Prudential Implications of Intrafirm Structure: The Segmentation of Global Systemically Important Banks

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ABSTRACT

Modern finance is increasingly dominated by large financial firms made up of many legal entities. This trend is particularly pronounced for global systemically important banks (G-SIBs), which often have over a thousand subsidiaries that are connected through a complex and opaque web of wide-ranging explicit and tacit relationships. There is widespread acceptance that such complex intrafirm structures affect a G-SIB's risk profile, but the nature of these risks are only superficially understood. This thesis articulates a framework for characterising intrafirm structures and applies that framework to G-SIBs to explore the relationship between intrafirm structure and prudential risk.

The thesis yields three important contributions to scholarly and public policy debates surrounding the regulation of G-SIBs. First, the thesis develops an analytical framework rooted in network theory that facilitates the qualitative and quantitative characterisation and study of intrafirm structures. Second, the thesis elucidates the sources of intrafirm segmentation along entity lines and, building on the network-based framework proposed to study intrafirm structures, develops a tractable approach to study the consequences of intrafirm segmentation for a G-SIB's risk profile. Third, drawing on a case study of the UK ring-fencing regime, the thesis explores the central role of intrafirm governance to the success of regulatory intrafirm segmentation policies and highlights how intrafirm governance may create unique vulnerabilities to their credibility.

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Dutch poet Jules Deelder once remarked that 'de omgeving van de mens is de medemens' ('men's environment consists of their fellow men'). I couldn't be more grateful for my friends and family. Many of them came to doubt that this doctorate would ever be finished. Without their subtle and not-so-subtle encouragement, it might not have been. I would court calamity if I attempted to thank my friends and family individually. Instead, to (twice) paraphrase a wise mentor and friend, whom I admire more than my words could possibly convey (Q.E.D.), let me just say: they know who they are, and I thank them with *even* more sincerity, gratitude, and genuine friendship than they thought I would.

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TABLE OF ABBREVIATIONS

BCBS	Basel Committee on Banking Supervision
BHC	Bank Holding Company
BIS	Bank of International Settlements
BRRD	Bank Recovery and Resolution Directive
CBFA	Commission Bancaire, Financière et des Assurances
CFTC	Commodity Futures Trading Commission
CRD	Capital Requirements Directive
CRD IV	Capital Requirements Directive IV
CRD V	Capital Requirements Directive V
CRR	Capital Requirements Regulation
CRR2	Capital Requirements Regulation II
DNB	De Nederlandsche Bank
EBA	European Banking Authority
EC	European Commission
EU	European Union
FDIC	Federal Deposit Insurance Corporation
FCA	Financial Conduct Authority
FSA	Financial Services Authority
FSB	Financial Stability Board

FSMA	Financial Services and Markets Act
GAAP	Generally Accepted Accounting Principles
G-SIB	Global Systemically Important Bank
G-SIFI	Global Systemically Important Financial Institution
ICB	Independent Commission on Banking
IHC	Intermediate Holding Company
IFRS	International Financial Reporting Standards
IHC	Intermediate Holding Company
IMF	International Monetary Fund
IPU	Intermediate Parent Undertaking
ISDA	International Swaps and Derivatives Association
LBHI	Lehman Brothers Holding, Inc
LCFI	Large and Complex Financial Institution
LEI	Legal Entity Identifier
LER	Legal Entity Rationalisation
M&M	Modigliani and Miller's capital structure irrelevancy proposition
MPOE	Multiple Point of Entry
MREL	Minimum Requirement for own funds and Eligible Liabilities
NIC	National Information Center

OECD	Organisation for Economic Co-operation and Development
OTC	Over-the-Counter
PCBS	Parliamentary Commission on Banking
PRA	Prudential Regulation Authority
RASCALS	Regulation and Administration of Safe Custody and Global Settlement
RFB	Ring-Fenced Body
SAS	Stand-Alone Subsidiary
SIB	Systemically Important Bank
SIFI	Systemically Important Financial Institution
SMF	Senior Management Function
SMR	Senior Managers Regime
SPE	Special Purpose Entity
SPOE	Single Point of Entry
TBTF	Too big to fail
TLAC	Total Loss-Absorbing Capacity
UK	United Kingdom
US	United States

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PART I: INTRAFIRM STRUCTURE AND PRUDENTIAL RISK

CHAPTER 1: INTRODUCTION

Modern finance is increasingly dominated by large financial firms made up of many legal entities. This trend is particularly pronounced for global systemically important banks ('G-SIBs'), which often have over a thousand subsidiaries that are connected through a complex and opaque web of explicit and tacit relationships. Such 'intrafirm structures' – the pattern of legal and non-legal relationships among the entities that make up the economic enterprise of the G-SIB firm – are thought to be complicit in generating prudential risks and entrenching 'too-big-to-fail' and are therefore the subject of extensive regulatory intervention. This thesis articulates a framework for the analysis of intrafirm structures, applies that framework to G-SIBs to explore how intrafirm segmentation contributes to prudential risk, and explores the role of intrafirm governance to the success of regulatory intrafirm segmentation policies.

The objective of this introductory chapter is to frame the contributions of this thesis and to outline its scope and structure. It proceeds as follows. Section I situates the subject of this thesis within the broader context of thinking (by academics and policymakers) on systemic risk, G-SIBs and their intrafirm structure, and prudential policies designed to affect those intrafirm structures. Section II sets out the scope and methodological approach of the thesis. Section III concludes with an overview of the subsequent chapters in this thesis.

I. BROADER CONTEXT: (SYSTEMIC) RISK AND THE INTRAFIRM STRUCTURE OF G-SIBS

This Section provides a concise overview of literature and policy initiatives relevant to the subject of this thesis – the prudential implications of intrafirm segmentation – with a view to situating its contribution within the broader context of thinking by scholars and policymakers. A large and complex literature studies banks and their potential systemically important role within society, the notion of 'too-big-to-fail' and the role of banks' intrafirm structure in rendering them so, the drivers that lead firms generally, and banks specifically, to develop highly involved intrafirm structures, and the policies designed to affect those structures. The breadth and complexity of this large body of literature cannot fully be captured here.[2] Rather than attempting to provide a comprehensive review, the more modest aim of this Section is therefore to introduce the literature and its main findings to contextualise the contributions of this thesis.

[2] And, as will be referenced, has already been reviewed elsewhere – albeit in a fragmented way.

A. Banks, Systemic Importance, and Intrafirm Complexity

Banks[3] fulfil a central yet perilous role in economic life.[4] By providing liquidity insurance[5] and delegated screening and monitoring[6], banks contribute to the operation of the payment system and enable the efficient allocation of capital.[7] In carrying out these important social functions, banks perform liquidity, maturity, and credit transformations, creating associated balance sheet mismatches which render them

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[3] 'Banks' are firms that channel the excess cash accumulated by households and businesses into (hopefully) productive investments. Functionally, the defining feature of banks is that they combine this investment function with the issuance of deposits, a feature that is reflected in the legal definitions of banks across jurisdictions. For the EU see Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 Text with EEA relevance OJ L 176 (hereafter 'Capital Requirements Regulation' or 'CRR'), Art 4(1)(a) ('[bank] means an undertaking the business of which is to take deposits or other repayable funds from the public and to grant credits for its own account'). See also European Banking Authority, 'Opinion of the European Banking Authority on elements of the definition of credit institution under Article 4(1), point 1, letter (a) of Regulation (EU) No 575/2013 and on aspects of the scope of the authorisation' (18 September 2020) EBA/OP/2020/15. For the US see Bank Holding Company Act 1956 (US) para 2(c)(1)(B) ('the term 'bank' means (…) [a]n institution (…) which both – (i) accepts demands deposits or deposits that the depositor may withdraw by check or similar means for payment to third parties or others; and (ii) is engaged in the business of making commercial loans'). In practice, many banks – and particularly the G-SIBs that are the subject of this thesis – carry out many more activities, including providing underwriting services, acting as market makers, advising on complex financial transactions like mergers and acquisitions, and creating derivatives.

[4] For a review, see John Armour, Dan Awrey, Paul Davies, Luca Enriques, Jeffrey N Gordon, Colin Mayer and Jennifer Payne, *Principles of Financial Regulation* (Oxford University Press 2016) ch 14.

[5] See eg Douglas W Diamond and Philip H Dybvig, 'Bank Runs, Deposit Insurance, and Liquidity' (1983) 91 Journal of Political Economy 3, 401. See also Hyun Song Shin, 'Reflections on Northern Rock: The Bank Run that Heralded the Global Financial Crisis' (2009) 23 Journal of Economic Perspectives 1, 101.

[6] See eg Douglas W Diamond, 'Financial Intermediation and Delegated Monitoring' (1984) 51 Review of Economic Studies 3, 393. For a review, see also Arnoud WA Boot, 'Relationship Banking: What Do We Know?' 9 Journal of Financial Intermediation 1, 7.

[7] For a review of the literature on relationship banking, see eg Boot (n 6).

structurally fragile and prone to runs.[8] If such a run forces a bank to sell its assets in a 'fire sale' and it incurs haircuts in the process (partly due to asymmetric information vis-à-vis potential buyers[9]), then a liquidity problem can quickly turn into a solvency problem. Such solvency problems, in turn, may threaten the viability of the bank.

A corollary of the social value of the services provided by banks is that the social costs of (sudden) discontinuation of the provision of those services are high. In case of bank failure, banks may be forced to annul long-standing relationships. The associated loss of relationship-specific information cannot readily be substituted[10], which can restrict access to credit for the bank's customers and thus lead to a credit squeeze.[11] This particularly affects individuals and small and medium-sized companies, who rely most heavily on bank-based finance.[12] A litany of bank failures has therefore led to the

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[8] See eg Diamond and Dybvig (n 6). See also Charles W Calomiris and Stephen H Haber, *Fragile by Design: The Political Origins of Banking Crises and Scarce Credit* (Princeton University Press 2014) (examining the relationship between bank fragility and political institutions).

[9] See eg Gorge A Akerlof, 'The Market for "Lemons": Quality, Uncertainty and the Market Mechanism' (1970) 83 Quarterly Journal of Economics 3, 488-500.

[10] See eg Bruce C Greenwald and Joseph E Stiglitz, 'Externalities in Economies with Imperfect Information and Incomplete Markets' (1986) 101 Quarterly Journal of Economics 2, 229.

[11] See eg Christopher James, 'The Losses Realised in Bank Failures' (1991) 46 Journal of Finance 4, 1223; Myron B Slovin, Marie E Sushka and John A Polonchek, 'The Value of Bank Durability: Borrowers as Bank Stakeholders' (1993) 48 Journal of Finance 1, 247; Adam B Ashcraft, 'Are Banks Really Special? New Evidence from the FDIC-Induced Failure of Healthy Banks' (2005) 95 American Economic Review 5, 1712.

[12] See eg Alicia M Robb and David T Robinson, 'The Capital Structure Decisions of New Firms' 27 The Review of Financial Studies 1, 153. For a review of the literature investigating the real economy impact of bank failures, see John Armour and Jeffrey N Gordon, 'Systemic Harms and Shareholder Value' (2014) 6 Journal of Legal Analysis 1, 35, 42 (Table 1).

development of a substantial and highly complex[13] body of banking laws and regulations designed to enhance banks' resilience whilst maintaining their socially valuable role, for example by imposing capital and liquidity requirements and curbing incentives and opportunities for socially-excessive risk-taking through reforms of bank governance and structural regulation.[14]

The social costs of bank failure need not be limited to its direct stakeholders. Both liquidity and solvency problems can spill over, particularly given the highly interconnected nature of the financial system[15], causing potentially system-wide financial contagion that negatively affects the financial health of other financial institutions.[16] In case one or even multiple disorderly insolvencies result, a firm-specific

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[13] See eg William Li, Pablo Azar, David Larochelle, Phil Hill and Andrew W Lo, 'Law Is Code: A Software Engineering Approach to Analyzing the United States Code' (2015) 10 Journal of Business & Technology Law 297 (noting, in particular, the complexity of the US Dodd-Frank Wall Street Reform and Consumer Protection Act); Zahid Amadxarif, James Brookes, Nicola Garbarino, Rajan Patel and Eryk Walczak, 'The Language of Rules: Textual Complexity in Banking Reforms' (2019) Bank of England Staff Working Paper No. 834 (finding a sharp increase not only in the quantum but also in the complexity of the prudential regulatory rules applying to banks following implementation of the Basel III standards). On the measurement of regulatory complexity, see eg Jean-Edouard Colliard and Co-Pierre Georg, Measuring Regulatory Complexity' (2020) CEPR Discussion Paper DP14377.

[14] For a review, see Armour et al. (n 4) chs 14-19.

[15] See eg Tobias Adrian and Hyun Song Shin, 'Liquidity and Leverage' (2010) 19 Journal of Financial Intermediation 3, 418. See also International Monetary Fund, 'Assessing the Systemic Implications of Financial Linkages' in Global Financial Stability Report, Volume 2 (April 2009). See also **Chapter 2** and references therein.

[16] For reviews on the literature related to systemic risk, see eg Sylvain Benoit, Jean-Edouard Colliard, Christophe Hurlin and Christophe Pérignon, 'Where the Risks Lie: A Survey on Systemic Risk' (2017) 21 Review of Finance 1, 109; Christoph Aymanns, J Doyne Farmer, Alissa M Kleinnijenhuis and Thom Wetzer, 'Models of Financial Stability and Their Application in Stress Tests' in Cars Hommes and Blake LeBaron (eds) *4 Handbook of Computational Economics* 329 (Elsevier 2018). See also Franklin Allen and Douglas Gale, 'Financial Contagion' (2000) 108 Journal of Political Economy 1; Viral V Acharya, 'A Theory of Systemic Risk and Design of Prudential Bank Regulation' 5 Journal of Financial Stability 3,

crisis could turn into a system-wide financial crisis with large, widely distributed losses.[17] The resulting credit squeeze can have a long-term adverse impact on the flow of liquidity and credit to the real economy, which in turn can translate into an economic crisis. The type of risk whereby a local shock propagates through, and is amplified by, the financial system, and subsequently disrupts its operation to the extent that the real economy is negatively affected, is referred to as 'systemic risk'.[18]

Given the high social costs that materialise when systemic risk manifests, governments have stepped in to support fragile and failing banks rather than running the systemic risks that insolvency, and in particular disorderly insolvency[19], might entail. In the first instance, such attempts focus on preventing destabilising runs (and other sources of financial shocks)[20], but, where those attempts prove unsuccessful,

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224; Garbrand Wiersema, Alissa M Kleinnijenhuis, Esti Kemp and Thom Wetzer, 'Higher-Order Exposures' (2021) Working Paper.

[17] A discussion of the causes and mechanisms of the 2007-2009 global financial crisis is beyond the scope of this Chapter. For a helpful review, see eg Richard A Posner, *A Failure of Capitalism: The Crisis of '08 and the Descent into Depression* (Harvard University Press 2009); Kenneth R French, Martin N Baily, John Y Campbell, John H Cochrane, Douglas W Diamond, Darrell Duffie, Anil K Kashyap, Frederic S Mishkin, Raghuram G Rajan, David S Scharfstein, Robert J Shiller, Hyun Song Shin, Matthew J Slaughter, Jeremy C Stein, and René M Stulz, *The Squam Lake Report: Fixing the Financial System* (Princeton University Press 2010); Financial Crisis Inquiry Commission, *Final Report of the National Commission on the Causes of the Financial Crisis in the United States* (Public Affairs 2011).

[18] A universally accepted definition of 'systemic risk' remains elusive, in part because of its multiple dimensions see eg Dimitrios Bisias, Mark Flood, Andrew W Lo, and Stavros Valavanis, 'A Survey of Systemic Risk Analytics' (2012) 4 Annual Review of Financial Economics 255; Benoit, Colliard, Hurlin and Pérignon (n 16). See also Steven L Schwarcz, 'Systemic Risk' (2008) 97 Georgetown Law Journal 193; John C Coffee Jr, 'Systemic Risk after Dodd-Frank: Contingent Capital and the Need for Regulatory Strategies Beyond Oversight' (2011) 11 Columbia Law Review 795.

[19] See eg John Armour, 'Making Bank Resolution Credible' in Niamh Moloney, Eilís Ferran and Jennifer Payne (eds), *The Oxford Handbook of Financial Regulation* (Oxford University Press 2015).

[20] Examples where the government provides liquidity insurance to banks include the provision of deposit insurance and the introduction of 'lender of last resort' facilities, see eg Paul Davies, 'Liquidity Safety

government support extends to the provision of bailouts.[21] The expectation of such government support corrupts the incentives of managers of banks that are deemed to be 'too big to fail'[22], who, at least in the UK and the US, as well as in most European jurisdictions, are commonly subjected to governance regimes structured around the concept of shareholder primacy.[23] Uninsured creditors, essentially relying on free government insurance, *ex ante* expect the government to cover their downside risk. This weakens their incentive to monitor and discipline bank managers and allows them to lower the risk premium they demand when offering credit to the bank.[24] A result is that the bank's risk-taking is under-priced, effectively amounting to an 'implicit subsidy' conferred by the expectation of a bailout.[25] Shareholders benefit from maximising the

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Nets for Banks' (2013) 13 Journal of Corporate Law Studies 2, 287; Dan Awrey, 'The Puzzling Divergence of the Lender of Last Resort Regimes in the US and the UK' (2020) 45 The Journal of Corporation Law 3, 101.

[21] Despite concerted efforts on behalf of governments and regulators worldwide, many authors consider it impossible to credibly withdraw the option of bailouts, see eg Alan D Morrison, 'Systemic Risks and the 'Too-Big-to-Fail' Problem' (2011) 27 Oxford Review of Economic Policy 3, 498; Jeffrey N Gordon and Christopher Muller, (2011) 'Confronting Financial Crisis: Dodd-Frank's Dangers and the Case for a Systemic Emergency Insurance Fund' 28 Yale Journal on Regulation 1, 151; Peter Conti-Brown, 'Elective Shareholder Liability' (2012) 64 Stanford Law Review, 409.

[22] See eg Ron J Feldman and Gary H Stern, *Too Big to Fail: The Hazards of Bank Bailouts* (Brookings Institution Press 2009).

[23] See eg Lucian A Bebchuk and Holger Spamann, 'Regulating Bankers' Pay' (2010) 98 Georgetown Law Journal 2, 247; Marco Becht, Patrick Bolton and Ailsa Röell, 'Why Bank Governance is Different' (2011) 27 Oxford Review of Economic Policy 3, 437; Mark J Roe, 'Structural Corporate Degradation Due to Too-Big-To-Fail Finance' (2014) 162 University of Pennsylvania Law Review, 1419; Armour and Gordon (n 12). This is a particularly severe form of the moral hazard associated with equity in general, see eg Michael C Jensen and William H Meckling, 'Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure' (1976) 3 Journal of Financial Economics 4, 305.

[24] See eg Adam J Levitin, 'In Defense of Bailouts' (2011) 99 Georgetown Law Journal 435.

[25] See eg Maureen O'Hara and Wayne Shaw, 'Deposit Insurance and Wealth Effects: The Value of Being "Too Big to Fail"' (1990) 45 Journal of Finance 5, 1587; Joseph Noss and Rhiannon Sowerbutts, 'The Implicit Subsidy of Banks' (2012) Bank of England Financial Stability Paper No. 15 – May 2012.

expected value of this 'implicit subsidy', and shareholder-oriented governance and market pressures compel managers to act accordingly – leading banks that are already deemed 'too big to fail' to take socially excessive risks[26] as well as rewarding actions that entrench their 'too big to fail' status, and nudging firms that are not yet 'too big to fail' to become so.[27]

Studies analysing actions that are likely to entrench or generate a 'too big to fail' status provide a window into what makes banks 'too big to fail'. In general, banking firms are thought to increase the likelihood of state support by increasing the bank's systemic importance and by complicating orderly resolution[28], as reflected in a growth

[26] Such risk-taking would maximise the value of the free insurance, and would take the form taking on riskier investments, a reliance on cheaper but less stable funding, and increase leverage in the capital structure of banks, see eg Jonathan R Macey, 'Commercial Banking and Democracy: The Illusive Quest for Deregulation' (2006) 23 Yale Journal on Regulation 1; Morrison (n 21); Saule T Omarova, 'The "Too Big To Fail" Problem' (2019) 103 Minnesota Law Review 2495. For empirical evidence consistent with this account, see eg Andrea Beltratti and René M Stulz, 'The Credit Crisis Around the Globe: Why Did Some Banks Perform Better?' (2012) 105 Journal of Financial Economics 1, 1.

[27] For a discussion, see Morrison (n 21).

[28] See eg Armour (n 19).

of the size[29], scope of activities[30], structural complexity[31] and interconnectedness[32] of banks. Under the auspices of the Financial Stability Board ('FSB') and using an assessment methodology developed by the Basel Committee on Banking Supervision ('BCBS'), these observations were formalised into a designation method for global systemically important banks ('G-SIBs').[33] The BCBS's assessment methodology developed an 'indicator-based measurement approach' centred around five core categories: size, interconnectedness, the lack of readily available substitutes or financial institution infrastructure for the services banks provide ('substitutability'), global (cross-jurisdictional) activity, and complexity.[34] Using these criteria, each operationalised

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[29] See eg Allen N Berger, Rebecca S Demsetz and Philip E Strahan, 'The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future' (1999) 23 Journal of Banking and Finance 2-4, 135; Edward J Kane, 'Incentives for Banking Megamergers: What Motives Might Regulators Infer from Event-study Evidence?' (2000) 32 Journal of Money, Credit and Banking 3, 671; Viral V Acharya, Deniz Anginer and A Joseph Warburton, 'The End of Market Discipline? Investor Expectations of Implicit Government Guarantees' (2022) SSRN Working Paper (available here https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1961656, accessed on 10 August 2022).

[30] See eg Roger W Ferguson Jr, Philipp Hartmann, Faabio Panetta and Richard Portes, *International Financial Stability: Geneva Reports on the World Economy 9* (CEPR 2007); Elijah Brewer III and Julapa Jagtiani, 'How Much Did Banks Pay to Become Too-Big-To-Fail and to Become Systemically Important?' (2013) 43 Journal of Financial Services Research, 1.

[31] See eg Richard Herring and Jacopo Carmassi, 'The Corporate Structure of International Financial Conglomerates: Complexity and its Implications for Safety and Soundness' in Allen N Berger, Philip Molyneux and John OS Wilson (eds), *The Oxford Handbook of Banking* (Oxford University Press 2010); Morrison (n 21), 21.

[32] See eg Kathryn Judge, 'Interbank Discipline' (2013) 60 UCLA Law Review 1262, 1267. For a discussion for the role of interconnectedness to the systemic importance of financial institutions, see eg Luca Enriques, Alessandro Romano and Thom Wetzer, 'Network-Sensitive Financial Regulation' (2020) 45 The Journal of Corporation Law 2, 351.

[33] Basel Committee on Banking Supervision, *Global Systemically Important Banks: Updated Assessment Methodology and the Higher Loss Absorbency Requirement* (July 2013); Basel Committee on Banking Supervision, *Global Systemically Important Banks: Revised Assessment Methodology and the Higher Loss Absorbency Requirement* (July 2018).

[34] Basel Committee on Banking Supervision (2018) (n 33) 4-7. Supervisory judgment may be relied upon to adjust the classification. The BCBS has also published an assessment framework for domestic SIBs

through various metrics, the FSB has published a list of G-SIBs on a yearly basis since 2011.[35] Banks on this list are allocated to 'buckets' depending on their degree of systemic importance.

Including metrics for 'complexity' in the assessment method for G-SIBs implies a perceived relationship between it and the systemic likelihood or impact of a bank's distress or failure. We can distinguish between three types of such complexity; business complexity (related to the activities the bank conducts on its balance sheet), geographic complexity (the global scope and diversity of a bank's operations), and finally, and most importantly in the context of this thesis, organisational complexity.[36] The BCBS assessment methodology notes that '[t]he more complex a bank is, the greater the costs and time needed to resolve the bank'[37] and assigns a seemingly arbitrarily weight of twenty percent to the role of complexity in the overall determination of a bank's systemic risk. More specifically, the BCBS operationalises complexity by looking at '(i) notional amount of OTC derivatives; (ii) level 3 assets[38]; and (iii) trading and available-

('D-SIBs'), which largely mirrors the methodology used for G-SIBs, see Basel Committee on Banking Supervision, *A Framework for Dealing with Domestic Systemically Important Banks* (October 2012).

[35] See eg Financial Stability Board, *2021 List of Global Systemically Important Banks (G-SIBs)* (23 November 2021).

[36] See eg Financial Stability Board, *Evaluation of the Effects of Too-Big-to-Fail Reforms: Consultation Report* (28 June 2020) 119. **Chapter 2** discusses this literature.

[37] Basel Committee on Banking Supervision (2018) (n 33) 6.

[38] 'Level 3 assets' are illiquid and hard-to-value assets whereby pricing generally involves reliance on so-called 'unobservable inputs' (management's assumptions and estimates that cannot necessarily be corroborated with reference to market data). Common examples include complex derivatives, distressed debt, private equity shares, and mortgage-backed securities.

for-sale securities'.[39] The relationship between these metrics and the prudentially relevant properties of complexity is not explained, reflecting a broader lack of rigour in the approach to this issue.[40] In particular, each of these three metrics focuses on business (balance sheet) complexity and is unrelated to the complexity of a bank's intrafirm structure (organisational complexity) – the subject of this thesis.[41]

Nonetheless, at an intuitive level the average G-SIB remains organisationally complex, which is proxied by the FSB as G-SIBs having an average of 1,203 subsidiaries.[42] The lack of deeper analysis, even at a conceptual level, by the BCBS into organisational complexity in the context of its systemic risk estimations is therefore puzzling. It may be an artefact of traditional economic thinking about the legal nature of firms. Pistor (2019) has noted that '[t]o most non-lawyers, the relevant unit of analysis in the world of business is the firm, its legal form being only of marginal intertest, or worse, a distraction from its economic substance'.[43] Economists frequently refer to the 'legal fiction'[44] created by the legal construction of firms. Early theories in corporate finance suggested intrafirm structure was of little significance and adopted a highly

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[39] Basel Committee on Banking Supervision (2018) (n 33) 6.

[40] See **Chapter 2**.

[41] See eg Jacopo Carmassi and Richard Herring, 'The Corporate Complexity of Global Systemically Important Banks' (2016) 49 Journal of Financial Services Research 2, 175.

[42] Financial Stability Board (n 36) 47. The number of subsidiaries provides only a superficial perspective on the complexity of the structure of a G-SIB, see **Chapter 2**.

[43] Katharina Pistor, *The Code of Capital: How the Law Creates Wealth and Inequality* (Princeton University Press 2019) 52.

[44] See eg Jensen and Meckling (n 23).

stylised view of firms, their capital structure, and their interaction with financial markets.[45] Modigliani and Miller's capital structure irrelevancy proposition ('M&M') epitomises this outlook.[46] However, as is widely acknowledged, M&M's assumptions are frequently violated in practice. In fact, the rapid rise in organisational complexity of corporate groups generally and banking groups specifically[47] suggests that the legal structure of firms has significant economic implications. The fact that the rise in organisational complexity is particularly pronounced for banking groups should caution against presumptions of irrelevance regarding the pertinence of intrafirm structure in the prudential context, too.

B. Origins of 'Complex' G-SIB Intrafirm Structures

It is therefore apposite to ask why firms generally, and banking firms specifically, spawn so many legal entities. A private ordering perspective emphasises the role of corporate structure in overcoming a range of economic frictions which arise from market imperfections (asymmetric information and other transaction costs), the costs of

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[45] See eg Dan Awrey, 'Complexity, Innovation, and the Regulation of Modern Financial Markets' (2012) 2 Harvard Business Law Review 235.

[46] Franco Modigliani and Merton H Miller, 'The Cost of Capital, Corporation Finance and the Theory of Investment' (1958) 48 American Economic Review 3, 261. One of the authors noted later that the exercise was meant to set out a research agenda that would help to better understand the operation of financial markets by relaxing these very assumptions, see Merton Miller, 'The Modigliani-Miller Propositions After Thirty Years' (1988) 2 Journal of Economic Perspectives 4, 99.

[47] See Melvin Aron Eisenberg, 'Megasubsidiaires: The Effect of Corporate Structure on Corporate Control' (1971) 84 Harvard Law Review 1577.

financial distress, and the impact of and response to regulation and taxation.[48] The appeal of using multiple legal entities to organise an integrated economic enterprise dates back a long time. In fifteenth-century Europe, when international banking started to take shape, the Medici bank made extensive use of the ability of legal entities to create distinct fiefdoms and pools of assets within the larger firm.[49]

Various rationales for the elaborate use of corporate structure relate to the partitioning of assets that the use of separate legal entities makes possible – a practice commonly referred to as 'asset partitioning' in corporate law.[50] In relation to informational asymmetries, for example, asset partitioning can help realise credit

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[48] The account given here is highly functional in orientation, which is premised on the notion that intrafirm structures are the result of deliberate design – e.g., to optimise corporate structures to unlock value (net of costs) within the constraints provided by law. This is consistent with the idea of the value-adding lawyer, see Ronald J Gilson, 'Value Creation by Business Lawyers: Legal Skills and Asset Pricing' (1984) 94 Yale Law Journal 2, 239. However, it would be a stretch to assume that intrafirm structures are entirely the product of conscious planning, see eg Richard Squire, 'Strategic Liability in the Corporate Group' (2011) 78 The University of Chicago Law Review 605, 614; Charles HR Morris, *The Law of Financial Services Group* (Oxford University Press 2019) para 1.085-86 (suggesting that inefficient use of legal entities, for example as a consequence of bolt-on acquisitions and (semi-)dormant entities once created for a purpose that is no longer relevant, may not be addressed if the inefficiency is not sufficiently material to merit the time and resources needed to liquidate them).

[49] See eg Raymond de Roover, 'The Medici Bank Organization and Management' (1946) 6 Journal of Economic History 1, 24. For other historical examples, see eg Ebbe Rogge, 'Regulating International Banks', in Peter T Muchlinksi, *Multinational Enterprises & The Law* (Third Edition, Oxford University Press 2012) 385.

[50] See eg Henry Hansmann and Reinier Kraakman, 'The Essential Role of Organizational Law' (2000) 110 Yale Law Journal 3, 387 (defines 'asset partitioning'); Henry Hansmann, Reinier Kraakman and Richard Squire, 'Law and the Rise of the Firm' (2005) 119 Harvard Law Review 5, 1333 (defines 'owner shielding'); Henry Hansmann and Richard Squire 'External and Internal Asset Partitioning: Corporations and Their Subsidiaries' in Jeffrey N Gordon and Wolf-Georg Ringe (eds) *The Oxford Handbook of Corporate Law and Governance* (Oxford University Press 2018). Asset partitioning is discussed in **Chapter 3**.

monitoring efficiencies[51] and enable selective creditor enforcement[52]. Asset partitioning can also be used to create withdrawal rights in case of insolvency[53], to ensure that entities are bankruptcy-remote from the borrowing firm in the context of securitisation structures[54], to define internal capital markets[55], and to act strategically against a backdrop of potential liability[56]. Asset partitioning clearly is a versatile property of the corporate form.

The use of separate legal entities can also be part of a mechanism designed to credibly commit, for example not to shift risks within the firm[57] or to avoid (real or

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[51] See eg Hansmann and Kraakman (n 50).

[52] See eg Anthony J Casey, 'The New Corporate Web: Tailored Entity Partitions and Creditors' Selective Enforcement' (2015) 124 Yale Law Journal 2680.

[53] See eg Douglas G Baird and Anthony J Casey, 'No Exit? Withdrawal Rights and the Law of Corporate Reorganizations' (2013) 113 Columbia Law Review 1.

[54] See eg Gary B Gorton and Nicholas S Souleles, 'Special Purpose Vehicles and Securitization' in René M Stulz and Mark Carey (eds), *The Risks of Financial Institutions* (University of Chicago Press 2006); Kenneth Ayotte and Stav Gaon, 'Asset-Backed Securities: Costs and Benefits of "Bankruptcy Remoteness"' (2011) 24 Review of Financial Studies 4, 1299.

[55] George G Triantis, 'Organizations as Internal Capital Markets: The Legal Boundaries of Firms, Collateral, and Trusts in Commercial and Charitable Enterprises' (2004) 117 Harvard Law Review 4, 1102.

[56] See eg Hugh Collins, 'Ascription of Legal Responsibility to Groups in Complex Patterns of Economic Integration' (1990) 53 Modern Law Review 731, 737 ('The capital boundary problem which arises consists of this: because the firm determines its own size, it also chooses the limits of its legal responsibilities, which in turn provides an open invitation for the evasion of mandatory legal duties.'); Squire (n 48) (describing a type of shareholder opportunism termed 'correlation seeking').

[57] See eg Charles Kahn and Andrew Winton 'Moral Hazard and Optimal Subsidiary Structure for Financial Institutions' (2004) 59 Journal of Finance 6, 2531 (on how subsidiarisation can prevent intragroup risk-shifting by enabling monitoring, discouraging asset substitution, and incentivising screening). Note that it would only make sense for an outside creditor to monitor only one subsidiary if it is partitioned off from the rest of the group.

perceived) conflicts of interests[58]. Alternatively, when intrafirm managerial agency costs are likely to be high, creating distinct pockets of responsibility through subsidiarisation can help align incentives by enabling both agent monitoring and the creation of more bespoke reward strategies.[59] Additionally, if a firm expects to sell part of its business in the future, separate legal entities can be used to create 'bundled assignability' – used in this way, the apt use of legal entities can provide liquidity to the firm.[60] Finally, creating legal entities within a firm can also be a mechanism to separate ownership from control, for example by creating a pyramidal group structure.[61]

Regulation and taxation can also incentivise (or require[62]) the creation of separate legal entities, notably with a view to regulatory and tax arbitrage.[63] This should

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[58] See eg Randall S Kroszner and Raghuram G Rajan, 'Organization Structure and Credibility: Evidence from Commercial Bank Securities Activities Before the Glass-Steagall Act' (1997) 39 Journal of Monetary Economics 3, 475. Also see US Senate Commission on Banking and Currency, *The Pecora Commission's Final Report* (USGPO, 1934) 163-167.

[59] See eg Raghuram G Rajan and Luigi Zingales, 'The Firm as a Dedicated Hierarchy: A Theory of the Origins and Growth of Firms' (2001) 116 The Quarterly Journal of Economics 3, 805.

[60] Kenneth Ayotte and Henry Hansmann, 'Legal Entities as Transferable Bundles of Contracts' (2013) 111 Michigan Law Review 5, 715. Having easily transferable bundles of contracts may also have incentive benefits. For example, it has been suggested that having a corporate structure that allows for spin-offs can achieve some of the incentive benefits of having a separate corporate entity, even if the spin-off does not occur, see Debra J Aron 'Using the Capital Market as a Monitor: Corporate Spinoffs in an Agency Framework' (1991) 22 RAND Journal of Economics 4, 505-518.

[61] See eg Marcello Bianchi, Magda Bianco and Luca Enriques, 'Pyramidal Groups and the Separation Between Ownership and Control in Italy' Fabrizio Barca and Marco Becht (eds) *The Control of Corporate Europe* (Oxford University Press 2001) 154. Also see Lucian A. Bebchuk, Reinier Kraakman and George Triantis, 'Stock Pyramids, Cross-Ownership and Dual Class Equity: The Mechanisms and Agency Costs of Separating Control from Cash-Flow Rights' in Randall K Morck (ed) *Concentrated Corporate Ownership* (The University of Chicago Press 2000) 445.

[62] For a discussion of financial regulatory interventions to affect intrafirm structure, see Section I.D.

[63] Klaus J Hopt, 'Groups of Companies: A Comparative Study of the Economics, Law, and Regulation of Corporate Groups' in Jeffrey N Gordon and Wolf-Georg Ringe (eds), *The Oxford Handbook of Corporate*

be viewed against a broader trend of progressively lower costs associated with the use of the corporate form. Costs formally associated with the establishment of new legal entities have gone down in many jurisdictions[64], and, on the whole, corporate law has become more enabling.[65] Moreover, the de facto move from the real seat theory towards the incorporation theory in several jurisdictions, coupled with the freedom of incorporation and free flows of capital across borders, has facilitated a degree of optionality in both the tax and regulatory sphere that can be exercised by incorporating separate legal entities across jurisdictions.[66] Firms have exercised this optionality, which is reflected in the relatively high rate of subsidiarisation in highly regulated industries[67] and the elaborate tax structures of multinational enterprises[68]. Benefits bestowed on

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Law and Governance (Oxford University Press 2017), 604 ('The choice of the [corporate group's legal] form is most often tax-driven.').

[64] In several jurisdictions (and especially those relevant to G-SIBs) minimum capital has been abolished (at least for some types of legal entities) and registration fees and franchise taxes have been reduced or even abolished as well. See eg Pistor (n 43) 52. See also Martin Gelter, 'The Structure of Regulatory Competition in European Corporate Law' (2005) 5 Journal of Corporate Law Studies 2, 247.

[65] See eg Roberta Romano, 'Answering the Wrong Question: The Tenuous Case for Mandatory Corporate Laws' (1989) 89 Columbia Law Review 7, 1599; Jonathan R Macey, 'Corporate Law and Corporate Governance: A Contractual Perspective' (1993) 18 Journal of Corporation Law 186; cf Jeffrey N Gordon, 'The Mandatory Structure of Corporate Law' (1989) 89 Columbia Law Review 7, 1549.

[66] A review of the relevant literature is beyond the scope of this thesis. For a synthesis relevant to the argument made here, see Pistor (n 43) 67-76. See also Gillian Hadfield and Eric Talley, 'On Public versus Private Provision of Corporate Law' (2006) 22 The Journal of Law, Economics, and Organization 2, 414; Annelise Riles, 'Managing Regulatory Arbitrage: A Conflict of Laws Approach' (2014) 47 Cornell International Law Journal 63.

[67] See eg Eisenberg (n 47), 1580-1584.

[68] For an account of how firms design their intrafirm structure for tax optimisation, see eg Asli Demirgüç-Kunt and Harry Huisinga 'The Taxation of Domestic and Foreign Banking' (2001) 79 Journal of Public Economics 3, 429. See also Peter T Muchlinksi, *Multinational Enterprises & The Law* (Third Edition, Oxford University Press 2012) ch 2 (discussing the relationship between the business organisation and the legal form of multinational enterprises and providing several examples of structures used for tax or regulatory arbitrage).

parties using the corporate form in this way have further increased the appeal of the creation of multiple legal entities within the firm.[69]

So far, the rationales provided apply for firms generally. But there is reason to believe that at least some of these private ordering rationales may apply with particular force to banks.[70] Economies of scale and scope in the banking industry[71] have driven consolidation. This has increased the size and scope of banking firms and created more expansive and complex intrafirm structures[72], partly as a legacy of mergers and acquisition activity[73]. One force driving these acquisitions was the need to adapt to new financial technology. Financial innovation around securitisation has changed the nature of financial intermediation, which increasingly relies on nonbank entities to provide

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[69] Generally, see Muchlinksi (n 68), 36 ('The ability of an [multinational enterprise] to take advantage of differences in regulatory environments between states is one of its internalization advantages.').

[70] A full review of the literature is beyond the scope of this thesis. For helpful reviews of the economic literature, see Richard Herring and Jacopo Carmassi (n 31); Jacopo Carmassi and Richard Herring, 'Corporate Complexity and Systemic Risk: A Progress Report' in Allen N Berger, Philip Molyneux and John OS Wilson (eds), *The Oxford Handbook of Banking* (Third Edition, Oxford University Press 2019). Despite various hypotheses, the drivers of bank complexity remain unclear, see eg Nicola Cetorelli and Linda S Goldberg, 'Measures of Global Bank Complexity' (2014) FRBNY Economic Policy Review 107, 124 ('It is not clear what might be driving the buildup in bank complexity.').

[71] See eg Richard J Herring and Anthony M Santomero, 'The Corporate Structure of Financial Conglomerates' (1990) 4 Journal of Financial Services Research 4, 471.

[72] See eg Howell E Jackson, 'The Expanding Obligations of Financial Holding Companies' (1994) 107 Harvard Law Review 3, 514; Dafna Avraham, Particia Selvaggi and James Vickery, 'A Structural View of U.S. Bank Holding Companies' (2012) FRBNY Economic Policy Review 75 ('organizational complexity is positively related to the diversity of the BHC's activities, across both industrial sectors and geographic locations').

[73] For a review, see Richard Herring and Jacopo Carmassi (n 31) 210-212; Carmassi and Herring (n 70) 115-116. See also Mark D Flood, Dror Y Kenett, Robin L Lumsdaine and Jonathan K Simon, 'The Complexity of Bank Holding Companies: A Topological Approach' (2020) 118 Journal of Banking & Finance 105789, 18-25 (documenting the evolving the complexity of Wells Fargo following its acquisition of Wachovia).

specialised services.[74] To compete, traditional banks have increasingly incorporated these specialists as subsidiaries within their firm.[75] Banks have also benefited from the ability to create bankruptcy-remote legal entities when setting up securitisation structures[76], which might notionally be outside the perimeter of the banking firm. Finally, moves by banks to expand their international footprint have also been accompanied by a growth in the number of legal entities within banking firms.[77]

Arbitrage appears to have been a strong driver of the use of legal entities within the firm. Various studies report that large banking groups – including G-SIBs – tend to incorporate a high number of subsidiaries in tax havens.[78] Given the high regulatory pressures on banks, it should be unsurprising that regulatory arbitrage also plays a major role in the design of their intrafirm structures.[79] Examples in the prudential sphere

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[74] See eg Zoltan Poszar, Tobias Adrian, Adam Ashcraft and Hayley Boesky, 'Shadow Banks' (2013) Federal Reserve Bank of New York Economic Policy Review 1.

[75] See eg Nicola Cetorelli, Benjamin H Mandel and Lindsay Millineaux, 'The Evolution of Banks and Financial Intermediation: Framing the Analysis' (2012) FRBNY Economic Policy Review 1; Nicola Cetorelli, James McAndrews and James Traina, 'Evolution in Bank Complexity' (2014) FRBNY Economic Policy Review 85, 87 ('the *boundaries* of the banking firm have expanded progressively to include the activities of nonbank intermediaries, and this evolution should be reflected in the forms of increasingly complex bank holding companies').

[76] See fn 54 and accompanying text.

[77] See eg Stijn Claessens and Neeltje van Horen, 'Foreign Banks: Trends and Impact' (2014) 46 Journal of Money, Credit and Banking 1, 295. See also Kahn and Winton (n 57).

[78] See eg Linda S Goldberg and Rose Wang, 'U.S. Banks' Changing Footprint at Home and Abroad' (2015) Liberty Street Economics (available at https://libertystreeteconomics.newyorkfed.org/2015/11/us-banks-changing-footprint-at-home-and-abroad/) (noting a rising share of BHC affiliates in tax havens).

[79] For a discussion of the literature, see eg Richard Herring and Jacopo Carmassi (n 31) (and references therein); Herring and Carmassi (n 70) (and references therein). On regulatory arbitrage in the financial sector generally, see Armour et al. (n 4) 84-86, 565-566, 635-638.

include the movement of capital and liquidity throughout the corporate group[80] and the creation of special purpose entities ('SPEs')[81] to lower effective capital requirements.[82] Equally, legal entities appear to have been created to structure operations in relation to bank secrecy requirements.[83]

Quite apart from tax and regulatory arbitrage, banks' intrafirm structure is heavily affected by their efforts to comply with regulatory requirements.[84] In some cases, regulatory requirements lead to the creation of new entities, as is the case with ring-fencing of deposit takers in the UK[85] or, more prosaically, a requirement to create stand-alone entities to house activities that provide intrafirm operational services (e.g. IT

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[80] See eg Pistor (n 43) 73-76 (describing Lehman Brother's Regulation and Administration of Safe Custody and Global Settlement, or 'RASCALS', scheme). See also **Chapters 3** and **4**.

[81] See eg David Jones, 'Emerging Problems with the Basel Capital Accord: Regulatory Capital Arbitrage and Related Issues' (2000) 24 Journal of Banking & Finance 35; Brent W Ambrose, Michael LaCour-Little and Anthony B Sanders, 'Does Regulatory Capital Arbitrage, Reputation, or Asymmetric Information Drive Securitization?' (2005) 28 Journal of Financial Services Research 113. For a technical discussion of the motivations for the use of SPEs, see Basel Committee on Banking Supervision, *The Joint Forum: Report on Special Purpose Entities* (September 2009) 11-19. For an example of the use of SPEs in (potential) regulatory and tax arbitrage, see Neil Hume, 'Protium's Acid Reflux [Updated]' (April 28, 2011) Financial Times (available at https://www.ft.com/content/b17b41ec-3c4e-3f42-95b6-3c73c070703b) ('analysts see the Protium (…) as another example of Barclays' unnecessary complexity' and 'Barclays calls the structure an "insurance policy". Many investors and analysts take a different view, seeing it as a combination of regulatory and tax arbitrage.').

[82] This is another reason why banks moved into securitisation.

[83] See eg Goldberg and Wang (n 78) (noting a rising share of BHC affiliates in financial secrecy jurisdictions).

[84] For a brief account along these lines focused on the US, see Avraham, Selvaggi and Vickery (n 72) 67-68. For a discussion of financial regulatory interventions to affect intrafirm structure, see Section I.D.

[85] See **Chapters 5** and **6**.

services) as part of resolution planning.[86] More broadly, as illustrated by the arbitrage dynamics, banking firms' private ordering takes place in the shadow of regulatory requirements[87] and constitutes an attempt to optimise operations within regulatory and other external constraints. Because regulators (rightfully) perceive some of these optimisation actions as driven by arbitrage, they tend to impose new or different rules in response. This iterative interaction between G-SIBs and their regulators, a phenomenon referred to as 'regulatory endogeneity'[88], is itself likely to be a significant source of G-SIBs' intrafirm complexity.[89] A particularly problematic example from a prudential perspective, discussed earlier[90], is that banks may alter and complicate their intrafirm structures to benefit from the implicit subsidy that 'too big to fail' banks receive.

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[86] See eg Carmassi and Herring (n 70) 118. See fns 130-140 and accompanying text.

[87] Firms can partition themselves so that their activities can be better targeted by regulatory requirements, see eg Randall S Krozner and Raghuram G Rajan 'Organization Structure and Credibility: Evidence from Commercial Banks Securities Activities Before the Glass-Steagall Act' (1997) 39 Journal of Monetary Economics 475-516.

[88] Dan Awrey and Kathryn Judge, 'Why Financial Regulation Keeps Falling Short' (2020) 61 Boston College Law Review 2295, 2304-2305.

[89] Herring and Carmassi (n 70) 216 (and references therein) ('LCFIs [Large and Complex Financial Institutions] often respond to new regulations with still more corporate complexity. (…) The regulators in turn react to perception of regulatory avoidance with still more regulation.').

[90] See fns 22-27 and accompanying text.

C. Prudential Risks Posed by Intrafirm Structures

The practices described so far lead to outcomes that, within the external constraints, are at least presumptively privately valuable.[91] Intrafirm structures are part of the territory were value-maximising lawyers operate[92] and, guided by Adam Smith's 'invisible hand', turn the corporate form into a 'capital mint'.[93]

However, these structures may drive a wedge between the legitimate private benefits that legal entities are meant to confer and the sometimes illegitimate private benefits that they can facilitate, frequently by imposing costs on third parties in the process. This concern applies generally to the structuring of corporate groups, for example when avoiding liabilities arising from torts or incurred as regulatory obligations[94], exacerbating agency costs between debtors and creditors[95], lowering the amount of tax owed, or evading rules designed to enhance the resilience of the

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[91] They are, after all, examples of private ordering.

[92] Gilson (n 48).

[93] Pistor (n 43) Chapter 3.

[94] See eg Joshua Macey and Jackson Salovaara, 'Bankruptcy as Bailout: Coal Company Insolvency and the Erosion of Federal Law' (2019) 71 Stanford Law Review 879.

[95] See eg Reinier Kraakman, John Armour, Paul Davies, Luca Enriques, Henry Hansmann, Gerard Hertig, Klaus Hopt, Hideki Kanda, Mariana Pargendler, Wolf-Georg Ringe, and Edward Rock, *The Anatomy of Corporate Law – A Comparative and Functional Approach* (Third Edition, Oxford University Press 2017) 111-114 (and references therein). See also Pistor (n 43) 59 ('At bottom, the legal partitioning of assets of an economically fully integrated business organization only pretends to make creditors more secure, when in fact it renders a firm's *total* debt more opaque and more difficult to monitor fore creditors and the parent company alike.')

institution[96]. But the problem of illegitimate private benefits associated with intrafirm structuring is particularly severe in the case of G-SIBs. As the entrenchment of, or movement towards, a bank's 'too big to fail' status illustrates, the social costs of intrafirm structure can take on systemic consequences. To illustrate, such social costs materialised when Bradford & Bingley, Lloyds Banking Group, Northern Rock, and Royal Bank of Scotland were acquired by the government in whole or part during the financial crisis of 2007-2010.[97] In total, the UK's National Audit Office (2013) estimates that the value of the financial support granted by the Treasury to the UK banking sector during the 2007-2009 financial crisis peaked at £1.2 trillion.[98]

There are various relationships between intrafirm structure and (externalised) social costs. Of relevance to this thesis are the prudential regulatory costs, which arise from at least two interrelated economic problems: informational asymmetry and coordination problems[99].[100]

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[96] Pistor (n 43) 73-76 (describing the risks generated by Lehman Brother's 'RASCALS' scheme).

[97] National Audit Office, 'Financial Institutions Landscape' (2015) Report by the Comptroller and Auditor General.

[98] National Audit Office, 'The Comptroller and Auditor General's Report to the House of Commons' (2015) HM Treasury Resource Accounts 2012-2013.

[99] For a discussion on the regulatory costs of complexity in general, see eg Kathryn Judge, 'Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk' (2012) 64 Stanford Law Review 657; Dan Awrey, 'Complexity, Innovation, and the Regulation of Modern Financial Markets' (2012) 2 Harvard Business Law Review 235; Awrey and Judge (n 88).

[100] The primary regulatory areas that are affected are recovery and resolution, and risk management (specifically in the context of prudential regulation and governance).

First, when intrafirm structures increase the opacity of G-SIBs[101], they aggravate informational asymmetries. *Ex ante*, that means monitoring becomes more complicated for creditors[102], supervisors, and even bank directors and managers, and *ex post* it complicates information gathering by resolution authorities that need to act swiftly if the resolution is to succeed.[103] Information asymmetries can be exploited to hide socially undesirable practices that increase the G-SIBs risk profile.[104] In the context of capital and liquidity regulation, for example, they might hide (i) the fact that exposures reported as being off-balance sheet (e.g. in SPEs) are *de facto* still on the firm's books[105], (ii) the creation of 'quantum particle' capital or liquidity that satisfies multiple regulatory requirements at once ('multiple gearing')[106], and (iii) the risk that capital and liquidity

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[101] This could be termed 'organisational opacity', to distinguish it from opacity in the bank's balance sheet, see eg Flood, Kenett, Lumsdaine and Simon (n 73) 1 ('[O]rganizational opacity arises from an organizational structure that creates governance or coordination challenges for managers or supervisors tasked with risk identification.'). On the relationship between managers ability to control and organisation and that organisation's size and complexity, see generally Oliver E Williamson, 'Hierarchical Control and Optimum Firm Size' (1967) 75 Journal of Political Economy 2, 123; Guillermo A Calvo and Stanislaw Wellisz, 'Supervision, Loss of Control, and the optimum Size of the Firm' (1978) 86 Journal of Political Economy 5, 943.

[102] A bank's opacity during times of crisis may affect financial stability, see eg Mark J Flannery, Simon H Kwan and Mahendrarajah Nimalendran, 'The 2007-2009 Financial Crisis and Bank Opaqueness' (2013) 22 Journal of Financial Intermediation 1, 55; Viral V Acharya and Stephen G Ryan, 'Banks' Financial Reporting and Financial System Stability' (2016) 54 Journal of Accounting Research 2, 277. It may also reduce outside monitoring, see Robert M Bushman, 'Thoughts on Financial Accounting and the Banking Industry' (2014) 58 Journal of Accounting and Economics 2, 384.

[103] See eg Robert M Bushman and Christopher D Williams, 'Accounting Discretion, Loan Loss Provisioning, and Discipline of Banks' Risk-Taking' (2012) 54 Journal of Accounting and Economics 1, 1 (a high degree of opacity inhibits outside monitoring).

[104] Such arbitrage, after all, often involves attempts to 'disguise' the functional relationship between various legal entities, see **Chapter 3**.

[105] See **Chapters 2** and **3**.

[106] See eg Basel Committee on Banking Supervision, *Joint Forum: Principles for the Supervision of Financial Conglomerates* (September 2012) 28 (see principle 17(d): 'Supervisors should be alert to ownership structures that pose prudential concerns (eg sister entities owning capital), and overly complex

buffers which are used to meet consolidated requirements are in fact not fully mobile within the corporate structure[107]. Moreover, as a result of increasing opacity a bank's leadership and even its risk managers might lose sight of (*inter* and *intra*firm) exposures and inadvertently take on more risk than even their shareholders desire.[108]

Second, coordination problems might complicate orderly resolution and therefore increase the risk of systemic repercussions. In general terms, complex intrafirm structures may start to resemble Gordian Knots that resolution authorities may struggle to swiftly untie in an orderly fashion (even with the necessary information[109]).[110] This problem will likely be particularly pronounced when multiple

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organisational structures that could obscure instances of double or multiple gearing within the financial conglomerate.').

[107] See eg Kim Cuong Ly, Frank Hong Liu and Kwaku Opong, 'Can Parents Protect Their Children? Risk Comparison Analysis Between Affiliates of Multi- and Single-Bank Holding Companies' (2018) 37 Journal of Financial Stability 1. See **Chapters 3** and **4**.

[108] Bank opacity may increase operational risk, see eg Anna Chernobai, Ali Ozdagli and Jianlin Wang, 'Business Complexity and Risk Management: Evidence from Operational Risk Events in U.S. Bank Holding Companies' (2021) 117 Journal of Monetary Economics 418. Alternatively, bank managers might too heavily rely on the stock price (given shareholder primacy) which, given the opacity of a bank's assets, may not take the true downside costs of its strategy into account, see eg Armour et al. (n 4) ch 17. See also Becht, Bolton and Röell (n 23); Morrison (n 21) 505 (quoting Michael Foot at a House of Lords inquiry into Banking Supervision and Regulation, 'I used to look at Citibank and I wondered how any group of human beings could actually run that entity.'); Luc Laeven, 'Corproate Governance: What's Special About Banks?' (2013) 5 Annual Review of Financial Economics 63; Andew Hill, 'When is a Company Too Big to Manage?' (February 27, 2015) Financial Times (highlighting the link between a bank's complexity and operational oversights by its management).

