid.
[205] FIS (n 201); Soble & Doyle (n 201).

Generally, the usage of non-public information between several sellers and payoff functions that calculate the total joint profit of all sellers would likely amount to concerted practices.[206] Applied to the example at hand, it would seem that coordination on strategic parameters like future container loads or shipping routes could therefore feasibly attract the attention of antitrust authorities, if it resulted in the division of markets and increased prices. It it may also prove difficult to distinguish between notions of strategic data and aggregated data, the latter usually being considered less harmful.[207]

Queues may be taken from trade associations, which constitute an institutionalised form of aggregated information exchange and, as a result, are in large part covered by existing rules on information exchange. Amongst other functions, the purpose of their information dissemination aligns closely with what conventional legal literature considers beneficial for the market.[208] However, one key difference between access to generally aggregated data observed by various sellers and non-pricing algorithms is that the former entails common knowledge, whereas the latter generates mutual knowledge.

To recall the distinction from Chapter 1: mutual knowledge of something 'just means that everyone knows it', whereas common knowledge of something means that 'everyone knows that everyone else knows it'.[209] Traditionally, it might be difficult for sellers to attain common knowledge of each other's intent to collude without communicating their intentions.[210] Use of a single algorithm arguably bridges the important gap between sellers having common knowledge of the market and, somewhat more precariously, having an algorithmic assistant calibrated to translate the myriad of information into a mutual understanding of the market. In other words, use of a single algorithm may go a long way in overcoming the non-trivial problem of equilibrium selection.

This, by itself, may not necessarily be a sufficient reason to categorise usage of a single algorithm between sellers as a concerted practice. However, it does illustrate that there is still

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[206] CMA (n 148) 5.20
[207] Federal Trade Commission & Department of Justice, *Antitrust Guidelines for Collaborations Among Competitors* (2000), 16.
[208] M Bennett & P Collins, 'The Law and Economics of Information Sharing: the Good, the Bad, and the Ugly' (2010) *6 European Competition Journal 311*, 330-331; CH Samel & JA Carmassi, 'Trade Associations: Boundaries in Antitrust Litigation (Part II)' (2007) *6(1) ABA Section of Litigation – The Antitrust Litigaton*; OFT, *Trade Associations, Professions and Self-Regulating Bodies* (2004), 10-11; OECD, 'Potential Pro-Competitive and Anti-Competitive Aspects of Trade/Business Associations' *DAF/COMP(2007)45*, 37-38; EF Bissocoli, 'Trade Associations and Information Exchange Under US Antitrust and EU Competition Law' (2000) *23 World Competition Law and Economics Review 79*, 80-81; X Vives, 'Trade Association Disclosure Rules, Incentives to Share Information, and Welfare' (1990) *21 The RAND Journal of Economics 409*, 410.
[209] Green et al. (n 84) 481.
[210] ibid.

an important difference between the unilateral creation of separate algorithms and the use of a single algorithm providing a mutual lens to read the market. With this in mind, it might be appropriate that not only intermediary pricing algorithms – in keeping with the arguments in Section 2 – but also certain "conduct" algorithms should amount to concerted practices. If adherence to a single algorithm can resolve the problem of equilibrium selection in a significant number of cases, resulting in coordination, it may become necessary to examine whether the use of a wider range of non-pricing intermediary algorithms should also be prohibited after all – at least in oligopolistic markets.

4) Conclusion

Technological development brings with it several thought-provoking challenges for competition law. Adapting competition analysis from cooperation between human actors to the interaction between machines generates fascinating questions. However, at least with regard to coordination between sellers, these developments do not (yet) appear to render existing competition laws obsolescent. For the most part, the existing competition law framework proves rather resilient. For more difficult questions regarding autonomous agents, the bulk of the debate pertains to the practical likelihood of sustainable coordination and, subsequently, the attribution of liability. These issues entail significant technological questions, complicating the potential application of competition law. It is not obvious that coordination between algorithms that do not communicate should automatically be categorised as tacit collusion. In a world that strvies to automate and replace the need for communication in many fields and applications, is it still appropriate for competition law to continue analysing seller conduct based on an increasingly outdated method of commercial interaction and coordination? As discussed in Section 2, there are indeed behavioural properties that – though currently unique to the interaction between computerised agents – arguably meet the abstract threshold for concerted practices explored in this thesis.

The more asymmetrically favourable to sellers the transmission of information – by nature of the method of exchange or the type of information – the more susceptible it renders the market to coordination. The crucial element is that sellers are capable of ascertaining and implementing parallelism before they are exposed to a demand reaction. The aim is to present buyers with a fait accompli of a raised market equilibrium without risking significant demand shifts. In the context of certain algorithmic interactions, the near-immediacy of reactions to competitor conduct generating parallelism effectively removes demand pressure from the rationale of sellers. This allows them to circumvent demand to achieve coordination in a manner very much consistent with what this thesis argues to amount to concerted practices.

This goes some way in addressing the question of whether the conventional rules designed for human interaction remain effective or whether new laws are required. For the time being, the latter does not seem to be the case. However, there is a need for due clarification in how the current laws – specifically with regard to the dividing line between tacit collusion and concerted practices – should apply to novel methods of coordination. This chapter contributed to this endeavour by exploring how certain interactions between algorithms might be viewed in the context of the elusive dividing line.

Removing from the interaction between algorithms the blanket defence of tacit collusion opens up the discussion to more nuanced analysis. Without this categorical defence, there is an argument that algorithms calibrated to follow price leadership and to execute trigger strategies differ in material ways from the same conduct implemented between human actors. The former may enable coordination that is no longer bound by the logic of demand pressure that characterises oligopolistic interdependence and, as such, tacit collusion. This also helps, in part, in examining certain competition implications of intermediary, hub-and-spoke algorithms. Simply put, it removes the assumption that a lack of communication necessarily translates into tacit collusion.

Several properties of autonomous agents render the application of clear competition rules more difficult. There is the lack of clear instructions to communicate and potential difficulties with understanding the operational logic of autonomous agents. However, it also remains unclear whether such autonomous agents can effectively overcome certain practical and commercial limitations, such as their current unpredictability or susceptibility to manipulation. These issues arguably make autonomous agents less likely to be of imminent risk to competition. Nevertheless, advances in technology may, in the not too distant future, render it increasingly unsustainable to duck theoretical questions regarding their competition law implications.

Slightly different challenges arise with algorithmic and Big Data intermediaries. Hub-and-spoke algorithms may resolve the important issue of equilibrium selection, which could change the applicable competition law implications. By analogy, outsourcing pricing or other important strategic decisions to a conventional intermediary, such as a consultancy that chooses an equilibrium for several competitors, would almost certainly amount to concerted practices. Hence, pure pricing algorithms designed by an intermediary and adopted by several competitors to institute price leadership and trigger strategies would likely fall within the remit of concerted practices in the same manner that individually designed algorithms (described in Section 2) would.

However, where an algorithm is designed to monitor and react to market developments other than adjustments in competitor prices or quantities, it may not only become more difficult to spot alignment between sellers who have unilaterally adopted the same third-party algorithm, it would also be less straightforward to identify an obvious element of concerted practices in such conduct. In those instances, where sellers view the market through the same lens at the output level, the risk for coordination may be such that competition authorities may consider prohibiting the use of such algorithms in oligopolistic markets but generally permit

their use in less concentrated markets where smaller sellers can legitimately benefit from their adoption.

Thesis Conclusion

Sellers coordinate; at least they might. That is the assumption underlying oligopoly analysis in competition law. Parallelism is an economic outcome that can, in theory, be achieved through both tacit collusion and concerted practices. This creates a dual inference problem. Predicated on identical economic conditions, absent concrete evidence indicating that sellers engage in concerted practices, the mere observance of parallelism is equally consistent with permissible tacit collusion, market conditions permitting. This dual inference problem describes how a discernible market outcome – parallelism – is not easily categorised as the result of either tacit collusion or concerted practices.