[109] Although informational asymmetries can aggravate other transaction costs.

[110] There may be, in other words, transaction costs unrelated to the information asymmetry (e.g. coordination costs). Simply put, even if all intrafirm relationships are known, coordination challenges – for example, about who will bear what costs – will likely still rise as the number of cross-border relationships grows. See eg Herring and Carmassi (n 70) 197 ('In the event of bankruptcy, hundreds of legal entities would need to be resolved. (…) [T]hese legal entities would be subject to scores of different national regulatory and bankruptcy procedures, many of which conflict.'). See also Armour (n 19).

authorities are required to work together, for example in a cross-border context. More specifically, a firm's loss absorbing liabilities (TLAC/MREL[111]) may be misplaced in the corporate group or become inaccessible, access to funding during the resolution process may be inhibited, or intrafirm dependencies may unravel.[112] High corporate complexity within G-SIBs is likely to exacerbate such coordination challenges.

D. Regulatory Intervention into G-SIBs' Intrafirm Structures

Because features of a G-SIB's intrafirm structure can create or heighten risk, legislators and regulators around the world have developed a menu of strategies designed to alter them to better align with prudential objectives.[113] These policies, designed to help close the wedge between privately and socially optimal intrafirm structures of G-SIBs[114], have blossomed since the 2007-2009 financial crisis, a time when that wedge became all too apparent. The policy menu is elaborate and highly technical. Highlighting the most salient examples[115] provides a window into the way legislators, regulators, and scholars[116] think about the origin and scope of prudential risks associated with intrafirm structures.

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[111] TLAC stands for 'Total Loss-Absorbing Capacity', and MREL stands for 'Minimum Requirement for own funds and Eligible Liabilities'.

[112] See **Chapters 3** and **4**.

[113] This is the 'public ordering' perspective on intrafirm structure.

[114] Some of these policies are not, however, designed for G-SIBs specifically. That observation does not alter the conclusions in this Part.

[115] A comprehensive discussion of these highly technical policies is beyond the scope of this dissertation.

[116] For a review of various options on the policy menu in the US context, see eg Jeremy C Kress, 'Solving Banking's 'Too Big to Manage' Problem' (2019) 104 Minnesota Law Review 171.

1. Structural Regulation

Perhaps the most rigorous policy option is to break up a banking firm entirely, splitting out certain parts to reduce the firm's footprint[117], avoid socially negative synergies between activity combinations, and make the resultant entity (entities) altogether more manageable. This, by and large, is the domain of structural regulation, defined roughly as 'measures designed to limit the range of activities that may be carried on by a banking firm'.[118] Effectively, these policies redraw the border *around* banking groups and move

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[117] Direct size caps, for example capping the size of a bank's balance sheet as a percentage of GDP, have been suggested too, see eg Jonathan R Macey and James P Holdcroft, Jr, 'Failure is and Option: An Ersatz-Antitrust Approach to Financial Regulation' (2011) 120 Yale Law Journal 1368; Simon Johnson and James Kwak, *13 Bankers: The Wall Street Takeover and the Next Financial Meltdown* (Knopf Doubleday Publishing Group 2010) 214. These are not, usually, considered part of the structural regulation toolkit, and because they do not affect intrafirm structure they are not considered further here.

[118] For a review of structural regulation policies, see Armour et al. (n 4) ch 23 (and references therein). See also Julian TS Chow and Jay Surti, 'Making Banks Safer: Can Volcker and Vickers Do It?' (2011) IMF Working Paper WP/11/236; J Vickers, 'Banking Reform in Britain and Europe' (2013) IMF – Rethinking Macro Policy II: First Steps and Early Lessons (April 16-17, 2013); José Viñals, Ceyla Pazarbasioglu, Jay Surti, Aditya Narain, Michaela Erbenova and Julian Chow, 'Creating a Safer Financial System: Will the Volcker, Vickers, and Liikanen Structural Measures Help?' (2013) IMF Staff Discussion Note SDN/13/4; Randall D Guynn and Patrick S Kenadjian, 'Structural Solutions: Blinded by Volcker, Vickers, Liikanen, Glass Steagall and Narrow Banking', in Patrick S Kenadjian and Andreas Sombret (eds) *Too Big to Fail III: Structural Reform Proposals – Should We Break Up the Banks?* (De Gruyter 2015). An important example is the 'Volcker Rule' in the US, which bans proprietary trading from the banking group, see 12 U.S.C. para 1851. Structural regulation has been considered and, in some cases, implemented in multiple jurisdictions, including the US, UK, and the EU. For the US, which has the longest history of structural regulation in banking, characterised by vacillation, see eg Armour et al. (n 4) ch 23 (and references therein). Also see Jonathan R Macey, 'The Business of Banking: Before and After Gramm-Leach-Bliley (2001) 25 The Journal of Corporation Law 691; Saule T Omarova, 'From Gramm-Leach-Bliley to Dodd-Frank: The Unfulfilled Promise of Section 23A of the Federal Reserve Act' (2011) 89 North Caroline Law Review 5, 1683. For the UK, see Independent Commission on Banking, *Final Report: Recommendations* (ICB, 2011) ('ICB Report'); Parliamentary Commission on Banking Standards, *First Report: First Report of Session 2012-13*, HL Paper 98: HC 848 (HMSO 2012); PCBS, *Banking Reform—Towards the Right Structure: Second Report of Session 2012-13*, HL Paper 126: HC 1012 (HMSO 2013). The UK's implementation is discussed further in **Chapters 5** and **6**. For the EU, see High-Level Expert Group on Reforming the Structure of the EU

certain activities *outside* the perimeter of the banking firm (termed 'full structural separation'[119]), but restrictions of this type do not affect a G-SIBs *intra*firm structure. However, some types of structural regulation, most notably the UK's ring-fencing regime[120], impose entity-level and intra-group restrictions (restrictions on the relationships between various entities within the banking firm[121]) that together *do* affect intrafirm structure. This may involve the creation of a separate legal entity (or group of entities) which houses either the protected 'socially critical' activities or the 'risky, casino-banking' activities, so that they can be fenced-off from other activities carried out by the group and avoid financial (and cultural) contagion.[122] In contrast to group-level policies, entity-level restrictions can – in theory – create the desired protection while retaining scale and scope economies.[123] This theory hinges on the ability to create a semi-permeable membrane between various entities of a firm, which enables socially useful relationships but halts socially risky ones.[124]

Banking Sector, *Final Report* (2012) (the 'Liikanen Report'). These recommendations were later abandoned, see Morris (n 48) ch 14.

[119] See **Chapter 5**.

[120] See **Chapters 5** and **6**. For a detailed technical discussion, see Morris (n 48) ch 14.

[121] Such restrictions also apply in the US, see Sections 23A and 23B of the Federal Reserve Act of 1913, 12 U.S. Code para 226. For a review, see Omarova (n 118).

[122] For a discussion see Armour et al. (n 4) 515-521. This could be framed as creating an entity (or group of entities) that is fenced off from the other entities in the firm, at least from a prudential perspective, thereby creating a segmented firm. See **Chapter 3** for a discussion of intrafirm segmentation, and **Chapters 5** and **6** for a discussion of the role of governance in creating such segmentation (and the permeability of the membranes between the segments).

[123] ICB Report (n 118) 26. See also **Chapter 5**.

[124] This semi-permeable membrane should, for example, prevent the parent company from nudging the regulated entity to circumvent intra-group restrictions. For a discussion, see **Chapter 5** and **6**.

2. Merger Control

In addition to splitting up banks, regulators have the option to prevent them from getting together. This is the domain of bank merger reviews.[125] Ostensibly, it may appear as if this option also does not affect banks' *intra*firm structure. However, the standards used in bank merger reviews (e.g., not systemically risky) can nudge a bank that anticipates an acquisition to develop plans that would affect the intrafirm structure of the post-acquisition group. In the US, for example, agencies evaluating a bank merger have to consider its financial stability implications, which includes an evaluation of the resulting firm's complexity.[126] The framework within which this financial stability analysis occurs, however, lacks clarity and analytical rigour.[127] As a result, managers may not be able to anticipate with precision how their bank's proposed intrafirm structure might be evaluated, which complicates their efforts (and mitigates their incentives) to make adjustments *ex ante*.

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[125] See eg Jeremy C Kress, 'Modernizing Bank Merger Review' (2020) 37 Yale Journal on Regulation 435; Jeremy C Kress, 'Reviving Bank Antitrust' (*forthcoming*) 72 Duke Law Review.

[126] See eg Bank Merger Act, Pub. L. No 86-463, 74 Stat. 129 (codified as amended at 12 U.S.C. § 1828(c) (2018)) para 1828(c)(5) (agencies must take into account possible 'risk[s] to the stability of the United States banking of financial system'). For a discussion, see Kress (2020) (n 125) 469-472.

[127] Kress (2020) (n 125) 470 ('the agencies' financial stability analysis is both vague and relatively rudimentary').

3. Intermediate Bank Holding Companies: Creating a 'Nexus for Regulatory Control'

Several other policy options directly affect the intrafirm structure of a banking group. One example, which shares features with structural regulation but is driven by different rationales, is the introduction of intermediate bank holding companies along jurisdictional lines. Internationally operating banking groups frequently use centralised funding structures, which tend to be run from one dedicated legal entity (the 'financing entity').[128] Other legal entities within the firm, including those located in foreign host jurisdictions, are therefore dependent on a financing entity that may well be beyond the reach of the host jurisdiction's regulators. To change that, various host regulators mandated that internationally operating banking groups create an intermediate holding company that would act as an interface between the banking firm's operations within that host jurisdictions and its operations elsewhere.[129] This intermediate bank holding company is subjected to enhanced supervision and regulation by the host regulator (in the case of the US, the Federal Reserve), enabling it to exert control and guard the exposures that cross jurisdictional boundaries. The creation of the new legal entity thus

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[128] See **Chapters 3** and **4**.

[129] See 12 C.F.R. para 252.153 'U.S. intermediate holding company requirement for foreign banking organizations with combined U.S. assets of $100 billion or more and U.S. non-branch assets of $50 billion or more' ('A foreign banking organization with U.S. non-branch assets of $50 billion or more must establish a U.S. intermediate holding company, or designate an existing subsidiary that meets the requirements of paragraph (a)(2) of this section, as its U.S. intermediate holding company.'). For a discussion, see Luigi L De Ghenghi, Andrew S Fei et al., 'US Intermediate Holding Company: Structuring and Regulatory Considerations for Foreign Banks' (April 2, 2014) Davis Polk Client Memorandum (available at https://www.davispolk.com/files/U.S.Intermediate.Holding.Company.Structuring.and_.Regulatory.Considerations.for_.Foreign.Banks_.pdf); Jeremy C Kress, 'Domesticating Foreign Finance' (2021) 73 Florida Law Review 951, 954 (arguing that this reform was 'a half-baked measure at best').

creates a 'nexus for regulatory control' within the firm, effectively setting up a regulatory perimeter within the bank's larger intrafirm structure.

4. Recovery and Resolution

A closely related policy option, at least in terms of its impact on intrafirm structures, focuses on changes to a bank's intrafirm structure that are mandated with a view to enabling orderly recovery and resolution.[130] We can distinguish between two policy levers. The first relates to the choice between single-point-of-entry ('SPOE') resolution and multiple-point-of-entry resolution ('MPOE') models, which has far-reaching implications for intrafirm structure.[131] In brief, SPOE implies that only the bank's holding company enters the resolution process, while other operating entities remain outside. If successful, this greatly simplifies the resolution attempt because authorities only have to deal with one legal entity in one jurisdiction. That success, however, is contingent on there being a holding company, that holding company's ability to directly fund the entire banking group (so-called 'clean funding pathways'), and the willingness of home supervisors (resolution authorities, in this case) to provide such funding even

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[130] For an overview, see Armour et al. (n 4) Chapter 16; Armour (n 19); Simon Gleeson and Randall Guynn, *Bank Resolution and Crisis Management* (Oxford University Press 2016); Michael Schillig, *Resolution and Insolvency of Bank and Financial Institutions* (Oxford University Press 2016). See also Financial Stability Board, *Key Attributes of Effective Resolution Regimes for Financial Institutions* (15 October 2014).

[131] See eg Jeffrey N Gordon and Wolf-Georg Ringe, 'Bank Resolution in the European Banking Union: A Transatlantic Perspective on What It Would Take' (2015) 114 Columbia Law Review 1297; Kwon-Yong Kim, 'How to Eat an Elephant: Corporate Group Structure of Systemically Important Financial Institutions, Orderly Liquidation Authority, and Single Point of Entry Resolution' (2015) 124 Yale Law Journal 1746, 1320-1330.

to parts of the group that are located in other jurisdictions.[132] MPOE operates in a similar way within the boundaries of a jurisdiction – it involves multiple holding companies enabling recapitalisation along jurisdictional lines within the bank.

Once a resolution model has been chosen, a second set of policy levers can be used to ensure its feasibility and success.[133] As noted before[134], certain properties of intrafirm structures may impede the effective resolution of banking groups. To address those, resolution authorities have been granted powers to require alterations to intrafirm structure and remove impediments to resolution.[135] These powers are primarily exercised during a bank's development, and the resolution authority's approval, of a 'recovery and resolution plan', colloquially known as its 'living will'. The powers are

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[132] For discussions of the viability of the SPOE model, see eg Stephen J Lubben, 'Resolution, Orderly and Otherwise: B of A in OLA' (2013) 81 University of Cincinnati Law Review 2, 485; Gordon and Ringe (n 131); Kim (n 131); Paul Kupiec and Peter Wallison, 'Can the "Single Point of Entry" Strategy Be Used to Recapitalize a Systemically Important Failing Bank?' (2015) 20 Journal of Financial Stability 184; Stephen J Lubben and Arthur E Wilmarth, Jr, 'Too Big and Unable to Fail' (2017) 69 Florida Law Review 1205, 1205 ('The "single point of entry" (SPOE) resolution strategy, which focuses all resolution efforts on a SIFI's parent holding company, is a strategy devised for a very stylized, even hypothetical sort of failure that does not threaten the stability of the financial system. It is unlikely to work as intended during a future global crisis that involves multiple failing SIFIs operating thousands of subsidiaries across dozens of national boundaries.').

[133] For a general review, see Financial Stability Board, *Evaluation of the Effects of Too-Big-to-Fail Reforms: Consultation Report* (28 June 2020) 21-31. Progress is, however, most advanced in jurisdictions that are home to G-SIBs, see Financial Stability Board, *Thematic Review on Bank Resolution Planning* (29 April 2019).

[134] See fns 19, 29-41 and accompanying text.

[135] Financial Stability Board (n 130) Principle 10.5. For the EU, see Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council (Text with EEA relevance) OJ L 173 (hereafter 'Bank Recovery and Resolution Directive' or 'BRRD') Art 17. For the UK, see Section 2A of the Banking Act 2009 and Sections 64-82 Bank Recovery and Resolution (No 2) order 2014.

broad in scope and can be used to affect a wide variety of changes within a firm's intrafirm structure, including changes to the structure of the organisation, actions to ensure the appropriate distribution of internal loss-absorbing liabilities (internal TLAC/MREL), and the creation of new legal entities, legally and operationally segmented from risks in the banking group, that house critical operational activities[136].[137] Importantly, resolution authorities also have the power to require that banks rationalise their intrafirm structures, a process knowns as 'legal entity rationalisation' ('LER'). LER aims to align banks' legal and economic organisation and to remove unnecessary complexity. The idea is that this 'living will' process grants resolution authorities a powerful lever to ensure that a bank becomes 'resolvable'[138], but in practice these powers have not frequently been used.[139] According to the FSB's analysis, the implementation of these policies has been 'slower and more uneven' than the adoption of legal frameworks empowering resolution authorities, with a particularly low uptake in the development of resolvability policies.[140]

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[136] This is to ensure operational continuity in resolution. See eg Bank of England, *The Bank of England's Power to Direct Institutions to Address Impediments to Resolvability* (December 2015) para 2.10.

[137] See eg Roshni Banker, 'Glass-Steagall Through the Back Door: Creating a Divide in Banking Functions Through the Use of Corporate Living Wills' (2010) 1 Columbia Business Law Review 2, 424; Adam Feibelman, 'Living Wills and Pre-Commitment' (2011) 1 American University Business Law Review 1, 93; Paul Lippe, Daniel Martin Katz and Dan Jackson, 'Legal by Design: A New Paradigm for Handling Complexity in Banking Regulation and Elsewhere in Law' (2015) 93 Oregon Law Review 4, 833.

[138] For the EU, see BRRD Art 2 Section 1 sub 47 (definition of a resolvable bank), Annex Section C (non-exhaustive list of factors to consider in making the assessment whether a bank is resolvable).

[139] See eg Kress (n 116) 218.

[140] Financial Stability Board (n 133) 22-23.

5. Pigouvian Regulation and Supervision

Rather than relying on command-and-control policies, regulators can also incentivise banks to alter their intrafirm structures so that they no longer impose externalities on third parties. This is the idea behind 'Pigouvian regulation'[141], which imposes costs on parties equal to the harm they cause to third parties. If successfully implemented, the party causing the harm will only continue to do so if the value of the activity exceeds the costs of the harm, thereby ensuring that the social value of the activity is positive. Translated to G-SIBs and their intrafirm structure, Pigouvian regulation would ensure that G-SIBs only develop intrafirm structures that produce socially valuable outcomes. If, for example, organisational complexity is creating (or facilitates the creation of) socially excessive risks, a Pigouvian regulation would lead bank managers to reduce that complexity – triggering a reorganisation of the group. Prudential regulation can, at least in the US, be understood as having a Pigouvian impact through the incidence of the compliance costs it generates.[142]

An important example of a more explicitly Pigouvian regulation is the risk-based capital surcharge that applies to systemically important banks (hereafter 'G-SIB

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[141] See eg Jonathan S Masur and Eric A Posner, 'Toward a Pigouvian State' (2015) 164 University of Pennsylvania Law Review 93. In economics, the more common term (focusing on the incidence of costs) is that of a 'Pigouvian tax', see Agnar Sandmo 'Direct Versus Indirect Pigouvian Taxation' (1976) 7 European Economic Review 4, 337.

[142] See eg Aaron M Levine and Joshua C Macey, 'Dodd-Frank Is a Pigouvian Regulation' (2018) 127 Yale Law Reivew 1336.

surcharge').[143] Depending on the systemic risk of a bank, as measured by the same criteria used by the BCBS to assess the systemic importance of a bank[144], this G-SIB surcharge is designed to increase resilience. However, as then US Federal Reserve Governor Daniel Tarullo noted, '[t]his measure might also create incentives for them to reduce their systemic footprint and risk profile'[145]. Prodded by the suggestion, analysts from Goldman Sachs concluded that, if such a surcharge were to be implemented, shareholders should elect to break up JPMorgan Chase.[146] Given that organisational

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[143] This example is controversial for at least two reasons. First, some argue that capital is not costly per se, see eg Armour et al. (n 4) 310-313 (and references therein). Second, insofar as higher capital requirements are costly, it is not clear that these costs do indeed reflect the marginal costs of risks, as Pigouvian regulation requires. An analysis of this issue is beyond the scope of this Chapter.

[144] See fns 29-4039 and accompanying text.

[145] Daniel K Tarullo, then Governor of Board of Governors of the Federal Reserve System, 'Dodd-Frank Implementation' (9 September 2014) Hearing Before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, Washington, D.C., available at https://www.federalreserve.gov/newsevents/testimony/tarullo20140909a.htm. Similarly, see Daniel K Tarullo, then Governor of Board of Governors of the Federal Reserve System, 'Industry Structure and Systemic Risk Regulation' (4 December 2012) Speech at the Brookings Institution Conference on Structuring the Financial Industry to Enhance Economic Growth and Stability, Washington, D.C., available at https://www.bis.org/review/r121205e.pdf ('If [the surcharge has] a modest effect on industry structure, it would be an intended – rather than unintended or undesirable – consequence of the regulation.'). A study by the Basel Committee on Banking Supervision finds that most G-SIBs (particularly those in the Euro Area, the UK, and the US) have changed their balance sheets in ways consistent with the G-SIB framework's aims (and thus having lowered their G-SIB scores), see Basel Committee on Banking Supervision, *An Examination of Initial Experience with the Global Systemically Important Bank Framework* (2019) BCBS Working Paper 34.

[146] John Gapper, 'Regulators Right to Cut Biggest Banks Down to Size' (7 January 2015) Financial Times ('Goldman Sachs caused a bit of a stir this week by issuing an analysts' report suggesting JPMorgan Chase might want to break itself up. I believe in the independence of investment bank research as much as the next person, but it is hard not to notice that the major beneficiary of such a step would be Goldman Sachs.').

complexity contributes to a bank's systemic riskiness, a careful calibration of the G-SIB surcharge could in theory cause a bank to rationalise its intrafirm structure.[147]

However, as noted before, the metrics chosen to calibrate the systemic risk assessment and, by implication, the G-SIB surcharge, currently do not capture organisational complexity.[148] This problem plagues the use of Pigouvian regulation in relation to intrafirm structure more broadly. Pigouvian supervision could rely more on judgment and discretion, exploiting the ambiguities in the treatment of intrafirm complexity, and may therefore be more easily operationalised. This approach could be adopted, for example, when supervisors suggests that more complex banking firms should be subjected to heightened liquidity requirements.[149] Pigouvian costs could also be created through a hostile regulatory environment for firms whose intrafirm structure is considered problematic.[150] Such a hostile environment can result from implied threats,

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[147] Note, however, that banks have been known to use intrafirm structure to circumvent regulatory requirements and might do so again here. See Sections I.B and I.C.

[148] See fns 29-4039 and accompanying text. See also **Chapter 2**.

[149] Basel Committee on Banking Supervision, *Joint Forum: Principles for the Supervision of Financial Conglomerates* (September 2012) Principle 20 ('Conglomerates should develop and maintain liquidity management processes and funding programs that are consistent with their complexity, risk profile, and scope of operations.'); Other examples of (proposed) Pigouvian regulation in the context of systemic risk suffer from the same shortcoming. For an example in the context of governance, see eg Alessandro Romano, Luca Enriques and Jonathan R Macey, 'Extended Shareholder Liability for Systemically Important Financial Institutions' (2020) 69 American University Law Review 3, 976.

[150] This could be the case, for example, when supervisors conclude that a bank's intrafirm structure endangers (prudential) regulatory objectives, see Basel Committee on Banking Supervision (n 149) Principle 11(c) ('Supervisors should seek to ensure that the structure of the financial conglomerate does not impede effective supervision. Supervisors may seek restructuring under appropriate circumstances to achieve this, if necessary.') and 11(d) ('Supervisors should seek to ensure that the board and senior management of the head of the financial conglomerate are capable of describing and understanding the purpose, structure, strategy, material operations, and material risks of the financial conglomerate, including those of unregulated entities that are part of the financial conglomerate structure.').

for example of forced divestiture[151] or as part of the assessment process of recovery and resolution plans[152].[153]

6. Concluding Thoughts

Despite their arsenal of policy options to alter intrafirm structures, policymakers continue to face significant challenges. The main challenge is that these policy options appear to be designed and implemented in siloes, without a proper consideration for their interaction. Illustrative for this unease is the concern that structural regulation policies make banks' intrafirm structure more complicated, rather than easier, to resolve.[154] The Skeoch Review of ring-fencing policies in the UK, for example, concluded that 'it is even possible that provisions of the ring-fencing regime may have to be disapplied, so that they do not become an obstacle to an orderly resolution'.[155] This is illustrative for a broader concern, which is that prudential regulators do not have

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[151] See eg Kress (n 116).

[152] See fns 133-140 and accompanying text.

[153] See also Morris (n 48) paras 14.081-14.082. This approach comes at the cost of supervisory uncertainty for regulated firms.

[154] See eg Jens-Hinrich Binder, 'Resolution Planning and Structural Bank Reform Within the Banking Union', in Juan E Castañeda, David G Mayes and Geoffrey Wood, *European Banking Union: Prospects and Challenges* (Routledge 2015).

[155] Ring-fencing and Proprietary Trading Independent Review, *Final Report* (March 2022) (hereafter 'Skeoch Review') para 3.37 (also: 'The orderly resolution of a large banking group might need to allow for the deployment of capital, liquidity and resources in a way that would not be compatible with how the ring-fencing regime would operate in normal circumstances.'). The review concludes, however, that '[if necessary] in resolution, key parts of the ring-fencing regime can be disapplied', see Skeoch Review 42.

a coherent, holistic framework against which to evaluate a bank's intrafirm structure. References to organisational 'complexity' remain vague and ambiguous, even in the more detailed supervisory guidance, and many relevant metrics (like those used in the systemic risk assessment for banks) do not appear to relate to the relevant prudential concerns at all. Finally, and relatedly, the link between intrafirm structure and prudential risks remains under-theorised. The degree to which a firm's legal structure underpinning its 'complexity' is relevant from a prudential perspective remains, so far, an open question.[156]

Beyond its scholarly interest, an analysis of the prudential implications of G-SIBs intrafirm structures remains highly pertinent for policymakers in light of recent economic studies. When evaluating the progress made on the prudential regulation of G-SIBs since the 2007-2009 global financial crisis, the evidence is mixed. An influential study using market-based measures to assess the risk of banks found that volatility and risk premia appear to have increased.[157] And although the funding cost advantage of (G-)SIBs appears to have declined since the peak of the crisis period, it has not

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[156] See eg Avraham, Selvaggi and Vickery (n 72) 75 ('To what extent is organizational structure largely irrelevant, conditional on the asset and liability structure of the consolidated entity?').

[157] Natasha Sarin and Lawrence H Summers, 'Understanding Bank Risk Through Market Measures' (2016) Brookings Papers on Economic Activity 57. Their findings may, however, also be read as evidence of successful regulatory intervention: markets may be more sensitive to the financial health of banks because they are now more likely to bear the risk of failure – which is consistent with a reduced probability of bailouts. For a study making a similar point, see Viral V Acharya, Deniz Anginer and A Joseph Warburton, 'The End of Market Discipline? Investor Expectations of Implicit Government Guarantees' (2022) SSRN Working Paper (available here https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1961656, accessed on 10 August 2022).

disappeared.[158] In fact, a review of the literature found that the funding cost advantage remains higher than in the pre-crisis period.[159] A better understanding of the relationship between intrafirm structure and prudential risks remains, therefore, of high policy salience.

That observation sets the stage for the scope, methodology, and structure of this thesis.

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[158] Financial Stability Board (n 36) 32. The evidence suggests that the credibility of resolution reforms has risen. Credit rating agencies, for example, reduced their support uplift in jurisdictions where resolution frameworks were considered effective or operational, see Financial Stability Board (n 36) 39.

[159] Financial Stability Board (n 36) 33.

II. METHODOLOGY AND SCOPE

The objective of this thesis is to advance our understanding of the relationship between a G-SIB's *intrafirm structure* and its *prudential risk* profile. Such an inquiry encompasses a potentially wide-ranging set of perspectives, ranging from resolvability to risk-taking cultures and accounting, so a delineation of its methodology and scope is in order.

Most fundamentally, the thesis adopts a 'functional approach'. Although this term is commonly invoked, particularly in the context of corporate law[160] and financial regulatory scholarship[161], it has no widely agreed-upon definition.[162] The term is used in this thesis to convey a focus on economic problems and the manner in which the law responds to them and, equally importantly, how it might help shape them.[163] A common thread running through this dissertation is that the legal structure of banking firms does

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[160] See eg Kraakman, Armour, Davies, Enriques, Hansmann, Hertig, Hopt, Kanda, Pargendler, Ringe, and Rock (n 95) 3-4.

[161] See eg Armour et al. (n 4) 12 ('[O]ur analysis of the financial system will be functional in orientation. This means we are not so much concerned with the question, 'what is a bank?', but rather with, 'what functions do banks perform?'. The latter question emphasizes that the set of firms perfroming these functions are not necessarily limited to those firms categorized by current regulation as 'banks'.'). See also Robert C Merton and Zvi Bodie, 'A Conceptual Framework for Analyzing the Financial Environment' in Dwight B Crane, Kenneth A froot, Scott P Mason, André F Perold, Robert C Merton, Zvi Bodie, Erik R Sirri and Peter Tufano, *The Global Financial System: A Functional Perspective* (Harvard Business School 1995) ('The key element in the framework is its focus on functions rather than on institutions as the conceptual "anchor".')

[162] Kraakman, Armour, Davies, Enriques, Hansmann, Hertig, Hopt, Kanda, Pargendler, Ringe, and Rock (n 95) 4 ('For the purposes at hand, however, we need not commit ourselves on fine points of social science methodology. We need simply note that the exigencies of commercial activity and organization present practical problems that are roughly similar in market economies throughout the world. Our analysis is "functional" in the sense that we organize discussion around the ways in which corporate laws respond to these problems […].').

[163] Put differently, this conception focuses on the interaction between (i) the exigencies of financial (and economic) objectives and (ii) the enabling and complicating role of legal structuring.

not always align with the economic function it is thought to perform, and that this lack of alignment lies at the heart of a range of prudential risks generated by intrafirm structures.

One implication of this approach is that the analysis in this thesis is not tied to any specific jurisdiction and can in fact be considered in the context of any jurisdiction that shares a fundamentally similar set of economic problems. The emphasis, after all, is on the nature of a set of economic problems and how understanding those might inform the design and implementation of prudential regulatory policy. Accordingly, this thesis does not attempt to provide a comprehensive account of any specific legal regime governing intrafirm structure or its prudential regulation.[164] When specific examples of rules are given, however, these will most frequently relate to the UK, the EU, and, to a lesser extent, the US. At various points, and most notably in **Chapters 5** and **6** that cover the UK ring-fencing framework, this thesis draws on case studies to ground a more generally applicable conceptual enquiry into a specific, practical reality to concretise the discussion.

In line with the functional approach, this thesis views the firm through the lens of law and finance (and, to a lesser degree, economics).[165] Seen through this lens, throughout this thesis the use of the term 'firm' emphasises the economic unit in the Coasean sense to 'indicate an economic enterprise under common control of one

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[164] Morris (n 48) provides such an account for the UK.

[165] It is however recognised that, for example in the context of ring-fencing, other disciplines such as accounting and tax also play an important role.

entrepreneur, owner, or hierarchy'[166].[167] As explained in **Chapter 2**, this definition will inform how the perimeter of the banking firm is determined and, consequently, will set out which relationships between entities we consider as *intra*firm rather than *inter*firm – and therefore which of these relationship are within the scope of this thesis. The *structure* of those *intrafirm* relationships (the 'intrafirm structure'), in turn, refers to the *pattern of legal, economic, and financial relationships* that make up that economic enterprise.

The thesis focuses on the properties of *G-SIBs'* intrafirm structures. Its inquiry is therefore limited to financial firms that carry out banking activities – but they may, and indeed do, carry out a wide range of other (financial) activities, too. The discussion of applicable legislative and regulatory frameworks will, accordingly, emphasise the field of banking regulation. However, as befits the functional approach, any insights this thesis might generate could help inform the regulation of other (financial) firms that are exposed to similar economic problems. The focus on G-SIBs, rather than banks generally, reflects the prudential orientation of the enquiry.[168] G-SIBs are characterised by their propensity to create systemic risk – a *macro*prudential concept – but the prudential risks studied here also include *micro*prudential risks affecting the firm (with the understanding that *micro*prudential risks manifesting at a G-SIB may have

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[166] Casey (n 52) 2682.

[167] See Ronald H Coase, 'The Nature of the Firm' (1937) 4 Economica 386, 393 (noting that a firm 'consists of the system of relationships which comes into existence when the direction of resources is dependent on an entrepreneur').

[168] Morris (n 48) para 1.029 ('It is in the related spheres of prudential regulation and resolution that regulators are most justifiably concerned to address the group dynamic').

*macro*prudential repercussions).[169] Because of its prudential lens, other problems that may arise as a result of a firm's intrafirm structure, which could be related to issues as diverse as organisational culture, conflicts of interests, and operational efficiency, are beyond the scope of this thesis.

Even thus circumscribed, the number of potential questions covered by the objective of this thesis – to advance our understanding of the relationship between a G-SIB's *intrafirm structure* and its *prudential risk* profile – is substantial. That is why this thesis focuses on three issues that get to the heart of the relationship and its regulatory implications but are not yet rigorously addressed in the literature. The first is how, conceptually, we can conceive of the intrafirm structure of G-SIBs through a prudential lens, marrying financial and legal analysis. That investigation enables a study of intrafirm segmentation – a phenomenon that intrafirm structures enable. The second part of this thesis studies how such segmentation arises, how we can conceptualise and study the resulting risks, and what the implications for prudential policy are. Prudential policy sometimes deliberately causes intrafirm segmentation, usually of a semi-permeable type. The third part of the thesis studies the role and efficacy of intrafirm governance in delivering such segmentation, focusing on the ring-fencing regime in the UK.

One final set of clarifications might be warranted. This thesis does not attempt to provide a complete account of the prudential regulation of G-SIBs, nor does it attempt to comprehensively evaluate the introduction of such regulation since the 2007-

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[169] For a discussion of macroprudential policy, see Armour et al. (n 4) ch 19.

2009 global financial crisis.[170] It is also not an attempt to comprehensively review the implications of the corporate law of groups in the context of G-SIBs – in fact, it sidesteps many such questions by ignoring issues related to minority shareholders of entities within the corporate group structure. Finally, the thesis does not attempt to suggest detailed policy solutions. Rather, it articulates a set of conceptual contributions that policymakers (and others) can draw upon in their design of prudential regulatory policy.

III. STRUCTURE OF THE THESIS

This thesis proceeds in three parts. **Part I** (which includes this chapter) discusses a set of foundational issues in relation to intrafirm structure and its relationship to prudential risks. This chapter – **Chapter 1** – serves to canvas the broader context within which to situate the contributions of this thesis, as well as its methodology and scope. **Chapter 2** articulates a framework to study intrafirm structures and uses that framework to structure and motivate key questions covered in this thesis. It begins by surveying the various ways in which intrafirm structures are conventionally studied, with a focus on how such studies conceive of the features of intrafirm structures that are relevant for prudential purposes – notably, their 'complexity'. It then suggests a novel approach to these questions, which is rooted in network theory. Network theory is widely used to map complex systems, including the *inter*firm structure of the financial system, and offers an extensive toolkit to study their prudential properties. In the *intra*firm context,

[170] For such an evaluation, see Financial Stability Board (n 36).

the chapter shows how network theory can be used to represent the relationships between the entities of the firm in an analytically tractable way, and, by way of illustration, applies this approach empirically (albeit in a stylised way) to portray the intrafirm structure of US G-SIBs.

Conceptualising intrafirm structure using network theory equips regulators to analyse the implications of *intra*firm exposures for prudential purposes, using many of the same tools that are widely used in the *inter*firm context. It also raises a first-order question: given that the financial system is characterised by a vast network of relationship across legal entities, how do we decide which entities are to be considered part of the same firm? We introduce the idea that the location of a firm's perimeter is contextual and is a product of the functional question that motivates the attempt to locate it. The 'prudential perimeter' – the location of a firm's perimeter when approached from a prudential perspective – is the working definition used in the remainder of the thesis.

Part II focuses on the sources and prudential implications of intrafirm segmentation. **Chapter 3** sets out how the assets of banking firms can, to a more or lesser extent, be segmented along legal entity lines. To do so, it provides an overview of the theory of corporate law asset partitioning as a source of segmentation and proposes an extension to that logic by introducing the concept of regulatory segmentation. In brief, regulatory segmentation takes place when regulatory actions, whether *ex ante* or *ex post*, enforce legal entity boundaries to prevent certain intrafirm transactions and decisions on intrafirm structures. Regulators can also insist on de-segmentation where

corporate law segments. In sum, the segmentation of a firm is a product of interacting corporate law and regulatory segmentation, whereby regulatory segmentation tends to trump corporate law asset partitioning in case of conflict.

The chapter proceeds to illustrate various segmentation relationships that might emerge between two entities (on a spectrum from full de-segmentation to full segmentation), and notes that a firm's overall segmentation pattern is a product of each entity's interaction with each other entity that is part of the firm. Such patterns can be studied leveraging the network-based conception of the firm introduced in Chapter 2, by constructing a segmentation-weighted adjacency matrix of the intrafirm network. The chapter concludes by framing the daunting task that this represents to the firm's managers, creditors, and regulators – for whom knowledge of the intrafirm adjacency matrix is central from a risk-management perspective, yet seemingly elusive.

Building on Chapter 3, **Chapter 4** analyses two ways in which intrafirm segmentation might contribute to systemic risk. First, it sets out how the resilience of a firm (its risk profile) is critically dependent on its segmentation pattern. A firm that is internally segmented may be subjected to 'misallocation risk', which can significantly alter its risk profile relative to an integrated firm. Second, the chapter studies the sources of, and risks associated with, sudden, large-scale and persistent changes in segmentation patterns, which are referred to as 'segmentation shifts'. The chapter concludes by outlining various implications of intrafirm segmentation for prudential policymakers, specifically related to monitoring and supervisory challenges (both by supervisors and by bank management), recovery and resolution planning, and intrafirm stress tests.

To effectively implement intrafirm segmentation policies, regulatory interventions rely on changes to intrafirm governance arrangements. **Part III** studies the role and efficacy of intrafirm governance in delivering intrafirm segmentation, specifically that of a semi-permeable type, using the UK's ring-fencing regime as a case study.[171] **Chapter 5** outlines the role of governance in enabling regulatory segmentation as part of the UK's ring-fencing regime. Ring-fencing strategies primarily rely on a set of rules to construct the 'fence' around the entity (or entities) involved. The chapter highlights that, because these rules are necessarily incomplete and indeterminate, there is an important role for gap-filling mechanisms to maintain the credibility of the fence. The objective of especially designed intrafirm (or 'ring-fence') governance is that managers of the ring-fenced entity prioritise the interests of the ring-fence(d entity) above those of the group, and would therefore be compelled to interfere whenever the ring-fence may be undermined. Although the chapter focuses on the UK implementation of ring-fencing, the general point that is advanced is equally applicable in other (economically similar) contexts.

Chapter 6 assesses the efficacy of governance as an intrafirm segmentation method. The role of ring-fence governance in ensuring that managers of the ring-fenced entity prioritise the interests of the ring-fenced entity over those of the group inevitably creates conflicting loyalties. In brief, these managers will be subject to the shareholder(s)

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[171] The material in Part III has, in slightly modified and reduced form, been published, see Thom Wetzer, 'In Two Minds: The Governance of Ring-Fenced Banks' (2019) 19 Journal of Corporate Law Studies 179.

exercising its (their) rights on the one hand (which would generally enable strong influence from the entity's parent, and therefore by the group) and ring-fence obligations on the other, and these might conflict. More precisely, where ring-fence rules are indeterminate shareholders pushing the group's interest might encourage the ring-fenced bank managers to act in ways that undermine the ring-fence. Given these conflicting loyalties, as well as the inevitable indeterminacy of the ring-fencing rules, it is not clear that the managers of ring-fenced entities would choose to uphold the ring-fence. The Chapter evaluates this point on the basis of an in-depth analysis of the UK's implementation of the ring-fencing regime.

The thesis wraps up with the **Conclusion**, which concisely summarises the core contributions of this project as outlined in its six Chapters.

CHAPTER 2: FOUNDATIONS OF INTRAFIRM STRUCTURE

This chapter articulates a framework rooted in network theory to study intrafirm structures and uses that framework to organise and motivate key questions covered in this thesis.

As discussed in **Chapter 1**, the preponderance of scholarly work[1] and regulatory discussion[2] about the prudential risks generated by G-SIB's intrafirm structures revolve around the concept of a bank's 'complexity'. It is almost platitudinous to observe that the structure of the financial system – whether in relation to financial products, markets, or institutions – is exceedingly complex.[3] Grappling with these dynamic and complex structures has been described as 'the greatest financial-market challenge of the future'[4], with some suggesting that the complexity of the financial system has already eclipsed

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[1] See eg Richard Herring and Jacopo Carmassi, 'The Corporate Structure of International Financial Conglomerates: Complexity and its Implications for Safety and Soundness' in Allen N Berger, Philip Molyneux and John OS Wilson (eds), *The Oxford Handbook of Banking* (Oxford University Press 2010), 197 ('Our central premise is that the complexity of the corporate structures that most international financial conglomerates have developed is itself a significant source of systemic risk.').

[2] This dates back at least to the coining of the term 'large and complex financial institutions' (LCFIs), introduced by a Task Force formed by the Financial Stability Forum, the G10 Ministers and Governors, and the Basel Committee of Banking Supervision in 2000, see Eva HG Hüpkes, '"Too Big to Save" – Towards a Functional Approach to Resolving Crises in Global Financial Institutions' in Douglas Evanoff and George Kaufman (eds), *Systemic Financial Crises: Resolving Large Bank Insolvencies* (World Scientific 2005). See also Group of Ten, 'Report on Consolidation in the Financial Sector (Ferguson Report)' (January 2001).

[3] For a more general exposition on the complexity and dynamism of financial systems, see Steven L Schwarcz, 'Regulating Complexity in Financial Markets' (2009) 87 Washington University Law Review 211.

[4] Schwarcz (n 3).

the ability of regulators and regulations to keep up.[5] Several studies have attempted to map that complexity, explain its drivers, and provide advice to policymakers on how to operate against its backdrop.[6] Mostly, such studies focus on individual financial products[7] or, at more of a macro-level, the structure of *inter*firm relationships.

The major conceptual difficulty is to articulate the nature of a G-SIB's *intra*firm structure. Conventional analysis tends to side-step more fundamental questions about the nature of those structures and the risks generated by their 'complexity'. Instead, it focuses on the development of proxies like the number and geographic spread of subsidiaries that make up a banking group.[8] Barring notable exceptions, corporate law theory, financial regulatory theory, and the literature on the theory of the firm are silent about *how* banking firms are structured internally, or even on where the boundaries

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[5] Simon A Levin and Andrew W Lo, 'A New Approach to Financial Regulation' (2015) 112 Proceedings of the National Academy of Sciences 12,543 ('We propose that the financial system has crossed a threshold of complexity where the system is evolving faster than regulators and regulations can keep pace.').

[6] See eg Dan Awrey, 'Complexity, Innovation, and the Regulation of Modern Financial Markets' (2012) 2 Harvard Business Law Review 235; Dan Awrey and Kathryn Judge, 'Why Financial Regulation Keeps Falling Short' (2020) 61 Boston College Law Review 2295. See also: J Doyne Farmer, Alissa M Kleinnijenhuis and Thom Wetzer, 'Stress Testing the Financial Macrocosm' in J Doyne Farmer, Alissa M Kleinnijenhuis, Til Schuermann and Thom Wetzer (eds), *Handbook of Financial Stress Testing* (Cambridge University Press 2022).

[7] See eg Claire Célérier and Boris Vallée, 'Catering to Investors Through Security Design: Headline Rate and Complexity' (2017) The Quarterly Journal of Economics, Volume 132, Issue 3, 1469-1508; Kathryn Judge, 'Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk' (2012) 64 Stanford Law Review 657; Robert P Bartlett, III, 'Inefficiencies in Information Thicket: A Case Study of Derivative Disclosures During the Financial Crisis' (2010) 36 Journal of Corporation Law 1.

[8] See eg Financial Stability Board, *Evaluation of the Effects of Too-Big-to-Fail Reforms: Consultation Report* (28 June 2020) 6 ('Global systemically important banks remain complex. The average G-SIB still has over a thousand subsidiaries in over 40 jurisdictions.').

between *intra*firm and *inter*firm structures should be drawn. This lack of analytical rigour complicates both positive and normative analyses of intrafirm structures which, in turn, renders qualitative and quantitative evaluations of policy interventions less useful. Given the continued policy salience of regulatory challenges relating to, and the substantial regulatory interventions attempting to mitigate, the prudential risks arising from the intrafirm structures of G-SIBs, this state of affairs is unsatisfying.[9]

The Chapter proceeds as follows. Section I surveys conventional approaches to the characterisation of intrafirm structure, covering the literature on G-SIBs' 'complexity' as well as the literature studying the organisation of firms made up of multiple legal entities generally. Section II draws on the insights from that review to develop a novel conceptualisation of intrafirm structure using network theory. It provides a primer on network theory and its usefulness in mapping complex systems generally and proceeds to explain how it is used to study the *inter*firm structure of the financial system. We then turn to outline a framework for the representation of banks' *intra*firm structure using those same methodological tools and, for illustrative purposes only, apply that framework to empirically map – albeit in a stylised sense – the intrafirm structure of US G-SIBs. Section III outlines the analytical possibilities that are opened up by characterising intrafirm structures using network theory, focusing on opportunities with relevance for prudential policymakers. The network approach raises a first-order question for the study of intrafirm structure, which is where the perimeter of the firm is located. Section IV delves into that question. It proposes that a firm's

[9] Financial Stability Board, (n 8). For an overview of regulatory interventions affecting intrafirm structure, see **Chapter 1**.

perimeter should be determined on a contextual and functional basis – that is, the perimeter is not fixed but a product of the objective of the enquiry. Given that we are interested in the prudential implications of intrafirm structures, it concludes by articulating the notion of a firm's 'prudential perimeter', which forms the basis for our enquiry in the remainder of the thesis.

I. CONCEPTUALISING INTRAFIRM STRUCTURE: CONVENTIONAL APPROACHES

Corporate groups are a ubiquitous feature of economic life.[10] Most large firms are organised as groups of companies (a 'family of legal persons'[11]) and there is ample literature studying their diversity and the distinct problems that this type of legal organisation raises[12].[13] Most commonly, these problems are related either to the specific agency costs associated with the protection of minority shareholders or creditors of subsidiaries, or to the legal regimes designed to facilitate the operation of corporate groups – both issues are beyond the scope of this thesis.[14] Instead, this Section focuses

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[10] For a classic account on the topic, see Melvin Aron Eisenberg, 'Megasubsidiaires: The Effect of Corporate Structure on Corporate Control' (1971) 84 Harvard Law Review 1577. Klaus J Hopt, 'Groups of Companies: A Comparative Study of the Economics, Law, and Regulation of Corporate Groups' in Jeffrey N Gordon and Wolf-Georg Ringe (eds), *The Oxford Handbook of Corporate Law and Governance* (Oxford University Press 2017) 603 ('Groups of companies rather than single independent companies are the modern reality of the corporation').

[11] Katharina Pistor, *The Code of Capital: How the Law Creates Wealth and Inequality* (Princeton University Press 2019) 51.

[12] For a review, see eg Hopt (n 10).

[13] **Chapter 1** covers various rationales for the use of multiple legal entities within a firm.

[14] As noted in **Chapter 1**, most of these questions are beyond the scope of this thesis. For an overview, see eg Hopt (n 10); Reinier Kraakman, John Armour, Paul Davies, Luca Enriques, Henry Hansmann, Gerard Hertig, Klaus Hopt, Hideki Kanda, Mariana Pargendler, Wolf-Georg Ringe, and Edward Rock,

on the ways that these intrafirm structures are characterised. It starts with a discussion of quantitative approaches, which are almost exclusively related to attempts to define proxies for the 'complexity' of G-SIBs. It then turns to more qualitative characterisations.

A. Quantitative Approaches: Intrafirm 'Complexity'

The prudential relevance of G-SIB's intrafirm structures is often equated with their 'complexity'[15] – a rather indeterminate concept that defies meaningful definition.[16] **Chapter 1** already observed that a comprehensive conceptualisation of that term and its relation to prudential considerations remains elusive.[17]

The Anatomy of Corporate Law – A Comparative and Functional Approach (Third Edition, Oxford University Press 2017), chs 5 and 6.

[15] The context of that discussion is outlined in **Chapter 1**.

[16] See eg George G Kaufman, 'Too Big to Fail in Banking: What Does it Mean?' 13 Journal of Financial Stability 214 (noting the role of 'complexity' of banks). Note that this chapter is not concerned with the issue of 'complexity' of intrafirm structures per se, but focuses on this dimension of intrafirm structure because (1) it is often conflated with the relevant properties of G-SIBs' intrafirm structure for prudential purposes (which is the topic of this thesis) and is therefore – rightly or, more likely, wrongly – equated with intrafirm structure in academic and regulatory discourse, and (2) the discussion about complexity, both its conceptual understanding its proxies, elucidates how scholars and practitioners think about intrafirm structure generally and its prudential implications specifically.

[17] See eg Nicola Cetorelli, James McAndrews and James Traina, 'Evolution in Bank Complexity' (2014) FRBNY Economic Policy Review 85, 85 ('[E]ven the meaning and metrics of complexity are debatable; in both comparative and absolute terms, we lack a clear consensus on how to assess an entity's complexity'). See also Nicola Cetorelli and Linda S Goldberg, 'Measures of Global Bank Complexity' (2014) FRBNY Economic Policy Review 107, 108 ('Despite the centrality of the bank complexity issue, no shared consensus has emerged just yet on what complexity might mean in the context of banking, or at least what might be the agreed-upon dimensions of our analysis of complexity'), who then proceed to propose such a measure. Since these statements were made, the literature has progressed somewhat – as will be outlined below – but a 'clear consensus' on the issue remains illusory. This point is also illustrated by regulatory practice, see eg Bank of England, *Financial Stability Review* (December 2001) 81 ('A sample

The multidimensional nature of complexity is partly to blame. We can distinguish between (at least) three types of complexity, which are frequently conflated in the literature.[18] First, we can think of 'business' (balance sheet) complexity as the complexity of the (combination of) economic activities that the firm is undertaking. Under these definitions firms are, by and large, considered more 'complex' when they undertake many different types of activities (say 'banking', 'insurance', 'market making').[19] A consistent finding in the literature is that this type of complexity has been on the rise for most US-based G-SIBs, at least in the decade or so leading up to 2014. This timeframe coincides with a reduction in regulatory limitations on the allowable scope of financial activities carried out within the same banking firm (more specifically, under the same bank holding company).[20] A second dimension of complexity is 'geographic' complexity, which attempts to capture the complexity that results when a bank's activities are carried out across multiple jurisdictions, where they may be covered by different regulatory authorities. The third dimension of complexity, and the one most

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of LCFIs was selected according to the scale of their activities in capital markets, as measured using objective, if fairly arbitrary, criteria.').

[18] See eg Cetorelli and Goldberg (n 17) 108. In many other contexts, these dimensions are used interchangeably when speaking about 'complexity', see eg Cetorelli, McAndrews and Traina (n 17) 85.

[19] Cetorelli and Goldberg (n 17) 108 (defining business complexity as 'a concept referring to the type and variety of activities that may be conducted within the walls of a given institution').

[20] See eg Dafna Avraham, Particia Selvaggi and James Vickery, 'A Structural View of U.S. Bank Holding Companies' (2012) FRBNY Economic Policy Review 65-68. See also Kevin Stiroh, 'Diversification in Banking: Is Noninterest Income the Answer?' (2004) 36 Journal of Money, Credit and Banking 5, 853; Saule T Omarova and Margaret E Tahyar, 'That Which We Call a Bank: Revisiting the History of Bank Holding Company Regulation in the United States' (2012) 31 Review of Banking & Financial Law 113.

closely related to the notion of intrafirm structure as used in this thesis[21], is 'organisational complexity'. This conceptualisation focuses on the legal and economic organisation of the firm (for example, the 'degree to which the organization is structured through separate affiliated entities'[22] and the extent to which such legal organisation aligns with the economic organisation of the firm). In practice, the business, geographic, and organisational dimensions of complexity frequently interact. At least intuitively, any given organisational structure is likely to become more complex from a prudential perspective if its subsidiaries engage in several economically distinct activities across multiple jurisdictions.

Most conceptualisations of intrafirm organisational complexity, hereafter simply referred to as 'complexity', are superficial. The most conventional approach is to refer to the number of subsidiaries a firm consists of, where a higher number of subsidiaries equates to a more 'complex' intrafirm structure and therefore, presumably, higher prudential risk.[23] At times, this approach is complemented by proxies attempting to

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[21] Cetorelli and Goldberg (n 17) 108 (noting that '[b]usiness complexity concepts may speak more to the diversification and fragmentation of the type of production undertaken by organizations', while '[o]rganizational measures have a more direct fit with the main concerns typically associated with complexity, such as resolution, fragmentation, cross-border systemic risk, internal liquidity dynamics, managerial agency frictions, and "too big to fail".).

[22] Linda S Goldberg, '' in Asli Demirguc-Kunt, Douglas D Evanoff and George G Kaufman, *The Future of Large, Internationally Active Banks* (World Scientific, 2016) 60-61.

[23] See eg Herring and Carmassi (n 1) 200 (noting that it is 'a regrettably superficial measure of corporate complexity'); Avraham, Selvaggi and Vickery (n 20) 65-66 ('One simple measure of complexity is the number of separate legal entities in the BHC'); Cetorelli and Goldberg (n 17); Cetorelli, McAndrews and Traina (n 17); Goldberg (n 22) 61-62 (noting that '[w]hile this is certainly not a perfect measure that captures all dimensions of complexity, it provides an accessible and verifiable metric given the type of information that can be accessed about holding company structure'). This approach appears to be barely

reflect the geographical[24], business line[25], or jurisdictional variety[26] of these subsidiaries, either in absolute terms or on a weighted basis[27].[28] The development of these metrics has enabled a host of statistical studies attempting to track the drivers and implications of intrafirm complexity in banks.[29] Notwithstanding the intuitive appeal of this approach and the ease with which it allows for quantitative (statistical) analysis, these representations ultimately convey scant information about the relationships between legal entities in a firm, let alone elucidate why these structures might produce prudential risks.

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more informative than simply using the size of the institution's balance sheet as a proxy, see eg Cetorelli and Goldberg (n 17) (finding that affiliate counts are correlated with size).

[24] See eg Herring and Carmassi (n 1); Avraham, Selvaggi and Vickery (n 20); Cetorelli and Goldberg (n 17),

[25] This approach risks mixing the 'business' conception of intrafirm complexity with the 'organisational' conception, see eg Cetorelli, McAndrews and Traina (n 17).

[26] Depending on the methodology, this can encompass the number of jurisdictions a firm is active in (which would overlap with the frequently used approach to assessing geographic complexity), the number of different regulated activities a firm engages in, and/or the number of supervisory and regulatory bodies a firm's entities are covered by. See eg Avraham, Selvaggi and Vickery (n 20); Cetorelli, McAndrews and Traina (n 17).

[27] See eg Herring and Carmassi (n 1) 199 (reporting the percentage of foreign subsidiaries and the percentage of subsidiaries in offshore financial centres), Cetorelli and Goldberg (n 17) 114 (proposing a proxy for 'geographic complexity' using a normalised Herfindahl index, and a ratio of a firm's total number of nonbank affiliates over its banking affiliates which they refer to as 'CountNBtoB').

[28] Such more diverse measures of tend to be more weakly correlated with size than the number of a firm's subsidiaries, confirming the intuition that 'there is more to complexity than just organizational size' see Cetorelli and Goldberg (n 17) 124. The authors also note that various measures of complexity they introduce are not always significantly or positively correlated with each other, see Cetorelli and Goldberg (n 17) 120, which confirms the multidimensional nature of intrafirm complexity.

[29] See eg Anna Chernobai, Ali Ozdagli and Jianlin Wang, 'Business Complexity and Risk Management: Evidence from Operational Risk Events in U.S. Bank Holding Companies' (2021) 117 Journal of Monetary Economics 418; Kim Cuong Ly, Frank Hong Liu and Kwaku Opong, 'Can Parents Protect Their Children? Risk Comparison Analysis Between Affiliates of Multi- and Single-Bank Holding Companies' (2018) 37 Journal of Financial Stability 1.

To illustrate, consider two firms – *Firm A* and *Firm B* – with the same number (and even with the same geographical, business line, jurisdictional makeup) of subsidiaries. Although their representation using the metrics discussed above would be similar, these two firms can have radically different intrafirm structures, each generating vastly different prudential risks. The subsidiaries of *Firm A* might, for example, be much more neatly ordered by business line and jurisdiction than those in *Firm B*, which could facilitate prudential supervision and orderly resolution.[30] Alternatively, *Firm A*'s subsidiaries might be connected by a vastly denser web of intrafirm exposures or make more frequent use of the 'segmentation' that legal entities can provide.[31] In each case, the prudential risks are likely to be qualitatively and quantitatively affected by differences in intrafirm structure that simply counting subsidiaries (and the geographies or business lines in which they operate) would do little to reveal. Even more strikingly, it is not necessarily the case that having more subsidiaries necessarily implies a firm is more complex or, more to the point, that its intrafirm structure poses a greater prudential risk. Clearly, these characterisations are unsatisfactory as a guide to prudential policymaking.

[30] See **Chapter 1** for a discussion of the interaction between intrafirm structure and resolvability.

[31] See **Chapters 3** and **4**.

B. Qualitative Approaches to Intrafirm Structure

Other strands of literature shed light on the nature and structure of the interconnections and relationships amongst the legal entities that make up a firm. These structure and interconnections can take on a variety of forms and each literature, depending on its focus, emphasises a different property. One relevant strand of literature studies the business structure of firms, which often is a product of the economic, legal, and political exigencies of the underlying business[32] and can be characterised as following relatively well-defined patterns.[33] These patterns of business structure, in turn, shed light on the rationales for the organisational (legal) form of enterprises. Studies focusing on organisational form are concerned with the legal and non-legal relationships that the entities within an enterprise can take on.[34] A recurring observation in this thesis[35], which these two strands of literature bear out, is that the legal and economic structure of the firm may not overlap.[36]

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[32] See eg Alfred D Chandler, *Strategy and Structure: Chapters in the History of the American Industrial Enterprise* (MIT Press, 1962); John H. Dunning and Sarianna M Lundan, *Multinational Enterprises and the Global Economy* (Second Edition, Edward Elgar 2008).

[33] See eg Organisation for Economic Co-operation and Development, *Structure an Organisation of Multinational Enterprises* (OECD 1987); Richard E Caves, *Multinational Enterprise and Economic Analysis* (Third Edition, Cambridge University Press 2007); Dunning and Lundan (n 32) 241-243.

[34] For a review, see Peter T Muchlinksi, *Multinational Enterprises & The Law* (Third Edition, Oxford University Press 2012), Chapter 2 (discussing the relationship between the business organisation and the legal form of multinational enterprises).

[35] See **Chapters 3** and **4**, which discuss how a firm's legal structure may have unforeseen implications for its economic and financial operation.

[36] See eg Tom Hadden, *The Control of Corporate Groups* (Institute of Advanced Legal Studies, University of London 1983) 9-12; Hugh Collins, 'Ascription of Legal Responsibility to Groups in Complex Patterns of Economic Integration' (1990) 53 Modern Law Review 731, 733 ('The pattern of distinct corporate entities often arises through the accidents of acquisition, and may not correspond at all to the functional,

The literature focusing on organisational form, which is most relevant to the enquiry in this chapter, distinguishes between different organisational (legal) forms for the corporate enterprise. Some of these are based on contract[37], joint ventures between independent firms[38], or strategic alliances[39] – all looser forms of coordination in the narrow sense that they fall short of full legal integration using (controlling) equity

administrative, and accounting division operated by the central holding company.'); Herring and Carmassi (n 1) 197 ('Since most of these firms are managed in an integrated fashion along lines of business with only minimal regard for legal entities, national borders, or functional regulatory domains, and with substantial and complex intragroup relationships, simply mapping an institution's business activities into its legal entities presents a formidable challenge.'); Simon Gleeson and Randall Guynn, *Bank Resolution and Crisis Management* (Oxford University Press 2016) 28; Charles HR Morris, *The Law of Financial Services Groups* (Oxford University Press 2019) para 1.105 ('[C]orporate management organograms often bear very little resemblance to corporate group entity structure charts: in other words, they set up conflicts and tensions with, and undermine the integrity of, the corporate entity structure.'); Muchlinksi (n 34) 77 ('The resulting legal structure may, or may not, correspond to the business structure of the enterprise.').

[37] This refers to organisational forms that are not contracts (other than equity contracts), such as those governed by distribution or production agreements and public-private partnerships. Muchlinksi (n 34) 49-53. Organisations of this type are also referred to as 'network organisations', see eg Günter Teubner, *Networks as Connected Contracts* (Hart Publishing 2011). See also: Walter W Powell, 'Neither Market nor Hierarchy: Network Forms of Organization' (1990) 12 Research in Organisational Behaviour 295; Edward H Lorenz, 'Neither Friends nor Strangers: Informal Networks of Subcontracting in French Industry' Diego Gambetta (ed) *Trust: Making and Breaking Co-operative Relations* (Blackwell 1988). For a critique, see Richard M Buxbaum, 'Is "Network" a Legal Concept?' (1993) 149 Journal of Institutional and Theoretical Economics (JITE) / Zeitschrift für die Gesamte Staatswissenschaft No. 4, 698, 704 ('"Network" is not a legal concept.').

[38] See eg Muchlinksi (n 34) 64-66. See also Edgar Herzfeld and Adam Wilson, *Joint Ventures* (Third Edition, Jordans 1996).

[39] See eg Dunning and Lundan (n 32) 260-269; Muchlinksi (n 34) 66-67.

contracts[40].[41] Others, and those more commonly associated with the concept of a 'firm'[42], can be characterised as corporate groups.[43]

The unifying feature of corporate groups is that the legal entities are bound together through control relationships structured through equity holdings.[44] Variation in the legal setup that corporate groups display with respect to their structure, organisation, and ownership is enormous.[45] A full description is beyond the scope of this dissertation, but we can make some general observations.[46] Commonly[47], a

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[40] Which does not necessarily, however, imply that these forms of organisation can be characterised as heterarchical; in addition to various forms of 'control contracts' (contractual arrangements other than those using equity contracts where a hierarchy between two economically integrated entities is achieved) various non-contractual mechanisms may create a hierarchy between legal entities. In the case of joint ventures, equity contracts may explicitly create such a hierarchy, for example when one party owns 51 percent or more of the (voting) shares.

[41] Generally, see Muchlinksi (n 34) 49-79. There is a vast literature that attempts to explain why these organisational forms are chosen, a review of which is beyond the scope of this thesis. For influential accounts focusing on innovation as a driver, see Ronald J Gilson, Charles F Sabel and Robert E Scott, 'Contracting for Innovation: Vertical Disintegration and Interfirm Collaboration' (2009) 109 Columbia Law Review 3, 431; Ronald J Gilson, 'Locating Innovation: The Endogeneity of Technology, Organizational Structure, and Financial Contracting' (2010) 110 Columbia Law Review 885.

[42] As discussed in Section IV, that approach to the definition of a 'firm' can be underinclusive.

[43] See eg Hopt (n 10); Muchlinksi (n 34) 53-63. The rise of 'platform companies' complicates this taxonomy, because they may combine features of contractual organisation and group companies, see eg Nick Srnicek, *Platform Capitalism* (Polity Press 2017). But that complication need not concern us here.

[44] See eg Luis Alfonso Dau, Randall Morck and Bernard Yeung, 'Business Groups and the Study of International Business: A Coasean Synthesis and Extension' (2021) 52 Journal of International Business Studies 161, 166.

[45] See eg Paul Davies, *Introduction to Company Law* (Second Edition, Oxford University Press 2010) 96; Hopt (n 10) 603-616; Muchlinksi (n 34) 53-63.

[46] For a discussion of various archetypes, see Morris (n 36) paras 1.105-1.121.

[47] This tends to be the case for G-SIBs.

corporate group has one controlling entity at its apex – the parent company (sometimes organised as a holding company)[48] – which creates a clear control hierarchy.[49] Within the group, control over subsidiaries is exercised through equity shareholdings. In some cases, the parent (or 'holding') company will hold all the subsidiary's shares (a 'wholly-owned' subsidiary) or simply a majority of them, whereas in others it may be able to control the subsidiary without holding a majority of its shares[50]. In some cases, corporate groups generate strings of subsidiaries, with the parent company (*P*) controlling a subsidiary (*S1*), which in turn controls a subsidiary (*S2*), and so on.

A substantial related literature studies how the specific intrafirm structure of groups may affect its properties, for example in relation to corporate governance. One notable example relates to 'pyramidal' groups, which follow the hierarchical model described above and frequently make use of controlling-minority structures to separate ownership from control, thus enabling the control of vast resources with limited

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[48] See eg Morris (n 36) para 1.095.

[49] This type of structure is most common when the creation of the integrated enterprise is driven by the internalisation of production to capture economies of scale and scope, which benefits from a hierarchical control structure and centralised management, see eg Muchlinksi (n 34) 42. Note that many corporate groups do not conform to such hierarchical intrafirm structures. Instead, they may have circular shareholdings, although these are prohibited in many jurisdictions, such as the UK (para 135 Companies Act 2006), Delaware (para 160(c) Delaware General Corporation Law), and France (Art. L. 233-31 Code de Commerce), or consist of more-or-less autonomously operated networks of profit centres. An important example of the latter is the Japanese 'keiretsu' structure, which is characterised by small, intra-firm crossholdings of equity and debt, see eg Ronald J Gilson and Mark J. Roe, 'Understanding the Japanese Keiretsu: Overlaps Between Corporate Governance and Industrial Organization' 102 Yale Law Journal 871; Erik Berglöf and Enrico Perotti, 'The Governance Structure of the Japanese Keiretsu' (1994) 36 Journal of Financial Economics 259.

[50] Davies (n 45) 96 (giving the example where, under English law, 'a substantial but minority corporate shareholder has the right to appoint the majority of the subsidiary's board').

amounts of capital.[51] Equally, academics and practitioners in the fields of corporate law, insolvency law, and financial regulation frequently visually represent a firm's intrafirm structure using its control hierarchy as the organising principle, with the ultimate intrafirm controller (the parent or 'holding' company) at its apex. In this depiction, the relationships between a parent and its subsidiaries (or amongst subsidiaries) are most commonly the equity (cross-) holdings. Such studies may not lend themselves to easy quantification, but they do bring out an appreciation for the (implications of the) legal and economic (structure of) connections and dependences between the legal entities making up a firm.

Marrying some of the qualitative insights from the organisational literature with the more quantitative view associated with the development of proxies for 'complexity', some studies have formulated complexity metrics that capture elements of group *structure*. Most notably, Cetorelli and Goldberg (2014) explicitly map and study banks' organisational trees, which they capture in terms of the 'level' of a subsidiary. Parent companies are at 'Level 0', its subsidiaries are at 'Level 1', its subsidiaries' subsidiaries are at 'Level 2', and so on.[52] Intuitively, a higher number of 'levels' in a corporate structure suggests a more complex intrafirm structure. The authors also remark on the fact that for some banking groups in their sample, different types of legal entities conducting different types of (regulated) activities are scattered throughout the

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[51] See eg Marcello Bianchi, Magda Bianco and Luca Enriques, 'Pyramidal Groups and the Separation Between Ownership and Control in Italy' Fabrizio Barca and Marco Becht (eds) *The Control of Corporate Europe* (Oxford University Press 2001) 154.

[52] Cetorelli and Goldberg (n 17) 112-113, 115-116.

organisational structure of the group, which they note might 'increase the challenges in conducting effective monitoring and regulation'.[53]

Quantitative characterisations of this type provide us with a proximate sense of the firm's structure. At the same time, they leave many open questions. Specifically, based on these conventional approaches to the conceptualisation of intrafirm structure it is not clear what the prudentially relevant properties of these structures are. To study the intrafirm structures and their implications for systemic risks, in both qualitative and quantitative terms, we need a more analytically rigorous and tractable approach.

II. A NEW APPROACH: INTRAFIRM NETWORKS

To develop such an analytically rigorous and tractable approach, it is helpful to take a step back and ask how we study structures of other highly complex and dynamic systems. After all, there are many other systems that are similarly composed of clearly distinguishable individual components that are joined up in some way. When studying these systems, we can of course study their individual components or the nature of the connections and interactions between them, which is what legal scholars traditionally do in relation to firms[54], but it is also possible to study the pattern of connections between components and its evolution over time. These patterns of connections and

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[53] Cetorelli and Goldberg (n 17) 113.

[54] For a general discussion about the levels of analysis in law, see Alessandro Romano, 'Micro-Meso-Macro Comparative Law: An Essay on the Methodology of Comparative Law' (2016) 17 Chicago-Kent Journal of International and Comparative Law 1, 5.

interactions or, to use phrasing more in line with the discussion so far, the *structure* of connections and interactions, can have a major impact on the behaviour of a system.

A. A Primer on Network Theory

One of the major methodological approaches used to study systems in these terms is network theory.[55] Network theory is a 'an interdisciplinary field that combines ideas from mathematics, physics, biology, computer science, the social sciences, and many other areas'[56]. Networks are simply collections of points connected by lines.[57] These points are referred to as *nodes* (or *vertices*[58]), while the lines that connect them are called *edges*. Edges can be *undirected* (simply connecting two nodes) or *directed*, pointing from one node to another.[59] In many networks, each pair of nodes is connected by no more than one edge.[60] However, sometimes a pair of nodes has multiple connections between them, which are referred to as *multiedges*.[61] Taken together, the nodes and edges form a

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[55] Mark EJ Newman, *Networks: An Introduction* (Oxford University Press 2010) 1-2; Sanjeev Goyal, *Connections: An Introduction to the Economics of Networks* (Princeton University Press 2007) 4-7.

[56] Newman (n 55) *x*.

[57] In mathematical terms, network theory is the study of graphs, where a graph is a structure amounting to a set of objects in which some pairs of the objects are 'related'.

[58] Singular: vertex. In this dissertation, we will use the term 'nodes'.

[59] Newman (n 55) 114-115.

[60] In the mathematics of networks, such networks are referred to as a 'simple network' or 'simple graph'.

[61] In the mathematics of networks, a network with multiple edges is referred to as a 'multigraph'.

network. The architecture of this network, or equivalently, its structure, is referred to as its *topology*.

Using just these simple building blocks, it is possible to represent very complex systems of an awesome variety.[62] Social networks, for example, can be studied with people as nodes and their relationships ('does *Person A* know *Person B*?') as edges.[63] The dynamics of ecosystems can be studied by mapping their predator-prey relationships (using what is called a 'food web'), where species are the nodes and predation relationships are the edges.[64] Technological networks can be represented as well. The structure of the internet, for example, can be represented by depicting computers or routers as nodes and cables or wireless data connections as edges.[65] The power grid can be represented with generating stations or substations as nodes and transmission lines as edges.[66] And the list goes on,[67] which is indicative of the versatility of the methodology.[68]

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[62] Newman (n 55) 110 and ch 2.

[63] See eg Anatol Rapoport and William J Horvath, 'A Study of a Large Sociogram' (1961) 6 Behavioural Science 4, 279.

[64] See eg Jennifer A Dunne, Richard J Williams and Neo D Martinez, 'Network Structure and Biodiversity Loss in Food Webs: Robustness Increases with Connectance' (2002) 5 Ecology Letters 4, 558.

[65] See eg Romualdo Pastor-Satorras, Alexei Vázquez and Alessandro Vespignani, 'Dynamical and Correlation Properties of the Internet' (2001) 87 Physical Review Letters 258701.

[66] See eg Duncan J Watts and Steven H Strogatz, 'Collective Dynamics of 'Small-World' Networks' (1998) 393 Nature 440.

[67] See eg Newman (n 55) chs 2-5.

[68] For a thoughtful reflection on the idea that different systems can be meaningfully characterised using a common methodology, see Herbert A Simon, 'The Architecture of Complexity' (1962) 106 Proceedings of the American Philosophical Society 6, 467.

What is the point of representing these systems as networks? For starters, it enables a visualisation of their structure. This is useful, because it allows for instant (if casual) recognition of structural features or patterns that might be harder to deduce from the raw data.[69] For example, it might be obvious that the network has a clear core-periphery structure, or that there are one or more clusters of nodes in the system. However, once networks become more complex merely visualising them would be insufficient to enable meaningful analysis of a system's structure. At that stage, it becomes helpful to develop measures and metrics to quantify network structure (topology) more formally.

Network theory, and in particular the mathematical branch of graph theory that studies network properties, has developed an extensive and highly sophisticated analytical toolkit to do just that.[70] A full review of these tools is beyond the scope of this chapter[71], but a few examples illustrate the types of analyses that become possible once a system is represented as a network.[72] One type of network measures that is

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[69] Newman (n 55) 8.

[70] Newman (n 55) 109 and references therein.

[71] But see Newman (n 55) and Goyal (n 55) for helpful and accessible overviews of this highly technical field.

[72] As with any model, it is important to acknowledge that a network is a simplified representation of a system – not the system itself. Whenever a model is developed, information is lost. Whether the properties of the network structure (its topology) reflect those of the system, or at least those properties of the system that the analysis is meant to uncover, hinges on whether the network representation captures the system's salient qualities. See eg J Doyne Farmer, *The Economics Revolution: How Complex Systems Science Can Help Solve Our Biggest Problems* (forthcoming, draft on file with author) (articulating the 'principle of verisimilitude'). See also: Farmer, Kleinnijenhuis and Wetzer (n 6).

frequently used study its *centrality*, which quantifies the importance of a particular node in a network.[73] A useful centrality measure is called *degree* (or *degree centrality*).[74] The degree of a node in a network corresponds to the number of edges attached to it. In a social network (which, recall, can represent people as nodes and their relationships, say friendships, as edges), a high centrality might imply that one person plays a central role in the social scene, for example because that person (node) has many friends (other nodes, to which (s)he is connected through edges). In many systems, the nodes with the highest degrees (the most numbers of connections) can play a disproportionately important role in the functioning of the system[75].[76] Studying centrality can thus help focus attention on the system's most critical elements.

Another informative network property that is revealed by its degree is whether it has a *core-periphery structure* and, if so, what that structure looks like.[77] In network terms,

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[73] See eg Scott Kirkpatrick, C Daniel Gelatt Jr and Mario P Vecchi, 'Optimization by Simulated Annealing' (1983) 220 Science 671; Stanley Wasserman and Katherine Faust, *Social Network Analysis: Methods and Applications* (Cambridge University Press 1994).

[74] See eg Newman (n 55) 133; Goyal (n 55) 16.

[75] See eg Newman (n 55) 9. Such nodes are referred to as "hubs" – nodes with unusually high degrees in a network.

[76] Studying a node's centrality using the degree of that node has the shortcoming that it does not account for the centrality of the neighbouring nodes ('how well-connected are your connections?'). More complex metrics for centrality, most commonly *eigenvector centrality*, account for this property, see eg Newman (n 55) 169-172.

[77] See eg Stephen P Borgatti and Martin G Everett, 'Models of Core/Periphery Structures' (1999) 21 Social Networks 375; Peter Csermely, András London, Ling-Yun Wu and Brian Uzzi, 'Structure and Dynamics of Core/Periphery Networks' (2013) 1 Journal of Complex Networks 2, 93; M Puck Rombach, Mason A Porter, James H Fowler and Peter J Mucha, 'Core-Periphery Structure in Networks' (2014) SIAM 74 Journal of Applied Mathematics 1, 167.

a core-periphery structure emerges when nodes with a high degree connect with other nodes that also have high degrees, thus forming the core of the network. The other nodes, which have (comparatively) low degrees and are connected to other nodes that share that characteristic, form the periphery. Such a network is called an *assortative network*.[78] By contrast, a network where high-degree nodes are connected to low-degree nodes is called a *disassortative network*.

A final example of an important network property is its *density*, which describes the number of edges in the network over the total number of possible edges[79].[80] The higher a network's density is, the more connections there are between the nodes: density is zero if there are no edges between the nodes[81], and the network is maximally dense ('complete') if edges connect every node directly to every other node. The density of a network is considered to be an important factor in determining its resilience[82], with

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[78] Newman (n 55) 230.

[79] Of course, the number of possible edges in a network is equal to the number of edges it takes to directly connect every node to every other node (for a network with four nodes, this requires six edges). This theoretical approach is of limited use in practice. In a social network, for example, it would be unlikely that a 'the number of a person's friends will double solely because the population of the world doubles', Newman (n 55) 135. In practice, the degree of a network is therefore mostly determined with reference to the dynamic of the system that is studied, see Newman (n 55) 134-145.

[80] Newman (n 55) 134.

[81] A network is said to be 'sparse' when density is low.

[82] See eg Jianxi Gao, Baruch Barzel and Albert-László Barabási, 'Universal Resilience Patterns in Complex Networks' (2016) 530 Nature 307. See also Marco A Janssen, Örjan Bodin, John M Anderies, Thomas Elmqvist, Henrik Ernstson, Ryan RJ McAllister, Per Olsson and Paul Ryan, 'Toward a Network Perspective of the Study of Resilience in Social-Ecological Systems' (2006) 11 Ecology and Society 1, 15.

resilience commonly defined as the ability of a system to adjust to shocks so that it still carries out its functions.[83]

So far, the tools to study network structure are all 'static'; they study the properties of a given network structure, rather than the dynamics operating on, or the evolution of, that structure over time (say, in response to shocks). However, an important methodological strength of network theory is that it also lends itself to such 'dynamic' analyses. One way to operationalise that is to represent the dynamics operating on the network in terms of dynamical systems, which are systems 'whose state, as represented by some set of quantitative variables, changes over time according to some given rules or equations'.[84] Such dynamical systems on networks can, for example, represent the movement of electricity through a power grid or data over the internet, the evolution of ecosystems, or the spread of disease through populations[85]. Those dynamic analyses can, in turn, shed light on network properties such as resilience too. Particularly when studying a system that is characterised by change and constant evolution, such dynamic analyses are highly informative of the system's properties.

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[83] For example: if a node in a power grid, say a generating station, is switched off, will the power grid still be able to continue to function?

[84] Newman (n 55) 676.

[85] See generally Roy M. Anderson and Robert May, *Infectious Diseases of Humans: Dynamics and Control* (Oxford University Press 1991). Also see

B. Interfirm Financial Networks

Particularly since the 2007-2009 global financial crisis, network theory is increasingly used to study the structural properties of another complex and highly interconnected system: the financial system.[86] In most financial networks, financial institutions (firms) are represented as nodes and the edges linking them represent financial flows, contracts, or other types of interaction.[87] In many, but not all, cases, the edges in a financial network are directed because they reflect (net) exposures between two financial institutions (nodes)[88], although the nature of those exposures can vary[89].

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[86] See eg Janet L Yellen, (then) Vice Chair, Board of Governors of the Federal Reserve System, 'Interconnectedness and Systemic Risk: Lessons from the Financial Crisis and Policy Implications' (4 January 2013) Speech at the American Economic Association / American Finance Association Joint Luncheon, San Diego, California, available at https://www.federalreserve.gov/newsevents/speech/yellen20130104a.htm ('Complex links among financial market participants and institutions are a hallmark of the modern global financial system.')

[87] See eg Andrew G Haldane and Robert M May, 'Systemic Risk in Banking Ecosystems' (2011) 469 Nature 351; Macro Galbiati, Danilo Delpini and Stephano Battiston, 'The Power to Control' 9 (2013) Nature Physics 126.

[88] See eg Nimalan Arinaminpathy, Sujit Kapadia and Robert M May, 'Size and Complexity in Model Financial Systems' (2012) 109 Proceedings of the National Academy of Sciences 18338, 18342 ('We represent the lending network as a directed graph, taking each individual loan to be the same size; we allow multiple loans in both directions between any given pair of banks, which are then aggregated to give the total bilateral exposure between pairs of banks.'); Stefano Battiston, Michelangelo Puliga, Rahul Kaushik, Paolo Tasca and Guido Caldarelli, 'DebtRank: Too Central to Fail? Financial Networks, the FED and Systemic Risk' (2012) 2 Scientific Reports 3, 2 ('In a network perspective, nodes represent institutions, while directed edges represent lending relations weighted by the amount of the outstanding debt.').

[89] Edges could also, for example, represent the transmission of shocks, see eg Garbrand Wiersema, Alissa M Kleinnijenhuis, J Doyne Farmer and Thom Wetzer, 'Scenario-Free Analysis of Financial Stability with Interacting Contagion Channels' (forthcoming) Journal of Banking & Finance.

Recent studies attempt to develop more detailed yet comprehensive representations of the financial network. Instead of netting exposures and connecting institutions (nodes) with a maximum of one edge, they represent exposures with separate edges per contractual type. This creates a network with multiple interacting layers – a *multilayer* network – where each layer corresponds to a contractual type.[90] Crucially, each layer can have different topological properties and display a different evolution, for example in terms of the contagious dynamics that materialise in response to a financial shock.[91] In theory, network models of this type can more closely approximate the structure of interconnections that we observe in reality, given the vast number and diversity of contractual (and non-contractual) relationships between financial institutions. Moreover, it is now clear that multilayer networks exhibit different properties than their single-layer counterparts, even when these layers are merely stacked (and do not interact), which also affects their resilience.[92] However, a practical challenge when working at that level of granularity and complexity is to ensure proper

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[90] See eg Sebastian Poledna, José Luis Molina-Borboa, Serafín Martínez-Jaramillo, Marco van der Leij and Stefan Thurner, 'The Multi-Layer Network Nature of Systemic Risk and its Implications for the Costs of Financial Crises' (2015) 20 Journal of Financial Stability 70.

[91] See eg Richard Bookstaber, *The End of Theory: Financial Crises, the Failure of Economics, and the Sweep of Human Interaction* (Princeton University Press 2017), 127-143; J Doyne Farmer, Alissa M Kleinnijenhuis, Paul Nahai-Williamson and Thom Wetzer, 'Foundations of System-Wide Financial Stress Testing with Heterogeneous Institutions' (2020) Bank of England Staff Working Paper No. 861.

[92] Bookstaber (n 91), 204 ('[A] multilayer network tends to be more fragile than a set of isolated single-layer networks.'). See also Dong Zhou, Amir Bashan, Reuven Cohen, Yehiel Berezin, Nadav Shnerb and Shlomo Havlin, 'Simultaneous First- and Second-Order Percolation Transitions in Interdependent Networks' (2014) 90 Physical Review E 1.

calibration and verification of the results.[93] Recall that it is one thing to study the properties of a network, but another to ensure that the properties of the network reflect those of the system that is being studied.

Once financial systems are represented as networks, the toolkit offered by network theory can be used to study the structural (topological) properties of the financial system.[94] Some studies focus on static analysis of the network topology, but in most cases these analyses also study the dynamics acting upon, or the evolution of, the network itself. Given the high degree of dynamism that characterises the financial system, such analyses provide important additional insight into the financial system's (network) properties. Dynamical analyses can take the form of a dynamical system, an agent-based model, or a more conventional economic model that operates on the network structure of the financial system and, potentially, alters that structure (for example by describing conditions where parties withdraw contracts and thereby sever

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[93] Modelling exposures at the level of individual contracts can give the impression of accuracy and verisimilitude, but it is unlikely that the micro-foundations of such a model are correct, since that presumes the perfect modelling of (frequently complex) financial contracts.

[94] See eg Daron Acemoglu, Asuman Ozdaglar and Alireza Tahbaz-Salehi, 'Systemic Risk and Stability in Financial Networks' (2015) 105 American Economic Review 2, 564 ('Since the global financial crisis of 2008, the view that the architecture of the financial system plays a central role in shaping systemic risk has become conventional wisdom.'). A full review of this literature is beyond the scope of the thesis, but for illustrative findings see Co-Pierre Georg, 'The Effect of the Interbank Network Structure on Contagion and Common Shocks' (2013) 37 Journal of Banking & Finance 7, 2216 (using a multi-agent model operating on a network to characterise optimal policy responses to systemic risk via contagion and common shocks); Serafin Martinez-Jaramillo, Biliana Alexandrova-Kabadjova, Bernardo Bravo-Benitez and Juan Pablo Solórzano-Margain, 'An Empirical Study of the Mexican Banking System's Network and its Implications for Systemic Risk' (2014) 40 Journal of Economic Dynamics and Control 242 (presenting topological metrics for the interbank exposures and payment system network, analysing the topological evolution of these networks, and evaluating the impact of network structure on systemic risk).

linkages between financial actors).[95] This literature sheds light on a range of prudentially relevant issues, including which financial institutions (nodes) play the most central role in the system[96] (also introducing the concept of firms that are 'too-central-to-fail'[97]) or are most likely to affect the system's overall behaviour[98], how the complexity and concentration of a financial network might affect its fragility[99], the direction and

[95] See eg Robin Greenwood, Augustin Landier and David Thesmar, 'Vulnerable Banks' 115 Journal of Financial Economics 3, 471.

[96] See eg Rama Cont, Amal Moussa and Edson B Santos, 'Network Structure and Systemic Risk in Banking Systems' in Jean-Pierre Fouque and Joseph A Langsam (eds), *Handbook on Systemic Risk* (Cambridge University Press 2013) (developing a metric for the systemic importance of institutions – the Contagion Index – using balance sheet size and the financial network structure to estimate an institution's contribution to systemic risk).

[97] See eg Battiston, Puliga, Kaushik, Tasca and Caldarelli (n 88). See also Stefano Battiston, J Doyne Farmer, Andreas Flache, Diego Garlaschelli, Andrew G Haldane, Hans Heesterbeek, Cars Hommes, Carlo Jaeger, Robert May and Marten Scheffer, 'Complexity Theory and Financial Regulation' 351 Science 6275, 818.

[98] See eg Macro Galbiati, Danilo Delpini and Stephano Battiston, 'The Power to Control' 9 (2013) Nature Physics 126 (suggesting that 'controllability' and 'centrality' measures can help identify the most important institutions driving the behaviour of a financial network).

[99] See eg Prasanna Gai, Andrew Haldane and Sujit Kapadia, 'Complexity, Concentration and Contagion' (2011) 58 Journal of Monetary Economics 453 (illustrating how greater complexity and concentration in the financial network may amplify its fragility in the face of liquidity crises).

magnitude of indirect contagion across the network[100], and the relationship between the density of the financial network (interconnections) and its resilience[101].[102]

[100] See eg Rama Cont and Eric Schaanning, 'Monitoring Indirect Contagion' (2019) 104 Journal of Banking & Finance 85 (introducing the Indirect Contagion Index, which shows how contagion spreading over a financial network might create indirect exposures); Garbrand Wiersema, Alissa M Kleinnijenhuis, Esti Kemp and Thom Wetzer, 'Higher-Order Exposures' (2021) Working Paper (showing that higher-order exposures arising from shocks that spread across the financial network can be quantitatively significant and qualitatively distinct from direct and indirect exposures as traditionally measured).

[101] The literature is divided on this front. Some studies find that a more interconnected network enhances the resilience of the system to the insolvency of individual institutions, see eg Franklin Allen and Douglas Gale, 'Financial Contagion' (2000) 108 Journal of Political Economy 1, 1; Xavier Freixas, Bruno M Parigi and Jean-Charles Rochet, 'Systemic Risk, Interbank Relations, and Liquidity Provision by the Central Bank' (2000) 32 Journal of Money, Credit, and Banking 3, 611. Other studies find that dense interconnections can be a destabilising force, see eg Lawrence Blume, David Easley, Jon Kleinberg and Éva Tardos, 'Which Networks are Least Susceptible to Cascading Failures?' (2011) Proceedings of the 2011 52nd IEEE Annual Symposium on Foundations of Computer Science, 393. A more recent literature suggests these observations are two sides of the same coin, see eg Andrew H. Haldane, (then) Executive Director of Financial Stability, Bank of England, 'Rethinking the Financial Network' (29 April 2009) Speech at the Financial Student Association, Amsterdam, the Netherlands, available at https://www.bankofengland.co.uk/speech/2009/rethinking-the-financial-network (referring to financial systems as 'robust-yet-fragile'); Daron Acemoglu, Asuman Ozdaglar and Alireza Tahbaz-Salehi, 'Systemic Risk and Stability in Financial Networks' (2015) 105 American Economic Review 2, 564, 564 ('As long as the magnitude of negative shocks affecting financial institutions are sufficiently small, a more densely connected financial network (corresponding to a more diversified pattern of interbank liabilities) enhances financial stability. However, beyond a certain point, dense interconnections serve as a mechanism for the propagation of shocks, leading to a more fragile financial system.').

[102] For a review of models of financial stability, including (some) of the key findings from network theory, see Christoph Aymanns, J Doyne Farmer, Alissa M Kleinnijenhuis and Thom Wetzer, 'Models of Financial Stability and Their Application in Stress Tests' in Cars Hommes and Blake LeBaron (eds) *4 Handbook of Computational Economics* 329 (Elsevier 2018).

Such insights from network theory can inform, and have indeed started to inform[103], the decisions of regulators and policymakers.[104] The identification methods for G-SIBs that were discussed in **Chapter 1**, for example, are informed by metrics accounting for 'interconnectedness', and those measurement methods also inform the G-SIB capital surcharge.[105] Large exposure regimes and the introduction of mandatory clearing can be viewed as attempts to alter the structure (topology) of the financial network to make it more resilient.[106] Financial stress tests run by regulators and supervisors make frequent use of network theory in order to capture higher-order effects of financial contagion and endogenous network dynamics.[107] Various proposals seek to go even further, for example by using Pigouvian taxation that induces actions

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[103] See eg Ben S Bernanke, (then) Chairman of the Board of Governors of the US Federal Reserve System, 'Statement Before the Financial Crisis Inquiry Commission' (2 September 2010) Washington D.C., United States, 20, available at https://www.federalreserve.gov/newsevents/testimony/bernanke20100902a.pdf (arguing that systemic importance is not only a function of size of an institution, but also on its complexity and interconnectedness within the financial network); Ben S Bernanke, (then) Chairman of the Board of Governors of the US Federal Reserve System, 'Monitoring the Financial System' (10 May 2013) Speech at the 49th Annual Conference on 'Bank Structure and Competition", Sponsored by the Federal Reserve Bank of Chicago, Chicago, Illinois, United States, 4 available at https://www.bis.org/review/r130514a.pdf ('Network analysis, yet another promising tool under active development, has the potential to help us better monitor the interconnectedness of financial institutions and markets.').

[104] See eg Luca Enriques, Alessandro Romano and Thom Wetzer, 'Network-Sensitive Financial Regulation' (2020) 45 The Journal of Corporation Law 2, 351 (arguing that network theory can and should inform the design of financial regulation, and providing various examples of where this is already the case).

[105] Basel Committee on Banking Supervision, *Global Systemically Important Banks: Updated Assessment Methodology and the Higher Loss Absorbency Requirement* (July 2013); Basel Committee on Banking Supervision, *Global Systemically Important Banks: Revised Assessment Methodology and the Higher Loss Absorbency Requirement* (July 2018).

[106] For a discussion, see Enriques, Alessandro Romano and Thom Wetzer (n 104) 371-372. Also see Andrew G Haldane and Robert M May (n 87) 355.

[107] See eg Christoph Aymanns, J Doyne Farmer, Alissa M Kleinnijenhuis and Thom Wetzer (n 102).

by banks that, in turn, alter network topologies[108], or Pigouvian regulation that scales the application of prudential rules according to a firm's importance to the financial network.[109]

All these network analyses focus on *inter*firm structures, representing the firm as a single node. Based on what we know about the *intra*firm structures of G-SIBs, this belies the substantial complexity within firms, as characterised by the relationships between legal entities making up these firms.[110] To make the point using network parlance: common financial network models depict the firm as a node, whereas it is a *network in its own right*. That observation has important methodological implications for how we conceptualise intrafirm structures and provides the basis for a novel methodological framework to characterise, map, and analyse them.

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[108] See eg Sebastian Poledna and Stefan Thurner, 'Elimination of Systemic Risk in Financial Networks by Means of a Systemic Risk Transaction Tax' (2014) 16 Quantitative Finance 10, 1599.

[109] See generally Enriques, Romano and Wetzer (n 104). Also see Alessandro Romano, Luca Enriques and Jonathan R Macey, 'Extended Shareholder Liability for Systemically Important Financial Institutions' (2020) 69 American University Law Review 3, 976 (proposing a liability regime for financial institutions whereby liability is scaled using centrality measures); John Armour and Jeffrey N Gordon, 'Systemic Harms and Shareholder Value' (2014) 6 Journal of Legal Analysis 1, 35.

[110] See eg Bookstaber (n 91), 204 ('Network analysis has treated the nodes – the banks and other financial services firms – essentially as black boxes.').

Once the firm is conceptualised not just as a node but as a network of nodes, the question becomes how to best represent that *intra*firm network. That starts with a consideration of essential intrafirm properties.

A firm (*F*) consists of legal entities (*N*)[111] connected through contracts (*C*)[112]. As was the case for *inter*firm relationships, each individual legal entity acts as a (literal) nexus of contracts,[113] which in turn connect it to other legal entities. A legal entity thus holds a collection of contracts on its balance sheet, both as assets (*A*) and liabilities (*L*). The terms of contracts can differ, which allows us to distinguish different contractual types (so $C = \{c_1, c_2, \ldots c_n\}$) and, in turn, different types of relationships between firms. **Figure 2.1** illustrates these stylised balance sheets.

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[111] Nodes can be labelled, for example to confer information about the jurisdiction in which they are based, their regulatory classification, or the nature of the activities they carry out.

[112] The term 'contract' is used in a loose economic sense as opposed to its more specific legal meaning. Viewed in this way, contracts can be both explicit and tacit and reflect economic relationships between legal entities.

[113] In line with more abstract representations in the literature, see eg Armen Alchian and Harold Demsetz, 'Production, Information Costs, and Economic Organisation' (1972) 62 American Economic Review 777; Michael C Jensen and William H Meckling, 'Theory of the Firm: Managerial Behaviour, Agency Costs, and Ownership Structure' (1976) Journal of Financial Economics Vol. 3, 305-360, 310.

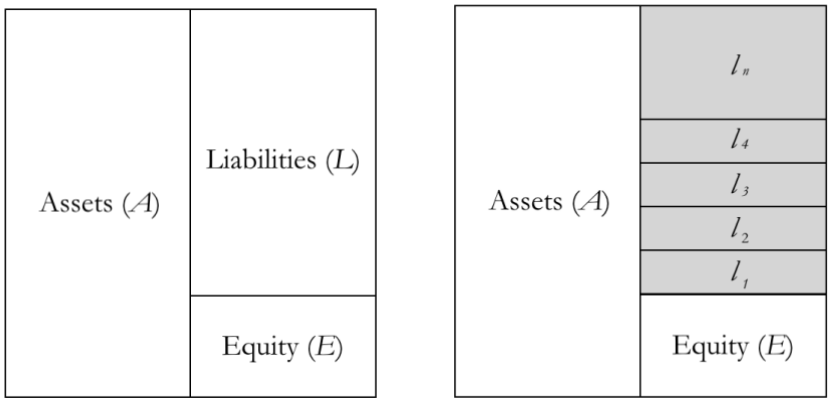


Figure 2.1: The balance sheet of a legal entity *N*, both simple (left) and with multiple types of liabilities (right)[114].

This setup allows us to formalise a network structure, with *N* acting as *nodes* and *C* acting as *edges*.[115] So far, this representation corresponds closely to that used for *inter*firm financial networks.[116] A crucial difference, however, is that firms are distinct from markets in their organisational properties. As discussed in the introductory chapter[117], the concept of a 'firm' as used in this thesis is defined in a loosely Coasean sense to refer to an economic enterprise under common control of one control hierarchy.[118] As we have seen earlier in this chapter, that conceptualisation is in line with

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[114] One could equally imagine having multiple types of assets *A*, so that $A = \{a_1, a_2, \ldots a_n\}$).

[115] Newman (n 55) ch 1.

[116] See Section II.B.

[117] See **Chapter 1**.

[118] See eg Ronald H Coase, 'The Nature of the Firm' (1937) 4 Economica 386, 393 (noting that a firm 'consists of the system of relationships which comes into existence when the direction of resources is dependent on an entrepreneur').

a broader literature on the organisation of firms and enterprise and with emergent literature attempting to quantitatively describe the 'complexity' of intrafirm structures.[119] Contrary to network models designed to study *inter*firm structure[120], network models of *intra*firm structures should capture this distinctive property.

Fortunately, network theory lends itself well to this exercise. To illustrate, the following exposition will focus on one type of contract: controlling[121] equity stakes in other entities that are part of the same firm.[122] To illustrate the direction of control, the edges will be *directed* (pointing *from* the entity that owns the equity and can exercise control *to* the entity that issued it). In the case of intrafirm structures that are drawn on the basis of controlling equity stakes, the resulting network will take the form of a *rooted directed tree*. This means there is an ultimate parent company (*rooted*)[123], that equity

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[119] See Section I.A.

[120] Hierarchies may also *de facto* be present in the interfirm context in the financial system, with some institutions operating at its apex and others being more peripheral, see Katharina Pistor, 'A Legal Theory of Finance' (2013) 41 Journal of Comparative Economics 315, 319-320. Such hierarchies are not commonly modelled using network theory, but they could be – for example using the analogy of market ecology (which includes the notion of 'food webs' of financial players). See eg Maarten P Scholl, Anisoara Calinescu and J Doyne Farmer, 'How Market Ecology Explains Market Malfunction' (2021) 118 PNAS 26.

[121] Ideally, non-controlling equity stakes and other (contractual) relations would also be captured. For exposition, this is ignored for now.

[122] Currently, only one type of contract – equity – is considered in most studies of intrafirm complexity. In addition, most studies only consider a legal entity to be part of a firm if its parent owns more than 50 percent of the voting shares. This inclusion criterion is likely underinclusive, particularly when we study intrafirm structures through a prudential lens, see Section IV.

[123] Which aligns well with the 'hierarchical' structures that most G-SIBs take on, see Section I.

ownerships imply a hierarchy within the firm (*directed*), and that there are no loops (*tree*)[124].

As a stylised example to illustrate this approach, consider a simple firm consisting of seven legal entities (**figure 2.2**). In this example, a legal entity (let's call it n_4) is controlled by another legal entity (n_3), which in turn is controlled by another legal entity (n_2), and finally by the (ultimate) parent (n_1 or n_{parent}) that controls the firm. This representation also intuitively represents the 'layers' of subsidiaries alluded to before.[125] Reasoning from n_{parent} down, we can formalise the hierarchical relationships as 'layers', which give 'depth' to the intrafirm structure.

[124] That is, no circular shareholdings. By construction, this is a function of using *controlling* equity shareholdings as (directed) edges and assigning an ultimate parent.

[125] See Section I.

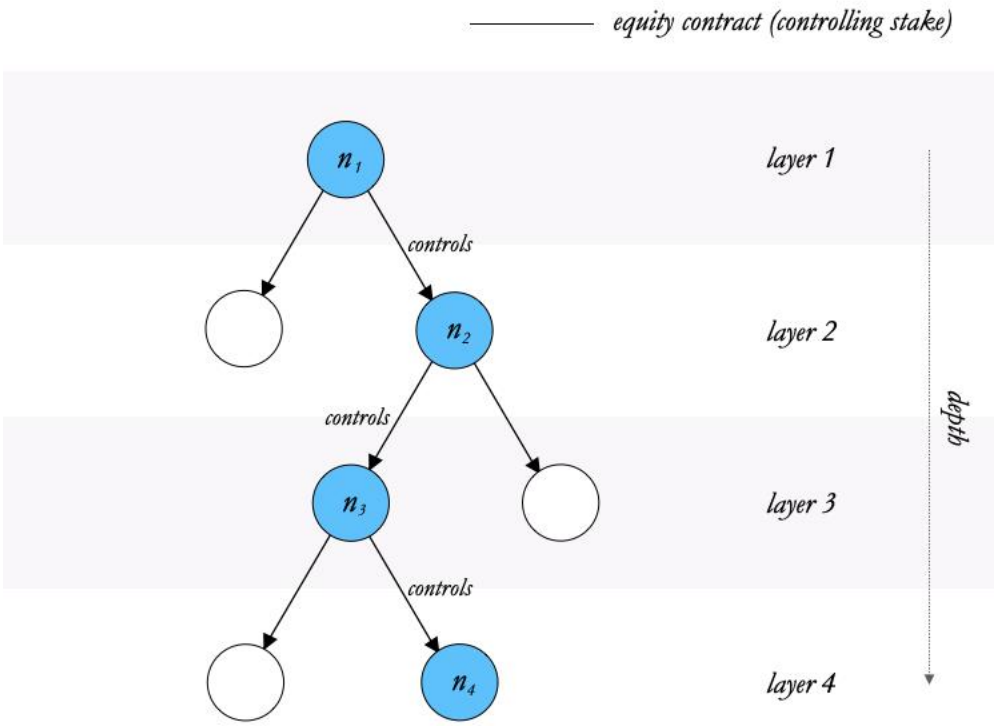


Figure 2.2: Intrafirm hierarchies based on ownership structures. This intrafirm network consists of 4 layers, so its depth is 4.

So far, the network representation of intrafirm structures only captured controlling equity stakes. Focusing on one type of contract facilitates the creation of a basic hierarchical network, but is insufficient to study the richness of intrafirm relationships and their structure. As was the case for *inter*firm financial network models, we can add institutional detail to *intra*firm network models by using multiple network layers[126] to represent different contractual relationships. This would create a multi-layered intrafirm network of the type depicted in (the highly stylised) **figure 2.3**.

[126] Confusingly, note that the literature uses the term 'layer' in two different senses: a hierarchical structure has different 'layers' to indicate the depth of the control hierarchy, and a network has different 'layers'

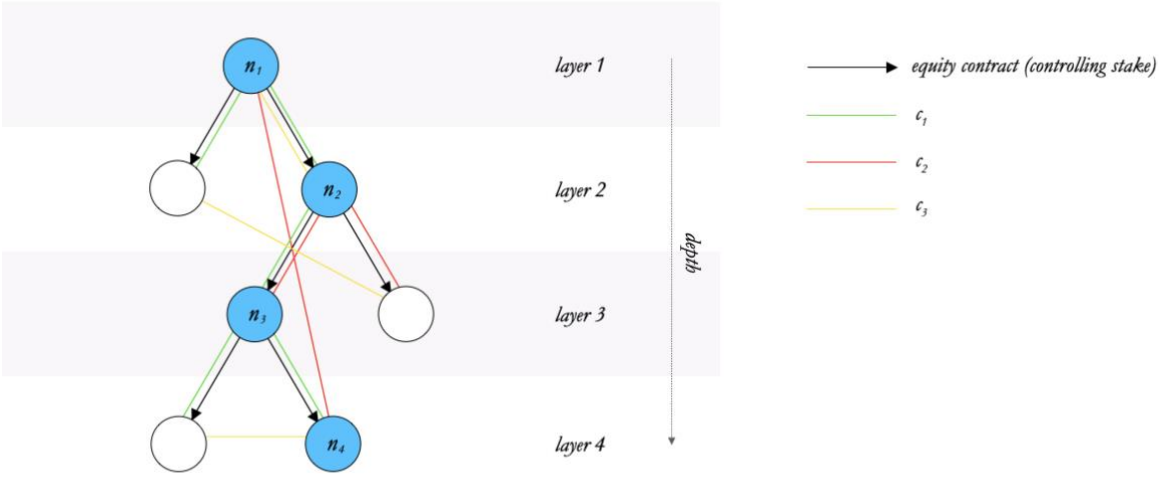


Figure 2.3: Multi-layered intrafirm network mapping. This particular network has four network layers, corresponding to four types of contracts (equity contract, c_1, c_2, c_3).

Using these fundamental principles, it is possible to conceptualise and map hierarchical (multi-layered) networks that describe intrafirm structures using a rigorous and analytically tractable approach.

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stacked on top of each other to represent different types of relationships (here, different types of contracts).

D. Empirical Illustration: The Intrafirm Structure of US G-SIBs

To illustrate the application of this framework to empirical data, this section maps out the intrafirm structure of US G-SIBs. Because of limits on publicly available data, this exercise will focus only on one edge type – controlling equity stakes – and thus generate a stylised representation.[127] In **Chapter 3**, the implications of including multiple contractual types for the purposes of the prudential analysis of intrafirm structures will be considered further as part of the discussion on intrafirm segmentation.

This empirical exercise relies on publicly available data reported by US Bank Holding Companies in form FR Y-6 ('Annual Report of Bank Holding Companies').[128] This form details intercompany ownership and control relationships in all entities that meet the reporting criteria. Such data can be used to map the directed edges that, taken together, create the hierarchical structure. For each entity (node), form FR Y-6 also provides the name, jurisdiction (city and country), and entity type (e.g. securities broker dealer, financial holding company).[129] This data was downloaded for all US global systemically important banks (G-SIBs) as of 31 December 2017[130], converted from .pdf

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[127] The exercise will thus create an empirical mapping following the conceptual approach illustrated by **figure 2.2**.

[128] This data is available through the US National Information Center ('NIC') repository. I have cleaned this data and linked it to other publicly available data sources.

[129] Similarly granular data for G-SIBs based in the EU or the UK does not appear to be available in the public domain.

[130] Financial Stability Board, '2017 List of Global Systemically Important Banks' (21 November 2017). Banks included in the sample are: Bank of America, Citigroup, Goldman Sachs, JPMorgan, Morgan Stanley, NY Mellon, State Street, and Wells Fargo.

to .xls[131], and subsequently cleaned[132]. **Table 2.1** highlights preliminary summary statistics that provide a basic characterisation of the intrafirm structures of these US G-SIBs.

	#Subsidiaries	Depth	Average Shortest Path Length
Bank of America	1,558	10	5.3549
Citigroup	1,576	12	7.8172
Goldman Sachs	6,242	13	9.2775
JPMorgan	1,382	11	7.0766
Morgan Stanley	6,672	21	12.8618
NY Mellon	1,000	11	8.9859
State Street	214	7	4.5020
Wells Fargo	731	8	6.0127

Table 2.1: Preliminary summary statistics of US G-SIBs on 31 December 2017.

[131] The conversion from *pdf* to *xls* files is not perfect; there is an error rate. Because full manual checks would be exceptionally time-consuming, I have only (1) manually checked the top two layers of the graphs, (2) checked that each graph corresponds to a *rooted directed tree*.

[132] Approximately 12 percent of the active links in the database involve entities that have multiple parents within the banking group. Because the analysis carried out here assumed that every entity has a controlling parent, it was necessary to 'assign custody'. Entities were in the first instance assigned to the party that had majority ownership, then by plurality, and then simply alphabetically (if the parent was in the same branch of the network and there was no other deterministic data point available). The Legal Entity Identifier ('LEI') database adds additional datapoints that can be used to determine which entity is the primary parent. This approach was preferred over excluding the entities entirely, because inclusion of the entity in the database means the US Federal Reserve considers the entity to be part of the G-SIB. Future research should relax the imposition of a rooted directed tree on the data to study intrafirm structures that are more complex with a higher degree of accuracy.

Using this data, the intrafirm structure network graphs (all rooted directed trees) were generated. For each firm, two graphs were created: the first classifies the nodes along jurisdictional lines, the second does so based on 'entity types' (activities). **Figure 2.4** shows one such graph, that of Morgan Stanley. For comparison, **figure 2.5** shows the graph for Goldman Sachs, **figure 2.6** that for Bank of New York Mellon, and **figure 2.7** that for State Street. All graphs are included in **Appendix I**.

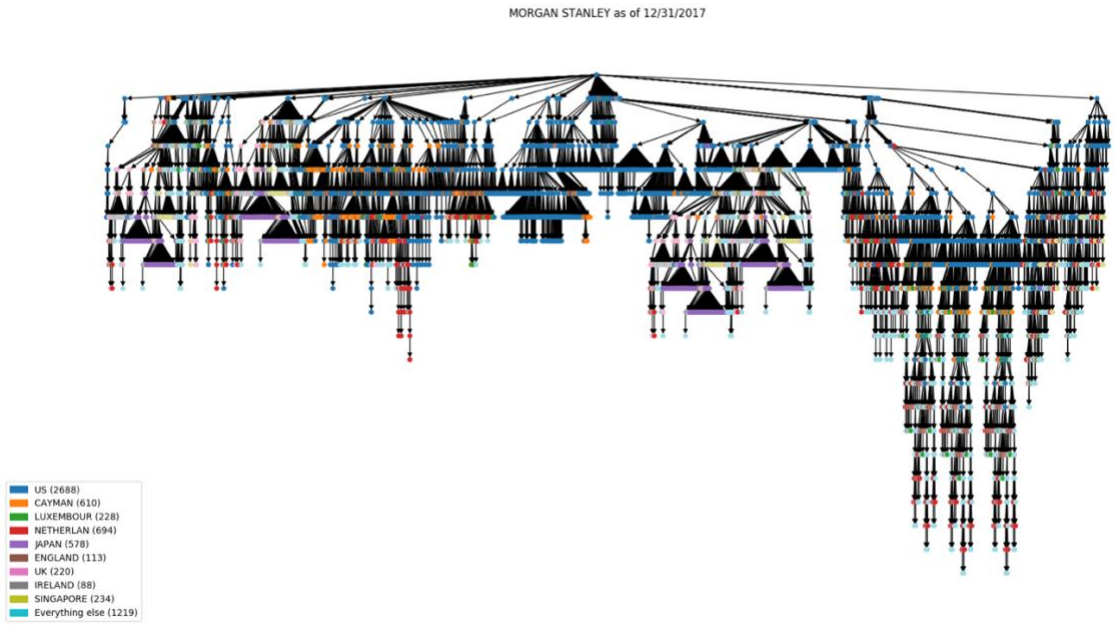


Figure 2.4: Network graph of Morgan Stanley's intrafirm structure as reported on 31 December 2017. The nodes represent legal entities, and the edges controlling equity relationships. The colour of the nodes refers to the jurisdiction in which the entity is incorporated.