At the heart of the problem are two incommensurable disciplines that maintain disparate interpretations of competition and coordination between sellers. An economic phenomenon that requires a legal filter, collusion carries a different meaning in either discipline. Economics considers coordination on a spectrum. Different types of conduct affect the sustainability of coordination to different degrees. The law sets up a categorical binary between what is permissible – tacit collusion – and what is impermissible – concerted practices. This disparity complicates the interpretation of economic conduct in a manner that is legally administrable.

The economic conditions that sustain collusion – equilibrium selection, monitoring, punishment, and barriers to entry – do not distinguish tacit collusion from concerted practices. They are rather the prerequisite to competition law analysis of any given type of coordination. The same applies to the structural variables that prevail on a given market. Whether it is the frequency of interaction, product homogeneity or market cycles, to name but a few, these variables affect the sustainability of tacit collusion and concerted practices to an equal, or at least very similar, extent.

Conventional legal benchmarks – e.g. common design, meeting of the minds, sellers knowingly working together to accomplish a common purpose – also inadequately distinguish tacit collusion from concerted practices, because they focus on the conscious realisation between sellers that collective action bears profit. Benchmarks that envisage that several sellers consciously coordinate their conduct to increase their profits readily encompass tacit collusion. Save certain exceptional occasions, that statement would nearly always hold true. Rarely would sellers not want to increase their profits. Yet the statement also conflates the theoretical acquiescence of several sellers to a particular economic outcome with the more relevant issue of the conduct employed to achieve this outcome.

Agreement, communication, and reciprocity are inaccurate and/or incomplete benchmarks, unable to fully capture all forms of illicit conduct without stifling permissible ones. Agreement or a meeting of the minds exist where sellers act in the expectation of reciprocal action by competitors, something that can (in theory) be achieved through a mere sensible recognition of prevailing market conditions. It does not require clandestine coordination in smoke-filled rooms for pedestrians to use umbrellas when it rains. It also remains unclear at what level of subtlety an ostensible signal can still be considered communication.

1) Practices that Enable Coordination

This lack of clarity between what is merely a signal and what qualifies as communication materialises when examining the various practices discussed in this thesis. For lack of a theoretical dividing line, the pertinent question practically reverses when examining specific conduct that is considered conducive to coordination: there is a discernible economic mechanism (say, information disclosure) but the external observer struggles to identify whether it amounts to tacit collusion or a concerted practice. The practices that facilitate coordination are manifold. But for their common ability to facilitate coordination on account of the transparency they generate between sellers, the practices discussed in this thesis differ in most of their attributes.

Information disclosure. Information disclosure and signalling have the most apparent theoretical rationale and also the most immediate influence on market transparency among the relevant brick-and-mortar forms of conduct. Information and its disclosure are ingrained in markets and are essential to their efficient functioning. Where information is disclosed, the intended audience matters. Sellers would frequently disclose information to facilitate buyer choice and improve the efficient allocation of resources. At the same time, certain types of information disclosure enable sellers to identify and maintain collusive equilibria to the detriment of buyers.

Information disclosure is conducive to transparency assessment since it typically relates to the direct link between sellers and buyers. Its value relative to sellers and buyers can be evaluated in terms of content, format, and context. That is, certain types of information, how they are shared or when they are shared, enable the observe to infer whether they reflect the commercially sensible aim to inform and attract buyers or, instead, a strategic artifice intended to facilitate coordination. What concerted types of information disclosure generally share is that they provide sellers with informational value that buyers cannot meaningfully access, thus creating a disparity in transparency. For ostensibly unilateral forms of information disclosure, the content can also reveal the audience, and the relevant question becomes whether it responds – truly unilaterally – to what the market requires or rewards.

Hub-and-spoke. Hub-and-spoke affects the structure and flow of information in parallel vertical relationships. Its legitimacy and the corresponding metrics of natural transparency follow from the rationale of vertical relationships. The information flows are not meant to be accessible to buyers, such that notions of natural and artificial transparency are the result not of relative informational benefit afforded to buyers but of the commercial incentives

within the supply chain that theoretically trickle down to buyers. Since they align incentives in the provision of goods and services, vertical relationships, too, are indispensable to efficient markets. Economic incentives in vertical relationships can be complex but provide an initial filter for questions of transparency. Commercial rationale relates to the structure of the relationship itself.