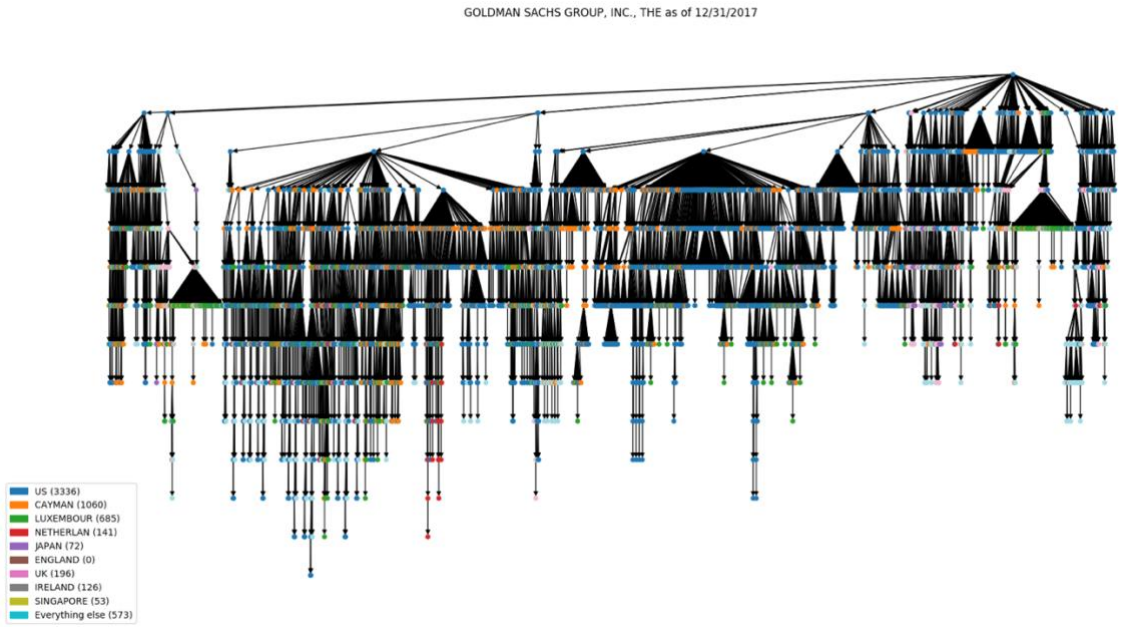


Figure 2.5: Network graph of Goldman Sachs' intrafirm structure as reported on 31 December 2017. The nodes represent legal entities, and the edges controlling equity relationships. The colour of the nodes refers to the jurisdiction in which the entity is incorporated.

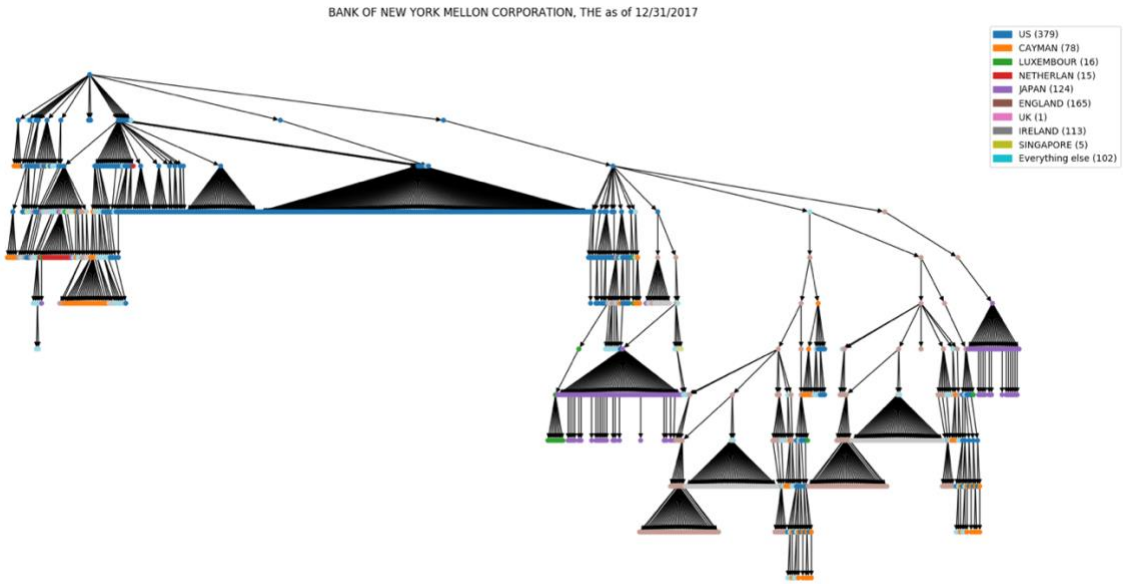


Figure 2.6: Network graph of Bank of New York Mellon's intrafirm structure as reported on 31 December 2017. The nodes represent legal entities, and the edges controlling equity relationships. The colour of the nodes refers to the jurisdiction in which the entity is incorporated.

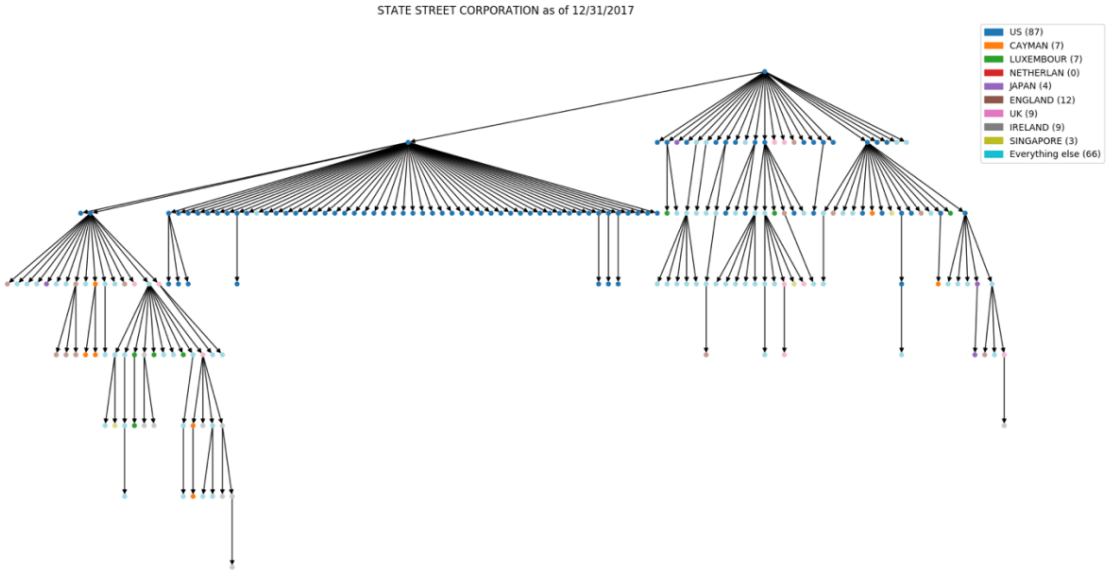


Figure 2.7: Network graph of State Street's intrafirm structure as reported on 31 December 2017. The nodes represent legal entities, and the edges controlling equity relationships. The colour of the nodes refers to the jurisdiction in which the entity is incorporated.

On the basis of these visual representations in **figures 2.4-2.7**, we can draw a number of tentative conclusions. First, the complexity of the intrafirm structure appears to differ substantially across G-SIBs. Goldman Sachs and Morgan Stanley appear to have far more subsidiaries structured in far more complicated patterns than, say, State Street. The differing levels of complexity are also reflected in the different depths of the intrafirm structures, with State Street's having a depth of seven whilst Morgan Stanley's has a depth of twenty-one. Second, in many cases legal entities operating in different jurisdictions are spread across the intrafirm structure. This practice appears to be particularly pronounced at Morgan Stanley and far less so at State Street and Bank New York Mellon, where legal entities from different jurisdictions are more neatly grouped together. Third, most of the US G-SIBs appear to have 'clusters' of legal entities (where one legal entity is the parent of a large number of them), but the location of these clusters and their makeup differ markedly. This suggests that some entities might be of particular importance to the legal structure of the firm.

III. WHAT INTRAFIRM NETWORKS (COULD) TELL US

While the visual analyses of G-SIBs' intrafirm structures help to build intuitions, carrying out the more formal analyses that network theory enables is likely to unlock the most meaningful insights about the relationship between intrafirm structures and prudential risks.[133] In line with the earlier discussion on the analyses network theory enables, we can differentiate between (static) topological analyses and dynamic analyses.

[133] Because this Chapter is meant merely to showcase the network approach used to map out intrafirm structures, it only provides the basic outline of the approach. In a companion article, the network approach to study the intrafirm structures of G-SIBs outlined in this chapter is used to carry out

Until recently no literature attempted to carry out static topological analyses on intrafirm networks, but two new articles that were published as this thesis was being written adopt such an approach. Both articles attempt to develop proxies for complexity to characterise prudential risks arising from banks' intrafirm structures, as in the prior literature, and both specifically focus on the information and coordination challenges that complex structures might engender.[134]

Lumsdaine et al. (2021)[135] focuses on the spread of information through firms. Using an approach similar to the one outlined above, they formalise intrafirm structures as hierarchical structures (rooted directed trees) based on controlling equity stakes.[136] Lumsdaine et al.'s approach starts with a labelling of legal entities within the group by type; that labelling can be based on jurisdiction or industry. The key assumption underpinning their complexity measure, justified with reference to supervisory architectures, is that information flows more easily between nodes with the same

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topological analysis and define complexity metrics relevant for prudential regulatory purposes, see John McDonough and Thom Wetzer, 'An Empirical Analysis of the Intrafirm Structure of US Bank Holding Companies' (on file with author) (creating a newly curated dataset covering all US Bank Holding Companies with assets of over $50bn to conduct in-depth empirical analyses of their intrafirm structures using network theory).

[134] As discussed in **Chapter 1**, the idea (in brief) is that the harder it is for information to spread throughout the firm, the harder it will be to aggregate information and effectively coordinate activity, and the more challenging it will be to take (supervisory or risk-management) decisions. That, in term, is likely to lead to elevated risks.

[135] Robin L Lumsdaine, Daniel N Rockmore, Nicholas J Foti, Gregory Leibon and J Doyne Farmer, 'The Intrafirm Complexity of Systemically Important Financial Institutions' (2021) 52 Journal of Financial Stability 100804.

[136] Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 4.

label.[137] From this perspective, an intrafirm structure where all nodes of a certain label are clustered is characterised as an 'ideal' or 'perfect' supervisory tree'. Taking account of the firm's topology (the number of nodes and their types, for example), such perfect supervisory trees are generated for each firm. A firm's actual intrafirm structure is then compared to that of its perfect supervisory tree to compute a 'perfect tree similarity statistic' that measures the statistical proximity of the structures. The higher the proximity between a bank's actual intrafirm structure and the perfect supervisory tree, the less informationally complex the firm and, by implication, the easier it will be for a supervisor to access the information it needs and efficaciously control prudential risks.[138] These metrics are used to compare the intrafirm complexity of firms and the development of that complexity over time – although the authors stress that this exercise is merely intended as a 'proof of concept'.

Flood et al. (2020)[139] build on this approach by proposing a suite of metrics that, the authors suggest, are particularly pertinent in the context of resolution. They also focus on information; specifically on the opacity that is created by the complexity of intrafirm structures. They link opacity to coordination challenges and operational risks

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[137] After all, nodes marked by the same label are more likely to be supervised by the same authority, which lowers coordination costs. See Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 4-5. Importantly, the authors note that the properties of the intrafirm structure change depending on the nature of the label chosen, which highlights the multidimensional nature of intrafirm structure complexity, Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 8.

[138] Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 6, 14.

[139] Mark D Flood, Dror Y Kenett, Robin L Lumsdaine and Jonathan K Simon, 'The Complexity of Bank Holding Companies: A Topological Approach' (2020) 118 Journal of Banking & Finance 105789.

that complicate managerial and supervisory decision-making.[140] Complexity of this type makes it harder for resolution authorities to disentangle an institution in financial distress. Like Lumsdaine et al. (2021), the authors suggest that organisational opacity could be measured using the intricacy of the distribution of entities carrying out similar lines of business within an intrafirm structure.[141] Specifically, the key conjecture is that organisational proximity of entities carrying out similar activities should facilitate coordination.[142]

In terms of characterising the prudential risks associated with intrafirm structures using network theory, the primary innovation made by Flood et al. is the use of quotient graphs as a dimensionality-reduction technique.[143] The intuition is that topological quotients collapse neighbouring subsidiaries onto each other if they are of the same type; that is, if they are labelled[144] in the same way. This focuses attention on the edges connecting nodes (legal entities) with different labels, which are referred to as

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[140] Flood, Kenett, Lumsdaine and Simon (n 139) 1-2.

[141] Flood, Kenett, Lumsdaine and Simon (n 139) 3.

[142] Flood, Kenett, Lumsdaine and Simon (n 139) 3 ('Our underlying assumption is that parent-subsidiary communication – for both managers and bank supervisors – between two entities of the same type (however defined) is easier that communication across types.') and 9 ('We start by observing that a fundamental attribute of subsidiaries, such as charter type or regulatory jurisdiction, might be concentrated in one part of the BHC network, or might be dispersed throughout. The degree of fragmentation versus concentration is key in assessing the potential complexity of a BHC, beyond simple measures of its size.').

[143] Flood, Kenett, Lumsdaine and Simon (n 139) 3-9 (outlining their methodology).

[144] Flood, Kenett, Lumsdaine and Simon (n 139) 3 ('The key to applying graph quotients to assess organizational complexity is to choose a suitable set of categories for the subsidiaries in the BHC (i.e., a set of labels for the vertices in a graph of the BHC's organizational structure.').

'heterogeneous edges'[145] (another important innovation of the study). The authors contend that coordination challenges, particularly in the context of resolution, arise primarily when such 'heterogeneous edges' have to be severed. Building on Lumsdaine et al. (2021), Flood et al. propose a metric using the logic of quotient graphs to compare a firm's actual intrafirm structure to the (firm-specific) ideal to capture 'dispersion complexity'.[146] The higher a firm's dispersion complexity, the higher the risks associated with its intrafirm structure.

These two papers provide a glimpse of the methodological sophistication and practical insight network analysis can bring to the study of the relationship between intrafirm structure and prudential risk. The characterisations of complexity proposed are much more closely related to the relevant properties of intrafirm structures than the characterisations used in previous studies[147] and are also likely to shed light on different dimensions of complexity.[148] At the same time, the two papers highlight at least three significant pitfalls in conducting static intrafirm network analysis.

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[145] Edges connecting two nodes with the same label (the edges that disappear in a quotient graph) are referred to as 'homogenous edges'.

[146] Flood, Kenett, Lumsdaine and Simon (n 139) 9 (explaining the method and noting that '[w]hen the BHC network is "perfect" (i.e. each label's equivalence class is contiguous), dispersion complexity by this definition is zero).

[147] See Section I.

[148] Both papers note that their metric is not perfectly correlated to previous complexity measures such as size, the number of subsidiaries (or their geographic, business, or jurisdictional spread), or depth, see Flood, Kenett, Lumsdaine and Simon (n 139) 10-14; Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 14-15.

First, both papers make strong assumptions about the analytical implications of specific 'labels' associated with legal entities. For example, it need not be the case that activity labels correspond to supervisory authority, or that information sharing within different branches of the same supervisory authority is necessarily easier than between two different supervisory authorities (silos can operate within supervisory authorities, too). Second, and more importantly, both papers represent the relationships between legal entities within a firm using only one edge type (controlling equity stakes) without properly accounting for the abstraction from reality this implies. Focussing on controlling equity stakes may be fine for the narrow purpose of characterising managerial information flows[149], but that exercise is distinct from characterising the information flows supervisors rely on when carrying out their duties.[150]

Second, such approaches require strong assumptions about the relative importance of controlling equity relationships vis-à-vis other types of contractual (in a broad sense) relationships between entities in a firm.[151] It may well be that other types

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[149] At least, such an approach could be reasonably justified on the basis that controlling equity stakes represent a governance mechanism that managers are likely to use in exercising their control and decision-making powers.

[150] Of course, a counterargument would be that supervisors can control managers and gain access to the information they possess, so that lower managerial information costs imply lower supervisory costs. But that would imply a host of additional assumptions about (a) the nature of information (a)symmetries between supervisors and the supervised and (b) the impact of intrafirm structure on such information (a)symmetries. For example, it would assume that (1) bank managers have largely symmetrical information relationships with their supervisors, and (2) that more opaque intrafirm structures are not used, and perhaps even endogenously created by managers, to complicate supervisory information gathering. Such assumptions would be tenuous.

[151] Or, they assume these relationships overlap, so that the legal structure of firms corresponds closely to their economic and organisational structure. On the organisational front, for example, Lumsdaine et al. (2021) suggest that changes to the control hierarchy of the firm can be related to organisational modes (how 'bureaucratic' a firm is, for example), see Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135)

of relationships, for example exposures generated by intrafirm guarantees or shared liquidity management, imply that economic clusters within a firm encompass entities carrying out several distinct activities across jurisdictions.[152] If such economic clusters are only loosely related to, say, jurisdictional lines, prudential risks between entities with the same 'label' may be highly salient and complex from a supervisory perspective.[153] Perhaps this should not be the case, particularly if intrafirm structures were fully rationalised from a prudential perspective. But, as **Chapter 3** discusses, the lack of such rationalisation may well be the most salient prudential issue associated with intrafirm structures. A multilayer representation of intrafirm structure, which is also more sensitive to the different topologies that may arise in different layers in the network, would do more justice to such concerns.

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10. On that basis, the authors relate an increase in the degree depth of an intrafirm structure to a 'shift towards a more bureaucratic organizational structure', see Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 13. A substantial literature suggest that this conclusion is questionable, see eg Section I (and references therein) and **Chapter 1**.

[152] It therefore is a stretch to suggest that risks are less likely to spill over between entities with different labels only based on this narrow network representation, see eg Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 6 ('[T]he greater the number of perfect subtrees in a tree, the less likely that difficulty faced by a subsidiary in one country (industry) will spill over into subsidiaries in other countries (and the easier it will be to 'ring-fence' in a resolution situation.'). Issues of this type are covered more extensively in **Chapter 3**.

[153] As discussed in Section I and **Chapter 1**, the legal structure of the firm may not overlap with its economic structure. The assumption that managerial or supervisory coordination would be properly focused by quotient graphs based on such labelling is, therefore, premature. For such an assumption, see eg Flood, Kenett, Lumsdaine and Simon (n 139) 9 ('Removing self-loops from [a firm's network representation] facilitates visualization of the amount of managerial coordination required for ongoing operations – or the amount of regulatory coordination required for resolution – by focusing attention on the heterogeneous edges connecting legal entities from different categories.').

Third, given the limitations implied by the single-layer network representation in both papers, some of the policy conclusions would benefit from further analysis.[154] It is, for example, not the case that in resolution the only (or even the most meaningful) contractual tie between legal entities in a firm that resolution authorities might need to sever is the one represented by a controlling equity stake.[155]

Despite these shortcomings, some of which are inevitable given the data restrictions and the impact of the assumptions those impose, the network approach to the study of intrafirm structure shows real promise. The metrics developed by Lumsdaine et al. (2021) and Flood et al. (2020) provide a first, and encouraging, impression of the possibilities that this methodology offers. These opportunities, however, can only really be grasped when the conception of the relationship between intrafirm structure and prudential risks is broadened beyond the notions of information and coordination problems. It should cover, for example, how the firm's capital structure interacts with its legal structure. Such an inquiry can only be carried out using a network representation of the firm extends beyond controlling equity stakes, for example to capture intrafirm exposures.[156] In addition, and by analogy to *inter*firm

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[154] In the sense that they draw too strongly on properties of the network representation of the firm and pay insufficient attention to the abstractions that this representation implies.

[155] As is frequently implied by Flood, Kenett, Lumsdaine and Simon (n 139).

[156] See **Chapter 3**. It would also imply that sticking to 'complexity' as a proxy for 'the things we care about from a prudential perspective' is unsatisfying, and that the concept must be unpacked more explicitly. In **Chapters 3** and **4**, the focus will, for example, be on intrafirm segmentation as a source of prudential risks.

networks,[157] certain entities in *intra*firm networks might, for example, play more central roles in the operation of the firm than others[158] and thus warrant heightened supervisory scrutiny. Thinking along these lines lays the groundwork for *intra*firm network-sensitive regulation.[159] Similarly, the density of *intra*firm networks may, as in the case of *inter*firm networks[160], affect the network's resilience – which could have direct implications for the calibration of (intrafirm) capital and liquidity requirements.[161]

Such a broader prudential perspective to the study of intrafirm structure would benefit greatly not only from static topological analysis but especially from dynamic analyses of the type carried out on *inter*firm financial networks. Intrafirm dynamic analysis could, for example, take account of the way that a firm prioritises funding flows to specific legal entities when under stress, or of the (in)ability of liquid assets to move through a firm's legal structure. Of course, carrying out such dynamic analyses would require methodological innovation so that the analysis accounts for the distinctive characteristics that apply in an *intra*firm context, such as the control relationships within

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[157] See eg Battiston, Puliga, Kaushik, Tasca and Caldarelli (n 88).

[158] A possibility also noted by Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 7 ('[T]hat node is an essential component of the complexity of the firm's majority-control hierarchy. Hence it may be a node of particular focus for a supervisor charged with evaluating the complexity of the SIFI.').

[159] This would be in line with the logic proposed in Enriques, Romano and Wetzer (n 104).

[160] See eg Daron Acemoglu, Asuman Ozdaglar and Alireza Tahbaz-Salehi, 'Systemic Risk and Stability in Financial Networks' (2015) 105 American Economic Review 564.

[161] See **Chapters 3** and **4**.

the firm.[162] Work of this nature has so far not been carried out, but the prudential insights it might generate are tantalising. **Chapter 3** proposes how such analysis might be conducted in relation to intrafirm segmentation and what type of insights it might yield. For now, the main takeaway is that representing a firm's intrafirm structure using network theory provides a compelling framework to map them, can be done in a way that is sensitive to the legal and financial reality of these firms, and enables analyses that characterise the prudential properties of these structures.

IV. THE PERIMETER(S) OF THE FIRM

The network representation of the firm raises several foundational questions about its intrafirm structure. Given a web of interdependencies between various legal entities, some *inter*firm and others *intra*firm, one such first-order question concerns classification: which of these relationships should be characterised as being between legal entities that are part of the same firm? What type(s) of relationship between two entities is (are) determinative in this respect?[163] Answers to these questions might appear intuitive but definitions of the firm's perimeter tend to be amorphous[164], not least because of the increasingly deep economic integration between banks and non-banks

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[162] See eg Financial Stability Board, *Evaluation of the Effects of Too-Big-to-Fail Reforms: Consultation Report* (28 June 2020) 6.

[163] To put the same point in network terms: the question is about the types of edges that we consider.

[164] The question can be compared to challenges associated with defining 'family', see Morris (n 36) para 1.034 ('Corporate groups are like families – collective concepts lacking a legal personality whose constituent members are (usually, but certainly not always) legal persons.').

and the development of long intermediation chains.[165] This Section proposes a way to define the perimeter of firms and, by extension, to answer the question whether a relationship between legal entities should be considered as *intra-* or *inter*firm from a prudential perspective.

A. Firm Boundaries

In a seminal paper, Coase (1937) observed that economic theory had no positive theory to determine the boundary of the firm.[166] This observation spurred an extensive literature on the theory of the firm, which considers where the 'boundary'[167] of a firm should be.[168] That is, it attempts to explain why particular relationships take place within the same firm and predicts which types of relationship are *intra*firm and which are *inter*firm (and why).[169] The focus of this literature is the separation between firms and

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[165] See eg Nicola Cetorelli, 'Hybrid Intermediaries' (2014) Federal Reserve Bank of New York Staff Reports, Staff Report No. 705. See also Zoltan Poszar, Tobias Adrian, Adam Ashcraft and Hayley Boesky, 'Shadow Banks' (2013) Federal Reserve Bank of New York Economic Policy Review 1; Jorge Abad, Marco D'Errico, Neill Killeen, Vera Luz, Tuomas Peltonen, Richard Portes and Teresa Urbano, 'Mapping the Interconnectedness Between EU Banks and Shadow Banking Entities' (2017) NBER Working Paper Series, Working Paper 23280.

[166] Coase (n 118).

[167] To avoid confusion, this thesis refers to the firm's 'perimeter' rather than its 'boundary'.

[168] Or, using similar arguments, it attempts to explain the rationale for the location of the boundary of a specific firm.

[169] In other words, it is about efficient levels of vertical integration of firms. A review of this literature is beyond the scope of this thesis. For a helpful (if somewhat dated) overview, see Oliver D Hart *Firms, Contracts, and Financial Structure* (1995 Oxford University Press). See also Oliver Williamson, 'Transaction-Cost Economics: The Governance of Contractual Relations' (1979) 22 Journal of Law and Economics 2, 233; Sanford J Grossman and Oliver D Hart, 'The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration' (1986) 94 Journal of Political Economy 4, 691.

markets.[170] Prevailing theories of industrial organisation suggest, for example, that when parties have to make asset-specific investments, concerns about opportunistic behaviour would drive them away from arms-length relationships and toward vertical integration.[171] Such observations can be complemented by considerations related to tax and regulatory arbitrage, which appear to have a major impact on the economics (and boundaries) of firms in practice.[172] A subliterature covers these questions in the specific context of banks[173].

Ultimately, however, literature on the boundary of the firm answers an analytically distinct question from the one at issue here.[174] The principal objective of our current enquiry is, after all, not to predict whether certain activities can be expected to be carried out within one firm but to ask, on a more practical level, which legal entities

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[170] In describing why parties contract through firms, Coase, for example, emphasised the role of authority (Coase (n 118)), while Alchian and Demsetz (1972) emphasised the role of monitoring. See Armen A Alchian and Harold Demsetz, 'Production, Information Costs, and Economic Organization' (1972) 62 American Economic Review 5, 777.

[171] Ronald J Gilson, Charles F Sabel, Robert E Scott, 'Contracting for Innovation: Vertical Disintegration and Interfirm Collaboration' (2009) 109 Columbia Law Review 3, 431, 432 (offering this characterisation of the literature, before proceeding to examine cases that do not confirm to it).

[172] Such considerations, albeit with a focus in the creation of intrafirm structures, are surveyed in **Chapter 1**. See also Pistor (n 11) 67-68.

[173] See eg Cetorelli, McAndrews and Traina (n 17) and references therein.

[174] cf eg George G Triantis, 'Organizations as Internal Capital Markets: The Legal Boundaries of Firms, Collateral, and Trusts in Commercial and Charitable Enterprises' (2004) 117 Harvard Law Review 4, 1102, 1104 ('With very few exceptions, this [economic literature on the boundary of the firm] pays no attention to the function of *legal* organizational boundaries.').

are to be considered part of the same firm – that is, to circumscribe the firm's (outer[175]) perimeter. As we will see, the answer to this question is highly context-dependent.

B. Vertical Control Relationships

As noted before, firms can be classified using several archetypes.[176] In some cases, relationships between separate entities that are part of the same firm are contractual in nature, in others the legal relationship between these firms is less clear-cut (and, in fact, no such direct legal relationship may exist).[177] A common thread, however, is that the notion of 'control' is important to the delineation of the firm's perimeter.[178] Consider two legal entities, *A* and *B*. If entity *A* is thought to 'control' entity *B* (or vice-versa), both are said to be part of the same firm, *F*. Critically, if no such control relationship exists, entities *A* and *B* are considered to be (part of) separate firms. This observation does not amount to a clear definition of the firm's perimeter, but it does focus that examination on the relevant operationalisation of the notion of 'control' (another amorphous concept).

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[175] **Chapters 3** and **4**, which focus on intrafirm segmentation, will also discuss various perimeters ('segments') *within* the firm.

[176] See Section I.B.

[177] See Section I.B.

[178] See Section I.B. See also Coase (n 118).

The next step is to define 'control' in a way that reflects its meaning in an economic sense.[179] In academic studies, 'control' is commonly defined with reference to controlling equity stakes.[180] In practice, there is some variability on what percentage is considered to classify as a controlling equity stake. A commonly-used rule of thumb in academic studies – sometimes informed by the datasets they draw on – is to use the threshold of holding a majority of the (voting) shares (that is, more than fifty percent).[181] However, there is broad recognition that holding the majority of the (voting) shares is not necessary to exert control, which is why some studies set the threshold at lower levels (twenty-five percent is common), which could significantly broaden the perimeter of the firm.[182] Still, under this view, (controlling) equity relationships would be a prerequisite.

In reality – that is, in law – many definitions of 'control' do indeed account for lower thresholds, but the definition tends to be broader still.[183] To illustrate, in the

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[179] Cetorelli and Goldberg (n 17) 111 ('[W]e seek to capture a level of ownership that is sufficient to constitute affiliation from an economic perspective – that is, where control can be presumed.').

[180] See Section I.B. This approach is in line with the one taken in Sections II.C. and II.D. (when drawing a stylised hierarchical representation of the firm).

[181] It is common for studies investigating intragroup structures to adopt the criteria of a controlling stake, which is frequently operationalised as having more than 50 percent of the voting shares, see eg Avraham, Selvaggi and Vickery (n 20) 69; Herring and Carmassi (n 1) 200; Cetorelli and Goldberg (n 17) 111-112 ('We restrict our analysis to include only those entities in which a parent has 50 percent or more ownership.'); Lumsdaine, Rockmore, Foti, Leibon and Farmer (n 135) 3 ('[C]ontrol is defined [in our data] as the parent controlling at least 50%+1 of the voting share for the child subsidiary').

[182] See eg Cetorelli and Goldberg (n 17) 112 ('[W]e make specific assumptions about the ownership share that warrants inclusion in our counts. Since lower ownership shares could also be associated with valid affiliates, our counts likely understate the total number of affiliates under control of an ultimate parent.').

[183] For a comprehensive discussion of EU and UK law in this area, see Morris (n 36) paras 1.004-1.078.

United Kingdom the notion of a 'group' is defined at section 421 of the Financial Services and Markets Act 2000 ('FSMA'):

> (1) In this Act "group", in relation to a person ("A"), means A and any person who is—
>
> (a) a parent undertaking of A;
> (b) a subsidiary undertaking of A;
> (c) a subsidiary undertaking of a parent undertaking of A;
> (d) a parent undertaking of a subsidiary undertaking of A;
> (e) an undertaking in which A or an undertaking mentioned in paragraph (a), (b), (c) or (d) has a participating interest; (…)[184]

The legal definition of a 'subsidiary undertaking'[185] (the correlative of a 'parent undertaking') is complex, but roughly encompasses two dimensions. An entity's subsidiary undertakings are those companies in which it either (i) holds a majority of the voting rights or (ii) otherwise exerts a dominant influence derived from other legal powers[186]. Such a dominant influence can, for example, take the form of the rights to

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184 UK Financial Services and Markets Act 2000, s 421(1). The full definition also includes the following, which is less relevant for our purposes: '(f) if A or an undertaking mentioned in paragraph (a) or (d) is a building society, an associated undertaking of the society; or (g) if A or an undertaking mentioned in paragraph (a) or (d) is an incorporated friendly society, a body corporate of which the society has joint control (within the meaning of section 13(9)(c) or (cc) of the M1Friendly Societies Act 1992).'

185 UK Companies Act 2006, s 1162 (together with Schedule 7). This definition derives from the EU's Seventh Company Law Directive, which was replaced by Directive 2013/34/EU of the European Parliament and of the Council of 26 June 2013 on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings, amending Directive 2006/43/EC of the European Parliament and of the Council and repealing Council Directives 78/660/EEC and 83/349/EEC Text with EEA relevance OJ L 182 (hereafter 'Accounts Directive'). It is used throughout EU legislation (although sometimes the term 'subsidiary' rather than 'subsidiary undertaking' is used).

186 This latter part defies easy definition but acts as a functional catch-all to capture the concept of the 'firm' in an economic sense.

appoint or remove a majority of the subsidiary's board of directors[187], rights derived from the subsidiary's articles[188], or rights deriving from a control contract[189].[190] Note that this definition may be satisfied indirectly. Imagine four legal entities, *A*, *B*, *C*, and *D*. Entities *B* and *C* are wholly-owned by *A*. Entity *D* is owned by *B* and *C*, which each own forty-five percent of its voting shares. Entity *A* would be the parent of *B* and *C*, which would be its subsidiaries. Ostensibly, entity *D* would not be a subsidiary of *B* and *C*[191] but it would be a subsidiary of *A* through its combined ownership of *B* and *C* (which together own ninety percent of the voting shares in *D*).[192] Entities *A*, *B*, *C*, and *D* are thus all part of the same firm, *F*.

A participating interest is defined in section 421A of FSMA to mean an 'interest held by an undertaking in the shares of another undertaking which it holds on a long-term basis for the purpose of securing a contribution to its activities by the exercise of control or influence arising from or related to that interest'[193], which is presumed by a holding of twenty percent or more of the shares in an undertaking[194]. Under EU law,

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[187] UK Companies Act 2006, s 1162(2)(b).

[188] UK Companies Act 2006, s 1162(2)(c)(i).

[189] UK Companies Act 2006, s 1162(2)(c)(ii).

[190] See Morris (n 36) para 1.044 (articulates seven tests to determine whether a legal entity classifies as a subsidiary undertaking).

[191] Unless entity *B* or *C* can exert a dominant influence on *D*.

[192] UK Companies Act 2006, Schedule 7 para 9(1) ('Rights shall be treated as held by a parent undertaking if they are held by any of its subsidiary undertakings.').

[193] UK Financial Services and Markets Act 2000, s 421A(1).

[194] UK Financial Services and Markets Act 2000, s 421A(2).

the same concept (with a similar presumption[195]) is defined as 'rights in the capital of other undertakings, whether or not represented by certificates, which, by creating a *durable link* with those undertakings, are intended to contribute to the activities of the undertaking which holds those rights'.[196] A 'durable link', in turn, is sometimes equated with the notion of 'significant influence' as used in International Accounting Standard 28[197], although depending on the context other factors may be considered too.[198] In addition to subsidiaries, entities that are classified as 'participations' fall within a firm's perimeter, too.

C. Horizontal Relationships

The focus so far has been on an – albeit broadened – set of vertical control relationships primarily (but not exclusively, as indicated by the discussion on 'dominant influence') through equity contracts. This fails to capture horizontal relationships between entities that do not have a common controller or that are based on less formalised forms of common management.[199] Two examples illustrate the nature of these relationships. The first is that of the 'common management relationship', a notion derived from EU law

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[195] Accounts Directive, Art 2(2) ('The holding of part of the capital of another undertaking is presumed to constitute a participating interest where it exceeds a percentage threshold fixed by the Member States which is lower than or equal to 20 %.').

[196] Accounts Directive, Art 2(2) (*emphasis* added).

[197] International Financial Reporting Standards, International Accounting Standard 28.

[198] For a discussion, see Morris (n 36) paras 1.049-1.055.

[199] For a detailed discussion, see Morris (n 36) para 1.061.

(where it is referred to as an 'Article 12(1) relationship'[200]) that has been amended in related Brexit legislation. It can arise between two entities (U1 and U2) not captured by section 1162 of the UK Companies where:

(i) U1 and U2 are managed on a unified basis pursuant to a contract with U1, or provisions in U2's memorandum or articles of association; or
(ii) the administrative, management or supervisory bodies of U2 consist, for the major part, of the same persons in office as U1, during the financial year of U1 for which it is being decided whether such a relationship exists;[201]

This categorisation carries some similarities to the notion of a 'dominant influence' but innovates primarily by adding the scenario where the two entities are practically managed by the same people. An alternative approach to capturing horizontal relationships is offered by the so-called 'Article 18(6) relationship' under the EU Capital Requirements Regulation II, which covers situations:

(a) where, in the opinion of the competent authorities, an institution exercises a significant influence over one or more institutions or financial institutions, but without holding a participation or other capital ties in these institutions; and
(b) where two or more institutions or financial institutions are placed under single management other than pursuant to a contract or clauses of their memoranda or articles of association.[202]

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[200] Article 12(1) is now replaced by Accounts Directive, Art 22(7). We continue to use the term 'Article 12(1) relationship', as is still common in practice.

[201] UK The Capital Requirements (Amendment) (EU Exit) Regulations 2018 Part 4, Chapter 1, Amending the Capital Requirements Regulation Article 4(1) (definitions), (30).

[202] Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013 as regards the leverage ratio, the net stable funding ratio, requirements for own funds and eligible liabilities, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures, reporting and disclosure requirements,

Under Article 18(6) relationships, the focus again broadens in an attempt to capture the functional, economic reality of the firm irrespective of its legal structure. This general principle is a recurring theme globally[203], and can significantly expand the firm's perimeter.[204]

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and Regulation (EU) No 648/2012 (Text with EEA relevance.) OJ L 150 (hereafter 'Capital Requirements Regulation II' or 'CRR2') Art 18(6). For a discussion, see Morris (n 36) paras 1.069-1.071.

[203] The US Federal Reserve broadly shares this view. For example, under Regulation Y the definition of control is essentially one of 25 percent ownership, but other considerations are important as well. For example, additional entities that meet FR Y-10/10F 'reportability criteria' are included, as well as entities for which the relationship is 'of interest to the Federal Reserve', see Regulation Y (Bank Holding Companies and Change in Bank Control), 12 C.F.R. 225.2 – Definitions: (e)(1):

> Control of a bank or other company means (except for the purposes of subpart E of this part):
>
> (i) Ownership, control, or power to vote 25 percent or more of the outstanding shares of any class of voting securities of the bank or other company, directly or indirectly or acting through one or more other persons;
>
> (ii) *Control in any manner* over the election of a majority of the directors, trustees, or general partners (or individuals exercising similar functions) of the bank or other company;
>
> (iii) The *power to exercise, directly or indirectly, a controlling influence over the management or policies of the bank or other company*, as determined by the Board after notice and opportunity for hearing in accordance with § 225.31 of subpart D of this part; or
>
> (iv) Conditioning in any manner the transfer of 25 percent or more of the outstanding shares of any class of voting securities of a bank or other company upon the transfer of 25 percent or more of the outstanding shares of any class of voting securities of another bank or other company.

[*emphasis* added]. See also Avraham, Selvaggi and Vickery (n 20) 69 and Appendix A.

[204] See also: Jacopo Carmassi and Richard J Herring, 'Corporate Structures, Transparency, and Resolvability of Global Systemically Important Banks' (2014) Unpublished Working Paper, 120 (especially note 79 and 80 and accompanying text) (noting that broader criteria for the inclusion of legal entities are 'likely to produce a significant impact' on the total number of legal entities in a firm and, thereby, on the perimeter of the firm).

D. A Contextual and Functional Definition of Firm Perimeters

A general point that arises from this discussion is that the firm's perimeter is at least partially indeterminate and highly contingent on context and judgment. To complicate matters further, different areas of the law[205] take a different view on its location. When considering the liability of multinational enterprises, for example, a frequently expressed concern is that firms can strategically determine the location of their perimeter to avoid liability for actions in their supply chain.[206] This has led to the question whether, in some cases, the 'contractual veil' should be lifted[207] and to proposals to extend the responsibility of companies to actors in their supply chains[208]. Under these narrow conditions, one could therefore argue that (at least in economic terms) the perimeter of the firm (in an economic and a legal sense) is extended.

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[205] Let alone accounting rules, such as those offered by the International Financial Reporting Standards ('IFRS') or Generally Accepted Accounting Principles ('GAAP'), which also take a view on consolidation. See eg Matthias Thiemann, "Out of the Shadows?' Accounting for Special Purpose Entities in European Banking Systems' (2012) 16 Competition and Change 1, 37.

[206] For a cogent articulation of that concern, see Collins (n 36). Generally, see Christian A Witting, *Liability of Corporate Groups and Networks* (Cambridge University Press 2018).

[207] By analogy to the lifting of the 'corporate veil', which is an *intra*firm concept. See eg Gunther Teubner, 'The Many-Headed Hydra: Networks as Higher-Order Collective Actors' in Joseph McCahery, Sol Picciotto and Colin Scott (eds) *Corporate Control and Accountability* (Clarendon Press 1993) 44.

[208] See eg Almut Schilling-Vacaflor and Andrea Lenschow, 'Hardening Foreign Corporate Accountability Through Mandatory Due Dilligence in the European Union? New Trends and Persisting Challenges' (2021) Regulation and Governance; Karsten E Sørensen, 'Corporate Sustainability Due Diligence in Groups of Companies' (2022) Nordic & European Company Law LSN Research Paper Series No. 22-02.

An implication appears to be that there is no such thing as 'the' perimeter of a firm.[209] Instead, it may be more accurate to conceive of the firm's perimeter as being a contextual product of a particular functional analysis, meaning that the location of a firm's perimeter depends on the *functional objective* adopted when attempting to locate it.[210] Given the focus of this dissertation on the prudential implications of intrafirm structure, the functional lens through which the perimeter of the firm is viewed is informed by considerations relevant to prudential risks.

F. The Prudential Perimeter

Conceptually, an implication of this functional approach is that entities that may not be controlled (through an equity stake) by the ultimate parent but that may be part of the firm in an economic sense and that, as such, affect its risk-profile should be included within the firm's perimeter. We can refer to this risk-based conception of the firm's perimeter as its 'prudential perimeter'. Conceptually, a firm's prudential perimeter is closely related to the notion of 'consolidation groups' under prudential regulation,

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[209] Tangentially, see Takeo Hoshi, 'The Economic Role of Corporate Grouping and the Main Bank System' Masahiko Aoki & Ronald Dore (eds) *The Japanese Firm: Sources of Competitive Strength* (Oxford University Press 1994) (eg 'The bank-firm relations in Japan are subtle and the arrangements are implicit. Similarly, the boundary of a 'corporate group' is ambiguous: it is often hard to decide whether a firm belongs to a group or not.' and 'Even after going through the list of characteristics that we observe in a typical corporate group, deciding whether or not a specific firm belongs to a group is a difficult task. (…) Thus, the border of a corporate group is fuzzy.').

[210] The term 'functional objective' is meant to convey, without any pretence of referring to a rigorous social science methodology, that the focus is on the problem that the law is trying to address. In other words, the term 'functional' refers to the purpose to which the boundary classification is put. For a similar use of the term, see Kraakman, Armour, Davies, Enriques, Hansmann, Hertig, Hopt, Kanda, Pargendler, Ringe and Rock (n 12) 3-4. This conceptualisation appears to accord with practice, see Morris (n 36) para 1.003.

which determine what entities of a financial group should be considered when applying prudential regulation[211]. One firm may, however, be subjected to multiple consolidation groups at the same time, because various prudential regimes – both within and across jurisdictions[212] – may apply simultaneously[213], whereas the firm has only one prudential perimeter.[214]

Consolidation groups come into existence because of 'trigger entities' within the firm, usually regulated entities (e.g. credit institutions) that are subjected to prudential regulation.[215] If such trigger entities exist, it is commonly the case that all entities that are part of the firm (in the sense defined by control, as discussed above[216], and by horizontal relationships on the basis of common management or Article 18(6)

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[211] For example, the Basel capital and liquidity frameworks apply on a consolidated basis, see eg Basel Committee on Banking Supervision, *Scope and Definitions: SCO10 Introduction* (15 December 2019) 3 ('This framework will be applied on a consolidated basis to internationally active banks').

[212] Consolidation groups are subjected to jurisdictional limits, see eg Morris (n 36) para 5.004.

[213] Consolidation groups can also exist *within* the perimeter of the firm (e.g. sub-consolidation groups), and several such groups may coexist depending on the prudential regime that imposes them. That is why the prudential perimeter is functionally and practically distinct from, albeit analytically and conceptually similar in nature to, consolidation groups.

[214] After all, a firm's prudential perimeter does not account for jurisdictional boundaries. Instead, it is strictly informed by a risk-based conception of the firm.

[215] For a comprehensive discussion on the identification of consolidation groups, see Morris (n 36) paras 4.030-4.047.

[216] See Sections I and IV.A.-C. However, in some cases the definition may be modified. CRR II, for example, modifies the definition of a participation for entities within its scope to clarify that 'the ownership, direct or indirect, of 20 % or more of the voting rights or capital of an undertaking' is always a participation (as opposed to merely creating a rebuttable presumption), see Capital Requirements Regulation II, Art 4(1)(35).

relationships[217]) are included. But when viewed through a prudential lens, other types of relationships may be just as important and, notably, these may extend to legal entities operating outside the (prudentially) regulated sector.[218] Consider, for example, the risks posed by special purpose entities ('SPEs'), like trusts or limited liability companies, that many G-SIBs use and that usually rely on guarantees provided by the G-SIB. Sometimes such guarantees are implied rather than contractual in nature, for example because of perceived reputational ties.[219] When, in times of crisis, G-SIBs have to step up to support their SPEs, the contingent liability materialises, potentially creating significant exposure (this is commonly referred to as 'step-in risk').[220] That suggests SPEs benefiting from such (implied) guarantees should be captured by the prudential perimeter. Consolidation regimes increasingly do account for step-in risk[221], although the practical challenges in operationalising this notion are substantial – after all, step-in risk could in theory arise anywhere. Given the open-ended nature of step-in risk, some are concerned that regulators would be afforded too much leeway to bring entities into

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[217] See Section IV.C.

[218] Basel Committee on Banking Supervision, *Joint Forum: Principles for the Supervision of Financial Conglomerates* (September 2012) 6.

[219] Or, alternatively, the implied guarantee extends beyond the contractual guarantee.

[220] See **Chapter 3** for a more wide-ranging discussion on SPEs.

[221] See eg Basel Committee on Banking Supervision, *Guidelines: Identification and Management of Step-In Risk* (October 2017) generally, and specifically at 12 ('[In case of step-in risk,] inclusion of the entity in the regulatory scope of consolidation may be the most appropriate measure, in particular where the entity's balance sheet structure and activities are amenable to banking regulations.'). See also Basel Committee on Banking Supervision (n 221) 38 (principle 29), 39 (para 29.2).

a firm's consolidation group (prudential perimeter).[222] Under the EU Capital Requirements Regulation II, authorities may decide to consolidate where they determine there is step-in risk[223], but only for entities that are already subsidiaries or participations.[224] Given how SPEs are frequently structured and used, this approach appears to provide ample opportunity for arbitrage.

Considering the regulatory implications, it should be no surprise that the perimeter of consolidation groups is a veritable battlefield for regulated institutions and their advisors. Conceptually, this does not affect the definition of the prudential perimeter, but it does reflect on how it might operate in practice. Successfully excluding activities from consolidation groups[225] through sophisticated structuring is a common and lucrative practice, for example because it lowers the firm's capital and liquidity requirements. Judgments that are more indeterminate and subjective in nature, such as those associated with common manager or Article 18(6) relationships or those related to step-in risk, are of course more vulnerable to such attempts. Vice-versa, regulated entities that have successfully excluded their activities from the scope of consolidation are vulnerable to reclassification – creating regulatory risks for firms.

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[222] Some have argued that the open-ended nature of step-in risk gives regulators too much leeway, see eg Morris (n 36) para 1.075.

[223] Defined as 'a substantial risk that the institution decides to provide financial support to that undertaking in stressed conditions, in the absence of, or in excess of any contractual obligations to provide such support', see Capital Requirements Regulation II, Art 18(8)(b).

[224] Capital Requirements Regulation II, Art 18(8).

[225] On exclusions, see Morris (n 36) paras 4.042-4.045.

The implications of using the prudential perimeter to determine which relationships are *inter*firm rather than *intra*firm are meaningful. First, relative to more conventional academic approaches that rely on controlling shareholdings, it calls for an extension of the scope of entities that are considered part of the firm – and thereby enlarges the scope of intrafirm analysis. Analyses that rely on network representations exclusively comprising controlling equity relationships are, therefore, likely to mischaracterise intrafirm structures in ways that could have substantial prudential implications. After all, as the discussion on arbitrage illustrated, the decision to use legal entities that are *not* directly controlled through controlling equity stakes is endogenous. SPEs, for example, are frequently used as part of capital and liquidity arbitrage schemes and would be excluded from such an analysis.[226] Second, it suggests that network analyses of intrafirm structure should, more generally, expand to capture non-equity relationships – particularly those created by debt contracts and guarantees (for a more extensive discussion on this point, see **Chapters 3** and **4**). Finally, regulators and supervisors should collect and share data about intrafirm structures of G-SIBs with the prudential perimeter in mind. This would also support academics, who currently have to work with very limited (and exclusively equity-based) data on relationships within firms, in their conduct of more sophisticated research into intrafirm structures.

[226] See **Chapter 1**.

CONCLUSION

Chapter 1 has set out why regulators and academics are interested in the intrafirm structure of G-SIBs, but also foreshadowed the problem that their conceptual understanding of the relationship between intrafirm structures and prudential risks was superficial. This Chapter opened with a review of the conventional account, which focuses on identifying quantitative proxies for 'complexity' – leaving the nature of that complexity or its relation to risk quite vague – or on qualitative studies covering primarily the legal nature of the relationships between entities of the group. It proceeded by articulating a novel framework, rooted in network theory, to study intrafirm structures. After providing a primer on network theory and its use to study *inter*firm relationships within the financial sector, it outlined how the same tools could be used to map out intrafirm structures. For illustrative purposes, the Chapter included an empirical mapping of US G-SIBs (albeit in a stylised way).

Using network theory to map out the intrafirm structure of G-SIBs raises foundational questions and creates novel analytical opportunities. One such foundational question relates to the inclusion criteria used to determine whether legal entities are part of the same firm. The Chapter proposed that the answer to this question is ultimately contextual and functional by nature – there is no 'fixed' perimeter, but rather its location should be determined according to the question which is sought to be answered. This thesis focuses on prudential risks, and so the relevant perimeter of G-SIBs is their *prudential perimeter*. When determining the location of the prudential perimeter, the approach taken is similar to that used when deciding the scope of a G-SIBs consolidation group (minus the practical limitations, such as those imposed by

jurisdictional limits on agency authority). It is useful to take an expansive view of a G-SIBs' perimeter, in order to capture as wide a range of prudential risks as possible – as illustrated by the concept of 'step-in risk'.

The scope for novel analyses that is created by conceptualising intrafirm structures using network theory is tantalising. Essentially, many of the tools that have been used in an *inter*firm context, for example those used in financial stress testing, can now be applied in an *intra*firm context as well. This thesis will not explore these options in great depth, because doing so would be a whole research agenda in its own right, but it does aim to illustrate how this could be done. In particular, **Part II** of this thesis explores the prudential risks of intrafirm segmentation and proposes to use the network representation of intrafirm structures to do so.

PART II: INTRAFIRM SEGMENTATION

CHAPTER 3: INTRAFIRM SEGMENTATION PATTERNS

As **Chapter 1** observed, it remains common to think of banks as economically monolithic institutions. Accordingly, post-crisis analyses of systemic risk mostly focus on the interactions and relations between firms (both *inter*firm phenomena),[1] and so assume that firms themselves are unitary actors.[2] This perspective also informs common parlance, other banking research, and discussions of regulatory tools. Bank governance, for example, focuses on 'the firm's board'[3]; banks have capital and liquidity requirements that are evaluated at the firm level[4]; and supervision and reporting largely takes place at the consolidated level[5].

At the same time, there is a widespread awareness that banks – and especially global systemically important banks ('G-SIBs') – are in fact sprawling corporate groups

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[1] This is, is for example, evident from the literature on financial contagion, as surveyed in **Chapter 2**. For an overview of this literature, see eg Christoph Aymanns, J Doyne Farmer, Alissa M Kleinnijenhuis and Thom Wetzer 'Models of Financial Stability and Their Application in Stress Tests' in Cars Hommes and Blake LeBaron (eds), *Handbook of Computational Economics, Vol. 4* (Elsevier 2018).

[2] Otherwise phrased, banks are frequently represented as a single entity.

[3] See eg John Armour and Jeffrey N Gordon, 'Systemic Harms and Shareholder Value' (2014) 6 Journal of Legal Analysis 35; Mark Roe, 'Structural Corporate Degradation Due to Too-Big-To-Fail Finance' (2014) 162 University of Pennsylvania Law Review 1419; John Armour, Dan Awrey, Paul Davies, Luca Enriques, Jeffrey N Gordon, Colin Mayer and Jennifer Payne, *Principles of Financial Regulation* (Oxford University Press 2016) ch 17. For an exception, see Thom Wetzer, 'In Two Minds: The Governance of Ring-Fenced Banks' (2019) 19 Journal of Corporate Law Studies 197.

[4] See eg Anat Admati and Martin Hellwig, *The Bankers' New Clothes – What's Wrong with Banking and What to Do About It* (Princeton University Press 2013).

[5] Most stress tests, for example, assume perfect capital mobility, see Eugenio Cerutti and Christian Schmieder, 'Ring-Fencing and Consolidated Banks' Stress Tests' (2014) 11 Journal of Financial Stability, 1-12; Aymanns, Farmer, Kleinnijenhuis and Wetzer (n 1).

with, in some cases, hundreds or even thousands of subsidiaries that are tied together in a complex web of interdependencies (see **Chapters 1** and **2**). The mapping exercise undertaken in **Chapter 2** confirms the vast complexity and elaborate legal structuring within banking groups that makes up a bank's intrafirm structure. **Chapter 2** also discusses how various regulatory initiatives explicitly acknowledge and act upon this intrafirm structure. Recovery and resolution plans, for example, must frequently be accompanied by a rationalisation of a bank's legal entity structure,[6] and both the Volcker Rule in the US[7] and the ring-fencing policy implemented in the UK[8] create separate entities or subgroups within the larger banking group.[9]

The common view of G-SIBs as monolithic and the reality of their complex intrafirm structures made up of many legal entities can only be reconciled if, at least in functional terms, full asset pooling takes place. Under full asset pooling, the various entities that make up the banking group seamlessly operate together as a single entity;

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[6] See eg Simon Gleeson and Randall Guynn, *Bank Resolution and Crisis Management: Law and Practice* (Oxford University Press 2016), 28 (noting that, until the introduction of resolvability criteria, banks did not emphasise or prioritise legal structures when designing operational processes or IT systems); Federal Deposit Insurance Corporation and Board of Governors of the Federal Reserve System, 'Guidance for 2018 para 165(d) Annual Resolution Plan Submissions by Foreign-Based Covered Companies that Submitted Resolution Plans in July 2015' (2017), 23-24.

[7] 12 U.S.C. 1851 'Prohibitions on proprietary trading and certain relationships with hedge funds and private equity funds' (Section 13 to the Bank Holding Company Act of 1956, 12 U.S.C. para 1851, as amended) (hereafter the 'Volcker Rule').

[8] Independent Commission on Banking, *Final Report: Recommendations* (ICB, 2011); Parliamentary Commission on Banking Standards, *First Report: First Report of Session 2012-13*, HL Paper 98; HC 848 (HMSO 2012); PCBS, *Banking Reform—Towards the Right Structure: Second Report of Session 2012-13*, HL Paper 126; HC 1012 (HMSO 2013). For an in-depth discussion of ring-fencing in the UK, see Wetzer (n 3).

[9] This issue is covered in greater depth in Section II(A). Also see Armour et al. (n 3) ch 23.

in this view, a bank can thus have a complicated intrafirm structure but still effectively operate as a unitary actor (a 'single economic enterprise'). This Chapter argues that such asset pooling is often impossible. Instead, banks are frequently segmented along entity lines, and regulation can contribute to that segmentation.[10] Such intrafirm segmentation is neither immaterial nor harmless; it may create unique financial stability risks that are lurking inside banking groups and are obscured from regulators' and other observers' view by their monolithic perspective.[11]

This Chapter examines the concept of intrafirm segmentation – that is, the bundling of assets in legal entities (or subgroups of entities) and the associated decline in intrafirm asset mobility – in G-SIBs. It proceeds as follows. Section I reviews the literature on corporate law asset partitioning, the commonly studied source of intrafirm segmentation. Section II builds on asset partitioning theory and extends its logic to include regulation as another source of segmentation, and then proceeds to discuss the relationship and interaction between corporate law segmentation and regulatory segmentation. Section III sets out how (de-)segmentation relationships between the entities of a firm together form intrafirm segmentation patterns and sketches the basic outlines of a tool (the segmentation-weighted adjacency matrix) to study such patterns.

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[10] See Section II.

[11] See **Chapter 4**.

I. CORPORATE LAW ASSET PARTITIONING

Corporate law theory starts with legal entities and their attributes.[12] Two of these, legal personality[13] and limited liability[14], together allow the entity to function as a 'nexus of contracts'[15] with assets (and liabilities) that are distinctly its own.[16] This designated pool of assets is legally owned by the entity and is available to satisfy the claims of its creditors[17] – a central feature of corporate law referred to as asset partitioning.[18]

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[12] Reinier Kraakman, John Armour, Paul Davies, Luca Enriques, Henry Hansmann, Gerard Hertig, Klaus Hopt, Hideki Kanda, Mariana Pargendler, Wolf-Georg Ringe, and Edward Rock, *The Anatomy of Corporate Law – A Comparative and Functional Approach* (Third Edition, Oxford University Press 2017), ch 1 (John Armour, Henry Hansmann, Reinier Kraakman & Mariana Pargendler, 'What is Corporate Law?').

[13] Armour, Enriques et al. (n 12) 5.

[14] Armour, Enriques et al. (n 12) 8. Also see Frank H Easterbrook and Daniel R Fischel, *The Economic Structure of Corporate Law* (Harvard University Press, 1983), ch 2; Frank H Easterbrook and Daniel R Fischel, 'Unlimited Liability and the Corporation (1985) 52 University of Chicago Law Review 89, 89-90.

[15] The conceptualisation of the firm as a 'nexus of contracts' derives from Armen Alchian and Harold Demsetz, 'Production, Information Costs, and Economic Organisation' (1972) 62 American Economic Review 777; Michael C Jensen and William H Meckling, 'Theory of the Firm: Managerial Behaviour, Agency Costs, and Ownership Structure' (1976) Journal of Financial Economics Vol. 3, 305-360, 310. See also Armour, Enriques et al. (n 12) 5 (noting that it may be more appropriate to refer to a nexus *for* contracts).

[16] This can be described as the creation of 'legally distinct asset pools', see Henry Hansmann, Reinier Kraakman and Richard Squire, 'Law and the Rise of the Firm' (2005) 119 Harvard Law Review 1333, 1343. In this context, corporate law theorists have also described the legal entity as a 'transferable bundle of contracts'. Under this theory, the bundling of contracts in a legal entity is valuable because it helps maintain the synergies between the various contracts, see Kenneth Ayotte and Henry Hansmann, 'Legal Entities as Transferable Bundles of Contracts' (2013) 111 Michigan Law Review 715.

[17] Henry Hansmann and Reinier Kraakman, 'The Essential Role of Organizational Law' (2000) 110(3) Yale Law Review 387, 393.

[18] Legal personality and limited liability together create asset partitioning, see Henry Hansmann and Reinier Kraakman, 'Organizational Law as Asset Partitioning' (2000) 44 European Economic Review 807; Hansmann and Kraakman (n 17) 387. Asset partitioning is a subset of intrafirm segmentation.

Legally, asset partitioning has two components.[19] First, a set of assets is circumscribed by, and attached to, a legal entity through ownership. Second, creditors of that legal entity are assigned priority over these assets ('subordination'). Such priority operates vis-à-vis the claims of the personal creditors of the firm's owners and creditors ('affirmative asset partitioning' or 'entity shielding'[20]).[21] At the same time, personal creditors of the entity's owners are granted an exclusive claim – the strongest form of 'priority' – on the owners' separate personal assets ('defensive asset partitioning', 'owner shielding', or 'limited liability'[22]).[23] **Figure 3.1** illustrates these two types of asset partitioning.

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[19] Hansmann and Kraakman (n 17) 393. Note that these two components can be present in a stronger and a weaker form depending on the type of legal entity.

[20] Hansmann, Kraakman and Squire (n 16).

[21] Hansmann and Kraakman (n 17); Hansmann, Kraakman and Squire (n 16) 1337.

[22] Hansmann and Kraakman (n 17) 423.

[23] Hansmann and Kraakman (n 17) 393; Hansmann, Kraakman and Squire (n 16). More generally, personal creditors of the entity's owners are granted an exclusive claim on the owners' separate personal assets that is *prior* to the claims of the entity's creditors. Such defensive asset partitioning, or 'owner shielding', can be of varying degrees. The strongest form is that offered by limited liability, which denies creditors of the firm any claim on the personal assets of the firm's shareholders. Conversely, the general partnership does away completely with defensive asset partitioning, so that 'partnership creditors share equally with the creditors of individual partners in distributing the separate assets of partners when both the partnership and its partners are insolvent'. Intermediate forms are characterised by a priority rule, see Hansmann and Kraakman (n 17) 395-398.

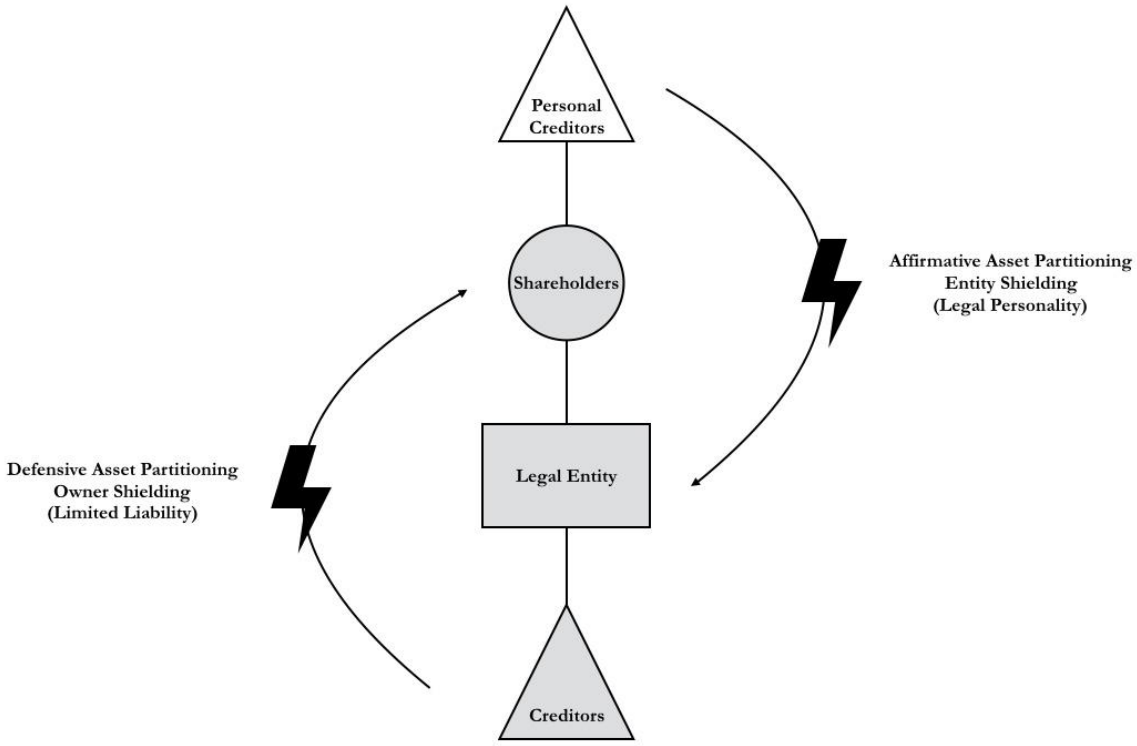


Figure 3.1: Affirmative and defensive asset partitioning. Affirmative asset partitioning, or entity shielding, protects the firm's assets from the shareholders' personal creditors. Defensive asset partitioning, or owner shielding, protects the firm's shareholders' assets from creditors of the firm.

Asset partitioning theory does not specify the legal nature of those from whom assets are shielded. It operates when a firm consists of *one entity* (so that the owners and creditors are external to the firm) and also when the firm is made up of a *group of entities* (so that, in most cases, the owners and creditors are internal to the firm). In the latter

case, which is common for larger businesses,[24] some entities in the group will be the owners and creditors of other legal entities that are part of the same firm. By maintaining asset partitioning in the context of a corporate group, the firm's assets are divided into smaller bundles that are assigned to its various legal entities. This economic phenomenon, whereby assets (and liabilities) are bundled and then segmented along legal entity lines in order to restrict their 'mobility' within the firm, we term *intrafirm segmentation*.[25]

As the corporate group grows, it starts to resemble a network of entities (see **Chapter 2**). In such a group, there is usually one entity at the top, the parent (or 'holding') company. This parent company tends to be the public face of the firm. Owners of the firm own shares in the parent company, which itself owns shares in the other entities in the group (the 'subsidiaries'[26]).[27] Those subsidiaries can in turn hold shares in subordinate entities, and so forth.[28] The result is increasingly complex intrafirm

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[24] See eg Melvin Aron Eisenberg, 'Megasubsidiaires: The Effect of Corporate Structure on Corporate Control' (1971) 84 Harvard Law Review 1577; Richard Squire, 'Strategic Liability in the Corporate Group' (2011) 78 The University of Chicago Law Review 605, 606.

[25] Asset partitioning is a subset of intrafirm segmentation, namely segmentation brought about through corporate law. Intrafirm segmentation can, however, also be the result of regulatory segmentation, see Section II(A).

[26] As discussed in **Chapter 2**, the term 'subsidiary' is commonly used to refer to an entity that is owned (through share ownership) by the parent company, but the scope of a G-SIBs prudential perimeter may include entities that do not fit that description. For ease of exposition, we will use the term 'subsidiary' in the remainder of this thesis to encompass all legal entities (except the parent) that fall within a G-SIB's prudential perimeter (unless otherwise stated).

[27] Squire (n 24) 612 ('This array of subsidiaries lies as if below a waterline, its structure hidden from public view.').

[28] The creation of such subsidiaries is referred to as 'subsidiarisation'.

segmentation, especially when ownership structures interlock. However, in most cases '[t]he division is legal but not real: all group members continue to be controlled by the same senior managers and owned by the same ultimate shareholders'[29] and frequently form an integrated economic enterprise. The legal and economic (or financial) structure of the firm do, in that sense, not always overlap.

Various theories attempt to explain why asset partitioning, generated through subsidiarisation, is used in this way.[30] Sceptics see it as legal fiction that complicates insolvency proceedings[31] and is used to mislead creditors and to deny them legitimate recourse to the firm's assets.[32] Proponents have criticised this latter view for being unduly shaped by 'a conception of the credit process as one in which scheming entrepreneurs manipulate hapless creditors'.[33] Instead, they justify asset partitioning on functional grounds, arguing that asset partitioning (1) facilitates credit monitoring by

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[29] Squire (n 24) 611.

[30] **Chapter 1** reviewed multiple rationales for the use of multiple legal entities within a firm, including asset partitioning. Here, I focus on the benefits of subsidiarisation as they relate to asset partitioning.

[31] Hansmann, Kraakman and Squire (n 16) 1401 (describing the possibility of fraud, increasingly difficult monitoring, and the heightened complexity of bankruptcy proceedings that may result from 'profligate asset partitioning'). More generally, see Richard A. Posner, 'The Rights of Creditors of Affiliated Corporations' (1975) 43 University of Chicago Law Review 499.

[32] The paradigmatic example of this line of argument is offered by Jonathan Landers, see Jonathan M Landers, 'A Unified Approach to Parent, Subsidiary, and Affiliate Questions in Bankruptcy' (1975) 42 University of Chicago Law Review 589 (arguing that a corporate group is a single economic enterprise and, subject to two exceptions, should be treated as such); Jonathan M Landers, 'Another Word on Parents, Subsidiaries and Affiliates in Bankruptcy' (1976) 43 University of Chicago Law Review 527.

[33] Posner (n 31) 500 ('[Management] juggles the assets of the enterprise among the corporations to thwart these claimants.'). U.S. appellate courts seem to broadly share this view, see eg Steven L Schwarcz, 'Collapsing Corporate Structures: Resolving the Tension between Form and Substance' (2004) 60 Business Law 109.

allowing creditors to focus on a smaller or more uniform set of assets,[34] (2) enables the firm's management to better monitor managerial performance in subsidiaries (provided that the subsidiary structure overlaps with the business divisions[35]),[36] (3) enables specialised risk-bearing,[37] and (4) facilitates the transferability of 'bundles of contracts'.[38] Theory aside, it is empirically beyond doubt that the use of subsidiarisation is now widespread, especially in the financial sector.[39]

But while subsidiarisation is widespread, the associated asset partitioning is frequently abandoned. Abandoning asset partitioning involves the use of 'de-partitioning measures'[40], which operate to fully or partially lift one of the two legal foundations of asset partitioning, most commonly that of priority. In some cases, de-partitioning is involuntary: it is imposed on the firm through judicial intervention, for

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[34] Hansmann and Kraakman (n 17) 401-403. Posner argued that appraisal and monitoring, for example of covenants and credit risk, is facilitated by the risk-compartmentalisation that subsidiarisation enables, provided subsidiaries create neat bundles of contracts that are structured functionally, see Posner (n 31) 508-509.

[35] Of course, this only works if the 'profit centres' follow subsidiary boundary lines, as Posner (n 31) acknowledged at fn 26 ('In some cases, however, the profit center may not coincide with divisional or corporate boundary lines.').

[36] This might also be used as a basis for compensation payments for divisional managers, see Posner (n 31) 513.

[37] Posner (n 31) 502. On specialised risk-bearing more generally, see Kenneth J Arrow, *Essays in the Theory of Risk-Bearing* (North-Holland 1971); Kenneth J Arrow, 'The Theory of Risk-Bearing: Small and Great Risks' (1996) 12 Journal of Risk and Uncertainty 103; Oren Sussman, *First Principles of Financial Economics* (Draft textbook: October 2018, on file with author) ch 5.

[38] Ayotte and Hansmann (n 16).

[39] As discussed in **Chapters 1** and **2**.

[40] De-partitioning measures, a term used in the context of corporate law segmentation, are a subset of de-segmentation measures.

example using veil-piercing[41] or veil-peeking[42] doctrines or through the use of substantive consolidation in insolvency[43].[44] In others, it is the consequence of a deliberate choice of the firm's management,[45] which has been characterised as 'veil-piercing by contract'.[46]

The most common mechanism by which asset partitioning is deliberately abandoned by the firm's management is through the provision of intrafirm guarantees[47]

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[41] On veil piercing generally, see eg Easterbrook and Fischel (1983) (n 14); Easterbrook and Fischel (1985) (n 14); Schwarcz (n 33). UK courts have varied somewhat in their judgments but remain largely restrictive, see *Salomon v A Salomon & Co Ltd* [1897] AC 22; *Adams v Cape Industries* [1990] Ch 433, CA; Paul Davies, *Introduction to Company Law* (Second Edition, Oxford University Press 2010) 96-99.

[42] See Mariana Pargendler, 'Veil Peeking: The Corporation as a Nexus for Regulation' (2021) 169 University of Pennsylvania Law Review 717.

[43] See eg Schwarcz (n 33); William H Widen, 'Corporate Form and Substantive Consolidation' (2007) 75 The George Washington Law Review 237, 251-267.

[44] Alternatively, in the UK the issue is also approached using the doctrine of shadow directors in the context of wrongful trading: if the parent company can be treated as a 'shadow director', it may be liable under Section 214 of the Insolvency Act for actions taken that contravene the interests of the creditors of the subsidiary in the period before insolvency if it failed to treat the management of the subsidiary as having an independent existence (the latter being a lower standard than that required under the common law doctrine of veil piercing). See eg Davies (n 41) 97.

[45] Squire (n 24) 614 ('The seeming saboteurs are the group's managers, who compromise the integrity of the cargo holds by causing the entities in the group to guarantee each other's major outside debts.').

[46] Squire (n 24) 615 (noting that the practical effect of veil-piercing is similar to that of an intragroup guarantee); Widen (n 43) 265.

[47] See eg Robert J Rosenberg 'Intercorporate Guarantees and the Law of Fraudulent Conveyances: Lender Beware' 125 University of Pennsylvania Law Review 235. For an overview of various types of guarantees, see Squire (n 24) 629; Anthony J Casey, 'The New Corporate Web: Tailored Entity Partitions and Creditors' Selective Enforcement' (2015) 124 Yale Law Journal 2680, Appendix. US banks usually disclose some of their guarantees in their 10-K filings, see eg The Goldman Sachs Group, Inc., 'Annual Report on Form 10-K for the Fiscal Year Ended December 31, 2017' (2018) 166 ('Group Inc. fully and unconditionally guarantees the securities issued by GS Finance Corp., a wholly-owned finance subsidiary of the firm. Group Inc. has guaranteed the payment obligations of Goldman Sachs & Co. LLC (GS&Co.) and GS Bank USA, subject to certain exceptions.')

and various other intrafirm support measures.[48] In essence, such practices imply that legal entities within the same group guarantee each other's outside liabilities in case of an entity's insolvency.[49]

Imagine two legal entities, *A* and *B*, that are both part of the same firm *F*(*A*, *B*). An outside company, *C*, makes a loan to *A*. *B* has offered a full guarantee to *C* for *A*'s loan. Consequently, if *A* cannot meet its obligations, *C* can seize *B*'s assets. This clearly breaks down the asset partitioning that, absent the guarantee, would obtain between *A* and *B*: *B*'s creditors are now not only exposed to the risk that *B* fails, but also to the risk that *A* does. It follows that the legal boundary between *A* and *B* no longer compartmentalises assets or risk. Similarly, *C*'s creditors are not only exposed to the risks faced by *C* or *A*, but also to those faced by *B*. From the perspective of *C* and its creditors, *A* and *B*'s assets are fully pooled – in other words, for all intents and purposes *C*'s counterparty is not merely entity *A*, but the firm *F*(*A*, *B*).

There are sound reasons for the provision of intrafirm guarantees.[50] They allow lenders to ignore the firm's subsidiary structure, which could lower monitoring costs in

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[48] Alternative intrafirm support measures include letters of credit, equity injections, letters of comfort, declarations of backing, and committed facilities (senior loans). For an overview of their use in banking groups, see The Joint Forum, *Report on Intra-Group Support Measures* (2012) Bank for International Settlements. For ease of exposition, this Chapter will consistently refer to 'guarantees' when discussing corporate law de-segmentation measures. Functionally, however, the alternative measures mentioned here could replace the guarantee without significantly altering the analysis in this Chapter.

[49] UK courts can take a restrictive view when determining whether a parent has guaranteed a subsidiary's liabilities, see eg *Re Polly Peck International Plc (In Administration)* [1996] 2 All ER 433.

[50] See eg Widen (n 43) 265; Squire (n 24) 618.

case the firm's asset partitioning structure is contrived and does not follow economically functional boundaries (see **Chapter 2**).[51] Moreover, guarantees lower the lender's exposure to the risk that the firm's managers siphon off the borrower's assets into another subsidiary that the creditor cannot reach.[52] Most commonly, however, such guarantees are provided to sophisticated lenders who, in theory, are best-equipped[53] to deal with such risks.[54]

In addition to the legal de-partitioning mechanisms, sloppy managerial practice that does not reflect the partitioning along legal entity lines can also make a mockery of asset partitioning. This could be referred to as *de facto* (as opposed to *de jure*) de-partitioning. Notoriously, *de facto* de-partitioning may be a consequence of 'slipshod internal accounting'[55] that does not keep track of which assets and liabilities properly belong to which of their entities.[56] Such practices are more widespread than might be

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[51] Especially when guarantees are necessary because the 'irrational' subsidiarisation (eg along non-functional lines) raises the cost of credit in the first place, see Squire (n 24) 619.

[52] See eg Avery Wiener Katz, 'An Economic Analysis of the Guaranty Contract' (1999) 66 University of Chicago Law Review 47, 73-74; Phillip I Blumberg, 'Intragroup (Upstream, Cross-Stream, and Downstream) Guarantees under the Uniform Fraudulent Transfer Act' (1987) 9 Cardozo Law Review 658, 686-687; Kenneth J Carl, 'Fraudulent Transfer Attacks on Guaranties in Bankruptcy' (1986) 60 American Bankruptcy Law Journal 109, 111.

[53] Notwithstanding this remark, the guarantees still reduce monitoring costs for sophisticated lenders.

[54] This may be problematic, however, because these sophisticated lenders would otherwise have pressured managers to maintain good subsidiary-level accounts. Now, they need no longer care about intrafirm asset partitioning, because they have a claim against the consolidated assets (for which good accounts are available).

[55] Squire (n 24) 609, and 608 ('apathetic internal recordkeeping').

[56] See eg Squire (n 24) 616 ('[C]orporate groups are notoriously bad at keeping track of which assets and liabilities properly belong to which of their constituent members. Indeed, it is sloppy or apathetic internal recordkeeping, rather than the deliberate shell game described by Landers, that bankruptcy judges cite as

assumed, even at presumptively sophisticated parties. For example, in order to try and seal a deal with Barclays, executives of Lehman Brothers' US broker-dealer operation famously engaged in an 'asset scramble' whereby, on a Friday morning, they 'discovered' $5 billion in additional assets on its various balance sheets.[57] Similarly, incompatible IT systems that do not overlap with legal entities (but rather, for example, with business lines and legacy infrastructure) can further complicate internal accounting and render clean, functional asset partitioning that aligns the legal and the economic (and financial, and accounting) reality a mirage. Following years of rapid growth through acquisitions, Deutsche Bank's challenge in rationalising its internal IT systems – which have been referred to as 'spaghetti infrastructure' – illustrates the salience of this problem.[58]

Critically, it is worth observing, as Richard Squire has done in a compelling paper, that the arguments explaining the existence of guarantees directly contradict those that support asset partitioning (and vice versa).[59] These opposing predictions are

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the main reason they so often are forced to collapse groups through the doctrine of substantive consolidation.').

[57] Kwon-Yong Jin, 'How to Eat an Elephant: Corporate Group Structure of Systemically Important Financial Institutions, Orderly Liquidation Authority, and Single Point of Entry Resolution' (2015) 124 Yale Law Journal 1746, 1775-1776. In the runup to its demise, Lehman Brothers was similarly scrambling for unencumbered assets in response to a collateral call from JPMorgan, revealing 'confusion about the ownership of certain assets', see Rosalind Z Wiggins and Andrew Metrick, 'The Lehman Brothers Bankruptcy E: The Effect on Lehman's U.S. Broker-Dealer' (2015) Yale Program on Financial Regulation Case Study 2014-3E-V1, 10.

[58] Patrick Jenkins and Laura Noonan, 'How Deutsche Bank's High-Stakes Gamble Went Wrong' (November 9, 2017) Financial Times.

[59] Squire (n 24).

puzzling, because both partitioning and de-partitioning frequently take place simultaneously – something these theories cannot explain.

There are several explanations for the simultaneous presence of both asset partitioning and de-partitioning. Squire, for example, argues that an opportunism hazard he calls 'correlation-seeking' – a practice where a firm incurs contingent debts that (can be made to) correlate with the firm's insolvency risk – explains part of the picture.[60] A more mundane set of explanations suggests that firms may deploy subsidiarisation to obtain tax and regulatory benefits, but prefer to avoid the segmentation that such subsidiarisation may entail.[61] In an attempt to optimise the benefits of, and minimise the costs associated with, subsidiarisation, firms design complex intrafirm structures that simultaneously deploy partitioning and de-partitioning techniques and enable them to selective benefit from the use of legal entities. Finally, it is increasingly questionable whether subsidiarisation and the provision of guarantees takes place along functional lines at all,[62] so that what may appear to be a puzzle is just the haphazard product of poor management and legacy systems that have not been rationalised.[63]

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[60] Squire (n 24) (hypothesising that the simultaneous use of subsidiarisation and guarantees can be explained by correlation-seeking.).

[61] See **Chapter 1**. A further discussion of this use of subsidiarisation in relation to intrafirm segmentation is beyond the scope of this Chapter.

[62] In fact, the literature on guarantees usually suggests that guarantees are called for exactly because a firm is a single economic enterprise and 'that its internal boundary lines are not informationally useful to creditors', see Squire (n 24) 617. This account conflicts with Posner's view of the corporate group ('legal boundaries between affiliated corporations demarcate real, functional distinctions among asset bundles, thereby compartmentalising the credit risks of what are, for practical purposes, separate enterprises'), see Posner (n 31).

[63] See eg Squire (n 24) 614 ('[T]he insides of corporate groups are not nearly so orderly. Instead of following clean functional lines, their bulkheads often are jumbled and in a state of disrepair. And, rather

II. REGULATORY SEGMENTATION

The term 'asset partitioning' is now so closely related to corporate law theory that it is helpful to distinguish the method of partitioning from the economic result. For the purposes of this thesis, what matters is not the source of the partitioning *per se* but the economic result: we will refer to this result as economic *segmentation* of the firm along legal entity lines. This Section focuses on the economic phenomenon of *intrafirm segmentation*, and broadens the discussion of its legal sources beyond corporate law.[64]

A. A New Perspective: Regulatory Intrafirm Segmentation

Subsidiarisation coupled with (*de facto*) asset partitioning has led to sprawling, intricate, and opaque corporate groups. Perhaps nowhere has this been more evident than in the

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than being watertight, the partitions leak – indeed, they are *rigged* to leak – in rough financial seas.'). It is also not clear that management necessarily has an incentive to keep track of assets, see Squire (n 24) 608 ('Finally, firms lose the incentive to keep track of which assets and liabilities properly belong to which constituent entities. This incentive disappears because firms have more subsidiaries than logical organisational divisions, and because their most sophisticated lenders – who otherwise would penalise them for sloppy internal accounting – are issued guarantees that make the lenders indifferent of to the allocation of value among entities.'). Having said that, there seems to be an appetite – perhaps inspired by regulatory scrutiny (see **Chapter 1**) – for firms to clear up their entity structures, as evidenced by the Legal Entity Rationalisation (LER) programmes advertised by major accountancy and consulting firms, see eg EY, 'Legal Entity Rationalization' (2013), available at https://www.ey.com/Publication/vwLUAssets/EY-Legal_entity_rationalization/$FILE/Legal-entity-rationalization.pdf; Sarah Dahlgren, Merlina Manocaran, Gerhard Schröck and Andrea Stefanucci, 'Resolution Planning: How Banks Can Tackle Legal-Entity Rationalization in 2017' (2017) McKinsey & Co, available at https://www.mckinsey.com/business-functions/risk/our-insights/resolution-planning-how-banks-can-tackle-legal-entity-rationalization-in-2017.

[64] In this sense, 'asset partitioning' refers to segmentation of the firm by means of corporate law.

financial sector and, particularly, in banking groups, which have grown to resemble vast and complex networks of interrelated entities.[65]

In **Chapter 1** we discussed that 'complex' intrafirm structures that are the product of private ordering may create social costs. At that stage, the problematic nature of 'complexity' remained ambiguous, but now we can hone in on one of its prudentially relevant dimensions: intrafirm segmentation. Unsurprisingly, the privately created segmentation of G-SIBs (usually by means of asset (de-)partitioning) may also imperil regulatory objectives.[66] First, a bank's haphazard asset partitioning can substantially complicate resolution, rendering it disorderly and exceedingly damaging to the wider economy.[67] When asset bundles are unclearly defined[68], or when it is not clear to what legal entity assets and liabilities belong, purchase-and-assumption methods cannot operate effectively.[69] Similarly, disentangling the core banking operations from the 'bad bank' in a swift and orderly manner may become untenable if these operations are deeply intertwined in ways that are not well-documented. Second, a regulator might want to prevent the commingling of certain activities and their associated assets and

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[65] As discussed in **Chapters 1** and **2**.

[66] As outlined in **Chapter 1**, this thesis focuses specifically on prudential objectives. See also Steven L Schwarcz, 'Ring-Fencing' (2013) 87 Southern California Law Review 69.

[67] See eg Jin (n 57).

[68] See eg Ayotte and Hansmann (n 16).

[69] See eg John Armour, 'Making Bank Resolution Credible' in Niamh Moloney, Eilís Ferran and Jennifer Payne (eds), *The Oxford Handbook of Financial Regulation* (Oxford University Press 2015); Jin (n 57).

liabilities. This may be out of concerns for cultural contagion[70] or financial contagion[71]. Alternatively, such measures may be driven by a desire to limit the cross-subsidisation of non-core banking activities that could arise when they are too closely intertwined with the (implicitly) supported 'core activities' (like deposit taking) of banks, which the government may elect to support in case of a looming insolvency.[72] Prominent examples of such structural regulation include the ring-fencing of retail banks in the UK, and the

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[70] Parliamentary Commission on Banking Standards ('PCBS'), *Changing Banking for Good – Oral Evidence*, HL Paper 27-III; HC 175-III (HMSO, 2013), Q588 (Andy Haldane notes: '[A]longside the financial reasons why you might seek separation or ring-fencing (…), equally, and in some ways more important, is what ring-fencing or separation might do to separate out cultures (…).'). Paul A Volcker, 'Commentary on the Restrictions on Proprietary Trading by Insured Depository Institutions' (13 February 2012) available at https://online.wsj.com/public/resources/documents/Volcker_Rule_Essay_2-13-12.pdf ('The need to restrict proprietary trading is not only, or perhaps most importantly, a matter of the immediate market risks involved. It is the seemingly inevitable implication for the culture of the commercial banking institutions involved, manifested in the huge incentives to take risk inherent in the compensation practices for the traders. Can one group of employees be so richly rewarded, the traders, for essentially speculative, impersonal, short-term trading activities while professional commercial bankers providing essential commercial banking services to customers, and properly imbued with fiduciary values, be confined to a much more modest structure of compensation?').

[71] See eg Independent Commission on Banking (n 8) 9 ('The aims of insulating U.K. retail banking from external shocks and of diminishing problems (including for resolvability) of financial interconnectedness imply that a wide range of services should *not be permitted* in the ring fence.') This view has been disputed on the ground that universal banking and the associated diversification may actually stabilise the bank as a whole, see eg Charles Goodhart, 'The Vickers Report: An Assessment' (2015) 6 Law and Financial Markets Review 32; Randall D Guynn and Patrick S Kenadjian, 'Structural Solutions: Blinded by Volcker, Vickers, Liikanen, Glass Steagall and Narrow Banking' in Patrick S Kenadjian and Andreas Sombret (eds) *Too Big to Fail III: Structural Reform Proposals – Should We Break Up the Banks?* (De Gruyter 2015).

[72] This may be the case when deposit-taking, which is commonly supported by a deposit guarantee scheme, is combined with investment banking activities, which are commonly not explicitly supported by the government *ex ante*. By co-mingling these activities, the (implicit) guarantee for deposits might be passed on to the investment banking activities in the form of a lower cost of capital, see eg John Vickers, 'Some Economics of Banking Reform' (2012) Rivista di Politica Economica (October/December 2012); Independent Commission on Banking (n 8); Leonardo Gambacorta and Adrian van Rixtel, 'Structural Bank Regulation Initiatives: Approaches and Implications' (2013) BIS Working Papers No 412, 1 ('The basic rationale for the structural measures is to insulate certain types of financial activities regarded as especially important for the real economy, or significant on consumer/depositor protection grounds, from the risks that emanate from potentially riskier but less important activities.'); Armour et al. (n 3) ch 23; D Wilson Ervin, 'The Risky Business of Ring-Fencing' (2017) Working Paper (retrieved on 15 December 2017).

imposition of the Volcker Rule in the US. Third, regulators may intervene to alter a bank's asset partitioning when doing so might mitigate informational problems by clarifying and simplifying asset partitioning patterns.

These three regulatory problems, whilst potentially serious within a given jurisdiction, come into even sharper focus when considering banks with cross-border operations.[73] First, as resolution becomes a cross-border undertaking, the interests of home and host regulators may diverge.[74] Second, segmentation along jurisdictional boundaries may prevent (implicit) subsidies granted to 'core activities' in one jurisdiction from subsidising activities outside that jurisdiction – which would allow regulators in other jurisdictions to free-ride on that backstop, especially in times of stress.

Given the problems generated by segmentation in banks, it is perhaps unsurprising that it is increasingly common for regulators to intervene not only to alter G-SIBs' intrafirm structure, but more specifically to change the way they are segmented. Such interventions commonly involve restrictions on the legal entities that make up the group, so that the intrafirm segmentation resulting from corporate law asset partitioning is altered by these regulatory interventions. Regulators may, for example, limit the types

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[73] See eg Katia D'Hulster, 'How Important is Ring-Fencing in Bank Prudential Regulation and Supervision?' (2014) 23 Journal of Financial Regulation and Compliance 322 (for measures of 'home bias' in prudential regulation). This point is made more extensively below, see **Chapter 4**.

[74] See eg Richard J Herring, 'Conflicts Between Home and Host Country Prudential Supervisors' in Douglas D Evanoff, George G Kaufman and John R LaBrosse (eds) *International Financial Stability: Global Banking and National Regulation* (World Scientific 2007); Dirk Schoenmaker, *Governance of International Banking: The Financial Trilemma* (Oxford University Press 2013). This issue is discussed at greater length in **Chapter 4**.

of exposures two entities within the same firm can have to each other, or enforce the attachment of assets to a particular legal entity in the firm to protect that entity's creditors (for example: depositors, in case the relevant legal entity has a banking license).

In other words, intrafirm segmentation is not only the result of corporate law segmentation, whether voluntary (eg guarantees) or involuntary (eg in insolvency), but also of (financial) regulation – an important example of the interaction between corporate law and financial regulation.[75] Since the regulatory challenges resulting from corporate law segmentation manifest themselves both within and between jurisdictions, regulatory segmentation takes place within and between jurisdictions as well.[76] In the inter-jurisdictional context, regulators regard it as an instrument that allows them to maintain control of crisis prevention and management within their jurisdiction, in service of their regulatory objective to safeguard financial stability.[77] Most commonly, such actions are taken by host regulators, but in some cases home regulators resort to their use too.[78]

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[75] For an overview of restrictions and regulatory requirements that apply to intrafirm support measures, see The Joint Forum (n 48), 14-18 (these include concentration limits, limits on upstream guarantees between banking subsidiaries, lending limits, and minimum capital requirements that limit intrafirm asset mobility).

[76] See eg Independent Commission on Banking (n 8); Gambacorta and Van Rixtel (n 72); Guynn and Kenadjian (n 71); Armour et al. (n 3) ch 23.

[77] See **Chapter 4**.

[78] This is usually the case for home jurisdictions with banks that have significant activities abroad, and are therefore rendered vulnerable to 'solvency, legal and operational problems in the event of financial stress', see eg Swiss Federal Market Supervisor Authority, *Final Report of the Commission of Experts for Limiting the Economic Risks of Large Companies* (2010).

Regulatory segmentation, which is involuntary by nature, can take place *ex ante* or *ex post*. *Ex post* regulatory segmentation commonly is an ad hoc measure; as part of a bank's resolution process, a regulator may, for example, prevent that bank's assets from leaving the jurisdiction.[79] *Ex ante* regulatory segmentation involves the regulator setting out, as a standard or a set of detailed prescriptions, some key segmentation parameters for banks to follow.[80] Standards are frequently used in the context of resolvability requirements and living wills, where banks are mandated to adopt a corporate structure that facilitates orderly resolution.[81] Prescriptive strategies, such as those used in structural regulation (eg the ring-fencing legislation in the UK[82]), generally take the form of (1) entity-level restrictions, prohibiting particular combinations of activities from

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[79] See, for example, *In re Liquidation of the N.Y. Agency & Other Assets of the Bank of Credit & Commerce International,* S.A. (BCCI), 587 N.Y.S.2d 524 (N.Y. Sup. Ct. 1992) (The court upheld the decision of the Superintendent of Banks of the State of New York to seize all of the assets of a foreign bank's state agency and to disburse these assets to the agency's creditors. As a consequence, the agency's New York creditors received more than other international creditors. The legal basis for the decision was the New York Consolidated Laws, Banking Law - BNK s 606.). Similarly, once the Federal Deposit Insurance Corporation ('FDIC') acts as a receiver to a financial institution, it has the power to avoid certain transfers, see 12 U.S.C. 5390 'Powers and Duties of the Corporation' (2016). For a more detailed discussion, see **Chapter 4**.

[80] Often, a regulatory segmentation regime uses a combination of both standards and details prescriptive requirements.

[81] Living wills were introduced in **Chapter 1**. For examples of the use of standards, see eg Bank Recovery and Resolution Directive, Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU and Regulations (EU) No 1093/2010 and (EU) No 648/2012 (hereafter 'BRRD'), Art 2 Section 1 sub 47 (definition of a resolvable bank), Annex Section C (non-exhaustive list of factors to consider in making the assessment whether a bank is resolvable).

[82] UK ring-fencing is discussed at greater length in **Chapters 5** and **6.**

being carried out from within the same legal entity,[83] and (2) intragroup restrictions, prescribing certain conditions on relationships between entities within the same banking group.[84]

Combining the various measures that make up such prescriptive strategies, regulators end up with a certain regulatory segmentation model, which can be characterised on a spectrum.[85] On one extreme, represented by the fully integrated banks, there is no regulatory segmentation within the firm and assets are pooled. Banks are given free rein and can, in principle, fully de-segment the firm.[86] The other extreme could be referred to as the Stand-Alone Subsidiary ('SAS') model, which mandates that a banking subsidiary operates fully independently and has its own asset pool.[87] That model, which has been deployed both within[88] and between jurisdictions, requires strong regulatory segmentation and heavily relies on intrafirm restrictions. Under the

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[83] In other words, the activities can be carried out from within the same banking group but should take place in separate legal entities. See eg Independent Commission on Banking (n 8).

[84] Such restrictions are frequently used to support the entity-level restrictions, see **Chapters 5** and **6**.

[85] See eg Gambacorta and Van Rixtel (n 72) (evaluating the Volcker Rule as well as the Vickers and Liikanen proposals).

[86] That is, the firm is free, at least from the perspectives of the regulator, to fully consolidate. The firm's management may still choose to voluntarily engage in segmentation, eg using corporate law (asset partitioning).

[87] Katia D'Hulster and Inci Otker-Robe, 'Ring-Fencing Cross-Border Banks: An Effective Supervisory Response?' (2018) 5 Journal of Financial Perspectives 1, 4 ('Complete separation means no intercompany transactions (hedging, loans, guarantees, and outsourcing of critical activities to a group company or transfer of funds). Each entity would hold sufficient capital and liquidity to survive on its own, thus reducing interconnectedness and contagion risk between the entities in the group.'). The aspiration is to create modularity within the banking group.

[88] The most striking example is likely the UK's ring-fencing regime, see **Chapters 5** and **6**.

UK's ring-fencing rules, for example, banks are required to 'ensure that intragroup transactions [between certain parts of the banking group] are conducted on arm's-length terms'[89]. These restrictions are designed to preserve segmentation and reduce intrafirm asset mobility, in order to ensure that the assets within the protected entity are used first and foremost to satisfy its own creditors. Specifically, such measures should prevent the protected entity from being exposed to contagion risks elsewhere in the banking group, and from supporting other entities in the group in ways that might jeopardise its own position.

Regulatory segmentation measures can take a variety of forms but are generally designed either to deploy segmentation techniques from corporate law, or to limit the ability of banks to undermine a certain intrafirm segmentation model. Deploying segmentation techniques from corporate law starts by requiring the creation of a new subsidiary to demarcate the pool of assets ('forced subsidiarisation'). In the United Kingdom, this subsidiary is referred to as a 'ring-fenced body' ('RFB'),[90] and it is the locus for the 'core banking activities' and the associated assets within a banking group. Alternatively, a subsidiary is created to act as an interface between the local subsidiaries

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[89] Prudential Regulation Authority ('PRA'), 'The Implementation of Ring-Fencing: Prudential Requirements, Intragroup Arrangements and Use of Financial Market Infrastructures' (October 2015) CP37/15, para 4.3, 24. See also PRA, 'The Implementation of Ring-Fencing: Prudential Requirements, Intragroup Arrangements and Use of Financial Market Infrastructures' (July 2016) PS20/16, para 7.20-28, 17-18; PRA, 'Supervisory Statement: Ring-Fenced Bodies (RFBs)' (February 2017, updating July 2016) SS8/16 (hereafter 'SS8/16'), para 7.16-19, 27-28. This requirement is based on FSMA Section 142H(5)(a) as inserted by Section 4(1) of the Act. The proposed implementing rules are contained in PRA Rulebook 2016/26, ch 12.

[90] See Financial Services and Markets Act 2000 ('FSMA'), as amended by the Financial Services (Banking Reform) Act 2013 ('the Act').

and the rest of the banking group, as is the case under the intermediate holding company ('IHC') requirements in the United States.[91] This IHC will act like a bridge between the local subsidiaries in the United States and the rest of the banking group, and regulators will police it like gatekeepers to enforce intrafirm segmentation and prevent assets from leaving the jurisdiction in times of crisis.[92]

Most regulatory segmentation measures are, however, designed to prevent parties from breaking down the segments within the firm. We refer to this phenomenon as 'de-segmentation'. These measures include rules that limit outflows from certain protected subsidiaries to other parts of the banking group, such as restrictions on intrafirm liquidity flows, upstream dividend restrictions, capital maintenance requirements at the entity level, asset pledges, intrafirm large exposure rules, and limits on intrafirm funding.[93] However, no rule can effectively prevent every possible de-

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[91] See 12 C.F.R. para 252.153 'US Intermediate Holding Company Requirement for Foreign Banking Organizations with U.S. Non-Branch Assets of $50 Billion or More' ('A foreign banking organization with U.S. non-branch assets of $50 billion or more must establish a U.S. intermediate holding company, or designate an existing subsidiary that meets the requirements of paragraph (a)(2) of this section, as its U.S. intermediate holding company.').

[92] For an overview, see Luigi L De Ghenghi, Andrew S Fei et al., 'US Intermediate Holding Company: Structuring and Regulatory Considerations for Foreign Banks' (April 2, 2014) Davis Polk Client Memorandum, available at https://www.davispolk.com/files/U.S.Intermediate.Holding.Company.Structuring.and_.Regulatory.Considerations.for_.Foreign.Banks_.pdf.

[93] For an overview and various examples, see In W Song, 'Foreign Bank Supervision and Challenges to Emerging Market Supervisors' (2004) IMF Working Paper 04/82 ('ring-fencing involves isolating the bank from other companies in the group by taking several actions, for instance by: (i) prohibiting or placing severe limits on the financial exposure of the bank vis-à-vis other companies in the group (ii) restricting the volume of funding the bank receives from companies in the group (iii) ensuring that directors and management of the bank can operate the bank independently of the group management.'); Eugenio Cerutti, Anna Ilyina, Yulia Makarova and Christian Schmieder, 'Bankers Without Borders? Implications of Ring-Fencing for European Cross-Border Banks' Peter Backé, Ernest Gnan and Philipp Hartmann (eds), *Contagion and Spillovers: New Insights from the Crisis* (SUERF 2010); The Joint Forum (n 48);

segmentation method while retaining the necessary flexibility to respond to unexpected circumstances, because doing so requires a semi-permeable segmentation. In such cases, the UK regime fills the gaps in the rules by imposing governance requirements on managers of the protected subsidiary that encourage them to act in the interests of the subsidiary and to protect its assets.[94] These measures vary widely in their reach, comprehensiveness, and strictness,[95] so that the resulting intrafirm segmentation can again be characterised on a scale from full segmentation to full de-segmentation. Most rules are semi-permeable, designed to allow prudent and functional corporate law de-segmentation, especially outside of crises.[96]

It is worth noting that regulatory interventions can also cause de-segmentation. Resolution planning, for example, can encourage the creation of so-called 'clean funding pathways', which allow the parent to recapitalise its subsidiaries under single point of entry resolution.[97] Creating such clean funding pathways essentially involves downstream de-segmentation, even though it does not have to be matched by upstream

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D'Hulster and Otker-Robe (n 87) 9 (Annex A provides an overview of ring-fencing measures adopted in various jurisdictions).

[94] This is how the UK's ring-fencing regime employs governance strategies in an effort to create a semi-permeable fence around RFBs. For an analysis of the efficacy of this strategy, see **Chapters 5** and **6**. In the UK, ring-fence governance is mandated under FSMA Section 142H(4)(b).

[95] See eg Gambacorta and Van Rixtel (n 72) Annex A.

[96] This flexibility leads to concerns that these rules may be permeable, see Wetzer (n 3). Also see Gambacorta and Van Rixtel (n 72) 4 (referring to the 'thickness of the line' between the ring-fenced entity and the rest of the firm).

[97] See eg Citigroup Inc., '2017 Resolution Plan: Public Section' (1 July 2017), 14; The Goldman Sachs Group, Inc., '2017 Resolution Plan: Public Section' (30 June 2017), 66. Single point of entry resolution is discussed at greater length in **Chapter 4**.

de-segmentation. Moreover, the 'source-of-strength doctrine' in the United States effectively requires entities to set aside intrafirm segmentation and support other parts of the banking group in times of financial stress.[98]

B. Interacting Segmentation Regimes

Given that intrafirm segmentation has (at least) two sources, corporate law and (financial) regulation[99], it is perhaps unsurprising that these two regimes may interact and overlap. The iterative nature of the interaction is intuitive.[100] If the *social costs* of corporate law segmentation, which ultimately arise as a product of private ordering, are judged to be unacceptably high, regulators may intervene by imposing regulatory (de-)segmentation to mitigate these costs. For example, the de-segmentation within universal banks, which cause retail and investment banking activities to be intermingled, was judged by UK regulators to undermine the interests of financial stability by causing moral hazard and excessive risk-taking; consequently, a policy requiring the ring-fencing of retail banks within banking groups was introduced.[101] Conversely, if a regulatory (de-

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[98] 12 U.S.C. para 1831o-1 'Source of Strength' ('The appropriate Federal banking agency for a bank holding company or savings and loan holding company shall require the bank holding company or savings and loan holding company to serve as a source of financial strength for any subsidiary of the bank holding company or savings and loan holding company that is a depository institution.'). For an evaluation, see Adam B Ashcraft, 'Are Bank Holding Companies a Source of Strength to Their Banking Subsidiaries?' (2008) 40 Journal of Money, Credit and Banking 273.

[99] Again, corporate law segmentation can be the result of a choice by the firm's management (*voluntary*) or imposed on the firm (*regulatory*, as might be the case in insolvency proceedings).

[100] See also **Chapter 1**.

[101] Independent Commission on Banking (n 8), 9.

)segmentation measure imposes *private costs* on individual institutions that their managers deem excessive, then those managers have a clear incentive to find loopholes to evade such measures through corporate law (private ordering) measures.[102] This type of arbitrage, which is enabled by incomplete and indeterminate regulatory segmentation rules,[103] usually requires the use of new legal entities. Widespread subsidiarisation, and arguably the complexity of corporate groups, can at least in part be explained by such iterative interactions between corporate law and regulatory segmentation.[104]

The close relation between corporate law and regulatory segmentation raises the question of whether there is a hierarchy between these two sources of segmentation that determines what happens when they overlap and conflict. Although this question cannot be answered universally, the prior, as elsewhere in corporate law, is that private ordering by means of corporate law segmentation is allowed if it is not disallowed by regulatory segmentation rules.[105]

With financial stability at risk, regulatory segmentation rules have historically broadened in scope, covering a wider range of situations than might have been anticipated *ex ante*. The intervention of the UK government during the Icelandic banking crisis in 2008 dramatically illustrates how regulatory powers can be stretched to

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[102] Of course, this logic will only apply if the benefit of such evasive action exceeds the cost of compliance with regulatory segmentation.

[103] See **Chapters 5** and **6**. Also see Wetzer (n 3), 205-213.

[104] See **Chapter 1**.

[105] Obligations arising from corporate law, including fiduciary duties, may also prevent (de-)segmentation.

enable regulatory segmentation. In the runup to 2008, Icelandic banks like Landsbanki and Kaupthing had expanded to multiple jurisdictions through branches and subsidiaries. In the UK, these banks rapidly gained market share by offering depositors high interest rates relative to their rivals.[106] However, in late September 2008, when the Icelandic financial system came under severe pressure due to concerns about the financial health of some Icelandic banks, all Icelandic banks became tainted.[107] The Icelandic government attempted to quell any concerns about the health of its banks by taking ownership stakes in some banks and providing emergency loans to others. However, and despite the country's initial low debt-to-GDP ratio and otherwise healthy economy, the combined size of the local banks' balance sheets relative to the size of the Icelandic economy raised renewed concerns, leading S&P and Fitch to downgrade Iceland's sovereign rating.[108] This, in turn, created an atmosphere of crisis that further adversely affected the Icelandic banks.

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[106] Gylfi Magnússon, 'What's The Lesson of Iceland's Collapse?' (22 May 2009) Yale Insights, available at https://insights.som.yale.edu/insights/whats-the-lesson-of-icelands-collapse; Basel Committee on Banking Supervision, 'Report and Recommendations of the Cross-Border Banking Group' (2010) Bank for International Settlements 12-14.

[107] This may have been a consequence of the Icelandic banks having a common regulator whose competence was questioned by investors and depositors. For an explanation of this mechanism, see Alan D Morrison and Lucy White, 'Reputational Contagion and Optimal Regulatory Forbearance' (2013) 110 Journal of Financial Economics 642.

[108] Basel Committee on Banking Supervision (n 106), 12. This account, supported by UK Chancellor of the Exchequer Alistair Darling, has been disputed by his Icelandic counterpart, see David Ibison, 'Iceland Requests $2bn Bail-Out from IMF' (October 24, 2008) Financial Times ('A transcript of a conversation between Mr Darling and the Icelandic finance minister obtained by the Financial Times reveals that at no time in the conversation did the Icelandic side say it did not intend to honour its obligations. Mr Haarde [the Icelandic prime minister at the time] told the FT on Friday: "The transcript of the conversation between the finance ministers clearly shows that the Icelandic government intended to honour its obligations." The U.K. Treasury insisted on Friday that Mr Darling had been told otherwise.').

As unrest spread, UK depositors in Landsbanki and Kaupthing had started to withdraw funds, leading to successive daily net outflows.[109] By early October 2008, UK supervisors feared that collapse of the Icelandic bank branches and subsidiaries located in the UK was imminent. According to UK officials, Icelandic supervisors were not willing to provide a guarantee to fulfil UK bank liabilities,[110] so the fear was that continuation of activities would rack up UK exposures. Hence, the UK's Financial Services Authority ('FSA'), the integrated financial market supervisor at the time, concluded that the local operations no longer met the conditions to operate as credit institutions and should therefore be closed and wound down. More strikingly, the UK Treasury decided on a 'defensive asset grab'[111] and ring-fenced all Icelandic banks' UK subsidiaries and assets. Ostensibly because existing laws related to insolvency law were 'not sufficient' to cover this situation,[112] the UK government used Section 4 of the *Anti-Terrorism, Crime, and Security Act 2001* to ring-fence the Icelandic bank's assets in the

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[109] Basel Committee on Banking Supervision (n 106) 12.

[110] Stijn Claessens, 'Lessons from the Recent Financial Crisis for Reforming National and International Financial Systems: The Road Ahead to a Sustainable Global Economic Systems' in Justin Yifu Lin and Boris Plescovic (eds) *Proceedings of the Annual Bank Conference on Development Economics 2010: Lessons from East Asia and the Global Financial Crisis* (World Bank 2011) 262; Julie Triedman, 'Ice Storm' (October 2011) American Lawyer.

[111] Claessens (n 110) 262 (also noting that '[e]xamples of defensive "asset grabs" were multiple').

[112] In the House of Commons Treasury Committee on Monday 3 November 2008, Colin Breed asked Chancellor of the Exchequer Alistair Darling why it was necessary for the Government to use anti-terrorism laws for the purpose of freezing the assets of the Icelandic banks, specifying 'Were the existing law relating to insolvency not sufficient to cover this situation?'. Mr Darling responded 'No, they were not (…)'. Treasury Committee, Uncorrected Evidence HC 1167-I (Monday 3 November 2008), available at

https://publications.parliament.U.K./pa/cm200708/cmselect/cmtreasy/uc1167-i/uc116702.htm.

UK[113] – essentially resorting to *ex post*, and clearly *ad hoc*, regulatory segmentation measures.