Hub-and-spoke settings that are profitable only where spokes act in parallel are not inherently concerted. What is relevant is how they are achieved. Individually realising the potential benefits of collective vertical relationships with the same hub and opting for an arrangement that is profitable only when competitors mimic bears all the hallmarks of tacit collusion. Only when illicit means – like communication to predetermine conditional participation – are employed to achieve hub-and-spoke can the resulting transparency be described as artificial. *E-Books* is a poignant example of an illegal hub-and-spoke setting that would have been permissible had it been achieved without prior negotiation between the participants.

Legitimate commercial incentives of vertically related hubs disappear when coordination is facilitated through third-party intermediaries that are not vertically related to the spokes and are therefore unable to internalise efficiencies and profits achieved through alterations in the supply chain. Absent an inherent vertical relationship, this quasi-hub-and-spoke structure could itself be considered artificial, so that, in cases of resulting coordination, it would likely tilt the balance towards concerted practice rather than tacit collusion.

MFCs and MCCs. Like hub-and-spoke, MFCs and MCCs affect the structure and flow of information along the vertical supply chain in a manner that can facilitate coordination. Subject to variations in their formulation and corresponding effects on competition, these clauses are rooted in the vertical commercial rationale to facilitate the interaction between different levels in the supply chain, usually between sellers and buyers or between sellers and platforms.

Somewhat unusual in the context of this thesis, retroactive MFCs in the brick-and-mortar context constitute a preconfigured, self-imposed restraint that amplifies punishment, which reduces the incentive to deviate and incidentally signals commitment to collusion. While these types of MFCs have no discernible effect on transparency, they also fail to explain equilibrium selection, which sets them apart from the other practices discussed in this thesis and arguably renders them less relevant to the discussion. In the context of digital platforms, wide downstream MFCs are more relevant, since they reduce incentives for platforms to compete. *Booking* and *HRS* both amply illustrate that these wide MFCs enable portals to peg

prices to upstream sellers and competitors. Artificial transparency in this case follows from the contractual guarantee for parallelism that prevents price increases from being undercut or punished.

Narrow MFCs are more contentions in terms of their effect on transparency. Providing certain commercial safeguards for platforms that bring tangible efficiencies like improved choice and lower search costs, the CMA acknowledges that, at least in certain circumstances, there are no obvious alternatives to their application. The competition concerns relate to network effects generated through narrow MFCs that lead to price uniformity between hotel portals and between hotels. The commercial rationale and the theory of harm are both disputed. The FCO did not consider the evidence of a commercial justification adduced by Booking.com sufficient and focussed on the harm that could arise through network effects. This argument was subsequently quashed on appeal, because the OLG Dusseldorf found no evidence of the feared network effects actually resulting in harm to competition.

MCCs. Discussed in conjunction with MFCs, MCCs reflect a similar vertical commercial rationale. They help sellers attract and retain custom through the legitimate promise of price reductions (especially for low-cost sellers), mitigate incomplete contract problems and provide an adaptation mechanism in changing market conditions. Yet, the ability to peddle price increases with a safeguarding MCC mechanism if competitors do not follow encourages price uniformity and removes incentives to compete. What MCCs appear to lack is a sufficiently important commercial rational – like that for comparable narrow MFCs adopted by PCWs – that offsets or generally legitimises their twofold collusive incentive to match competitor price increases and abstain from price cuts.

2) Transparency

What all the above practices share is that they have an effect on the amount, flow, and/or structure of information available on a given market. They affect the relative ease of access for sellers and buyers to relevant information. In short, these practices influence the nature and degree of transparency. Certain practices whose effect on transparency disproportionately favours sellers can be characterised as communication, meaning that they risk being considered as concerted practices. Market variables, industry identity, and communication all add to the transparency of markets. It is irrelevant from an economic point of view whether transparency and coordination were brought about by one or the other, or a combination of them. Yet, whereas market conditions are inherent and industry identity is unavoidable, communication is typically prohibited.