This unprecedented use of anti-terrorism powers grouped Landsbanki with Al Qaida and North Korea on the UK Treasury's list of regimes and organisations subjected to financial sanctions.[114] Although the UK government defended the use of these anti-terrorism powers on the grounds that the Act actually had the much broader purpose of protecting the UK's general economic interest – a purpose qualified as 'extraordinarily wide' by Lord Goodhart and challenged in the House of Lords when the bill was adopted[115] – the decision caused considerable irritation in Iceland and provoked comment in the UK.[116] Depositors on the Isle of Man and Guernsey, for example, pointed out that they did not benefit from the UK compensation scheme for which the assets were ring-fenced, but did suffer from the fact that the pool of assets they had recourse to had shrunk as a consequence of the UK government's

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[113] For Landsbanki, see Landsbanki Freezing Order 2008 (SI 2008/2668) and Landsbanki Freezing (Amendment) Order 2008 (SI 2008/2766).

[114] Hannes H Gissurarson, *Lessons for Europe from the 2008 Icelandic Bank Collapse* (European Reform 2018), 74-76.

[115] House of Lords, 'Debate on the Anti-Terrorism, Crime and Security Bill' (28 November 2001), Column 348. In this debate in the House of Lords, the purpose of the Act – adopted in the wake of September 11, 2001 – was clearly couched in terms of preventing terrorism by supporting terrorist investigations.

[116] See eg House of Commons Second Delegated Legislation Committee, 'Landesbanki Freezing Order 2008' (27 October 2008) Session 2007-08, Column 4 ('The plain impression was created for the general public and the Iceland Government that anti-terrorism legislation was being used for a totally unsuitable purpose. Can I take it that he accepts that using anti-terrorism legislation for a purpose of this kind would be an abuse? Does he accept that in future the Government should not include provisions in anti-terrorism legislation which are likely to be applied in anything other than situations where we are dealing with threatened terrorism?').

extraordinary action. Many other depositors based in different jurisdictions were in the same position. This is not the place to evaluate the actions of the UK government; the case study is simply meant to illustrate the general point that governments have the ability to stretch their authority to ring-fence assets (even if in a contestable manner), and that in such cases regulatory segmentation can be imposed without regard to a bank's corporate law segmentation setup.

There are, however, cases that qualify the prior in favour of regulatory intrafirm segmentation, suggesting that a blanket rule concerning the hierarchy of segmentation sources cannot be assumed. Following financial market's loss of confidence in Fortis, a major Belgian-Dutch financial conglomerate, its regulators decided to split the group in multiple parts.[117] In the Fall of 2008, the Belgian government had raised its stake in Fortis Bank Belgium to 99 percent and was planning to sell a 75 percent stake to the French bank BNP Paribas in return for new shares in that bank. The deal also involved moving a portfolio of structured products from Fortis Bank Belgium to a financial structure owned by the Belgian State, BNP Paribas, and Fortis Group.[118] However, on 12 December 2008 the Brussels Court of Appeal suspended the sale to BNP, which was not yet finalised, and decided that the finalised transactions that preceded it – and had led to the splitting up of the Fortis group – had to be submitted for approval to the general meeting of shareholders of Fortis Holding to be valid under Belgian law.[119] The

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[117] The case of Fortis is discussed at greater length in **Chapter 4**.

[118] Basel Committee on Banking Supervision (n 106) 10 (para 31).

[119] Basel Committee on Banking Supervision (n 106) 11 (para 32).

shareholders initially rejected the deal, but a renegotiated transaction was later approved. This case illustrates that it is not always possible to override shareholder rights when taking regulatory actions designed to maintain financial stability – including regulatory interventions to change or break up a bank's intrafirm structure.[120]

A bank's intrafirm segmentation is thus the product of joint actions of corporate law and regulation on its intrafirm structure. However, analysing corporate law and regulatory segmentation may not yield a complete picture of a firm's segmentation. This is because there are relationships between the firm's legal entities that we do not call 'guarantees' in the legal sense, but that functionally act like guarantees. One major example of such a relationship, which can be subtle and hard to observe *ex ante*, is that of reputational ties.[121] Even where a subsidiary is fully segmented from a firm's parent company, market participants commonly still expect the parent company to stand behind and support the subsidiary when it can no longer meet its obligations.[122] A failure on the part of the parent to do so could be interpreted as a signal of weakness, casting doubt on the financial viability not just of the subsidiary or parent but of the entire

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[120] Whether this is the case, however, depends on the financial supervisory legislation in a jurisdiction. In this case, Belgium legislation did not allow for such special measures that override the rights of shareholders, even in emergency situations. Under the BRRD (n 81), this has now changed, see eg Art 39(4) (sale of business tool); EBA, 'Final Draft Guidelines on the Effectiveness of the Sale of Business Tool' (20 May 2015) EBA/GL/2015/04.

[121] See eg Richard Herring and Til Schuermann, 'The Regulation of Position Risk in Banks, Securities Firms and Insurance Companies', in Hal S. Scott (ed.), *Capital Adequacy Beyond Basel, Banking, Securities and Insurance* (Oxford University Press 2005). See also **Chapter 4**.

[122] Unless, potentially, regulatory segmentation prevents the firm from supporting the subsidiary. In that case, not supporting the subsidiary would at most be a noisy signal about the parent company's financial health and may not even be a signal at all.

firm.[123] In light of such risk, the parent company may be compelled to support the subsidiary – notwithstanding the lack of any legal obligation to do so.[124] Such 'step-in risk'[125], which illustrates the 'braided'[126] nature of intrafirm segmentation, adds to the complexity and opacity of intrafirm structures.

The interaction of the two formal, 'legal' sources of intrafirm (de-)segmentation and the more tacit relationships can be pernicious. A seemingly arcane set of rules, designed to enhance transparency and resilience in derivatives markets,[127] provides a fascinating example as well as a cautionary tale of the risks that complex interactions between corporate law segmentation, regulatory segmentation measures, and more tacit reputational ties may give rise to.[128] This example is documented by Greenberger, from

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[123] Herring and Schuermann (n 121).

[124] See eg Independent Commission on Banking (n 8) 63 (There is strong evidence that reputational links are indeed important in banking. However, this means that full separation has risks as well as benefits. Reputational links mean that it is likely that a ring-fenced bank would if possible be saved from failure by the rest of its corporate group if it got into difficulty.').

[125] See eg Basel Committee on Banking Supervision, *Guidelines: Identification and Management of Step-In Risk* (October 2017). For a discussion on the implications of such step-in risk for the firm's prudential perimeter, see **Chapter 2**.

[126] See Ron Gilson, Charles Sabel, and Robert Scott, "Braiding: The Interaction of Formal and Informal Contracting in Theory, Practice, and Doctrine" (2010) 110 Columbia Law Review (2010) 1377 (introducing the term 'braiding' to describe the intertwining of formal and informal mechanisms in contract design). A key difference between the use of the term 'braiding' in this Chapter and that used by Gilson et al. is that in the examples highlighted in this Chapter the mix of corporate law and regulatory (de-)segmentation measures on the one hand and reputation on the other does not have to be *ex ante* deliberate.

[127] For a breakdown of derivative contracts, see Dan Awrey, 'Split Derivatives: Inside the World's Most Misunderstood Contract' (forthcoming) Yale Journal on Regulation.

[128] See Emily Flitter, 'Decade After Crisis, a $600 Trillion Market Remains Murky to Regulators' (22 July 2018) New York Times.

whose account this case study is derived.[129] Prior to the financial crisis, derivatives markets had grown to become vast, risky, and opaque, making it simultaneously important for regulators to understand the risks in these markets and hard for them accurately to do so.[130] These conditions invited a crisis, and when one indeed arrived in 2007 it was unclear where problems lurked and therefore harder to deal with them.[131] Because it proved difficult to untangle the direct and indirect connections between institutions created by derivatives, investors and banks stopped lending to one another altogether, causing markets to freeze.[132]

Following the crisis, US legislators and regulators worked to resolve this informational problem and included rules in the Dodd-Frank Wall Street Reform and Consumer Protection Act[133] (hereinafter the 'Dodd-Frank Act') designed to enhance the ability of regulators to monitor derivatives markets and make them more resilient. Specifically, US derivative dealers had to report detailed information about their trades,

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[129] For a more elaborate discussion of the case study presented here (on which this part of the chapter draws), see Michael Greenberger, 'Too Big to Fail U.S. Banks' Regulatory Alchemy: Converting an Obscure Agency Footnote into an "At Will" Nullification of Dodd-Frank's Regulation of the Multi-Trillion Dollar Financial Swaps Market' (2018) INET Working Paper No. 74, 29-30.

[130] See eg Lynn Stout, 'Derivatives and the Legal Origin of the 2008 Financial Crisis' (2012) 1 Harvard Business Law Review 1; Dan Awrey, 'Complexity, Innovation, and the Regulation of Modern Financial Markets' (2012) 2 Harvard Business Law Review 235.

[131] Generally, see Awrey (n 130).

[132] See eg Kenneth R French, Martin N Baily, John Y Campbell, John H Cochrane, Douglas W Diamond, Darrell Duffie, Anil K Kashyap, Frederic S Mishkin, Raghuram G Rajan, David S Scharfstein, Robert J Shiller, Hyun Song Shin, Matthew J Slaughter, Jeremy C Stein and René M Schultz, *The Squam Lake Report: Fixing the Financial System* (Princeton University Press 2010) chs 3, 9, 10.

[133] Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111–203, 124 Stat. 1376 (2010) (hereafter: Dodd-Frank Act).

including their counterparty, to the Commodity Futures Trading Commission ('CFTC'), which would then proceed to monitor and regulate them.[134] This rule was primarily directed at four systemically important US banks[135] (Citibank, J.P. Morgan Chase, Goldman Sachs, and Bank of America) which together dominated the US derivatives market, taking a market share of more than 90%.[136]

The rules target activities by US derivative dealers as well as by their foreign affiliates. The straightforward rationale for this extraterritorial move was that swaps trading activities in foreign affiliates could adversely affect operations in the US, for example through cascading swap defaults within the corporate group. Therefore, the Dodd-Frank Act was crafted with the intention to apply to swaps transactions when those activities (1) 'have a direct and significant connection with activities in, or effect on, commerce in the United States', or (2) 'contravene such rules or regulations as the [CFTC] may prescribe or promulgate as are necessary or appropriate to prevent the evasion of any provision [of Dodd-Frank].'[137] As the CFTC concluded,

> [T]he Commission has also considered the potential for cross-border activities to have substantial connection to or impact on the US financial system and the

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[134] Dodd-Frank Act, paras 727 (amending the Commodity Exchange Act, 7 U.S.C. 2(a)), 728 (amending the Commodity Exchange Act, 7 U.S.C. 24a), 17 C.F.R. para 45 (2018). For an overview of the changes the Dodd-Frank Act introduced to the regulation of derivatives markets, see Greenberger (n 129) 53-57.

[135] At the time, following determinations at the Financial Stability Board, the U.S. Financial Stability Oversight Council regarded these four banks as G-SIBs, see Financial Stability Board, *2016 List of Global Systemically Important Banks (G- SIBs)* (21 November 2016) available at http://www.fsb.org/wp-content/uploads/2016-list-of-global-systemically-important-banks-G-SIBs.pdf.

[136] Greenberger (n 129) 56, 60.

[137] 7 U.S.C. 2(i) 'Jurisdiction of the Commission'.

> global, highly integrated nature of today's swap business; to fulfil the purposes of the Dodd-Frank swaps reform, the Commission's supervisory oversight cannot be confined to activities strictly within the territory of the United States.[138]

To implement this principle, the CFTC issued guidance containing a complex set of rules that outlined when the swap rules in the Dodd-Frank Act had extraterritorial effect.[139] The swaps rules would apply to any 'U.S. person', as well as to 'persons that may be domiciled or operate outside the United States but whose swap activities nonetheless have a "direct and significant connection with activities in, or effect on, commerce of the United States" '.[140] The idea was clearly to prevent US banking groups to simply move their swaps dealing activities to 'foreign' entities in their corporate group to evade the Dodd-Frank Act's swaps rules.

Following the introduction of the swap rules, specialised analysts spotted peculiar developments in the swaps trading data: 'Hundreds of billions of dollars of trades by US banks had seemingly vanished.'[141] This was puzzling. Some suggested that foreign competitors had won market share over US banks thanks to the high compliance costs of swaps rules under the Dodd-Frank Act.[142] The more worrying

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[138] Commodities Futures Trading Commission, '17 C.F.R. Chapter I: Interpretive Guidance and Policy Statement Regarding Compliance with Certain Swap Regulations' (26 July 2013) 78 Fed. Reg. 45, 45301.

[139] Commodities Futures Trading Commission (n 138) 45292.

[140] Commodities Futures Trading Commission (n 138) 45302. See also Greenberger (n 129) fn 402 and accompanying text.

[141] Charles Levinson, 'Vanishing Act: U.S. Banks Moved Billions of Dollars in Trades Beyond Washington's Reach' (21 August 2015) Reuters.

[142] Levinson (n 141).

interpretation was that the CFTC rules had a loophole, and that US banks were exploiting it.

To operationalise the concept of a 'direct and significant connection' with the US, the CFTC had relied on the longstanding and widespread market practice that swaps executed through foreign affiliates of US-based banks would benefit from a contractual guarantee by the affiliate's parent company.[143] Thanks to such guarantees, the parent company would make good on the contract if the affiliate ran into trouble. Given the exposure such de-segmentation creates for the parent company, guarantees constitute the required connection between the foreign affiliate and the US parent company that resulted in the application of the swaps rules. The key observation is that this reasoning can be flipped; the absence of a contractual guarantee would imply that the foreign affiliate is not connected to the US parent so that the swaps rules do not apply to trades executed by that foreign affiliate.[144] Using this reasoning, swaps trades executed through 'de-guaranteed' 'foreign' affiliates – which are otherwise consolidated on the US bank holding companies' balance sheets but would now be classified by the

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[143] This guarantee was arranged using a Credit Support Annex, usually provided as part of the International Swaps and Derivatives Association ('ISDA') documentation for a swap. For an explanation, see Greenberger (n 129) 76.

[144] Commodities Futures Trading Commission (n 138) 45355 fn 563, and 45234-27. See also Levinson (n 141) ('On a call with bank officials in 2012, Rosen, the lobbyist, wondered aloud to his clients: "What happens if you just stop guaranteeing these transactions?" recalled a former bank official who participated in some of the calls. Rosen told Reuters that the idea of de-guaranteeing only came up after the CFTC issued its final policy guidance.').

CFTC as 'non-U.S. persons' – are outside the scope of the Dodd-Frank Act.[145] To use this loophole, a bank would only have to create a 'foreign' affiliate – often a (newly incorporated) foreign subsidiary – and remove the support or guarantee clause from the swaps documentation. To remove the guarantee, the foreign affiliate acting as a non-US swaps dealer must rely on 'a written representation by a non-U.S. counterparty that its obligations under the swap are not guaranteed with recourse by a U.S. person'.[146]

Helpfully, the International Swaps and Derivatives Association ('ISDA'), the organisation that has traditionally provided the boilerplate agreements that most of the swaps trading relies on, issued instructions to its members on how to effectively issue such a written representation. Specifically, it issued a 'Cross-Border Swaps Representation Letter' that includes the written statement required to de-guarantee a foreign affiliate, candidly reasoning that this would allow traders to avoid the application of the Dodd-Frank swaps rules.[147] Now that de-guaranteeing foreign affiliates was

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[145] Provided that the counterparty is not a 'U.S. person' either, but US counterparties can use the same trick and become a 'non-U.S. person' for the purposes of the trade. This proved eminently feasible, as Levinson (n 141) notes:

> By August 2014, U.S. bank participation in certain swaps markets had plummeted. The global inter-dealer market for interest rate swaps in Euros is one of the largest derivatives markets in the world. U.S. banks' monthly share of the market had plunged nearly 90 percent since January 2013, from over $1 trillion to $125 billion, according to ISDA. The data were misleading. U.S. banks were still trading as vigorously as ever. But their trades, booked through London affiliates, without any credit guarantees linking them back to the U.S., were now showing up in the data as the work of European banks.

See also Greenberger (n 129) 4. More generally, **Chapter 2** covers the analysis that the (prudential) perimeter of the firm.

[146] Commodities Futures Trading Commission (n 138) 45355, fn 563.

[147] International Swaps and Derivatives Association (ISDA), 'Cross-border Swaps Representation Letter' (19 August 2013), available at

reduced to a box-ticking exercise,[148] hundreds of thousands of contracts were rapidly de-guaranteed, as trading ostensibly moved into EU markets.[149] US banks were still engaged in swaps trading, but now in ways invisible to US regulators and not subject to US regulation.[150] Banks had successfully moved the (operationalisation of the) boundary of the prudential perimeter (see **Chapter 2**).

To its proponents, the de-guarantee achieves its intended purpose, because it seemingly removes the exposure of the US parent company to swaps trading.[151] Sceptics, however, counter that this is legal fiction, because this contractual de-guarantee may not truly sever the connection between the foreign affiliate and the US parent. So even though the operationalisation of the prudential perimeter had moved, the prudential perimeter itself – in the economic sense – had not. After all, the foreign affiliate is still part of the same firm and will likely have reputational ties to its many other de-

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http://www2.isda.org/attachment/NTgyNA==/Cross_Border_Rep_Letter_Final.doc ('This representation letter allows market participants to provide counterparties with status representations needed to determine whether compliance with various CFTC swap regulations is required by the [CFTC's] Interpretive Guidance. The representations in this letter are solely for the purposes of making such determinations.').

[148] ISDA (n 147) Section II(B): Guarantee Representations ('We hereby represent that we reasonably believe that we do not fall within any of the U.S. Person Categories and believe in good faith that we would not otherwise be deemed to be a "U.S. person" under the Interpretive Guidance. This representation shall be deemed repeated each time we enter into a Swap Transaction with you unless we have notified you to the contrary in a timely manner in writing prior to entering into such Swap Transaction.').

[149] Levinson (n 141); Greenberger (n 129) 63.

[150] Silla Brush, 'Wall Street Faces Scrutiny of Tactic to Evade Swaps Rules' (31 July 2014) Bloomberg.

[151] Levinson (n 141) (noting that the Securities Industry and Financial Markets Association, a Washington-based lobby group, suggested that 'This practice (of removing guarantees) reduces the perceived transmission of risk to the U.S. financial system.').

guaranteed affiliates and subsidiaries. If one of these affiliates cannot meet its obligations and does not receive support from the parent company, investors and counterparties may start to question the financial health of the others, and potentially even of the firm as a whole. Step-in risk was, therefore, high. As Gary Gensler, then Chairman of the CFTC, observed:

> The nature of modern finance is that financial institutions commonly set up hundreds, if not thousands, of "legal entities" around the globe with a multitude of affiliate relationships. When a run starts on any overseas affiliate or branch of a modern financial institution, risk comes crashing back to our shores.[152]

Reputational ties may, in other words, create economic ties between the 'de-guaranteed' foreign affiliate and the US parent company that functionally act in similar ways to a guarantee. Safe in the knowledge that reputational de-segmentation will substitute for a formal guarantee when it matters most, swap dealers used *de jure* corporate law 'segmentation' by means of the ISDA letter to pretend they had established the *de facto* segmentation regulators intended. Unsurprisingly, and despite the concerns expressed by some investors about the new 'de-guaranteed' contracts, premiums paid by clients to the banks were largely unaffected.[153]

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[152] Gary Gensler, 'Chairman Gary Gensler's Keynote Address on the Cross-Border Application of Swaps Market Reform' (6 June 2013) Speech at Sandler O'Neill Conference, available at https://www.cftc.gov/PressRoom/SpeechesTestimony/opagensler-141.

[153] Levinson (n 141). Although there may be other explanations for this finding (including market power of the big U.S. banks), the observation that premiums did not change is consistent with the hypothesis that clients did consider the 'de-guarantee' to materially affect the counterparty credit risk the swaps dealers posed.

It is clear that the CFTC did not intend its rules to be interpreted in this way, and it has since taken action to plug the loophole.[154] Nevertheless, the case vividly illustrates the potentially intricate interaction between corporate law (de-)segmentation, regulatory (de-)segmentation, and tacit reputational relationships – which can undermine the effectiveness of regulatory segmentation and complicate efforts to ascertain the economic relationship between two entities that are part of the same firm.

III. SEGMENTATION PATTERNS

Sections I and II discussed the sources of intrafirm segmentation and their interaction. This Section examines how various individual *segmentation-altering measures*[155] combine within a firm to create intrafirm *segmentation patterns*. Section III(A) opens with a categorisation of segmentation relationships between two entities – the analytical building blocks of intrafirm segmentation patterns. Section III(B) draws on these basic building blocks, explores how they can form segmentation patters across the firm, and introduces the segmentation-weighted adjacency matrix to map out and study these patterns. Section III(C) outlines, conceptually, how the segmentation-weighted adjacency matrix could be operationalised.

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[154] Commodities Futures Trading Commission, '17 C.F.R. Part 23: Margin Requirements for Uncleared Swaps for Swap Dealers and Major Swap Participants – Cross-Border Application of the Margin Requirements' (31 May 2016) 81 Fed. Reg. 104, 34818.

[155] The term (de-)segmentation measure is a synecdoche used to denote any act that, intentionally or not and voluntarily or not, alters the segmentation pattern of a firm.

A. Types of Segmentation Relationships Between Two Entities

Intrafirm segmentation is the result of a combination of segmentation relationships between pairs of entities that make up the firm.[156] These relationships are, in other words, the building blocks of segmentation patterns; segmentation relationships can be woven together to understand segmentation patterns at the firm level.[157] The intrafirm segmentation of a firm with three entities (let us call these entities *A*, *B*, and *C*) is therefore determined by the individual relationships between entities *A* and *B*, *A* and *C*, and *B* and *C*.[158] Segmentation relationships between two entities can take on various forms, each representing the aggregate (net) degree of segmentation resulting from the various corporate law, regulatory, and reputation-based (de-)segmentation measures between them.

In theory, these segmentation relationships can be characterised on a spectrum from full integration (in other words, complete de-segmentation) to full segmentation. When two entities are fully integrated, there still exist two legal entities – for example, for tax or regulatory purposes – but they functionally operate as one entity with full

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[156] It is possible to envision (de-)segmentation measures that involve more than two entities, like intrafirm guarantees from the parent to a group of subsidiaries, contracts pooled together in ISDA agreements (see discussion in Sections II(B) and III(C)) or contractual relationships between two parties that are guaranteed by a third party. However, most relationships – even those that involve multiple entities – can still be represented as existing between two entities, for example based on the exposure the relationship results in. A more elaborate treatment of this topic is beyond the scope of this Chapter.

[157] The relationships between pairs of entities are, in other words, the *micro foundation* that will enable us to say something about the *macro properties* of an intrafirm structure.

[158] Needless to say, two entities that are part of the same firm have a segmentation relationship even if they are not 'neighbours' in the intrafirm ownership network.

asset pooling (in other words, they function as an integrated economic enterprise). Another way of making the same point is that there is full 'asset mobility' between these two entities, and that counterparties can therefore treat these two entities as one. When there is full segmentation, on the other hand, the two entities are part of the same firm but have completely separate asset pools. Neither of the two entities guarantees or otherwise supports the other, and capital mobility between the two entities is non-existent. This situation corresponds, in the extreme, to the stand-alone subsidiary ('SAS') model.[159]

In practice, most action takes place between these two extremes, where segmentation is 'partial' (or, where the segmentation is 'semi-permeable'). Partial segmentation can take on various forms, as outlined in **figure 3.2**, which can be grouped in two categories: 'unilateral' and 'bilateral' segmentation. *Unilateral de-segmentation* implies that, in a relation between two otherwise segmented entities, only one of those two entities de-segments relative to the other – for example by providing it with a guarantee. This can take two forms; the first entity can either fully de-segment (e.g. by providing a full guarantee) (panel A) or partially de-segment (e.g. by providing a partial guarantee) (panel B). The key point is that, with unilateral de-segmentation, the de-segmentation is a one-way street: the entity provided with the guarantee will benefit from support from the entity that provides it, but not the other way around.

[159] See Section II(A).

In contrast, the second category of partial segmentation, *bilateral de-segmentation*, is a two-way street: both entities take de-segmentation measures relative to the other[160], but not to the point where the two entities become fully integrated. Within this category, the relationship can be symmetric or asymmetric. If it is symmetric, each entity takes similar de-segmentation measures relative to the other, but these measures are partial in the sense that they do not amount to full integration. This could be because the entities provide each other with guarantees that only cover some specific loans, or because the guarantees are capped at a level below total exposure (panel C). If the bilateral relationship is asymmetric, parties may offer each other either full or partial guarantees, but these guarantees are dissimilar and, in the aggregate, do not lead to full integration (panel D).

[160] These measures need not be mutually contingent.

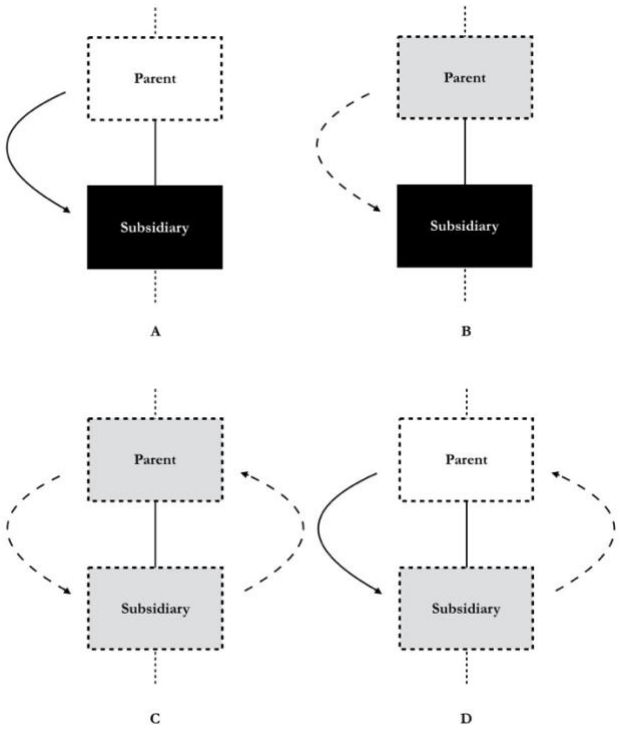


Figure 3.2: Varieties of partial segmentation. The colour of an entity indicates the extent of segmentation: a white entity is fully de-segmented[161], a black entity is fully segmented, and a grey entity is partially de-segmented. An arrow indicates a de-segmentation measure, for example a guarantee, with a full arrow indicating a full guarantee and a dashed arrow indicating a partial guarantee.

Determining the precise nature of a segmentation relationship is challenging.[162] As noted above, this difficulty may in part be a consequence of slipshod internal accounting, strategic behaviour, or simply a lack of disclosure,[163] each of which makes it harder to evaluate how the various de-segmentation measures add up, especially when

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[161] Note that the colouring gets more complex when we move away from the simple case of relationships between two entities. An entity may, for example, offer a full guarantee to one entity while choosing to remain completely segmented in its relationship with another entity.

[162] Basel Committee on Banking Supervision (n 106) 29 ('Events during the crisis have raised the issue of the value (whether implicit or explicit) that can be ascribed to parental guarantees, or even general assumptions that parental support will be forthcoming.').

[163] See Section I.

the segmentation relationships are partial and therefore less clear-cut.[164] Compounding this problem is the fact that these segmentation relationships are often fluid; they constantly change to reflect the needs of the firm or the demands of a regulator at a given point in time.[165] A firm's host regulator may, for example, choose to ring-fence a subsidiary to protect it from financial calamity at the level of the parent company.[166] Segmentation relationships may also be state-contingent, for example if a guarantee is provided in certain situations but not others.[167] The state-contingent nature of the relationship may be knowable *ex ante*, for example because the guarantee is made explicitly conditional on certain types of contingency, but it may also be that it is only revealed *ex post*, as may be the case with a reputation-based guarantee or a regulatory segmentation intervention.[168]

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[164] The Financial Stability Board encourages banks to set up and maintain 'Management Information Systems' that collect information about intra-group exposures at the legal entity level, and to make sure that this information is readily available. See Financial Stability Board, *Key Attributes for Effective Resolution Regimes for Financial Institutions* (October 2016).

[165] For an in-depth discussion of such a regime, see **Chapters 5** and **6** (covering UK ring-fencing, which includes such partial segmentation relationships by imposing 'semi-permeable' membranes between the ring-fenced bank and other parts of the banking firm).

[166] See **Chapter 4**.

[167] This example is discussed at greater length in Section III(C).

[168] For a discussion of the implications of unexpected *ex post* regulatory segmentation, see **Chapter 4**.

B. Tying It Together: Firm-Level Segmentation Patterns

Using segmentation relationships as the basic analytical building blocks, it is possible to characterise a firm's intrafirm segmentation pattern.[169] This pattern is obtained by combining individual relationships. As we have seen,[170] many G-SIBs consist of hundreds or even thousands of entities, with each pair of entities having its own segmentation relationship.[171] In view of this complexity, the exercise of aggregating all pairwise relationships may appear both pertinent and intractable. However, the conception of the firm as a network of relationships between the legal entities it comprises (as introduced in **Chapter 2**) allows for the novel use of network theory to characterise intrafirm segmentation patterns.

To illustrate this method, imagine a banking firm – 'SixBank' – which consists of six entities (one parent company, and five subsidiary companies). **Figure 3.3** uses a network representation of the firm (see **Chapter 2**) to map out SixBank's intrafirm structure. The straight lines denote controlling equity stakes, so that the intrafirm graph is a hierarchical control graph – like those drawn in **Chapter 2**. Assume that the six legal

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[169] This is, again, subject to the understanding expressed in (n 156).

[170] See **Chapter 2**.

[171] Segmentation patterns need not be the product of design, but may simply emerge through independent decisions of actors that form complex webs of interactions between them, see Friedrich A Hayek, *Law, Legislation and Liberty – Volume I: Rules and Order* (Chicago University Press 1973) 37 ('It would be no exaggeration to say that social theory begins with – and has an object only because of – the discovery that there exist orderly structures which are the product of the action of many men but are not the result of human design.'); Alan D Morrison and William J Wilhelm Jr., 'Trust, Reputation, and Law: The Evolution of Commitment in Investment Banking' (2015) 7 Journal of Legal Analysis 363 (citing Hayek, and noting that 'social orderings are seldom designed').

entities SixBank consists of are fully segmented unless a de-segmentation relationship is expressly indicated in the figure. As before, the curved arrows indicate a de-segmentation relationship; the arrow shows the direction in which the guarantee is provided. For example, the curved arrow from the parent to subsidiary 1 indicates that the parent provides a guarantee to the subsidiary. A solid arrow represents a complete guarantee (insofar as this is possible[172]), and a dashed line represents a partial guarantee. To express the strength of de-segmentation, a number on a scale of zero (no de-segmentation) to one (full de-segmentation, in other words: full integration) is included next to the arrow. At this stage, we do not attempt precisely to define the meaning of the strength; the scale simply conveys the fact that de-segmentation strengths vary.[173]

[172] A discussion of the *ability* of a legal entity within the firm to provide the economic equivalent of a complete guarantee is beyond the scope of this Chapter.

[173] Section III(C) provides pointers as to how the strength of a de-segmentation relationship could be operationalised.

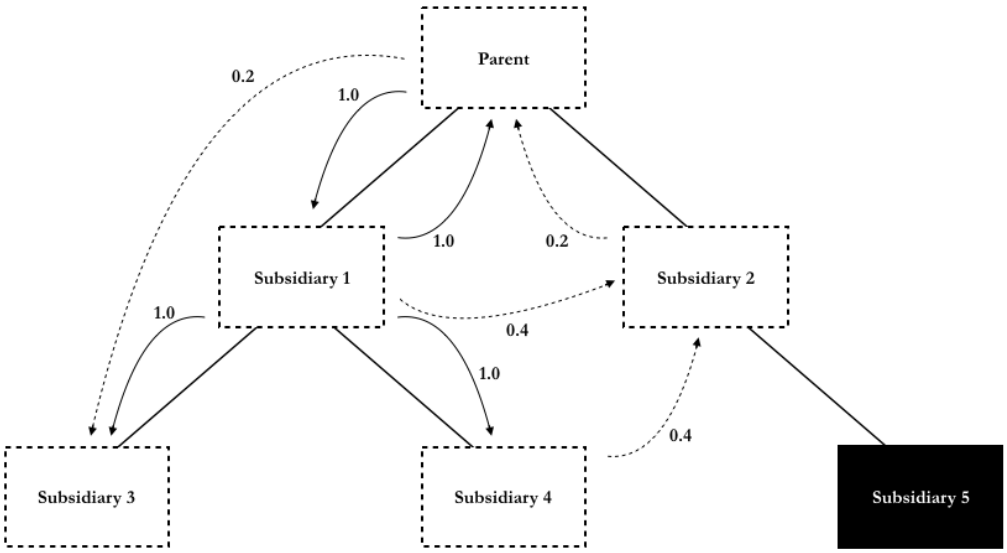


Figure 3.3: SixBank's intrafirm structure. SixBank consists of six entities – one parent and five subsidiaries. The hierarchical network graph depicts SixBank's intrafirm structure, with the straight lines indicating controlling equity stakes (with the entity located higher in the hierarchy controlling the entity below). As a baseline, each entity is fully segmented from the others unless otherwise indicated. Arrows indicate de-segmentation relationships from one entity to another, with a firm line indicating a full de-segmentation relationship and a dashed line indicating a partial de-segmentation relationship. The strength of the de-segmentation relationship is also indicated next to the arrow, with a number on a scale of zero (full segmentation) to one (full de-segmentation, or full integration). Entities indicated in black are fully segmented, whereas entities indicated in white are fully or partially de-segmented.

In **figure 3.3**, fully segmented entities are coloured black; those that are fully or partially de-segmented are indicated in white. Using this presentation, it is clear that all legal entities except subsidiary 5 are to some degree de-segmented. Subsidiary 5 is not part of any de-segmentation relationship and represents the stand-alone subsidiary model.

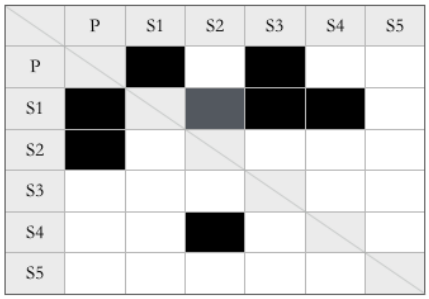
Although representing SixBank's intrafirm structure together with the de-segmentation measures gives us some sense of the intrafirm segmentation pattern, this pattern remains hard to interpret. This problem would only be aggravated in groups comprising many more entities. One way to represent SixBank's intrafirm segmentation pattern more formally is to depict the network's adjacency matrix. The intrafirm adjacency matrix is the matrix that represents the relationships between the entities in a firm.[174] Instead of focusing on controlling equity stakes, this matrix can also be developed to focus on (de-)segmentation relationships. In the simplest case, this *segmentation adjacency matrix* would only indicate whether there is a de-segmentation relationship from one entity to another (1) or not (0). Panel A of **figure 3.4** gives the segmentation adjacency matrix for SixBank.[175]

[174] Each element a_{ij} of this matrix denotes the relation between two entities (nodes), *i* and *j*. Therefore, in a directed non-weighted adjacency matrix, the value of a_{ij} will be 1 if there is an edge from *j* to *i*, and 0 otherwise. See also Mark EJ Newman, *Networks: An Introduction* (Oxford University Press 2010), 114-115.

[175] Note that the hierarchical nature of the relationships is largely but not completely lost in this representation of the firm: in the current representation, it is still loosely used in the ordering of the adjacency matrix (because the entities are listed by number, and numbers are assigned from top to bottom using the hierarchical representation of the firm). Depending on the analysis carried out and the properties of intrafirm segmentation that are studied, the ordering of the adjacency matrix can be altered. This is not explored further here.

	Parent	Subsidiary 1	Subsidiary 2	Subsidiary 3	Subsidiary 4	Subsidiary 5
Parent		1	0	1	0	0
Subsidiary 1	1		1	1	1	0
Subsidiary 2	1	0		0	0	0
Subsidiary 3	0	0	0		0	0
Subsidiary 4	0	0	1	0		0
Subsidiary 5	0	0	0	0	0	

A



B

	P	S1	S2	S3	S4	S5
P		1	0	1	0	0
S1	1		1	1	1	0
S2	1	0		0	0	0
S3	0	0	0		0	0
S4	0	0	1	0		0
S5	0	0	0	0	0	

C

Figure 3.4: SixBank's segmentation adjacency matrix. The segmentation adjacency matrix (Panel A) indicates for each relationship between one entity and another whether a de-segmentation measure is in place (1) or not (0). Because an entity cannot de-segment relative to itself, the diagonal elements are left blank. The same information is represented in different ways in panels B and C. Panel B represents de-segmentation measures between two entities by a black field, and the absence of such measures by a white field. The dark grey field represents a cross-stream de-segmentation measure. Panel C represents the symmetry in the pairwise segmentation relationships, with green fields indicating a symmetric segmentation relationship and orange fields indicating an asymmetric segmentation relationship.

Even on the basis of the information contained in this stylised adjacency matrix, we can deduce some basic characterisations of SixBank's intrafirm segmentation pattern. Panel B, for example, highlights the directionality of SixBank's segmentation pattern. In this matrix, the black fields represent directional de-segmentation measures, whereas the fields are white when such relationships are absent. All black rectangles above the diagonal indicate de-segmentation measures that, given the representation of the firm as a control hierarchy, can be characterised as 'downstream'. In other words, these represent de-segmentation measures by an entity higher up in the control hierarchy (for example, the parent company) to an entity lower down in the control hierarchy (for example, subsidiary 1). Conversely, all black fields below the diagonal represent upstream de-segmentation measures. The dark grey field represents a cross-stream de-segmentation measure; in this case, the de-segmentation measure is between two entities at the same level of the control hierarchy (from subsidiary 1 to subsidiary 2). Based on this representation, it is clear that most of SixBank's de-segmentation measures are downstream, a common observation in financial groups.[176] This pattern tells us something about the direction of de-segmentation relationships, and therefore about the direction of exposures, within the firm.

Panel C, on the other hand, highlights the symmetry within SixBank's segmentation relationships. The green fields represent symmetric relationships between

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[176] See eg The Goldman Sachs Group, Inc. (n 97) ('We do not have and do not permit upstream guarantees of the parent company by its subsidiaries, so the contagion of losses across the firm is reduced.').

a pair of entities, whereas orange rectangles represent asymmetric relationships. In the case of SixBank, all asymmetric relationships are between three out of the six entities (subsidiaries 2, 3, and 4). This is important information, because when a segmentation relationship is asymmetric a financial shock that hits SixBank will affect the entities involved differently depending on where it hits. For example, if a shock hits subsidiary 2, it can make use of some of subsidiary 1's assets to withstand it, drawing on the partial de-segmentation measure from subsidiary 1 to subsidiary 2. However, if that same shock had hit subsidiary 1, subsidiary 2 would not support it because there is no de-segmentation measure from subsidiary 2 to subsidiary 1.

It is possible to add more information about SixBank's intrafirm segmentation pattern to its segmentation adjacency matrix by including the weights of each segmentation relationship.[177] Using *segmentation weights*, already included next to the arrows in **figure 3.3**, would result in a *segmentation-weighted adjacency matrix*, see **figure 3.5**. This matrix provides richer information about the degree of integration of the various entities within SixBank.

[177] For the purposes of this example, we will use the stylised scale from zero (no de-segmentation) to one (full de-segmentation, in other words: full integration) introduced before.

	Parent	Subsidiary 1	Subsidiary 2	Subsidiary 3	Subsidiary 4	Subsidiary 5
Parent		1	0	0.2	0	0
Subsidiary 1	1		0.4	1	1	0
Subsidiary 2	0.2	0		0	0	0
Subsidiary 3	0	0	0		0	0
Subsidiary 4	0	0	0.4	0		0
Subsidiary 5	0	0	0	0	0	

Figure 3.5: SixBank's segmentation-weighted adjacency matrix. The segmentation-weighted adjacency matrix indicates for each relationship between one entity and another whether a de-segmentation measure is in place and as well as its strength on a scale of 0 (no de-segmentation measure) to 1 (full de-segmentation). Because an entity cannot de-segment relative to itself, the diagonal elements are left blank.

The example of SixBank, even though it is highly stylised, suggests the seemingly near-Herculean nature of the effort required to understand a bank's intrafirm segmentation pattern. As noted, it is not easy to discern the segmentation relationship between a pair of entities, and the number of such determinations that would have to be made to fill out the matrix (or to draw the hierarchical network graph) increases rapidly as the number of entities a firm consists of increases. For SixBank and its six

entities, the number of fields that have to be filled out is already high (30[178]), and for a firm with thousands of entities that number is extremely high.[179] For example, based on the analysis in **Chapter 2** Goldman Sachs had 6,242 entities on 31 December 2017, which means that filling out the matrix requires an astounding 38,956,322 determinations.[180]

But creating this matrix, drawing on the associated network graph, is important and useful to regulators, bank managers, creditors, and others. First, it provides and alternative representation of the firm's segmentation pattern, and one that is easier to read for firms with more entities. Second, the segmentation-weighted adjacency matrix is an instrument to translate the legal intrafirm structure of firms into a form that can be mathematically analysed and manipulated, using both static and dynamic modes of analysis, for example to calculate the intrafirm exposures of entities within the firm to analyse the intrafirm propagation of financial shocks.[181] This way, it can be used as a tool to develop intrafirm stress tests that are uniquely informed by the legal reality of a

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[178] This is calculated as follows: take the number of entities in a firm (n) and multiply this number by itself (so: $n * n$), and exclude the elements in the diagonal (n), to find that the total number of fields is: ($n * n$) – n. In the case of SixBank: 6 * 6 – 6 = 30.

[179] The number of determinations that have to be made to complete the matrix will be very large. This is true even if many of the entities in a large firm do not have a direct de-segmentation relationship so that many fields will be filled out with zeros.

[180] To calculate the number of determinations: (6,242 * 6,242) – 6,242 = 38,965,322. It is possible, in practice, to limit the required number of determinations, for example by focusing on consolidated subgroups, and to automate significant parts of this process, making it more tractable, see **Chapter 4**.

[181] *Inter*firm stress tests using network methods use a similar approach, but instead develop the matrix of exposures between financial institutions. For a review, see **Chapter 2**.

firm's operations to help evaluate a firm's resilience.[182] In addition, such models could be a tool to aid recovery and resolution planning, by mapping out the consequences of various recovery and resolution strategies on the firm.[183]

C. Qualifications to the Segmentation-Weighted Adjacency Matrix

Inevitably, the segmentation-weighted adjacency matrix will, like almost any mathematical representation of complex phenomena, fail to fully capture the complex nature of the (legal) relationships within the firm. Two sets of problems are most pronounced. The first relates to the choice of segmentation weights. So far, for the ease of exposition, we have assumed that the degree of (de-)segmentation can be expressed on a scale of 0 to 1. The appeal of this stylised approach, which is that it becomes easy to compare the degree of segmentation across entities, is clear. Devising and operationalising such a segmentation scale in practice is, however, complicated. A full treatment of this challenge is beyond the scope of this Chapter. This section will only highlight some key issues that modellers will inevitably encounter and suggest – with broad brushes – how they might fruitfully proceed.

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[182] One way to develop such stress tests would be to apply the max-flow/min-cut theorem to the segmentation-weighted adjacency matrix to examine how contagion spreads through a firm. On the max-flow/min-cut theorem, see eg Newman (n 174) 148-151. An alternative approach would be describe a dynamic system or more conventional economic model operating on this network structure, as alluded to in **Chapter 2** in the context of *interfirm* analyses. A more in-depth discussion is beyond the scope of this chapter.

[183] See **Chapter 3**.

One way of operationalising the notion of degrees of segmentation is to express the segmentation weight as the fraction of the value of the de-segmentation measure over the de-segmenting entity's asset value: if the value of a guarantee is £1 million and the entity providing it has an asset value of £2 million, the segmentation weight would be 0.5. The upside of using this approach is that it makes it easy to compare the degree of segmentation across entities, but the downside is that it is hard to know how meaningful the de-segmentation is in absolute monetary terms. The alternative approach of simply using the absolute monetary value of the de-segmentation measure has the opposite pros and cons; it is harder to compare the degree of segmentation across entities, but the monetary value of the de-segmentation measure is instantly clear.[184] Either way, the extreme cases of full integration or full partitioning are relatively easy to assess. When some entities within the firm are fully integrated, they can form a subgroup that acts like one consolidated entity (with full asset pooling). In such cases, this subgroup can be represented as one entity to simplify the adjacency matrix and dramatically reduce the number of determinations required to fill out its fields.

The second set of problems associated with the matrix-representation of a firm's segmentation pattern relates to its seeming one-dimensionality: for each directional relationship between two entities, the segmentation-weighted adjacency matrix only

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[184] Note that, in some cases, the value of a de-segmentation measure may be hard to compute. For example, for an entity providing a full guarantee to another entity the downside is potentially unlimited. In this case, it is possible to at any time compute the value of the liabilities of the entity receiving the guarantees, or to estimate the value of the guarantee by calculating the potential future exposure. Further details on these asset pricing methodologies are beyond the scope of this Chapter. For a widely adopted approach to the valuation of guarantees, see Robert C Merton, 'An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees: An Application of Modern Option Pricing Theory' (1977) 1 Journal of Banking & Finance 3.

provides a single number. However, as observed above,[185] it is likely that de-segmentation measures like guarantees are state-contingent in nature, so that the degree of de-segmentation differs across states and the representation of such contracts should reflect this multidimensionality. Imagine a guarantee (C_1) that distinguishes between two states of the world (0 and 1), and has a different value in each state: in state 0, it will have a value of £0.5 million, and in state 1 it will have a value of £2 million, so that:

$$C_1[0,1] = \begin{cases} 0 = £0.5\ million \\ 1 = £2\ million \end{cases}$$

The matrix obscures such state-contingent complexity that can be part of (de-)segmentation contracts, so that the matrix does not accurately reflect the degree of de-segmentation within the firm.

A theoretically coherent solution to this problem would be to draw up multiple matrices, one for each state of the world. But given the vast number of states any given contract can account for and the vast number of contracts within a firm, this approach is practically infeasible. A more tractable approach, but one that obscures some of the contractual detail, is to pick the state of the world that is most relevant given the objective of putting together the matrix. For example, a risk manager at the entity

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[185] See text accompanying notes 165-168. The universe and complexity of contractual arrangements operating in the intrafirm context is vast and cannot be fully covered here. To illustrate, consider how the value of collateral would have to be taken into account when guarantees are secured whilst asset encumbrance would be critical when they are not. This discussion does not purport to be comprehensive; its aim is simply to show how network analysis could in principle be applied to study the intrafirm segmentation patterns of G-SIBs. Detailed questions concerning its implementation will be left for future work.

providing the guarantee may be interested to know the maximum intrafirm exposure the entity might have due to the de-segmentation measure and will therefore include the state of the world with the largest value for the guarantee (in this case, state 1) into the matrix. Conversely, a counterparty of the entity that receives the guarantee might be interested in the lowest value of the intrafirm guarantee so that she can calculate the worst-case scenario from her perspective (state 0). Although this approach may obscure some of the sophistication of the intrafirm contracts, it will still provide a helpful tool to risk managers. Moreover, this modelling approach is in line with those commonly used to model *inter*firm exposures.[186]

The fact that the matrix only includes one field for each directional relation between two entities also makes it harder to capture the case where a guarantee is provided to cover specific contracts held by an entity, rather than all obligations by that entity.[187] Imagine an entity providing a guarantee (C_2) to another entity that holds three contracts (c_1, c_2, c_3). The guarantee has a cap that is different for each contract, so that

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[186] See eg Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral and Capital* (Third Edition, Wiley 2015). It is both possible and desirable to make such assessments robust to multiple approaches to measuring relevant parameters, for example by adopting a composite approach looking at a basket of indicators (including, for example, mean exposure and variance). A detailed development of such a composite approach is beyond the scope of this Chapter.

[187] It is also possible that a guarantee applies not to an individual contract, but to a set of contracts, for example those covered under the same ISDA master agreement as outlined in that agreement's Credit Support Annex. Analytically, the issue remains the same. However, contract-by-contract guarantees can, in the aggregate, become hard to value, see eg The Goldman Sachs Group, Inc. (n 47), 166 ('Group Inc. guarantees many of the obligations of its other consolidated subsidiaries on a transaction-by-transaction basis, as negotiated with counterparties. *Group Inc. is unable to develop an estimate of the maximum payout under its subsidiary guarantees*; however, because these guaranteed obligations are also obligations of consolidated subsidiaries, Group Inc.'s liabilities as guarantor are not separately disclosed.) (*emphasis* added).

the cap for c_1 is £2 million, for c_2 is £1 million, and for c_3 is £0 (meaning that c_3 is not guaranteed at all):

$$C_2 = \begin{cases} c_1 = £2\ million \\ c_2 = £1\ million \\ c_3 = £0 \end{cases}$$

In the matrix, this would again show up as a single number, obscuring the nature of the guarantee and thereby misrepresenting the segmentation pattern. To address this problem, it is, as before, possible to pick the one situation where the value of the guarantee is highest (lowest) depending on the objective one has for drawing up the adjacency matrix.[188] Another option to address this problem, which we will not explore in depth and is only relevant in case understanding the contract-specific nature of the segmentation pattern is critical, is to include the individual contracts in the matrix.[189]

The point here is not to either ignore or comprehensively address these shortcomings of the segmentation-weighted adjacency matrix, but rather to acknowledge them and to give pointers for how they can be dealt with in practice. Any model is, by its nature, a partial representation of reality. But as long as it captures salient properties that might otherwise be missed (in this case, when assuming a bank is fully integrated) the use of models is still valuable. The goal therefore should not be to deny

[188] Here, the maximum value of the guarantee would be £3 million, if it is called upon for both c_1 and c_2.

[189] This would imply that you create two types of nodes in the intrafirm network, one type representing entities and one type representing contracts. It is beyond the scope of this Chapter to venture into the modelling intricacies this approach entails.

that models are a partial representation of reality[190], but rather to find ways of leveraging the insights that these models can provide while being aware of their blind spots. In practical terms, this might involve using a composite approach that examines multiple measurements of exposures between entities to form a more holistic view.[191] Second, these models should not be seen as a substitute for, but rather as a complement to, more qualitative analyses that are already deployed as part of supervisory practice. Such qualitative analyses should inform the modelling choices and contextualise their results. Used in such a way, the segmentation-weighted adjacency matrix can help to scale up the analytical prowess of supervisors and regulators, and can aid them in dealing with this highly arcane intrafirm structures. Finally, the use of models should always be accompanied by a dose of intellectual humility by those who design and use them.[192]

CONCLUSION

Despite a widespread acknowledgement that G-SIBs have some of the most complex intrafirm structures around, they are frequently studied – both by academics and by practitioners – on the assumption that they are economically fully integrated, monolithic entities. This Chapter dispensed with that assumption. It discussed that firms are generally segmented along legal entity lines, whether that is the result of private ordering

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[190] Particularly if the availability of data that can be used to create these matrices is limited.

[191] In addition to the various options described above, these could include maximum possible exposure, mean exposure, and variance of exposures between entities.

[192] See eg Dan Awrey and Kathryn Judge, 'Why Financial Regulation Keeps Falling Short' (2020) 61 Boston College Law Review 2295; J Doyne Farmer, Alissa M Kleinnijenhuis and Thom Wetzer, 'Stress Testing the Financial Macrocosm' in J Doyne Farmer, Alissa M Kleinnijenhuis, Til Schuermann and Thom Wetzer (eds), *Handbook of Financial Stress Testing* (Cambridge University Press 2022).

or regulatory segmentation. To describe the resulting intrafirm segmentation patterns requires, first, a conceptual understanding of these sources of segmentation and their hierarchical relationships (which Sections I and II covered) and, second, a framework to study how individual segmentation relationships aggregate at the firm level.

Section III of this Chapter introduced such a framework. Building on the representation of intrafirm structures rooted in network theory that **Chapter 2** introduced, it developed the segmentation-weighted adjacency matrix to characterise segmentation patterns within firms. This approach has immediate practical relevance, because representing intrafirm segmentation in this way makes it amenable to mathematical analysis – using both static and dynamic methods – that can be used to develop intrafirm stress tests rooted in a clear understanding of the legal and economic relationships between the entities that make up the G-SIB. In **Chapter 4**, we will canvas how the intrafirm properties that can be studied using this approach can inform the prudential regulation and supervision of G-SIBs.

CHAPTER 4: SEGMENTATION PATTERNS AND RISK PROFILES

Chapter 3 examined the sources of intrafirm segmentation and their interaction, and proceeded to set out how they might combine to form segmentation relationships between two entities and, ultimately, segmentation patterns across the firm. This Chapter examines how segmentation patterns affect risk in a G-SIB, and highlights risks of particular salience for policymakers and academics. Section I outlines how segmentation affects a firm's risk profile and concludes that segmentation measures generate *misallocation risk*. Section II discusses how sudden, large-scale, and persistent changes in segmentation patterns, which we term *segmentation shifts*, may generate risks. Both *misallocation risk* and *segmentation shifts* can significantly affect the risk profile of G-SIBs. Section III therefore outlines a research and policy[1] agenda informed by these risks and the framework outlined in **Chapter 3**.

I. MISALLOCATION RISK

Chapter 1 noted that banks' business models classically deploy three types of transformations on their balance sheets: maturity, credit, and liquidity transformation.[2] These transformations inevitably result in three associated mismatches between assets

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[1] A companion article explores in greater detail how regulators can use the segmentation-weighted adjacency matrix to develop intrafirm stress tests and improve recovery and resolution planning, so that they can better understand and counter the risks discussed in this Chapter.

[2] Traditionally, see Douglas W Diamond and Philip H Dybvig, 'Bank Runs, Deposit Insurance, and Liquidity' (1983) 91 Journal of Political Economy 401; Douglas W Diamond, 'Financial Intermediation and Delegated Monitoring' (1984) 51 Review of Economic Studies 393. For an overview, see eg Xavier Freixas and Jean-Charles Rochet, *Microeconomics of Banking* (Second Edition, MIT Press 2008) chs 7, 8; John Armour, Dan Awrey, Paul Davies, Luca Enriques, Jeffrey N Gordon, Colin Mayer and Jennifer Payne, *Principles of Financial Regulation* (Oxford University Press 2016) ch 13.

and liabilities – maturity, credit and liquidity mismatches[3] – which render banks structurally fragile.[4] To ameliorate this fragility, regulators require banks to fund themselves with sufficient loss-absorbing capital instruments and hold liquidity buffers, which can offset some of these mismatches in times of crisis. On top of carefully screening and monitoring their investments, banks themselves engage in risk management, typically taking actions to diversify their portfolios at the level of the firm as a whole.[5] Although banks today face a much longer list of risks than those associated with the three mismatches mentioned above, from operational to cyber and climate risk, maintaining capital and liquidity buffers and diversifying risk across the firm remain the cornerstones of a bank's risk management.

Intrafirm segmentation affects these three risk-management strategies fundamentally, so that understanding a firm's segmentation pattern (and how it might change during crises[6]) is critical to understanding a firm's riskiness. In a nutshell, involuntary[7] segmentation may frustrate banks' efforts to manage risks as well as their

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[3] Diamond and Dybvig (n 2); Diamond (n 2); Freixas and Rochet (n 2); Armour et al. (n 2) ch 13.

[4] See e.g. Charles W Calomiris and Stephen H Haber, *Fragile by Design* (Princeton University Press 2014).

[5] For an intuitive explanation, see Armour et al. (n 2) 278. For an overview of the literature, see Kevin J Stiroh, 'Diversification in Banking' Allen N Berger, Philip Molyneux and John OS Wilson (eds), *The Oxford Handbook of Banking* (Oxford University Press 2010) (Despite the notion, popularised by portfolio theory, that institutions should not diversify (because investors should do so themselves), there is clear evidence that banking groups have acted to lower their risk profile by capturing diversification benefits.). It is, however, not always clear that risk diversification also entails economies of scope, see Leonardo Gambacorta and Adrian van Rixtel, 'Structural Bank Regulation Initiatives: Approaches and Implications' (2013) BIS Working Papers No 412 6 (Box 1), 9 (Box 2).

[6] See Section II.

[7] That is, intrafirm segmentation that is *imposed* on the firm, for example if it is the result of a court decision, an insolvency procedure, or a regulatory segmentation measure. Voluntary segmentation

capital and liquidity at the aggregate firm-level, sometimes in ways that are hard to anticipate *ex ante*. In the process, intrafirm segmentation also chips away at the ability of banks to draw on diversification benefits and economies of scale that may arise at the firm-level.

To see how, imagine two banks that are at the extreme ends of the integration-segmentation spectrum[8] but are otherwise identical.[9] The first bank, Monolith Bank, is fully integrated (de-segmented) so that capital and liquidity are fully mobile across the firm, and investments are pooled at the firm level, so that there is also maximum diversification in this respect.[10] The second bank, Segmented Bank, is the opposite of

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measures are unlikely to be credible in constraining a firm's actions under crisis, in part because of the reputational ties and associated step-in risk discussed in **Chapter 3**.

[8] There are, of course, many intermediate structures, see eg Thomas F Huertas, 'Six Structures in Search of Stability' (2015) LSE Financial Markets Group Paper Series: Special Paper 236; D Wilson Ervin, 'The Risky Business of Ring-Fencing' (2017) Working Paper (retrieved on 15 December 2017). Although each of these structures has its own subtleties, the argument made in this Section remains directionally applicable.

[9] That is, these banks are identical apart from their intrafirm segmentation. Some have studied how risk-taking incentives in financial conglomerates are affected by organizational form, see eg Xavier Freixas, Gyöngyi Lóránth and Alan D Morrison, 'Regulating Financial Conglomerates' (2007) 16 Journal of Financial Intermediation 479 (also show that diversification within integrated conglomerates increases risk-taking incentives). I assume that incentives are unaffected by the change to intrafirm segmentation. Similarly, I ignore any endogeneity in bank capital levels, which may arise when bank managers or regulators respond to the risks created by segmentation by raising capital levels.

[10] A bank like Monolith Bank may represent a bank that is fully branched, with only one legal entity with corporate personality. It may also be, as is more likely in the case of G-SIBs, that although there are many subsidiaries there are cross-guarantees in place or the subsidiaries are otherwise well-supported through legal, reputational, or economic ties, so that they are part of a single, fully integrated entity. See eg Ervin (n 8) 14. For evidence of group support received by affiliates in integrated banks, see eg Adam B Ashcraft, 'Are Bank Holding Companies a Source of Strength to Their Banking Subsidiaries?' (2008) 40 Journal of Money, Credit and Banking 273, 276 (finding that banks affiliated with bank holding companies 'are more likely to receive injections of capital when distressed, recover from financial distress more quickly, and are less likely to fail from distress in the next year' – and documenting that 'the benefit of holding

Monolith Bank. It is fully segmented along legal entity lines, with each subsidiary holding its own capital and liquidity buffers. Capital and liquidity cannot be moved freely within the group, making it harder to benefit from firm-level diversification.[11] The total capital and liquidity buffers held by Segmented Bank are equal to those held by Monolith Bank.

In this example, Segmented Bank faces a risk that Monolith Bank does not; it may have enough capital and liquidity at the aggregate (firm) level to offset a localised shock, but cannot put it to use in the affected subsidiary because of the segmentation restrictions. In this way, intrafirm segmentation restricts the ability of banks to manage their risks and benefit from firm-wide diversification.[12] Capital and liquidity buffers that would be available to cushion any incoming shock in Monolith Bank are by hypothesis unavailable in Segmented Bank, because they are trapped in the wrong subsidiary. Assume, for example, that Segmented Bank has two subsidiaries (*A* and *B*). If Subsidiary *A* is hit by a shock that wipes out its capital buffer, it would be liquidated even if the group as a whole would have sufficient capital to cushion the shock. The problem,

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company affiliation comes through access to resources in other bank and non-bank subsidiaries, as well as greater access to external funds through access that the parent has to the public equity market.').

[11] It may seem unrealistic that there is no ability to 'top up' capital and liquidity at some subsidiaries. However, if most of the capital and liquidity is held in subsidiaries and cannot move due to involuntary segmentation measures, there may not be much the parent company can do. That said, the logic of the example does not change if top-ups are allowed.

[12] More generally, see Henry Hansmann and Reinier Kraakman, 'The Essential Role of Organizational Law' (2000) 110(3) Yale Law Review 387, 400 ('There are, of course, costs to partitioning the assets of a single firm by subincorporation. One is that formal bankruptcy proceedings, and the transaction costs associated with them, are more likely to arise as asset pools become smaller and more homogenous.') A critique might be that, even when a group is fragmented, each part may still engage in hedging activities.

however, is that the capital that is required to do so is only available to Subsidiary *B* and cannot be used to cushion the financial shock affecting Subsidiary *A*.[13] Such 'misallocation risk'[14] renders Segmented Bank's subsidiary insolvent, even though Monolith Bank (which holds the same capital) would be able to withstand a similar shock.

As segmentation becomes more widespread, misallocation risk can become a significant risk category for a banking firm. By modelling stylised banking structures and subjecting them to simulated shocks, Ervin (2017) finds that a fully segmented bank has a 'failure risk' that can be up to five times higher than that faced by an integrated bank, an effect he attributes to misallocation risk and the *de facto* loss of diversification benefits that stems from it.[15] Similarly, Cerutti et al. (2010) conducted a simulation to project the capital needs of European banks and found that, to attain a similar level of resilience, these firms would need much higher levels of capital at the level of both the parent and the subsidiary if they faced the risk that cross-border capital mobility is reduced.[16]

One could argue that restricting the mobility of capital and liquidity buffers is precisely what the segmentation regime intends to attain, which is to contain losses

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[13] Or, in a subtler sense, the capital in Subsidiary *B* cannot be made available to Subsidiary *A in a timely fashion*.

[14] See eg Ervin (n 8). Also see Gambacorta and Van Rixtel (n 5) 11 ('[R]ing-fencing and subsidiarisation may constrain the allocation of capital and liquidity within a globally operating banking group.').

[15] Ervin (n 8).

[16] Eugenio Cerutti and Christian Schmieder, 'Ring-Fencing and Consolidated Banks' Stress Tests' (2014) 11 Journal of Financial Stability, 1-12.

within one subsidiary or jurisdiction and give priority to local creditors.[17] This is unlikely to be achieved, however, because the failure of one entity of a banking firm tends to cause intrafirm contagion. This may be because the failing subsidiary has important operational, business, or contractual ties to the rest of the firm, so that the demise of the subsidiary will also negatively affect the rest of the firm.[18] Perhaps even more significant is the intrafirm contagion that might result from the reputational damage that the failure of a subsidiary might inflict on the firm as a whole, which may arise from the perception that the parent firm was unable to support the subsidiary.[19] If such a perception persists and translates into tighter funding conditions for the firm, the firm as a whole might suffer a financial shock. Plausibly, this may be one of the reasons why it is rare for a banking firm to elect not to support a failing subsidiary when it has the ability to do so.[20] Bear Stearns, for example, had no obligation to support the various

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[17] Magda Bianco and Giovanna Nicodano, 'Business Groups and Debt' (2002) Mimeo, Bank of Italy and Università di Torino (showing that both shareholders of the financial group and society as a whole are better off when debt is raised through separately incorporated subsidiaries rather than through the holding company, because it allows for the containment of losses within the subsidiary); Deniz Anginer, Eugenio Cerutti and María Soledad Martínez Pería, 'Foreign Bank Subsidiaries' Default Risk During the Global Crisis: What Factors Help Insulate Affiliates From Their Parents?' (2017) 29 Journal of Financial Intermediation 19, 20 (mentioning this argument); Basel Committee on Banking Supervision, 'Report and Recommendations of the Cross-Border Banking Group' (2010) Bank for International Settlements 3.

[18] These can be seen as *de facto* de-segmentation measures, see **Chapter 3**.

[19] See **Chapter 3**.

[20] A notable example may be that ING cut loose a failing insurance subsidiary in London without substantial repercussions for its ability to do business, see Richard Herring and Til Schuermann, 'The Regulation of Position Risk in Banks, Securities Firms and Insurance Companies', in Hal S. Scott (ed.), *Capital Adequacy Beyond Basel, Banking, Securities and Insurance* (Oxford University Press, 2005). Also see Thomas C Baxter Jr., Joyce M Hansen, and Joseph H Sommer, 'Two Cheers for Territoriality: An Essay on International Bank Insolvency Law' (2004) 78 American Bankruptcy Law Journal 57, 68 ('As a general rule, banks do not become insolvent independently of their affiliates because a loss of confidence in any bank affiliate affects the bank.'). This again suggests that only regulatory segmentation may be credible under stress, given the significant (reputational) incentives to abandon segmentation when part of the firm approaches insolvency.

hedge funds that operated as its subsidiaries, but it elected to do so all the same, and primarily because of reputational concerns.[21] In sum, segmentation does not necessarily imply containment of financial distress. Studying this issue in greater detail can be aided by the network representation of firms (including the segmentation-weighted adjacency matrix introduced in **Chapter 3**), using methods similar to those used to study the resilience of financial networks in *inter*firm contexts (see **Chapter 2**).

Although the case of Segmented Bank may seem extreme, it is not implausible. Increasingly, regulatory segmentation requires subsidiaries to be separately capitalised, thereby imposing restrictions on capital mobility with rest of the firm. D'Hulster and Otker-Robe (2015) document the various jurisdictional regulatory segmentation measures that have been adopted since the financial crisis, and find strong examples in many countries including Switzerland, the UK, and the US.[22] Perhaps most notably, the US has required foreign banks with a large business presence in the US to set up Intermediate Holding Companies ('IHCs'), which are subjected to separate capital, liquidity and risk management standards.[23] When an IHC is on course to fall short of

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[21] Gary Gensler, 'Chairman Gary Gensler's Keynote Address on the Cross-Border Application of Swaps Market Reform' (6 June 2013) Speech at Sandler O'Neill Conference, available at https://www.cftc.gov/PressRoom/SpeechesTestimony/opagensler-141; Alison Lui, 'Retail Ring-Fencing of Banks and Its Implications' (2012) 31 Journal of Banking Regulation 336.

[22] See eg Katia D'Hulster and Inci Otker-Robe, 'Ring-Fencing Cross-Border Banks: An Effective Supervisory Response?' (2018) 5 Journal of Financial Perspectives 1, Appendix A.

[23] 12 C.F.R. para 252.153 'US Intermediate Holding Company Requirement for Foreign Banking Organizations with U.S. Non-Branch Assets of $50 Billion or More' ('A foreign banking organization with U.S. non-branch assets of $50 billion or more must establish a U.S. intermediate holding company, or designate an existing subsidiary that meets the requirements of paragraph (a)(2) of this section, as its U.S. intermediate holding company.') Also see **Chapters 1** and **3**.

these standards, it will be subjected to enhanced supervision, which may involve US regulators ring-fencing capital in the IHC until its compliance with US standards is guaranteed.[24] In response to the US measures, the EU reciprocated[25] by announcing its own regime, the Intermediate Parent Undertaking ('IPU')[26], further segmenting G-SIBs along jurisdictional lines. Within jurisdictions, too, regulators have introduced segmentation measures, with the ring-fencing of retail banks in the UK[27] and the introduction of the Volcker Rule in the US (which operates jointly with Section 23A of the Federal Reserve Act)[28] as the most prominent examples.[29] The increasing ubiquity of involuntary segmentation due to regulatory intervention is raising the relevance of misallocation risk for G-SIBs.

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[24] See eg Laura Noonan and Barney Jopson, 'Deutsche Bank's Failure in US Stress Test Could Harm Strategic Plan' (29 June 2018) Financial Times ('The Fed banned Deutsche's US holding company, which was going through the tests for the first time after its 2016 creation, from repatriating dividends to its Frankfurt headquarters. (…) The "main negative read" from the stress test failure was its potential to "impede" Deutsche from moving capital out of its US entity at a time when its strategic plan is "to move capital out of the US and reallocate it elsewhere".').

[25] See eg Alex Barker, Jim Brunsden and Martin Arnold, 'EU to Retaliate Against US Bank Capital Rules' (21 November 2016) Financial Times ('Brussels is proposing to tighten its grip over overseas banks operating in the EU in a tit-for-tat step against the US (…)'). When the US introduced the IHC, then EU Commissioner Michel Barnier wrote that the move 'could spark a protectionist reaction from other jurisdictions', see Letter from Michel Barnier to Ben Bernanke (18 April 2013), available at https://www.federalreserve.gov/SECRS/2013/April/20130422/R-1438/R-1438_041913_111076_515131431183_1.pdf.

[26] Directive (EU) 2019/878 of the European Parliament and of the Council of 20 May 2019 amending Directive 2013/36/EU as regards exempted entities, financial holding companies, mixed financial holding companies, remuneration, supervisory measures and powers and capital conservation measures, Text with EEA relevance, OJ L 150 (hereafter 'Capital Requirements Directive V' or 'CRD V') Art 21b.

[27] See **Chapters 1, 3** and **6**.

[28] See **Chapter 1** and **3**.

[29] See **Chapters 1** and **3**.

II. SEGMENTATION SHIFTS

The previous Section shows that a bank's segmentation pattern critically affects its risk profile. That analysis, however, was static; it accounted for differences between segmentation patterns, but not for situations where the segmentation patterns of a given firm is modified, despite the emphasis **Chapter 3** placed on the fluidity of segmentation relationships. This Section examines the impact of sudden, (mostly) unanticipated, and large-scale changes to intrafirm segmentation patterns that we will refer to as *segmentation shifts*.[30]

When segmentation shifts manifest themselves, usually during a crisis, it is not just the segmentation itself but potentially also the transition between segmentation patterns that creates immediate risks.[31] This is especially true if the transition is towards more segmentation. In normal times, firms are generally able to operate on an integrated basis[32] (a model much like Monolith Bank) and tend to do so to benefit from the

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[30] Such *segmentation shifts* can be studied by analogy to 'regime shifts' in ecology, see eg Marten Scheffer, Steve Carpenter, Jonathan A. Foley, Carl Folke and Brian Walker, 'Catastrophic Shifts in Ecosystems' (2001) 413 Nature 591; Steven J Lade, Alessandro Tavoni, Simon A Levin and Maja Schlüter, 'Regime Shifts in a Socio-Ecological System' (2013) 6 Theoretical Ecology 359. A regime shift changes the structure of the system in ways that affect its properties and behaviour. The analogy is not taken further in this Chapter but could point to methodological approaches (including those informed by network theory) that can be used to quantitatively study segmentation shifts.

[31] Again, this analysis primarily applies to regulatory (de-)segmentation, because if the (de-)segmentation is voluntary it can in principle be abandoned whenever it risks disrupting the firm's operations.

[32] Firms tend to operate on such a centralised basis, see eg The Joint Forum, *Report on Intra-Group Support Measures* (2012) Bank for International Settlements. See also JPMorgan Chase & Co, '2017 Resolution Plan Public Filing' (2017) 98 ('Our use of a centralized funding framework is designed to optimize liquidity sources and uses, and to ensure flexibility firmwide so that we can allocate liquidity when and whenever it may be needed in the franchise.').

advantages of having an internal capital market for their various entities.[33] However, that model is no longer viable if regulators adopt segmentation measures just before or during a crisis.[34] Especially when the firm operates on an integrated model, relying on the seamless flow of capital and liquidity across its entities, such sudden segmentation might severely upset its operational structure. In the worst case, a discontinuation of liquidity flows may cause acute solvency problems at individual entities within the firm – mirroring such processes in the *inter*firm context.[35]

Perhaps the most notorious example of a firm experiencing that fate is Lehman Brothers. Like many banks at the start of 2007, Lehman Brothers was largely managed as an integrated entity, and made no real attempt to police the flow of funds across the

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[33] On internal capital markets, see Jeremy C Stein, 'Internal Capital Markets and the Competition for Corporate Resources' (1997) 52 Journal of Finance 111 (justifying internal capital market transfers within a firm as leading to a more efficient allocation of resources); Raghuram Rajan, Henri Servaes, and Luigi Zingales, 'The Cost of Diversity: The Diversification Discount and Inefficient Investment' (2000) 55 Journal of Finance 35 (justifying internal capital markets as a managerial tool to mediate agency frictions existing within a firm); Ralph de Haas and Iman van Lelyveld, 'Internal Capital Markets and Lending by Multinational Bank Subsidiaries' (2010) 19 Journal of Financial Intermediation 1 (finding evidence for the existence of internal capital markets); Nicola Cetorelli and Linda S Goldberg, 'Liquidity Management of US Global Banks: Internal Capital Markets in the Great Recession' (2012) 88 Journal of International Economics 299 (documenting how global banks manage liquidity on a global scale); Nicola Cetorelli and Linda S Goldberg, 'Banking Globalization and Monetary Transmission' (2012) 67 Journal of Finance 1811 (providing direct evidence that internal capital markets are active in global banks).

[34] See eg Katia D'Hulster, 'Cross-Border Banking Supervision: Incentive Conflicts in Supervisory Information Sharing Between Home and Host Supervisors' (2012) 13 Journal of Banking Regulation 300, 314.

[35] See **Chapter 1** for a brief overview.

borders of the approximately 8,000 entities[36] that made up its intrafirm structure.[37] One entity, Lehman Brothers Holding, Inc. ('LBHI'), raised most of the funds, then lent it to other entities within the firm as needed.[38] At the end of the day, LBHI called back most of these loans, and stored the cash in LBHI's accounts.[39] When Lehman Brothers Holdings, Inc. filed for insolvency in the US on 15 September 2008, most of the subsidiaries in other parts of the firm still had to be funded, but the cash in LBHI could no longer move freely – it was trapped in the US, subject to long and uncertain court proceedings that effectively segmented Lehman's US operations from other parts of the firm. Lehman's non-US subsidiaries were therefore forced suddenly to find new ways to raise cash to fund their operations, and many were unable to do so.[40] A cascade of insolvencies followed, marking the end of the firm.[41]

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[36] See eg Rosalind Z Wiggins and Andrew Metrick, 'The Lehman Brothers Bankruptcy E: The Effect on Lehman's U.S. Broker-Dealer' (2015) Yale Program on Financial Stability Case Study 2014-3E-V1, 3.

[37] *In re Lehman Brothers Holdings Inc., et al.,* [Chapter 11 Case No. 08-13555, United States Bankruptcy Court Southern District of New York] Report of Anton R Valukas, Examiner (11 March 2010) Volume 5 (hereafter 'Examiners Report') 1550, 1562.

[38] Examiners Report (n 37) 1550, 1562; Lehman Brothers, 'Introduction to GCCM: Concepts and Detail of GCCM Disbursements and Receipts Accounting' File LBEX-LL 029285, slides 3, 9; Lehman Brothers, 'Company Overview: Third Quarter 2007' File LBEX-LL 2165164, slide 2 ('LBHI was incorporated (…) as a vehicle to source long term funding for the Group and to provide funding for the daily working capital needs for the unregulated subsidiaries within the Lehman Group. In that capacity, LBHI serves as a clearinghouse for internally and externally generated funds.'); Lehman Brothers Holdings Inc., 'Form 10-K: 2007' 12.

[39] Examiners Report (n 37) 1552 (suggests it is not strictly on a day-to-day basis, but rather on an as-needed basis).

[40] Examiners Report (n 37) 1535, 1938. Ironically, Lehman's risk management mentions this risk in a presentation dated July 2008, see Lehman Brothers, 'Liquidity Management at Lehman Brothers' File LBEX-DOCID 009007, slide 6 ('Legal entity structure places constraints on liquidity flows which should be explicitly accounted for in liquidity planning.').

[41] As an aside, Lehman Brothers in fact employed multiple such schemes. Another, referred to as Regulation and Administration of Safe Custody and Global Settlement ('RASCALS'), flipped assets back and forth between Lehman Brothers International Europe and various other legal entities to arbitrage

The case of Lehman Brothers illustrates that segmentation shifts are frequently a foreseeable yet regrettable consequence of coordination problems. Here, the coordination problem was a failure on the part of the bank and regulators to coordinate and swiftly execute a large-scale insolvency across jurisdictions.[42] This risk only manifested itself in the case of Lehman Brothers, but is typical of the insolvency of large, complex, multinational banks generally.[43] As a consequence, regulators, despite the moral hazard that will result[44], frequently opt for bailouts rather than to risk the fallout of a failed insolvency procedure.[45] Regulators have learnt from this experience and, since Lehman's collapse, alternative resolution procedures have emerged around the world to make the prospect of orderly resolution of large, complex, multinational banks more credible.[46]

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prudential rules. For a discussion, see Katharina Pistor, *The Code of Capital: How the Law Creates Wealth and Inequality* (Princeton University Press 2019) 73-76.

[42] See eg Basel Committee on Banking Supervision (n 17).

[43] See eg John Armour, 'Making Bank Resolution Credible' in Niamh Moloney, Eilís Ferran and Jennifer Payne (eds), *The Oxford Handbook of Financial Regulation* (Oxford University Press 2015); Jeffrey N Gordon and Wolf-Georg Ringe, 'Bank Resolution in the European Banking Union: A Transatlantic Perspective on What It Would Take' (2015) 115 Columbia Law Review 1297.

[44] Saving banks will fuel the anticipation of further government support in the future, which is at the root of moral hazard problems in the context of SIBs, see eg Alan D Morrison, 'Systemic Risks and the "Too-Big-To-Fail" Problem' (2011) 27 Oxford Review of Economic Policy 498.

[45] Paul Volcker references the 'not-on-my-watch syndrome' that tends to characterise the attitude of regulators in his Foreword to Gary H Stern and Ron J Feldman, *Too Big to Fail – The Hazards of Bank Bailouts* (Brookings Institution Press 2009). See also **Chapter 1**.

[46] See eg Thomas H Jackson and David A Skeel, Jr., 'Dynamic Resolution of Large Financial Institutions' (2012) 2 Harvard Business Law Review 435; Armour (n 43). See also Mark J Roe and Stephen D Adams, 'Restructuring Failed Financial Firms in Bankruptcy: Selling Lehman's Derivative Portfolio' (2015) 32 Yale Journal on Regulation 363. See also **Chapter 1**.

The 'single point of entry' ('SPOE') resolution, whereby only a banking firm's holding company enters the resolution process whilst other operating subsidiaries remain outside, is the most elegant of the new approaches that emerged.[47] Under SPOE, the firm's loss-absorbing resources, which the Financial Stability Board has dubbed 'Total Loss Absorbing Capacity' ('TLAC'), are placed in the holding company and shared among the entities of the firm. Weaknesses anywhere in the banking firm are addressed using this centralised reservoir of TLAC, which is effectively used as intrafirm financing.[48] An alternative approach, 'multiple point of entry' ('MPOE'), divides the firm into resolution units, each designed as a self-contained and individually resolvable entity with its own TLAC. Resolution units are usually organised along jurisdictional lines and supervised by a separate authority. Helpfully, MPOE does not require distribution of TLAC across resolution units during the resolution process, but the related downside is that an MPOE resolution not only segments but also likely breaks up the firm in a resolution scenario.[49]

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[47] See **Chapter 1**. See also David A Skeel, Jr., 'Single Point of Entry and the Bankruptcy Alternative' Martin Neil Baily and John B Taylor (eds), *Across the Great Divide: New Perspectives on the Financial Crisis* (Hoover Press 2014); Armour (n 43); Federal Deposit Insurance Corporation, 'Resolution of Systemically Important Financial Institutions: The Single Point of Entry Strategy' (2013) 78 Fed. Reg. 76614, 76623.

[48] See eg Patrick Bolton and Martin Oehmke, 'Bank Resolution and the Structure of Global Banks' (2019) 32 Review of Financial Studies 6, 2384.

[49] See eg Financial Stability Board, *Recovery and Resolution Planning for Systemically Important Financial Institutions: Guidance on Developing Effective Strategies* (16 July 2013); Paul Tucker, 'Solving Too Big to Fail: Where do Things Stand on Resolution?' (12 October 2013) Speech given at the Institute for International Finance 2013 Annual Membership Meeting, Washington D.C., 3 ('Under multiple-point-of-entry or MPE resolutions, by contrast, a group would be split up into some of its parts. Healthy parts might be sold or be maintained as a residual group shorn of their distressed sister companies.'); Armour (n 43); Federal Deposit Insurance Corporation (n 47) 76623.

SPOE, which is the dominant resolution strategy for G-SIBs[50], should be the most efficient approach of the two. In line with the analysis in Section I, it allows for centralised TLAC so that firms can benefit from diversification and co-insurance, making the firm more resilient to shocks for any given amount of TLAC.[51] In addition, the SPOE model allows a bank to build (*ex ante*) and maintain (*ex post*) an integrated operation, with shared capital and liquidity management and shared infrastructure. This allows the bank to reap the benefits of scale and scope economies[52] in ways that under MPOE would only be possible within a resolution unit. After all, if operations are integrated across the group the break-up of the firm under MPOE would risk a disruptive segmentation shift.[53]

Global banks are regulated and supervised by home and host authorities whose interests may start to diverge when insolvency approaches.[54] While home authorities are

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[50] See eg Wilson Ervin, 'Ring-Fencing: Escape from the Prisoner's Dilemma' (5 October 2018) Banking Perspectives.

[51] Bolton and Oehmke (n 48). Also see Section I on diversification and misallocation risk.

[52] See eg Allen N Berger, Rebecca S Demsetz and Philip E Strahan, 'The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future' (1999) 23 Journal of Banking & Finance 135; Guohua Feng and Apostolos Serletis, 'Efficiency, Technical Change, and Returns to Scale in Large US Banks: Panel Data Evidence from an Output Distance Function Satisfying Theoretical Regularity' (2010) 34 Journal of Banking & Finance 127; David C Wheelock and Paul W Wilson, 'Do Large Banks Have Lower Costs? New Estimates of Returns to Scale for U.S. Banks' (2012) 44 Journal of Money, Credit and Banking 171.

[53] Bolton and Oehmke (n 48).

[54] See eg D'Hulster (n 34); Richard J Herring, 'Conflicts Between Home and Host Country Prudential Supervisors' in Douglas D Evanoff, George G Kaufman and John R LaBrosse (eds) *International Financial Stability: Global Banking and National Regulation* (World Scientific 2007). For a more general analysis, see

responsible not only for the firm's operations in the home jurisdiction but also for the consolidated firm, host regulators are primarily responsible for the interests of the host jurisdiction.[55] Despite advances in the mitigation and management of these conflicts, for example through the creation of supervisory colleges,[56] host authorities cannot credibly commit not to act in their own, narrowly defined, interest.[57] This implies that they may decide to go it alone by ring-fencing local assets,[58] even if such regulatory segmentation might increase firm-wide fragility.[59] Such ring-fencing yields at least three potential advantages for the host authority. First, host authorities can use the threat of ring-fencing to compel home authorities (and other host authorities) to enhance

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Lucian A Bebchuk and Andrew T Guzman, 'An Economic Analysis of Transnational Bankruptcies' (1999) 42 Journal of Law and Economics 775.

[55] See eg Katharina Pistor, 'Host's Dilemma: Rethinking EU Banking Regulation in Light of the Global Crisis' (2010) ECGI Finance Working Paper No. 286/2010; Randall K Quarles, 'Trust Everyone – But Brand Your Cattle: Finding the Right Balance in Cross-Border Resolution' (16 May 2018) Remarks at a Symposium on Ring-Fencing the Global Banking System: The Shift Towards Financial Regulatory Protectionism (Harvard Law School).

[56] For a description of supervisory colleges, see D'Hulster (n 34).

[57] See eg Dirk Schoenmaker, *Governance of International Banking: The Financial Trilemma* (Oxford University Press 2013); Ervin (n 8); Bolton and Oehmke (n 48).

[58] See eg Stijn Claessens, 'Lessons from the Recent Financial Crisis for Reforming National and International Financial Systems: The Road Ahead to a Sustainable Global Economic Systems' in Justin Yifu Lin and Boris Plescovic (eds) *Proceedings of the Annual Bank Conference on Development Economics 2010: Lessons from East Asia and the Global Financial Crisis* (World Bank 2011) 262-263 (noting the German initiative to 'freeze Lehman's assets to assure the availability of cash to satisfy depositors before they could be claimed by the parent under U.S. bankruptcy proceedings'). See **Chapter 3**.

[59] See eg Ervin (n 8); Quarles (n 55); Andrea Enria, 'Fragmentation in Banking Markets: Crisis Legacy and the Challenge of Brexit' (17 September 2018) Speech at the BCBS-FSI High Level Meeting for Europe 5-10.

supervisory cooperation and negotiate better guarantees.[60] Second, by analogy to the credit monitoring argument advanced in corporate law[61], jurisdictional segmentation enables a host authority to focus its attention exclusively on the subsidiary (or resolution group's) assets and liabilities, safe in the knowledge that those assets are (largely) insulated from events in parts of the bank based in other jurisdictions.[62] Third, and following from the second observation, jurisdictional segmentation does away with a host authority's need to consider the home authority and other host authorities when deciding how to resolve a crisis.[63]

The resolution of Fortis in 2008 serves as a cautionary tale of home-host authority conflicts.[64] Fortis was a Belgian-Dutch financial conglomerate with substantial subsidiaries in Belgium, the Netherlands, and Luxembourg, where the bank was deemed systemically important. The Belgian Commission Bancaire, Financière et des Assurances ('CBFA') was the consolidated home supervisor. In 2007, Fortis bought, together with a consortium with Royal Bank of Scotland and Banco Santander, a part

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[60] See eg D'Hulster and Otker-Robe (n 22) 6 ('[t]he simple threat of ring-fencing can also be used by host supervisors as a way to persuade home supervisors to enhance supervisory cooperation by stepping up information sharing of addressing particular host concerns').

[61] See **Chapters 1** and **3** for a brief survey of this literature.

[62] See eg Schoenmaker (n 57) (arguing that such policies undermine international banking); D'Hulster and Otker-Robe (n n 22) 3 ('The use of territorial approaches thus results in a measured delineation of the local operations from other cross-border affiliates of the banking group on a permanent or temporary basis.'), and 4 ('This type of ring-fencing is imposed unilaterally by prudential supervisors with the objective of protecting a bank's domestic assets so that they can be seized and liquidated under local law in case of failure of the whole banking group or other entities of the group').

[63] See eg Herring (n 54); Independent Commission on Banking, *Final Report: Recommendations* (ICB, 2011).

[64] **Chapter 3** also discusses the Fortis case study.

of the Dutch Bank ABN Amro, significantly expanding its footprint in the Netherlands and becoming one of Europe's largest banks.[65] In the fall of 2008, Fortis lost the market's confidence. In the last week of September, just after the collapse of Lehman, its stock price plummeted and institutional clients started withdrawing substantial funds.[66]

The Dutch Central Bank ('DNB') grew worried about the financial health of Fortis and the way the CBFA was managing – or failing to manage – the situation.[67] A key point of contention between the two regulators were the liquid assets that ABN Amro still had on its balance sheet. Fortis tried to get hold of these assets and move them to the parent company to support the financial health of the group as a whole. However, Fortis could not do so until the post-merger integration between ABN Amro and Fortis was completed, and DNB – still the lead regulator for ABN Amro – refused to grant the required approvals. DNB was hesitant to release the funds because it feared doing so would weaken the position of the Dutch part of Fortis and ABN Amro in unpredictable ways, potentially undermining financial stability in the Netherlands.[68] Moreover, DNB feared it would lose its remaining leverage vis-à-vis the CBFA. This

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[65] Bloomberg News, 'Consortium Wins Control of ABN Amro' (9 October 2007) New York Times.

[66] Tweede Kamer der Staten-Generaal, *Parlementaire Enquête Financieel Stelsel* (2012) ('Final Report of the Dutch Parliamentary Inquiry into the Financial System') (hereafter 'Parliamentary Inquiry') 99; Basel Committee on Banking Supervision (n 17) 10.

[67] In fact, DNB even complained that the CBFA had not designated official counterparts for the Dutch to talk to, and those that were designated could not be reached in the Byzantine organisation of the Belgium civil service, see Parliamentary Inquiry (n 66) 105.

[68] Parliamentary Inquiry (n 66) 112.

was particularly important because the CBFA was already threatening to choke off funding to Fortis' Dutch activities, which relied on firm-wide liquidity management organised from Fortis' Belgian parent company[69], if DNB acted unilaterally to protect Dutch interests.[70]

After it became clear that the Belgian government, together with the CBFA, had worked to orchestrate a sale of parts of ABN Amro and Fortis to French banks without informing DNB or the Dutch government, the Dutch government opted to act unilaterally and segmented the Dutch parts of Fortis and ABN Amro, essentially splitting off this part of the firm and nationalising it.[71] This move severely limited the options available to the Belgian government and presented a segmentation shift to Fortis, which further aggravated its problems.

Informed by events like the Fortis failure,[72] both SPOE and MPOE are designed to limit incentive mismatches between, and the need for coordination among, resolution authorities. The aim is to reduce the likelihood of disruptive segmentation shifts. In both SPOE and MPOE resolutions, resolution authorities use recovery and resolution

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[69] The dependency of the Dutch part of Fortis on Belgian funding made it even harder to accept for DNB that it was not involved in or even informed about the strategy to strengthen Fortis' financial prospects. See Parliamentary Inquiry (n 66) 123.

[70] Parliamentary Inquiry (n 66) 123, 140, 145. Also see Parliamentary Inquiry (n 66) 104 (then Dutch Finance Minister Wouter Bos later stated: 'If that means ring-fencing the Dutch part of the bank, we will do that.').

[71] Nelson D Schwartz, 'Dutch Government Nationalises Fortis' Operations in the Netherlands' (3 October 2008) New York Times.

[72] See eg Basel Committee on Banking Supervision (n 17).

planning, or 'living wills'[73], to allocate decision-making authority *ex ante* to those parties that would otherwise claim it *ex post*. Under MPOE, this is achieved by designating resolution groups *ex ante*, often along jurisdictional lines, so that resolution authorities have clearly spelled out responsibilities in a resolution scenario that align with their mandates. Under SPOE, the goal is to eliminate the need for coordination by running the resolution from the holding company, so that in theory only the home authority needs to be involved.

Particularly in the case of SPOE, the strategy may fail to achieve complete consistency with respect to intrafirm segmentation patterns between *ex ante* and *ex post* states. A key distinction between SPOE and MPOE is that SPOE involves cross-jurisdictional TLAC transfers in resolution, whereas MPOE does not.[74] From the perspective of the banking group as a whole, having the flexibility to make cross-border transfers of TLAC to where it is needed most is desirable, because it implies that capital can be efficiently allocated and that diversification benefits can be realised. A national regulatory authority with responsibility for part of the group might take a different view, because a transfer of TLAC from its jurisdiction to another could undermine the resolution authority's ability to protect its jurisdictional interests.[75] Moreover, such a transfer would also imply a transfer from creditors of one of the group's entities (most

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[73] See eg Armour (n 43). See also **Chapter 1**.

[74] See eg Financial Stability Board, *Key Attributes for Effective Resolution Regimes for Financial Institutions* (October 2016); Financial Stability Board (n 49); Bolton and Oehmke (n 48).

[75] See eg Randall D Guynn, Gabriel D Rosenberg and Nuveen Dhingra, 'FSB Finalizes Guiding Principles on Internal TLAC' (10 July 2017) FinReg: Davis Polk Insights on Financial Regulation; Ervin (n 8); Quarles (n 55).

likely, the holding company) to creditors of another subsidiary (and, frequently, to creditors based in a different jurisdiction). Against this backdrop, such a transfer, which is necessary for SPOE to work, represents a cost to the national authority.

The problem of conflicting interests of home and host authorities may manifest itself in two distinct stages, as described by Bolton and Oehmke (2019).[76] The first, *ex ante*, is at the stage where the authorities decide whether to opt for SPOE or MPOE. If one authority expects *ex ante* that the part of the firm under its jurisdiction will need to provide substantial support to other parts of the firm in a resolution scenario, it may opt for MPOE to avoid such transfers.[77] Alternatively, if a host authority responsible for a subsidiary expects that the home authority responsible for the parent company will refuse to support subsidiaries in the host jurisdiction ('walkaway risk'[78]), it may also opt for MPOE. While a choice for MPOE would increase segmentation and therefore increase misallocation risk, it would also limit the risk of disruptive segmentation shifts. After all, the authority realises *ex ante* that its *ex post* decision would be to ring-fence. Based on that understanding, it should set up the resolution regime and change intrafirm segmentation accordingly *ex ante*.

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[76] This discussion follows the analysis of Bolton and Oehmke (n 48), who rationalise the FSB's policy using an elegant model. Also see Financial Stability Board (n 49); Financial Stability Board, *Principles on Loss-Absorbing and Recapitalisation Capacity of G-SIBs in Resolution: Total Loss-Absorbing Capacity (TLAC) Term Sheet* (9 November 2015); Financial Stability Board, *Guiding Principles on the Internal Total Loss-Absorbing Capacity of G-SIBs ('Internal TLAC')* (6 July 2017).

[77] This logic will mostly, but not exclusively, apply to the home regulator, which is responsible for the holding company, see Bolton and Oehmke (n 48).

[78] Ervin (n 8).

On the other hand, as Bolton and Oehmke (2019) show, even if an authority opts for SPOE *ex ante*, this commitment may not be credible.[79] The second stage where interests might conflict occurs *ex post*, when the firm enters an SPOE resolution and requires a transfer from one part of the firm to another.[80] In such a scenario, the authority overseeing the legal entity making the transfer evaluates the costs associated with making the transfer against the benefits of maintaining an integrated firm.[81] On the basis of this analysis, it may still decide to ring-fence its local entities to prevent the transfer from taking place, which may result in a disruptive segmentation shift given that the firm was set up for SPOE resolution *ex ante* and therefore likely operated on an integrated basis.[82] A complication of this scenario that can further aggravate the firm's position is that, as soon as it becomes clear that authorities are considering ring-fencing assets *ex post* despite previously agreeing to follow the SPOE strategy, there is a first-mover advantage[83] to not being the last resolution authority to ring-fence.[84] This

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[79] Bolton and Oehmke (n 48).

[80] See eg Howell E Jackson and Stephanie Massman, 'The Resolution of Distressed Financial Conglomerates' (2017) RSF: The Russell Sage Foundation Journal of the Social Sciences 3, 48 (noting that, while SPOE is primarily designed on the basis of downstream transfers from the holding company to operating subsidiaries, it may also involve upstream transfers (followed by downstream transfers) if some of the loss absorbing capital is *ex ante* placed at the operating subsidiaries).

[81] Bolton and Oehmke (n 48). The benefits of maintaining an integrated firm include the benefits to the resolution subgroup of having integrated capital and liquidity management, integrated infrastructure, and so on.

[82] See eg Ervin (n 8); Quarles (n 55).

[83] Generally see Diamond and Dybvig (n 2).

[84] If you are the last to ring-fence, most of the previously centralised TLAC (or, similarly, capital and liquidity) might already have been ring-fenced by someone else. See eg Guynn, Rosenberg and Dhingra (n 75); Ervin (n 50) fn 19 ('If aggressive jurisdictions trap most of the group's capital, then it can become difficult to re-allocate resources for others. This puts the "friendly host" into the unenviable position of a weak-capital entity inside a weakened group.').

dynamic might accelerate the segmentation shift, increasing the probability that this shift will disrupt the bank's operations.

To prevent an SPOE resolution from descending into a disruptive segmentation shift,[85] authorities' *ex post* cost-benefit analysis needs to change in favour of maintaining integration. Banks seem to understand this, and they have indicated in their resolution plans that it will be important to stress the value of their integrated operations to all authorities involved in an SPOE resolution.[86] A second approach to change the cost-benefit trade-off is to decrease the *ex post* costs for host authorities associated with SPOE by pre-positioning some TLAC locally rather than positioning it all at the holding company, which the FSB refers to as 'internal TLAC'.[87] This hybrid approach, also advocated by Bolton and Oehmke (2019)[88], retains some of the efficiency benefits from SPOE, in particular the diversification benefits from the TLAC that is still held at the holding company and the scale and scope economies associated with operating the firm on an integrated basis. At the same time, this approach also gives host authorities much of the comfort otherwise associated with MPOE. Host authorities will rely less, *ex post*, on TLAC transfers between jurisdictions and need no longer worry as much about coordination problems with the home authority. This hybrid model is designed

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[85] That is, to render an *ex ante* commitment to SPOE resolution time consistent.

[86] See eg JPMorgan Chase & Co (n 32) 62 (noting that despite these efforts, it still assumes soft ring-fencing by some foreign regulators). Bolton and Oehmke (n 48) reach the same conclusion and also imply that this suggests that banks that have more decentralised operations should opt for MPOE.

[87] See eg Financial Stability Board (2015) and (2017) (n 76).

[88] Bolton and Oehmke (n 48).

explicitly to support collaboration between the authorities involved in the resolution of a G-SIB and to limit the disruptive segmentation shifts that may result from unilateral ring-fencing.[89]

However, in pursuing its objective of preventing segmentation shifts, this hybrid approach may reintroduce the misallocation risk SPOE was meant to curtail. Localising too much TLAC in different pockets of a firm's intrafirm structure is akin to segmenting a firm by regulation.[90] The FSB has proposed that internal TLAC for 'material subgroups'[91] has to be in the 75-90 percent range of what it would have been if the subgroup had been a standalone firm.[92] Predictably, given that the same coordination problem applies as before, authorities in many jurisdictions – including the US[93] and the EU[94] – have opted for the upper end of this range. At the same time, perhaps realising

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[89] Financial Stability Board (2017) (n 76) 1

> 'A key objective of the TLAC standard is to provide home and host authorities with confidence that G-SIBs can be resolved in an orderly manner without putting public funds at risk. This should diminish any incentives on the part of the host authorities to ring-fence assets domestically, either ex ante or ex post in a resolution, and thereby avoid the adverse consequences of such actions, including global fragmentation of the financial system, and disorderly resolutions of failed cross-border firms. (…) To this end, there must be sufficient flexibility to use loss-absorbing capacity within a G-SIB where needed and credible mechanisms in place to allow losses and recapitalisation needs to be passed with legal certainty to the resolution entity or entities.'

[90] Bolton and Oehmke (n 48). In addition, moving away from the integrated view of the firm reintroduces previously netted out intrafirm exposures between resolution groups, so that overall TLAC will have to rise to account for the additional exposure.

[91] Financial Stability Board (2017) (n 76).

[92] Financial Stability Board (2017) (n 76).

[93] See eg Quarles (n 55).

[94] Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013 as regards the leverage ratio, the net stable funding ratio, requirements for

the misallocation risk that such policies generate[95], other jurisdictions are seeking to strike agreements that inspire sufficient confidence between authorities to move towards the lower end of the range.[96] The Bank of England, for example, will, when calibrating local TLAC, consider the availability of other uncommitted resources within the group that could be used to support the UK subsidiary.[97] Such arrangements have yet to bear fruit[98]; at the moment, the cost of avoiding disruptive segmentation shifts manifests itself in the form of more *ex ante* segmentation and therefore more

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own funds and eligible liabilities, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures, reporting and disclosure requirements, and Regulation (EU) No 648/2012 (Text with EEA relevance.) OJ L 150 (hereafter 'Capital Requirements Regulation II' or 'CRR2') Arts 92a and 92b (calibrating the internal TLAC requirement at 90%).

[95] See eg UBS, 'Response to the FSB's Consultative Document "Guiding Principles on the Internal Total Loss-Absorbing Capacity of G-SIBs ('Internal TLAC')"' (9 February 2017) 4 ('TLAC that is not pre-positioned ('surplus TLAC') should be readily available to recapitalize the resolution groups' subsidiaries. In a crisis, this provides the necessary flexibility to restore the financial situation of individual subsidiaries in need. This flexibility is of particular importance as it is difficult to predict the location of potential large future losses. Thus, from a global recovery and resolution perspective, a low pre-positioning is preferable.').

[96] Quarles (n 55) 9 ('I believe we should consider whether the internal TLAC calibration for IHCs could be adjusted to reflect the practice of other regulators without adversely affecting resolvability and U.S. financial stability. The current calibration is at the top end of the scale set forth by the FSB, and willingness by the United States to reconsider its calibration may prompt other jurisdictions to do the same, which could better the prospects of successful resolution for both foreign G-SIBs operating in the United States, and for U.S. G-SIBs operating abroad.').

[97] Bank of England, *The Bank of England's Approach to Setting a Minimum Requirement for Own Funds and Eligible Liabilities (MREL)* (June 2018) Statement of Policy, 9.

[98] Although some G-SIBs, particularly in the US, have put in place secured support agreements, which impose fully secured obligations on the parent company of the G-SIB group to provide capital and liquidity support to operating subsidiaries in a resolution scenario. The idea is that these agreements protect the interests of the host authority as effectively as internal TLAC would, but without the need to segment assets. See eg JPMorgan Chase & Co (n 32) 35-44.

misallocation risk. The hybrid approach is, therefore, a second-best response to contractual incompleteness in the SPOE resolution.[99]

Segmentation shifts do not always cause disruption, and under specific circumstances they could even foster continuity of operations. Regulators may, for example, opt to de-segment a previously segmented bank so that it can pool resources to help it better weather a financial crisis.[100] An important example, documented by Omarova (2011)[101], is the granting of waivers to Section 23A of the Federal Reserve Act by the Federal Reserve Board during the financial crisis from 2007 to 2009.[102] This Section restricts the relationships between banks and their affiliates within the same firm[103] in order to protect federally insured deposit-taking institutions and prevent a transfer of the federal subsidy to non-deposit-taking financial institutions.[104] However, the role of Section 23A in the broader financial regulatory framework has changed over

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[99] On contractual incompleteness and opportunism, see eg Oliver Hart and John Moore, 'Incomplete Contracts and Renegotiation' (1988) 56 Econometrica 755; Oliver Hart and John Moore, 'Foundations of Incomplete Contracts' (1999) 66 Review of Economic Studies 115; Eric Maskin and Jean Tirole, 'Unforeseen Contingencies and Incomplete Contracts' (1999) 66 Review of Economic Studies 83.

[100] This is particularly likely at the 'apex of the financial system' where law is most elastic, see Katharina Pistor, 'A Legal Theory of Finance' (2013) 41 Journal of Comparative Economics 315. The analysis so far suggests this type of de-segmentation is more likely to happen within than between jurisdictions.

[101] Saule T Omarova, 'From Gramm-Leach-Bliley to Dodd-Frank: The Unfulfilled Promise of Section 23A of the Federal Reserve Act' (2011) 89 North Carolina Law Review 101.

[102] 12 U.S.C. para 371c 'Banking Affiliates'.

[103] See eg 12 U.S.C. Section 371c(a)(1) ('A member bank and its subsidiaries may engage in a covered transaction with an affiliate only if in the case of any affiliate, the aggregate amount of covered transactions of the member bank and its subsidiaries will not exceed 10 per centum of the capital stock and surplus of the member bank'). For an overview, see Omarova (n 101) 109-112.

[104] For a general discussion of this rationale, see Freixas, Lóránth and Morrison (n 9).

time, most notably with the repeal of the Glass-Steagall Act by the Gramm-Leach-Bliley Act[105], which turned Section 23A into the primary statutory safeguard to insulate deposit-taking banks from risk from non-banking financial institutions. Notwithstanding this important new role, the Federal Reserve Board, which has the authority to waive the application of Section 23A in specific cases[106], lifted the segmentation measure on many occasions during the crisis, justifying its action on financial stability grounds because de-segmentation would allow banks to use their capital and liquidity to support the firm as a whole. For example, to facilitate the acquisition of the troubled Wachovia by Wells Fargo Bank, the Federal Reserve Board lifted the statutory restrictions to allow Wells Fargo Bank to extend up to $17 billion in credit to Wachovia Bank to enable it to meet its short-term funding obligations.[107]

It is not surprising that banks opted to make use of these waivers or elected to support their affiliates more generally. As discussed[108], banks have strong reputational ties to the various other entities within the same firm. Such ties may imply an *ex ante* expectation of support that the bank validates by de-segmenting *ex post*. Even if there is no clear *ex ante* expectation of support, banks may still opt to de-segment and support affiliated entities to signal financial strength, as was arguably the case when Citigroup elected to support its special purpose entities ('SPEs') during the financial crisis despite

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[105] Omarova (n 101).

[106] Omarova (n 101) 178-180.

[107] Omarova (n 101) 163.

[108] See Section I and **Chapters 2** and **3**.

the fact that these SPEs were organised as bankruptcy-remote entities that fall outside the perimeter of the firm.[109]

However, segmentation shifts favouring de-segmentation are most likely to take place within jurisdictions. Overall, with regulators increasingly prioritising national interests, jurisdictional segmentation has become more prevalent *ex ante* (heightening misallocation risk) and remains likely *ex post* (at the risk of triggering a disruptive segmentation shift). So far, strategies designed to limit the risk of such segmentation shifts have come at the cost of increased misallocation risk. Either way, the risks associated with intrafirm segmentation are salient and on the rise.

III. IMPLICATIONS

The foregoing analysis reveals the substantial and growing importance of segmentation risk to G-SIBs. Attempts by regulators to mitigate this risk have, in many cases, aggravated it. By imposing new (jurisdictional) segmentation measures, both *ex ante* and *ex post*, regulators have obtained more control over the intrafirm structure of global banks at the cost of, respectively, misallocation risk and segmentation shifts. That segmentation measures can be costly does not, however, mean that regulatory authorities are wrong to rely on them. This is particularly the case considering the severe

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[109] See eg Gensler (n 21) ('Citigroup set up numerous structured investment vehicles to move positions off its balance sheet. Citigroup had guaranteed the funding of these SIVs through a mechanism called a liquidity put. When the SIVs were about to fail, Citigroup here in the US assumed the huge debt, which taxpayers later bore the brunt of with two multi-billion dollar bailouts.'); Liz Moyer, 'Citigroup Goes It Alone to Rescue SIVs' (13 December 2007) Forbes.

coordination and informational problems regulatory authorities face in the context of vast corporate complexity stretching across multiple jurisdictions. The challenge is, instead, to understand the nature and magnitude of segmentation risk and then to mitigate or offset it. Recognising that segmentation of G-SIBs is a fact of life rather than a problem to be solved, this Section outlines several implications for future research and policy.

Understanding segmentation risk at an abstract as well as a practical level hinges on the ability to formalise it. The segmentation-weighted adjacency matrix introduced in **Chapter 3** provides the conceptual toolkit for such analysis but, as discussed, it will require further refinement.[110] Its use could also be extended to capture how the strength of (de-)segmentation can be affected by security interests and account for reputational ties (or *de facto* de-segmentation generally) by parameterising them.[111] Such a refinement of the matrix should go hand in hand with a further development of the methodologies used to map out intrafirm structures, which should then be applied in empirical studies to tease out important characteristics of firms that the matrix should reflect.[112] By

[110] **Chapter 3** covered the strength of the segmentation relationship and the ability of the segmentation-weighted adjacency matrix to capture the multidimensional nature of segmentation relationships.

[111] The strength of reputational ties could, for example, be characterised qualitatively by looking at common branding or quantitatively by inferring market expectations of support from, for example, correlations in risk premia for various subsidiaries. Each of these methods have their shortcomings – to discuss those is beyond the scope of this paper.

[112] See eg John McDonough and Thom Wetzer, 'An Empirical Analysis of the Intrafirm Structure of US Bank Holding Companies' (working paper, on file with author).

analogy to *inter*firm networks,[113] certain entities in *intra*firm networks might, for example, play more central roles in the operation of the firm than others. The segmentation-weighted adjacency matrix could help identify such entities and shed light on the nature of their importance. If some entities are indeed more central than others, it is important to be able to capture such distinctions in the segmentation-weighted adjacency matrix too. Similarly, the density of *intra*firm networks may, as in the case of *inter*firm networks, affect the network's resilience.[114]

In addition to such conceptual advances, the segmentation-weighted adjacency matrix can be used in policy settings to develop intrafirm stress tests that account for a firm's intrafirm structure and segmentation pattern. To date, most stress test models represent the firm as a monolith, assuming full asset pooling and perfect capital mobility.[115] By design, such stress tests fail to capture segmentation risk. This is not only important because of the magnitude of segmentation risks, but also because segmentation risk can heterogeneously affect different parts of the firm. If, as discussed in **Chapter 3**, a segmentation relationship is asymmetric, the propagation of a financial shock through the firm will depend on where it originates. Stress tests that capture such

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[113] See eg Stefano Battiston, Michelangelo Puliga, Rahul Kaushik, Paolo Tasca and Guido Caldarelli, 'DebtRank: Too Central to Fail? Financial Networks, the FED and Systemic Risk' (2012) 2 Scientific Reports 3.