Embedding legal thresholds within markets where these factors coincide is complicated, given that definitions of communication remain vague. Various modes of non-verbal and indirect interaction, including the practices discussed in this thesis, can have effects similar to communication. Oligopoly analysis encompasses various forms of conduct in evolving market conditions. The former can affect – and indeed be indistinct from – the latter. A reaction to the market reshapes its conditions, which begets subsequent reactions in a virtually continuous interplay. This blurs the difference between a rational response to the market and unwarranted conduct creating artificial market conditions. Industrial organisation principles of interdependence, rather than any particular type of conduct, imply that sellers responding to the market are implicitly responding to each other.

Viewing seller conduct through the lens of transparency provides an overarching framework that is flexible enough to encompass the peculiarities of the various practices conducive to coordination, while still meaningfully streamlining the narrative around abstract concepts of interdependence, tacit collusion, and concerted practices. Transparency assessment takes into account the commercial rationale underlying any particular type of practice used by sellers to advance or secure their position vis-à-vis competitors. Since these practices are merely derivatives of tacit collusion, enhancing transparency in a manner that facilitates coordination, the task is to identify by their underlying economic rationale whether practices are consistent with tacit collusion or concerted practices.

Generally directed at buyers, for information disclosure and certain algorithms the key element is that they cater to demand patterns in a way that secures or improves the competitive position of a seller vis-à-vis her competitors. If practices in this category cannot be shown to

have an effect on demand, it suggests that they constitute a strategic artifice that enables sellers to circumvent demand pressure before they implement coordinated conduct. In the context of information disclosures, this includes practices where the information is either inaccessible or lacks utility for buyers in terms of its content, format or context. In the context of certain pre-programmed algorithms, this inaccessibility may result from the speed and sophistication that algorithms can achieve, since they coordinate at a velocity unconstrained by demand pressure.

Generally instituted vertically between sellers to facilitate conduct and transactions, for agreements that make up hub-and-spoke structures and MFCs and MCCs the key element is that they secure or improve the seller's position within the supply chain. Practices within vertical relationships that instead enable sellers to circumvent demand pressure before they implement coordinated conduct are consistent with notions of artificial transparency. Noteworthy in that context are narrow MFCs. A key point of contention in recent investigations has been not only whether narrow MFCs facilitate coordination through network effects but also whether they are without obvious alternative for PCWs. The prevailing view is that these clauses do in fact ensure the fair and efficient provision of services by PCWs, thus likely rendering potential effects on coordination –yet to be proven in practice – a by-product of natural transparency.

Key to concerted practices are information flows that enable sellers to mutually ascertain and coordinate their conduct prior to its implementation, and the risk of an adverse demand response. Clandestine backroom negotiations, certain types information disclosures, hub-and-spoke arrangements, MFCs, MCCs or algorithms can all convey or structure information in a manner that asymmetrically favours seller transparency, thereby distorting the demand pressure that drives competition. As such, irrelevant or unnecessarily obfuscated information or information structures are more likely to be consistent with notions of artificial transparency. This argument considers as dispositive for the legal threshold of concerted practices the manner in which practices enhance transparency rather than the mere fact that they do.

All types of conduct relevant for this thesis can result in economically undesirable effects on coordination in a manner that conventional economic assessment of pro- and anticompetitive effects is ill-suited to evaluate. Anticompetitive economic outcomes do not reveal concerted methods. Not everything that has anticompetitive economic effects is also legally prohibited, the best example of this being the phenomenon of tacit collusion itself. Nevertheless, legal analysis of tacit collusion and concerted practices remains rooted in economic analysis. Economics studies the equilibria that oligopoly analysis works with.

Beyond that, the legal assessment draws from economic questions but – in an awkwardly circular manner – also directs them. Important is the underlying motivation of a practice as reflected in its effect on the relative position of a seller vis-à-vis her competitors. We must therefore identify the economics of the method rather than the economics of the outcome.

Questions of efficiency and anticompetitive effects are market-oriented. Questions of transparency are seller-oriented. The overriding message of Chapters 2 to 4 was that natural and artificial transparency follow from the commercial rationale of the practice in the context in which it is implemented. Important is the economic reasoning of the seller adopting the practice in question. But whereas efficiency sides with the market, the commercial rationale sides with the seller. What is good for the seller is not always good for the market. The commercial rationale for sellers is to attract the most demand vis-à-vis competitors – to "win" the competition. This is not the same as efficiency, the theoretical by-product of competition, which is considered good for the market. These discrepant lenses imply different metrics for the assessment of pro- and anticompetitive effects, on the one hand, and the assessment of transparency, on the other.

There is a palpable risk of arbitrary judgment calls on whether a given practice displays a legitimate commercial rationale. That question requires careful economic consideration. Information disclosure is a well-studied and relatively well-understood practice. Its effects and underlying rationale are relatively apparent. Along the vertical axis, hub-and-spoke settings have also received sufficient attention to chart out the likely commercial rationales of its various manifestations. For (narrow) MFCs and more so MCCs, the study of effects is somewhat more nascent. The notably different views of the German FCO and the OLG Dusseldorf as well as the CMA show that the jury is still out on the effects of narrow MFCs. The trajectories of natural and artificial transparency are less readily identified.

3) Interdependence and Identity

There is another reason why the calculation of economic effects alone cannot be the dispositive theoretical benchmark distinguishing tacit collusion from concerted practices. Further to potential vagaries in the assessment of the economics of the method, there is the longstanding realisation that not all conduct is calculably rational. Commercial rationales and decision-making entail bias that is difficult to measure through economic effects alone. The practices at issue display collusive characteristics of varying intensity and obviousness. At the extreme end of the spectrum, strategic artifices serving no purpose other than to facilitate coordination can easily be identified as concerted practices. But as conduct draws closer to the dividing line, notions of industry identity obfuscate the analysis and a pure analysis of economic effects becomes inadequate.

Sellers interact with each other, and within the same frame of reference, in many ways that are irrelevant for competition authorities. They learn about each other and understand different parameters of their decision-making in various meaningful ways even through the observation of competitively benign conduct. Especially in concentrated oligopolies, sellers tend to understand each other as mutual points of reference. Seemingly successful strategies invite mimicking behaviour from competitors. Where conduct appears to be sensible for a seller and affects her position vis-à-vis competitors, this may prompt them to reconsider mimicking her conduct. The higher the level of concentration, the stronger a sense of industry identity conducive to observation and mimicking can become.

Mimicking behaviour reflects the social dimension of industry identity, a by-product of interdependence that exists independently of whether sellers compete or cooperate. Where sellers are subject to some form of industry identity, they might act upon quasi-social impulses with a view to the perceived conduct of their competitors, which may transcend purely economic reasoning. They might follow actions on a hunch, through an ambition to retain relative market positions or simply on an exploratory basis. High-status sellers may serve as reference points for competitors that substitute actual or perceived information disparities.

Certain types of mimicking are permissible under the lens of competition law. Price leadership, the method conventionally associated with tacit collusion, constitutes but the mimicking of pricing conduct. This does not hold for practices that merely facilitate coordination through their effect on transparency. Whereas price leadership remains permissible under competition law, conduct that influences the flow and structure of information on the market can be associated with concerted practices. Several chapters

highlighted how this applies especially when such practices are adopted multilaterally. Where mimicking behaviour conducive to coordination cannot be explained by economic reasoning, it does not mean that it amounts to artificial transparency. Nevertheless, sellers may be hard-pressed to explain their actions in a manner satisfactory to conventional competition law assessment.

Titling an analysis around a dividing line between two opposing and mutually exclusive concepts may therefore be somewhat of a misnomer. A binary distinction between tacit collusion and concerted practices is illusive, especially so in the subjective awareness of oligopolistic sellers. The dynamics of interdependence predicate not only substantial and identifiable actions towards parallelism. They also entail a vast web of conscious and unconscious interactions within an industry that support a collective identity and might align ostensibly competing entities. Actions are observed, analysed, and occasionally mimicked. Individually benign moves and countermoves might place oligopolistic sellers into a position that would likely be considered the result of concerted practices if it had been achieved through, for example, communication. Social dynamics facilitate economic outcomes in ways that are difficult to calculate and are unlikely to be weeded out entirely where the interaction between human actors is concerned. This might change in the context of algorithmic interaction.

4) Coordination in the Future

This thesis has explored the scope of artificial and natural transparency and applied its findings to the various practices discussed. It queried the effectiveness of the legal framework around both well-established and novel forms of conduct that are conceivably within the scope of tacit collusion and concerted practices. The aim was to disentangle an evolving set of different practices capable of manifesting the same underlying concept. Foremost, clarifying the scope of tacit collusion and concerted practices aids legal certainty by contributing to the competition authorities' 'duty to define the conditions under which conduct claimed to facilitate price uniformity would be unfair so that businesses will have an inkling as to what they can lawfully do rather than be left in a state of complete unpredictability'.[1]

As the practices that might facilitate coordination evolve and become more sophisticated, so must the framework that regulates them. Questions of tacit collusion have recently become especially relevant, as competition law grapples with the novel challenges of digitalisation. The potential sophistication of coordination facilitated by algorithms adjusting their conduct at millisecond intervals differs quite drastically from conventional means of coordination between human actors. Algorithms might enable coordination without conventional means of signalling or communication, which would typically permit inferences of concerted practices. Their velocity of interaction enables rapid monitoring, which diminishes incentives to cheat and enables exploratory price increases without fear of being undercut.

Although communication is typically indicative of concerted practices, it is not the key element distinguishing the legal notion of tacit collusion from concerted practices. Algorithms that appear to meet conventional markers of the oligopoly gap can still create instances of artificial transparency. Conduct that can be considered to create natural transparency responds to supply-and-demand patterns in a way that secures or advances the position of the seller vis-à-vis her competitors. Indicative of artificial transparency, in turn, are practices that enable sellers to circumvent the demand response before their conduct is implemented. The latter category encompasses methods that enable coordination, by whatever means, before sellers incur a demand response.

It is true that algorithms do not entail conventional markers of communication and signalling that are generally associated with brick-and-mortar concerted practices.

[1] *E.I. Du Pont de Nemours & Company and Ethyl Corp. v. FTC* (1984) 729 F.2d 128, at 139.

Nevertheless novel in their method of achieving coordination, they can in certain circumstances meet what remains the underlying distinguishing feature of concerted practices: their velocity of interaction might conceivably circumvent the risks of an adverse demand response. Algorithms adjust and readjust prices in response to each other in a way that moots the potential relevance of a demand response. By comparison, it is the continued exposure to a potentially adverse demand response that preserves the legitimacy of price leadership. Applicable in the context of algorithms pre-programmed to maximise profits by following competitors price increases, a similar logic can be applied to hub-and-spoke algorithms and – when advanced enough to achieve coordination – autonomous agents. The key point is that there is nothing about the absence of communication that inherently shields algorithms from a finding of concerted practices.

Information in the context of algorithm gains in volume, variety, velocity, and value as much as it gains in complexity, which naturally raises questions regarding the continuing adequacy of the established framework. Does an evolving economy with novel business models, forms of communication, and competition require widened or altogether altered metrics of competition law? As far as the rules of coordination are concerned, the competition toolkit proves sophisticated and adaptable. The practices reflect evolution rather than revolution, so it could be argued that the applicable framework, too, merely evolves. The competition law framework remains capable of appraising methods conducive to coordination that evolve beyond conventional means of communication and signalling.

What is more, social notions of industry identity, prone to obfuscating the analysis of traditional methods of coordination between human actors, ought to be less applicable in the programmed environment. An interpretation of concerted practices that emphasises economic notions of efficiency, to the exclusion of social maxims that influence sellers in ways less easily explained through notions of commercial rationales, might yet prove surprisingly suitable to examining algorithmic interaction in the digital economy.

Novel forms of coordination may expand the scope of tacit collusion. Here, the competition toolkit will likely prove adaptable. Yet, as long as human actors remain involved in the process, certain social codes and mutual perceptions of the market and will continue to enhance transparency in ways that competition law struggles to categorise. These social and economic vagaries of human interaction necessarily elude clean binary categorisations between the permissible and the impermissible.

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