[114] See eg Daron Acemoglu, Asuman Ozdaglar and Alireza Tahbaz-Salehi, 'Systemic Risk and Stability in Financial Networks' (2015) 105 American Economic Review 564. See also **Chapter 2**.

[115] See eg Christoph Aymanns, J Doyne Farmer, Alissa M Kleinnijenhuis and Thom Wetzer 'Models of Financial Stability and Their Application in Stress Tests' in Cars Hommes and Blake LeBaron (eds), *Handbook of Computational Economics, Vol. 4* (Elsevier 2018); Cerutti and Schmieder (n 16). In the EU, the EBA for example conducts its stress tests at the 'highest level of consolidation', see eg EBA, *2021 EU-Wide Stress Tests: Results* (30 July 2021) 10.

*intra*firm contagion pathways can shed light on exposures of specific legal entities under a range of stress scenarios, which in turn informs the various regulators of a G-SIB about their burden-sharing arrangements.

Intrafirm stress tests that account for segmentation risk can helpfully inform at least two policy areas.[116] First, such stress tests can help regulators to calibrate capital and liquidity requirements, both in terms of the magnitude of the buffers and their location within the corporate group[117].[118] As noted in Section I, intrafirm segmentation creates misallocation risk; an integrated bank that holds the same capital and liquidity buffers as a segmented bank would, all else equal, be more resilient to financial shocks.[119] In cases where segmentation is inevitable, regulators can offset the associated misallocation risk by increasing capital and liquidity requirements. Second, intrafirm stress tests that account for segmentation risk can be used to evaluate recovery and resolution plans. As noted in Section II and **Chapter 1**, such plans set several criteria for 'resolvability', which include several that relate to banks' intrafirm structures and

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[116] Several others, including bank merger reviews, are discussed in **Chapter 1**.

[117] A similar observation might be made with respect to the level and location of TLAC/MREL issuances within the firm.

[118] Such analysis can also inform the granting of waivers. For the EU, see Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013 as regards the leverage ratio, the net stable funding ratio, requirements for own funds and eligible liabilities, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures, reporting and disclosure requirements (Text with EEA relevance)) OJ L 150 (hereafter 'Capital Requirements Regulation II' or 'CRR2') Arts 7-8. See also ECB, *ECB Guide on Options and Discretions Available in Union Law* (March 2016).

[119] See footnotes 8-14 and accompanying text. See also **Chapter 1**.

segmentation[120], but generally allow banks to decide, at least in the first instance, how to meet them.[121] Banks' proposals can, using intrafirm stress tests that include a range of resolution scenarios, be quantitatively assessed against these criteria and against their impact on various regulatory and other stakeholders. This is important not least because current proxies for complexity, like the number of legal entities that make up a group (**Chapter 2**), are unlikely to be meaningful: what matters instead is the nature of the interconnections between them.[122]

Using the segmentation adjacency matrix is likely to require that its operation is simplified, for example by focusing on consolidated subgroups rather than individual entities.[123] To illustrate how this might work, we return to SixBank (albeit with a slightly different configuration than in **Chapter 3**), see **Figure 4.1**. Panel A illustrates the segmentation relationships between the six legal entities that make up the bank. For simplicity, all de-segmentation relationships are symmetric. *Subsidiaries 1-3-4* together form Consolidated Subgroup (N), which is segmented from the rest of the firm apart from the de-segmentation relationships involving *Subsidiary 1*. Panel B displays the same

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[120] The Bank of England, for example, is looking explicitly at the role of corporate structure in meeting resolvability criteria, see Bank of England, *Resolvability Assessment of Major UK Banks: 2022* (10 June 2022). In their own resolvability assessments, banks also highlight how their corporate (intrafirm) structure affects resolvability, see eg HSCB Holdings plc, *Resolvability Assessment Framework – A Review of HSBC's Preparedness* (10 June 2022) s 3.2.

[121] See **Chapter 3**.

[122] See eg Financial Stability Board, *Evaluation of the Effects of Too-Big-to-Fail Reforms: Consultation Report* (28 June 2020) 98 ('From a resolution perspective […] the number of group entities is not a measure of complexity, which is instead caused by intragroup interconnection.').

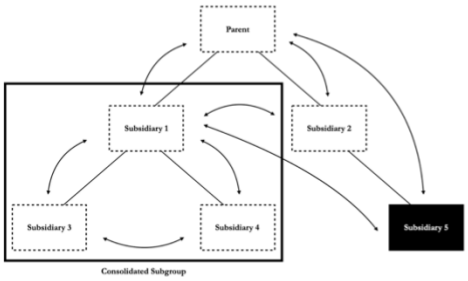
[123] See **Chapter 3**.

information in the form of a segmentation adjacency matrix. Given that all de-segmentation relationships between the consolidated subgroup and the rest of the firm run through *Subsidiary 1*, we can simply the representation of SixBank accordingly – see Panel C.[124] This simplified representation translates to the simplified segmentation adjacency matrix in Panel D. The simplification of this matrix relative to the one in Panel B is dramatic, reducing the number of fields from 30 to 12.[125] It is thus evident that approaches like this one, which relies on consolidated subgroups, can make the use of the segmentation adjacency matrix much more manageable. Of course, this approach does require confidence in the determination that the consolidated subgroup (*Subgroup N*) is properly consolidated and fully segmented, apart from the links through *Subsidiary 1*, from the rest of the firm (this relates to the determinations in the orange fields in Panel B).

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[124] This approach uses quotient graphs as a dimensionality-reduction technique, see **Chapter 2** and Mark D Flood, Dror Y Kenett, Robin L Lumsdaine and Jonathan K Simon, 'The Complexity of Bank Holding Companies: A Topological Approach' (2020) 118 Journal of Banking & Finance 105789.

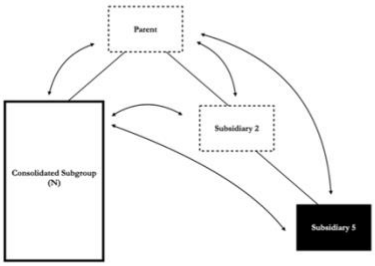
[125] In fact, it is now in its smallest possible form, because Panel C of **figure 4.1** depicts a complete network.



Panel A

	Parent	Subsidiary 1	Subsidiary 2	Subsidiary 3	Subsidiary 4	Subsidiary 5
Parent		1	1	0	0	1
Subsidiary 1	1		1	1	1	1
Subsidiary 2	1	1		0	0	1
Subsidiary 3	0	1	0		1	0
Subsidiary 4	0	1	0	1		0
Subsidiary 5	1	1	1	0	0	

Panel B



Panel C

	Parent	Subgroup N	Subsidiary 2	Subsidiary 5
Parent		1	1	1
Subgroup N	1		1	1
Subsidiary 2	1	1		1
Subsidiary 5	1	1	1	

Panel D

Figure 4.1: Simplifying SixBank's segmentation adjacency matrix. SixBank consists of six entities – one parent and five subsidiaries. The hierarchical network graphs (Panels A and C) depict SixBank's intrafirm structure, with the straight lines indicating controlling equity stakes. As a baseline, each entity is fully segmented from the others unless otherwise indicated. Arrows indicate de-segmentation relationships, which are symmetrical and non-weighted for simplicity. The segmentation adjacency matrices (Panels B and D) indicate whether de-segmentation measures are in place (1) or not (0) between pairs of entities. Panel A gives SixBank's full intrafirm network, and Panel B gives its segmentation adjacency matrix. *Subsidiaries 1-3-4* together form a consolidated subgroup (N). Given that all de-segmentation relationships between the consolidated subgroup and the rest of the firm run through *Subsidiary 1*, we can simply the depiction of SixBank by representing *Subsidiaries 1-3-4* by *Subgroup (N)* – see Panel C. This simplified representation can translate to the simplified segmentation adjacency matrix, see Panel D. The number of fields in this simplified matrix has been dramatically reduced, from 30 to 12.

The salience of segmentation risk also has clear implications for data gathering, reporting, and disclosure requirements. The study of segmentation risks requires a clear view of the intrafirm structure and segmentation pattern. That, in turn, requires detailed information on the linkages that tie together the firm's legal entities. In the *inter*firm context, the realisation that more data is needed has dawned on regulators since the financial crisis, and the Dodd-Frank Act indeed improves their ability to collect extensive data about the financial network.[126] Janet Yellen, then Vice-Chair of the US Federal Reserve, has argued that '[w]ithout such comprehensive and detailed data, it is simply not possible to understand how stress in one part of the network may spread and affect the entire system.'[127] The same logic applies to *intra*firm networks – however, in that context data gathering remains patchy. Even financial institutions themselves, as noted in **Chapter 3**, usually do not keep track of their assets and liabilities at the level of legal entities.[128]

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[126] See eg Dodd-Frank Act, para 153, 12 U.S.C. para 5343(a) (2017) (a complete review of the data gathering mandates is beyond the scope of this Chapter).

[127] Janet L Yellen, Vice Chair, Board of Governors of the Federal Reserve System, 'Interconnectedness and Systemic Risk: Lessons from the Financial Crisis and Policy Implications' (4 January 2013) Speech at the American Economic Association / American Finance Association Joint Luncheon, San Diego, California, available at https://www.federalreserve.gov/newsevents/speech/yellen20130104a.htm.

[128] Basel Committee on Banking Supervision, *Supervisory and Bank Stress Testing: Range of Practices* (2017) Bank for International Settlements, 4 ('Key challenges that remain for banks include finding and maintaining sufficent [*sic*] resources to run stress testing frameworks, and improving data quality, data granularity and the systems needed to efficiently aggregate data from across the banking group for use in stress tests.').

Enhanced reporting or disclosure requirements, for example as part of stress tests or the assessment of recovery and resolution plans, can force financial institutions to get their house in order and provide regulators with the information set they need to study intrafirm segmentation and its consequences. To make the task of gathering and processing the data required to populate the segmented-weighted adjacency matrix more tractable, much of the process can be automated and the matrix can be simplified.

Changes to reporting requirements alone may not be enough. Because segmentation alters a firm's risk profile and may also affect the risk profile of individual entities within firms, it affects investors and counterparties. Disclosure of intrafirm structures and segmentation patterns may therefore be needed to protect investors, for example by providing clarity on how creditor claims of different classes and at different legal entities may be treated in a resolution scenario, and facilitate pricing and market discipline.[129] In addition, enhanced disclosure of intrafirm structures and segmentation patterns would allow the market and the public to assess progress on recovery and resolution plans, allowing them to hold regulators and firms accountable in an area that is currently opaque. Currently the options to do so are limited.[130]

Of course, enhanced reporting and disclosure requirements are costly, both for the financial institutions that gather and report the data and for the regulators that

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[129] At the same time, the disclosure of information about a firm's segmentation pattern may prevent disorderly runs if it shows *ex ante* that certain legal entities (or consolidated subgroups) are insulated from failure elsewhere in the corporate group. See eg Financial Stability Board, *Public Disclosure on Resolution Planning and Resolvability: Discussion Paper for Public Consultation* (3 June 2019).

[130] Steve Bright, Paul Glasserman, Christopher Gregg and Hashim Hamandi, 'What Can We Learn from Publicly Available Data in Banks' Living Wills?' (2016) Office of Financial Research Brief Series 16-05.

process it. Moreover, in light of the fluidity of segmentation patterns alluded to in **Chapter 3**, the appropriate frequency of reporting and disclosure is not immediately obvious. Finally, more stringent reporting requirements raise confidentiality issues. Striking the right balance between the costs and benefits of enhanced reporting and disclosure requirements in the face of segmentation risk is therefore challenging and a worthwhile topic for further study.

CONCLUSION

Chapter 3 discussed intrafirm segmentation and its sources and introduced a novel method to study *segmentation patterns using the segmentation-weighted adjacency matrix*. Building on those insights, this Chapter outlined two prudential risks that arise specifically as a result of intrafirm segmentation. The first, *misallocation risk*, refers to the idea that capital and liquidity can get 'trapped' in one part of the firm and cannot be used to absorb shocks elsewhere. The second, *segmentation shifts*, highlighted the risks associated with sudden, large-scale changes to a firm's segmentation pattern. Such risks might cause a firm that is *ex ante* operating on an integrated basis to suddenly, *ex post*, face multiple intrafirm constraints on its ability to continue doing so.

Segmentation risk is frequently the result of an insufficient appreciation *ex ante* of the *ex post* challenges in achieving regulatory coordination, and so it commonly takes place along jurisdictional lines. It can be prevented by segmenting along such lines *ex ante*, but that would raise *misallocation risk*. One way or the other, it is therefore likely that the prudential risks associated with intrafirm segmentation will continue to be elevated. This calls for further policy action and research to better understand intrafirm

segmentation, and it is here that the network representation of intrafirm structure, together with the segmentation-weighted adjacency matrix that builds on it, prove distinctly valuable.

PART III: INTRAFIRM GOVERNANCE

CHAPTER 5: GOVERNANCE AS A SEGMENTATION TOOL

Chapter 1 outlined various regulatory interventions designed to affect banks' intrafirm structures. **Chapter 3**, which focused on intrafirm segmentation, noted that regulatory interventions to achieve such segmentation frequently attempt not to create 'full separation' but 'partial segmentation' – a semi-permeable membrane. This Chapter outlines the role of governance mechanisms in achieving that result by reviewing one specific intrafirm segmentation policy: the UK ring-fencing regime.

In the UK, regulators have forcibly altered the structure of universal banks by limiting the range of activities they can engage in. This type of structural regulation (see **Chapter 1**) entails the ring-fencing of deposit-taking and other protected activities in a separate and independently operated subsidiary, the 'ring-fenced body' ('RFB').[1] The efficacy of this policy hinges on whether such RFBs are truly separate and independent from the rest of the banking group. Ring-fencing strategies primarily rely on a set of rules to construct the 'fence' around RFB. This Chapter highlights that, because these rules are necessarily incomplete, there is an important role for gap-filling mechanisms to maintain the credibility of the fence. The objective of especially designed intrafirm (or 'ring-fence') governance is that managers of the ring-fenced entity prioritise the interests of the ring-fence(d entity) above those of the bank as a whole, and would therefore be compelled to interfere whenever regulatory gaps might be exploited to undermine the ring-fence.

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[1] See Financial Services and Markets Act 2000 ('FSMA'), as amended by the Financial Services (Banking Reform) Act 2013 ('the Act').

The Chapter proceeds as follows. Section I sets out the policy rationales for the UK ring-fencing regimes and discusses the design of the ring-fence. Section II argues that intra-group governance arrangements are required to compensate for the shortcomings of other parts of the ring-fencing framework. Finally, Section III describes the governance of ring-fenced banks in the UK, and analyses the tensions that exist between governance under ordinary UK corporate law and ring-fence governance. Although the chapter focuses on the UK implementation of ring-fencing, the general argument that is advanced is equally applicable in other (economically similar) contexts.

II. RING-FENCING IN THE UNITED KINGDOM

A. Recap: The Corrupted Governance of G-SIBs

Corporate governance theory, especially in Anglo-Saxon jurisdictions, converges around shareholder value.[2] This perspective is rooted in the view of a firm as a 'nexus of contracts'[3] characterised by a separation of ownership and control[4]. Agency-

[2] Andrei Shleifer and Robert W Vishny, 'A Survey of Corporate Governance' (1997) 52 Journal of Finance 737; Henry Hansmann and Reinier Kraakman, 'The End of History for Corporate Law' (2001) 89 Georgetown Law Journal 439-468; Jean Tirole, 'Corporate Governance' (2001) 69 Econometrica 1, 1-35; Paul L Davies, 'Shareholders in the United Kingdom' in Jennifer G Hill and Randall S Thomas (eds), *Research Handbook on Shareholder Power* (Edward Elgar 2015); Colin Mayer, *Firm Commitment* (Oxford University Press 2013).

[3] Michael C Jensen and William H Meckling, 'Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure' (1976) 3 Journal of Financial Economics 4, 310.

[4] Adolf A Berle and Gardiner C Means, *The Modern Corporation and Private Property* (Harvest Books 1968).

problems[5] amongst the firm's constituents, combined with an inability to write enforceable and complete contracts that spell out all their future obligations,[6] imply a role for corporate governance to ensure that agents exercise residual discretion in line with the interests of the principal.[7] Economists have argued that, when shareholders are the sole principal, the firm is most likely to maximise economic surplus.[8] This reasoning suggests that corporate governance should align the interests of managers (agents) with those of the shareholders (principal). Such an orientation towards shareholder value is not undisputed,[9] and the degree to which it is pursued throughout the world differs.[10] But the centrality of the principle to corporate governance is widely accepted,[11] and

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[5] Reinier Kraakman, John Armour, Paul Davies, Luca Enriques, Henry Hansmann, Gerard Hertig, Klaus Hopt, Hideki Kanda, Mariana Pargendler, Wolf-Georg Ringe, and Edward Rock, *The Anatomy of Corporate Law – A Comparative and Functional Approach* (Third Edition, Oxford University Press 2017) Ch 2.

[6] On the relation between transaction costs and incomplete contracts, see Ronald H Coase, 'The Nature of the Firm' (1937) 4 Economica 386; Oliver E Williamson, *The Economic Institutions of Capitalism* (New York: The Free Press 1985); Oliver Hart, 'Corporate Governance: Some Theory and Implications' (1995) 105 The Economic Journal 430, 678. On the role of corporate governance to fill contractual gaps, see Jonathan R Macey and Geoffrey P Miller, 'Corporate Stakeholders: A Contractual Perspective' (1993) 43 University of Toronto Law Journal 401.

[7] Shleifer and Vishny (n 2); Hansmann and Kraakman (n 2).

[8] Frank H Easterbrook and Daniel R Fischel, *The Economic Structure of Corporate Law* (Harvard University Press 1983), 68; Jonathan R Macey, 'An Economic Analysis of the Various Rationales of Making Shareholders the Exclusive Beneficiaries of Corporate Fiduciary Duties' (1992) 21 Stetson Law Review 23.

[9] See eg Lynn A Stout, 'Bad and Not-So-Bad Arguments for Shareholder Primacy' 75 South California Law Review 1189; MM Blair, *Ownership and Control: Rethinking Corporate Governance for the Twenty-First Century* (Washington DC, Brookings Institution 1995); Margaret M Blair and Lynn A Stout, 'A Team Production Theory of Corporate Law' (1999) 85 Virginia Law Review 247; Marc Goergen, 'What Do We Know About Different Systems of Corporate Governance?' (2007) 7 Journal of Corporate Law Studies 1.

[10] Klaus J Hopt, 'Labor Representation on Corporate Boards: Impacts and Problems for Corporate Governance and Economic Integration in Europe' (1994) 14 International Review of Law and Economics.

[11] Shleifer and Vishny (n 2); Armour et al. (n 5).

perhaps most strongly reflected in the corporate laws of the UK, where it takes the stronger form of shareholder primacy.[12]

This widespread acceptance breaks down in the case of banks,[13] especially those that are systemically important (the G-SIBs[14])[15]. To reiterate, **Chapter 1** outlined the socially valuable role that banks perform, and how this role is paired with an inherent fragility in the capital structure of banks. As banks become systemically important, they might also become 'too big to fail' so that governments would elect to bail them out rather than face the risks a disorderly insolvency might entail. The Chapter then noted that an expectation of such government support interacts negatively with shareholder primacy, because unsecured creditors and shareholders have a reduced incentive to monitor risk-taking and discipline bank managers.[16] In fact, shareholders are incentivised to maximise the implicit subsidy that these banks receive by entrenching their 'too-big-to-fail status'. They can do so in several ways, but one of them is to evolve

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[12] John Armour, Simon Deakin and Suzanne J Konzelmann, 'Shareholder Primacy and the Trajectory of UK Corporate Governance' (2003) 41 British Journal of Industrial Relations 3, 531; Davies (n 2). For a more detailed treatment, see Section III(A).

[13] Klaus J Hopt, 'Corporate Governance of Banks and Other Financial Institutions after the Financial Crisis' (2013) 13 Journal of Corporate Law Studies 2, 219; Jonathan R Macey and Maureen O'Hara, 'The Corporate Governance of Banks' (2003) Federal Reserve Bank of New York Economic Policy Review – April 2003.

[14] See **Chapter 1**.

[15] John Armour and Jeffrey N Gordon, 'Systemic Harms and Shareholder Value' (2014) 6 Journal of Legal Analysis 1, 35; Mark J Roe, 'Structural Corporate Degradation Due to Too-Big-To-Fail Finance' (2014) 162 University of Pennsylvania Law Review 1419; Jill E Fisch, 'The Mess at Morgan: Risk, Incentives, and Shareholder Empowerment' (2015) 83 University of Cincinnati Law Review 3, 651.

[16] Armour and Gordon (n 14); Roe (n 14).

their intrafirm structures in ways that complicate monitoring, increase risk, and lower the probability of an orderly resolution.

B. Ring-Fencing as a Response to the Governance Problems of SIBs

The financial crisis made painfully clear how high the social costs of corrupted governance in SIBs are, and thus provided the impetus for reform. By and large, regulators have adopted two types of strategies. First, they aim to curtail the symptoms of corrupted governance by mitigating shareholder primacy: For example, they have promulgated compensation reforms[17] and enhanced liability for directors[18].[19] Second, they propose measures to address the source of the corruption of governance, the implicit subsidy. This includes removing or risk-adjusting the government 'insurance' and making resolution credible so that government support does not have to be forthcoming during crises.[20]

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[17] See eg Directive (EU) 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (hereafter 'Capital Requirements Directive IV' or 'CRD IV') Arts. 92(1)(g) and 94(1)(g).

[18] See s 36 of the Act.

[19] For an overview, see John Armour, Dan Awrey, Paul Davies, Luca Enriques, Jeffrey N Gordon, Colin Mayer and Jennifer Payne, *Principles of Financial Regulation* (Oxford University Press 2016) ch 17.

[20] John Armour, 'Making Bank Resolution Credible' in Niamh Moloney, Eilís Ferran and Jennifer Payne (eds), *The Oxford Handbook of Financial Regulation* (Oxford University Press 2015); Alan D Morrison, 'Systemic Risks and the 'Too-Big-to-Fail' Problem' (2011) 27 Oxford Review of Economic Policy 3, 498.

The legal structure of banks, and particularly (universal) banking groups, is seen as central to both approaches. Optimisation of banks' legal structures from a regulator's perspective could support regulatory objectives in at least three ways.[21] First, it renders the resolution of banks more credible. Regulators can require that a bank's legal structure becomes less complex and opaque so that informational asymmetries between that bank's management and regulators are reduced.[22] In addition, regulators can work with a bank's management to design an organisational structure that facilitates orderly resolution[23] and implement it *ex ante*.[24]

Second, changes to a bank's legal structure can reduce risk-taking by *discouraging* or *disallowing* subsidy-seeking behaviour. If regulators mandate that banks carry out socially critical activities from a legal entity that is structurally separated from the rest of the banking group, then they can impose distinct, activity-specific resolution policies on various parts of the bank. If such a separation implies that retail banking (deposit-taking) activities receive government support but investment banking activities do not, then the subsidy-seeking rationale for expanding the scope of bank activities disappears. Correspondingly, bankers would face more risk-reflective funding costs that improve

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[21] Also see **Chapter 1**.

[22] This facilitates supervision and resolution.

[23] Because of the size of SIBs, 'separability' can facilitate purchase and assumption resolution processes, see Armour (n 20). See also **Chapters 1**, **3**, and **4**.

[24] John Vickers, 'Some Economics of Banking Reform' (2012) Rivista di Politica Economica (October/December 2012); J Armour et al. (n 19) ch 23.

ex ante discipline on risk-taking. Prohibiting the funding of investment banking activities by government-insured retail deposits could generate a similar result.[25]

Third, regulating a bank's legal structure facilitates the imposition of activity-specific governance mechanisms within a banking group. In that sense, as observed in **Chapter 1**, intrafirm structure can be used to create a *nexus for regulatory control.* Interaction between the risk-management practices of retail and investment banks within one banking group could, for example, lead to excessive risk-taking in the retail bank.[26] Such 'seepage' could be prevented by imposing a separate governance structure on the retail bank, with its own independent risk committee.[27]

C. Ring-Fencing in the United Kingdom

Based on similar rationales, the UK's Independent Commission on Banking ('ICB'), established by HM Treasury to consider 'structural and related non-structural reforms to the UK banking sector to promote financial stability and competition',[28] recommended that the structure of large banks be regulated through 'ring-fencing'.

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[25] John Vickers, 'Banking Reform in Britain and Europe' (2013) IMF – Rethinking Macro Policy II: First Steps and Early Lessons (April 16-17, 2013) 2.

[26] High-Level Expert Group on Reforming the Structure of the EU Banking Sector, *Final Report* (2012) ('Liikanen Report') 99.

[27] See eg Armour et al. (n 19) ch 23.

[28] Independent Commission on Banking ('ICB'), *Final Report: Recommendations* (ICB 2011) ('ICB Report') 19. In formulating its recommendations, the ICB was guided by a set of principles including to curb 'incentives for excessive risk-taking by neutralising subsidies and the unpriced risk of triggering financial crises', and to reduce 'the costs of systemic financial crises', see page 20.

Ring-fencing aims to insulate activities that are critical to the operation of the real economy but hard to substitute[29] from risks emanating from less critical activities within the bank.[30] It is an example of structural regulation (**Chapter 1**) and, more specifically, of a regulatory segmentation measure (**Chapter 3**).

In practice, ring-fencing is achieved by structurally separating retail banking from investment banking. Critical retail activities should be performed in a separate legal entity within the banking group: the 'ring-fenced body' or 'ring-fenced bank' ('RFB').[31] The RFB should have its own equity buffer, meet its own liquidity requirements, and be subject to a separate governance regime and restrictions on its dealings with the rest of the group.[32] This form of 'structured universal banking' (characterised by intrafirm regulation and, specifically, by regulatory segmentation measures) represents a departure from 'unstructured universal banking' (no intrafirm regulation), which does not mandate such separation, but stops short of 'full structural separation' (pushing activities outside the bank's perimeter altogether). Under full structural separation, the regulator imposes an activity separation at the group level, so that two completely separate banks are formed under different ownership (it has, in other words *inter*firm

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[29] Examples include deposit-taking, the payments system, and lending to consumers and small and medium-sized businesses, see ICB Report (n 28) 35-40.

[30] ICB Report (n 28) 35-40. For an analysis of this policy, see Armour et al. (n 19) ch 23.

[31] ICB Report (n 28) 23-27. Ring-fencing could be viewed as a reinforcement of affirmative asset partitioning, shielding the RFB's assets from claims from elsewhere in the banking group, see Henry Hansmann, Reinier Kraakman and Richard Squire, 'Law and the Rise of the Firm' (2005) 119 Harvard Law Review 5, 1333.

[32] ICB Report (n 28).

consequences). The ICB prefers structured universal banking because it captures the benefits of full structural separation without losing the scale and scope economies of unstructured universal banking.[33] This implies there is partial segmentation – in other words, that the ring-fence is semi-permeable. **Figure 5.1** graphically represents the three strategies.[34]

[33] ICB Report (n 28) 26.

[34] A comprehensive overview of structural regulation is presented in Armour et al. (n 19) ch 23. See also **Chapter 1** and references therein.

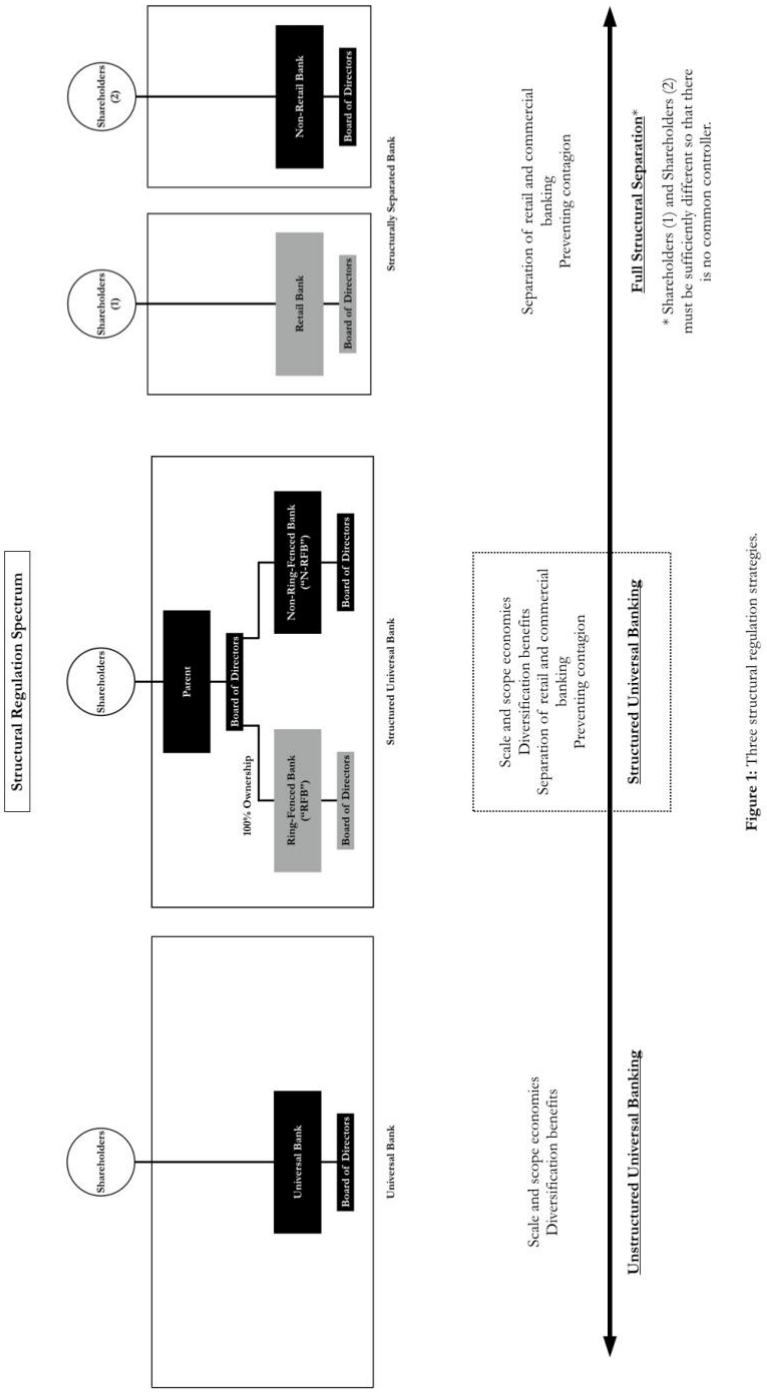


Figure 1: Three structural regulation strategies.

Figure 5.1: Three structural regulation strategies: unstructured universal banking (no intrafirm regulation) and full structural separation (pushing activities outside the perimeter of the banking firm) are on the extremes, with structured universal banking (a form of intrafirm regulation) as the intermediate option.

With a few amendments from the UK's Parliamentary Commission on Banking Standards ('PCBS'),[35] the government adopted most of the ICB's ring-fencing proposals and presented its Banking Reform Bill to Parliament in 2012 and 2013.[36] Ring-fencing was ultimately implemented[37] in legislation through the Financial Services and Markets Act 2000 ('FSMA'), as amended by the Financial Services (Banking Reform) Act 2013 ('the Act'). The Act requires HM Treasury to draft further implementing orders. It also requires that the Prudential Regulation Authority ('PRA') and the Financial Conduct Authority ('FCA')[38] develop rules and supervisory policies to implement ring-fencing.[39]

The Act distinguishes between three types of banking activities: 'core activities', 'prohibited activities', and 'permitted activities'; each is subject to specific restrictions. 'Core activities' relate to the regulated activity of accepting deposits.[40] Banking groups

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[35] Parliamentary Commission on Banking Standards ('PCBS'), *First Report: First Report of Session 2012-13*, HL Paper 98; HC 848 (HMSO 2012) (hereafter 'PCBS First Report'); PCBS, *Banking Reform—Towards the Right Structure: Second Report of Session 2012-13*, HL Paper 126; HC 1012 (HMSO 2013).

[36] See HM Treasury, 'Banking Reform: Delivering Stability and Supporting a Sustainable Economy' Cm 8356 (London, HMSO June 2012); HM Treasury, 'Sound Banking: Delivering Reform' Cm 8453 (London, HMSO October 2012); HM Treasury, 'Banking Reform: A New Structure for Stability and Growth' Cm 8545 (HMSO February 2013).

[37] This Chapter does not cover the potential interaction of UK ring-fencing with other forms of intrafirm regulation (see **Chapter 1**).

[38] When referring to a ring-fencing rule, this Chapter solely refers to the PRA's publications and makes no reference to the FCA's concurrent publications of these same consultation papers, policy statements, or rules. The PRA is the UK's primary regulator on ring-fencing, and its publications are substantively (largely) identical to those of the FCA.

[39] FSMA s 142H as inserted by s 4(1) of the Act. For the PRA's provisional rules, see PRA, 'PRA Rulebook: CRR Firms and Non-Authorised Persons: Ring-Fenced Bodies Instrument 2016' (4 July 2016) PRA 2016/26 (hereafter 'PRA Rulebook 2016/26').

[40] FSMA s 142B as inserted by s 4(1) of the Act.

that accept deposits whose value on average exceeds £25 billion[41] are required by the Act to place their core activities into RFBs.[42] 'Core services' complement these core activities. The Act identifies three categories of core service: *'(i) facilities of the accepting of deposits or other payments into an account which is provided in the course of carrying on the core activity of accepting deposits; (ii) facilities for withdrawing money or making payments from such an account; (iii) overdraft facilities in connection with such an account.'*[43] The Act identifies several 'prohibited activities' for RFBs:[44] these include dealing in investments as principal. Secondary legislation drafted by HM Treasury further specifies these exclusions and prohibitions,[45] and set out exceptions to the prohibited activities. The act categorises as 'permitted activities' any activities that are neither core nor prohibited. Permitted activities may be performed by RFBs and other parts of the banking group. **Table 5.1** sets out the resulting activity division between RFBs and non ring-fenced bodies (N-RFBs).

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[41] The Financial Services and Markets Act 2000 (Excluded Activities and Prohibitions) Order 2014 (the 'Excluded Activities Order') r 12, specifying FSMA s 142A as inserted by s 4(1) of the Act. This threshold will be calculated taking into account all UK banks within a group. On this basis, the legislation applied to HSBC Holdings plc, Barclays plc, Royal Bank of Scotland plc, Lloyds Banking Group plc, Santander UK plc and The Co-Operative Bank plc when it entered into force. All accept the latter were deemed systemically important by the PRA in 2015, see PRA, '2015 List of UK Firms Designated as Other Systemically Important Institutions (O-SIIs)' (2015).

[42] FSMA s 142A as inserted by s 4(1) of the Act.

[43] FSMA s 142C as inserted by s 4(1) of the Act. Secondary legislation drafted by HM Treasury sets out this first category of activities in greater detail, see The Financial Services and Markets Act 2000 (Ring-Fenced Bodies and Core Activities) Order 2014 (the 'Core Activities Order').

[44] FSMA s 142D as inserted by s 4(1) of the Act.

[45] Excluded Activities Order.

Ring-Fenced Bodies	Non Ring-Fenced Bodies
'Core activities' and 'core services' Exceptions to 'excluded activities' 'Permitted activities'	'Excluded activities' 'Permitted activities'

Table 5.1: The activity division between RFBs and N-RFBs.

II. WHY RING-FENCE GOVERNANCE IS ESSENTIAL FOR A CREDIBLE RING-FENCE

As Section I discussed, the goal of ring-fencing is to resolve the structural corruption of bank governance by addressing its source and symptoms. To achieve that goal, an RFB must be credibly separated from other parts of the banking group. This Section shows that the ring-fencing rules leave discretion to the managers and directors of RFBs and argues that, to achieve a credible separation and preserve the ring-fence, this discretion needs to be constrained via governance-focused legal strategies ('ring-fence governance').

A. The Incompleteness and Indeterminacy of Ring-Fence Rules

Regulatory rules that are complete, in the sense that they *ex ante* unambiguously stipulate all future contingencies[46], leave no role for governance. After all, the rules would spell

[46] Katharina Pistor and Chenggang Xu, 'Incomplete Law' (2003) 35 New York University Journal of International Law and Politics 4, 931, 932. Similarly: Cass R Sunstein, 'Problems with Rules' (1995) 83 California Law Review 4, 961 ('[Rules] attempt to specify outcomes before particular cases arise. (…) We have rules (…) to the extent that the content of the law has been set down in advance of applications of the law.'); Armour et al. (n 5) 39-45.

out how directors should behave in any conceivable eventuality, leaving them no discretion to serve interests inimical to the ring-fence. But writing complete rules *ex ante* may be impossibly ambitious, and even if it were feasible the result would likely be *ex post* inefficient.[47] It is now widely accepted that rules are incomplete[48], and the ring-fencing rules are no exception.

In fact, partially because of the delicate balance structured universal banking aims to strike, ring-fencing rules are substantially incomplete. RFBs are required to 'ensure that intragroup transactions are conducted on *arm's length terms*'[49]. The Act

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[47] See Sanford J Grossman and Oliver D Hart, 'The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration' (1986) 94 Journal of Political Economy 4, 691; Oliver Hart and John Moore, 'Incomplete Contracts and Renegotiation' (1988) 56 Econometrica 4, 755; Oliver Hart and John Moore, 'Foundations of Incomplete Contracts' (1999) 66 The Review of Economic Studies 1, 115; Louis Kaplow, 'Rules versus Standards: An Economic Analysis' (1992) 42 Duke Law Journal 3, 600 ('Yet another limitation on the ability to formulate laws as rules involves limitations of language.'); Eric Maskin and Jean Tirole, 'Unforeseen Contingencies and Incomplete Contracts' (1999) 66 Review of Economic Studies 83; Sunstein (n 46); Oliver E Williamson, 'Transaction-Cost Economics: The Governance of Contractual Relations' (1979) 22 Journal of Law and Economics 2, 233; Michael J Trebilcock, *The Limits of Freedom of Contract* (Harvard University Press 1993) ch 6. Note that, even though this literature discusses incomplete *contracts*, *rules* are considered to be a subset of contracts.

[48] Pistor and Xu (n 46) 938 ('The basic premise is that law is intrinsically incomplete'). See also Herbert LA Hart, *The Concept of Law* (Second Edition (Original: 1961) Clarendon Press Oxford 1994) 128 ('It is a feature of the human predicament (and so of the legislative one) that we labour under two connected handicaps whenever we seek to regulate, unambiguously and in advance, some sphere of conduct by means of general standards to be used without further official direction on particular occasions. The first handicap is our relative ignorance of fact: the second is our relative indeterminacy of aim.').

[49] PRA, 'The Implementation of Ring-Fencing: Prudential Requirements, Intragroup Arrangements and Use of Financial Market Infrastructures' (October 2015) CP37/15 (hereafter 'CP37/15') para 4.3, 24 (*emphasis* added). Also see PRA, 'The Implementation of Ring-Fencing: Prudential Requirements, Intragroup Arrangements and Use of Financial Market Infrastructures' (July 2016) PS20/16 para 7.20-28, 17-18; PRA, 'Supervisory Statement: Ring-Fenced Bodies (RFBs)' (February 2017, updating July 2016) SS8/16 (hereafter 'SS8/16') para 7.16-19, 27-28. This requirement is based on FSMA s 142H(5)(a) as inserted by s 4(1) of the Act. The proposed implementing rules are contained in: PRA Rulebook 2016/26 ch 12.

requires the PRA to make rules that spell out these restrictions, but the PRA has concluded such rules are a practical impossibility: the PRA is forced by the 'broad range of potential intragroup transactions and the degree of judgement involved in determining whether a transaction is on arm's length terms' to require banks to implement policies and procedures.[50] In its proposed rules, the PRA sets out requirements for these policies and procedures but requires RFBs to design their own bank-specific implementation.[51]

In addition, the relevant implementing order sets out permitted exceptions to the 'excluded activities' and 'prohibitions' defined therein, so that RFBs can undertake certain activities that would otherwise be disallowed.[52] In some cases, these exceptions leave little room for interpretation, whereas others – such as hedging exceptions,[53] liquid asset exceptions[54] and collateral exceptions[55] – involve a greater degree of judgment.[56] These latter rules are not only incomplete, but also indeterminate. Without further

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[50] CP37/15 para 4.7, 25; PRA Rulebook 2016/26 r 12.2.

[51] PRA Rulebook 2016/26 rr 12.3 and 12.4 respectively.

[52] PRA Rulebook 2016/26, ch 17; CP37/15, para 7.7-7.14, 36-37. The requirement is based on the Excluded Activities Order.

[53] Excluded Activities Order rr 6, 14. It is particularly hard to draft a complete rule regarding the determination that '*the sole or main purpose* of an exceptions transaction is and continues to be' (emphasis added) for a hedging exception transaction. See PRA Rulebook 2016/26, r 17.1(3). The case of the JP Morgan 'London Whale' illustrates this difficulty: United States Senate Permanent Subcommittee on Investigations, 'Staff Report on JP Morgan Chase Whale Trades: A Case History of Derivatives Risks and Abuses' (March 15, 2013). See also **Chapter 6**.

[54] Excluded Activities Order rr 6(3)(a) 18(b).

[55] Excluded Activities Order rr 6(3)(b) 14(5).

[56] CP37/15 para 7.8, 36.

action, this judgment would be exercised by the managers of the RFB. The PRA attempts to constrain that judgment by imposing requirements on RFBs in respect of the policies and procedures they have to implement[57], but, subject to those requirements, the managers of the RFB are again entitled to exercise discretion.

A final source of incompleteness and indeterminacy is the requirement that RFBs create a culture that is distinctive within the banking group for being 'customer focused' and conducive to 'long-term customer-oriented UK retail banking'.[58] This is important for the ring-fence, because it is 'difficult for regulations to work effectively if they are operating against the grain of corporate culture'.[59] Moreover, cross-contamination of commercial banking and retail banking cultures is widely thought to have been the root cause of undesirable risk-taking and short-termism in retail banks that were part of a universal bank.[60] Although the ICB recognises that 'corporate culture

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[57] Draft rules can be found in: PRA Rulebook 2016/26 ch 17. Further supervisory guidance is given in SS8/16 ch 10.

[58] ICB Report (n 28) 76.

[59] ICB Report (n 28) 74.

[60] Parliamentary Commission on Banking Standards ('PCBS'), *Changing Banking for Good – Oral Evidence*, HL Paper 27-III; HC 175-III (HMSO, 2013) (hereafter 'PCBS Final Report III') Q61 (Paul Volcker argues that it was not proprietary trading itself that was the problem, but the culture of proprietary trading that 'infected' the banks), Q588 (Andy Haldane notes: '[A]longside the financial reasons why you might seek separation or ring-fencing (…), equally, and in some ways more important, is what ring-fencing or separation might do to separate out cultures (…).'), Q625 (Andy Haldane notes: 'I do think that some of the sales culture that grew up around the retail banking proposition was (…) affected by the culture that operated within parts, at least, of investment banking, and that did come with some costs.').

cannot directly be regulated',[61] it suggests that the structural and governance measures proposed should consolidate the foundations for such a culture to arise.[62]

B. Regulator-Based Gap Filling Strategies for the Ring-Fence

Incomplete and indeterminate rules leave room for discretionary judgment, so that their application, 'even though it may not be arbitrary or irrational, is in effect a choice'.[63] Granting discretion might be preferable over the formalistic application of an *ex post* inefficient rule,[64] but it also exposes the regulator to opportunism, which can undermine the efficacy of the rule. The challenge for regulators is to ensure that bankers exercise their discretion in line with the ring-fencing objectives. To that end, the ring-fencing framework adopts at least three *regulator-based* gap-filling strategies.[65]

First, the legislators designed the legal structure of the ring-fence in a way that allows regulators to respond to changing circumstances. In line with UK convention, the ring-fencing regime is implemented at three levels. Primary legislation (FSMA as implemented by the Act, drafted by Parliament) covers the key principles; secondary

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[61] ICB Report (n 28) 76.

[62] ICB Report (n 28) 12.

[63] Hart (n 48) 127. More generally, see Sunstein (n 46).

[64] See eg Charles K Whitehead, 'The Volcker Rule and Evolving Financial Markets' (2011) 1 Harvard Business Law Review 39.

[65] A *regulator-based strategy* is a strategy that requires the regulator to proactively take initiative to execute and enforce it.

legislation (orders, drafted by HM Treasury) specifies more detailed rules; and rules and supervisory statements drafted by the PRA[66] and FCA contain the most detailed rules and supervisory principles. Of the three types of rules, primary legislation is the most complicated to amend or complement; changing rules and supervisory principles is relatively easy. Hence, with the drafters mindful of the challenges in designing complete and efficient rules *ex ante*,[67] the most detailed (and often controversial) provisions of the ring-fencing framework are included in rules. This legislative architecture ensures that regulators, in case a legal rule that was thought to be *ex ante* efficient turns out not to be so *ex post*, have the flexibility to respond by changing the rules in light of this new information.[68]

The second gap-filling strategy, on the advice of the PCBS,[69] has been to 'electrify' the ring-fence. This implies that consistent violation of the ring-fencing objectives by the banking group can be sanctioned by the regulator.[70] Specifically, the regulator has the power to impose a group restructuring that results in a full separation

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[66] FSMA s 142H as inserted by s 4(1) of the Act. The PRA fulfils its task in line with its general safety and soundness objective (FSMA Section 2B), which is amended by the Act when discharged in relation to ring-fencing, ring-fenced bodies and ring-fenced groups (FSMA s 2B as amended by s 1(2)(c) of the Act).

[67] PCBS Final Report III (n 60) Q685.

[68] Cf Whitehead (n 64) 39-74. In her oral evidence to the PCBS, Dorothy Livingston noted that, when it comes to the balance between the need to reduce uncertainty and to desire to foster flexibility, '[t]he right balance is not to make these banks so rigid that they cannot adapt to changes in conditions. (…) [W]e must not be so hidebound that banks cannot serve their customers' needs (…). [T]here is so much that has not yet been properly modelled or studied', see PCBS Final Report III (n 60) Q685.

[69] PCBS First Report (n 35) para 163, 73.

[70] PCBS First Report (n 35) 69; Parliamentary Commission on Banking Standards ('PCBS'), *Changing Banking for Good*, HL Paper 27-II; HC 175-II (HMSO 2013) 169.

between the RFB and the banking group.[71] 'Electrification' is meant to create 'a very significant disincentive for banks to depart from the spirit of the ring-fence by creating full structural separation as a viable alternative'.[72] It should provide a backstop in case 'the ring-fence proves permeable or impossible to police'.[73] Where the management of a ring-fenced bank might otherwise consciously evade the ring-fence, they now have an additional reason not to do so. Accidental actions contrary to ring-fencing objectives should also become less likely because the electrified ring-fence creates enhanced incentives for the management to monitor the RFB's activities. Electrification of the ring-fence thus incentivises the bank's management, both of the RFB and of the parent company, to exercise discretion left by the rules in line with the spirit of the ring-fence.[74]

The electrification of the ring-fence comes on top of existing powers a regulator can exercise if it concludes a bank breaches regulatory rules (see also **Chapter 1**).[75] Two

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[71] FSMA ss 142K (setting out the cases when group restructuring powers become exercisable), 142L (setting out the group restructuring powers), 142M and 142N (setting out the procedures for using the group restructuring powers) as inserted by s 4(1) of the Act.

[72] PCBS First Report (n 35) para 153, 69.

[73] PCBS Final Report III (n 60) Q596 (quoting Andy Haldane).

[74] 'The ring-fence envisaged by the Government may, in the long run, not provide an adequate degree of separation. Nor may it be adequate to buttress banking standards. Additional powers are essential to provide adequate incentives for the banks to comply not just with the rules of the ring-fence, but also with their spirit. In the absence of the Commission's legislative proposals to electrify the ring-fence, the risk that the ring-fence will eventually fail will be much higher.' Parliamentary Commission on Banking Standards ('PCBS'), *Changing Banking for Good*, HL Paper 27-I; HC 175-I (HMSO 2013) (hereafter 'PCBS Final Report I') para 163.

[75] For an overview, see Parliamentary Commission on Banking Standards ('PCBS'), *Changing Banking for Good – Written Evidence*, HL Paper 27-VI; HC 175-VI (HMSO, 2013) (hereafter 'PCBS Final Report VI') No. 198 (Bank of England, 6 December 2012).

such powers are most relevant in this context. Section 45 of the FSMA grants regulators the power to vary or cancel a firm's permission to carry out a regulated activity.[76] Although it stops short of mandating full separation, this power could theoretically be used to prevent an RFB from undertaking excluded activities or, more generally, activities contrary to the spirit of the ring-fence. In addition, as discussed in **Chapter 1**, the Bank Recovery and Resolution Directive ('BRRD') confers powers on resolution authorities to require divestments[77], the limitation or cessation of certain activities[78], or changes to the legal or operational structure of the firm[79].[80]

The third of the regulator's gap-filling strategies is to design and maintain part of the ring-fence on the basis of delegated authority and supervision. Some of the supervisory actions will focus on assessing compliance with the rules and the spirit of the ring-fence, so that unduly exercised discretion on the part of the management of an RFB can be cut short. In addition, the PRA has been accorded the discretionary power to waive or modify certain components of the ring-fence rules where their application

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[76] FSMA s 45.

[77] Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council (Text with EEA relevance) OJ L 173 (hereafter 'Bank Recovery and Resolution Directive' or 'BRRD') Art. 17(4)(d).

[78] BRRD Arts. 17(4)(e) and 17(4)(f).

[79] BRRD Art. 17(4)(g).

[80] Such actions can be taken in the context of inadequate recovery or resolution plans, see BRRD Arts. 6(6) and 17(4)-(5). See also: FSMA ss 192JA and 192JB as implemented by s 133 of the Act, in combination with Parts 1 to 3 of the UK Banking Act 2009.

would be unduly burdensome or would not support the purposes for which the rules were made, provided the waiver or modification itself would not adversely affect the advancement of any of the ring-fencing objectives or the PRA's wider objectives.[81] The PRA's discretionary power should be exercised on a case-by-case basis to make the ring-fencing rules more flexible and to prevent excessive formalism that might arise as a consequence of insufficiently customised rules.[82]

C. Common Challenges to Regulator-Based Gap-Filling Strategies

The three gap-filling strategies discussed in the preceding section may help to ensure that the discretion left by ring-fencing rules is exercised in accordance with the ring-fencing objectives. However, they all face similar challenges to their credibility and reliability, which arise due to their reliance on the ability and willingness of regulators to act as effective and predictable *ex post* gap-fillers. These challenges can create a wedge between law in the books and law in action, which can be characterised as 'regulatory slack'.[83] Such 'slack' renders regulator-based gap-filling strategies vulnerable.

As a result of informational asymmetries, regulators may not have the insight into the bank's operations necessary to efficaciously fill these gaps. These informational

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[81] FSMA s 138A. See also: PRA, 'The Implementation of Ring-Fencing: Legal Structure, Governance and the Continuity of Services and Facilities' (May 2015) PS10/15 (hereafter 'PS10/15') para 1.5, para 3.17.

[82] PS10/15 para 3.14.

[83] Armour and Gordon (n 14) 48 ('One [option] is for the firm to exploit differences between textbook and real-world regulators, which generate what we term 'regulatory slack'.').

asymmetries are to some extent natural, arising from the fact that the regulated – who have specialised in undertaking their activities – know more about their own actions and their business than those who seek to regulate them. However, firms may exploit and exacerbate information asymmetries to the detriment of the regulator. Financial institutions, including banks, seem to be inherently more opaque than other firms.[84] But informational asymmetries in systemically important banks might also be a by-product of the externalities described in **Chapter 1**; the same logic that leads bankers to pursue complexity might also induce them purposefully to increase their informational asymmetry vis-à-vis regulators in other ways. In sum, regulators face significant challenges to verify the actions of bankers.[85] In addition, where managerial decisions are more forward-looking, regulators are likely not best-positioned to decide what *should* happen or *should have* happened.

Moreover, even when regulators have sufficient information to make these gap-filling judgments, they may not have the capacity to process and act on that information. A back-of-the envelope calculation as used in Armour et al. (2016) illustrates the enormity of the task regulators face. The calculation suggests that in 2010 each employee at the Financial Services Authority ('FSA'), then the UK financial regulator charged with the supervision of banks and financial markets, had to supervise the production of

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[84] Donald P Morgan, 'Rating Banks: Risk and Uncertainty in an Opaque Industry' (2002) 92 American Economic Review 4, 874.

[85] Charles W Calomiris, 'Financial Innovation, Regulation, and Reform' (2009) 29 Cato Journal 65; Lucian A Bebchuk & Holger Spamann, 'Regulating Bankers' Pay' (2009) 98 Georgetown Law Journal 280, 280-282.

financial claims worth on average $2.4bn.[86] Even if regulators could attract the brightest minds in finance, this challenge would be formidable. Regulators might simply lack the capacity to make all necessary gap-filling judgments, let alone to make judgments of a sufficient quality.[87] Moreover, assuming for the sake of the argument that regulators are able to make such judgments, it is well-understood that they move more slowly than regulated entities. During that time lag, the regulator is exposed to opportunism by the regulated.[88]

Finally, even if regulators have the information and the capacity to act as gap-fillers, political economy considerations might dissuade them from doing so in line with the ring-fencing objectives.[89] With respect to the gap-filling mechanisms discussed above, two examples illustrate this concern.

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[86] Armour et al. (n 19) ch 4 Table 4.1 (using the same crude calculations and data as the authors).

[87] Especially given the informational asymmetries vis-à-vis bankers and their activities. For a related observation, regarding the challenge is filling out the *segmentation-weighted adjacency matrix*, see **Chapters 3** and **4**.

[88] James R Barth, Gerard Caprio and Ross Levine, 'Reassessing the Rationale and Practice of Bank Regulation and Supervision after Basel II' in IMF, *Current Developments in Monetary and Financial Law* (International Monetary Fund, 2008) 227 ('[m]ost supervisory agencies will never have sufficient human capital or budgets to implement Basel II successfully').

[89] On the political economy of business and financial regulation, see Pepper D Culpepper, *Quiet Politics and Business Power: Corporate Control in Europe and Japan* (Cambridge University Press 2011) ch 1; John C Coffee Jr, 'The Political Economy of Dodd-Frank: Why Financial Reform Tends to be Frustrated and Systemic Risk Perpetuated' (2012) 97 Cornell Law Review 1019; Roberta Romano, 'Regulating in the Dark' in Cary Coglianese (ed), *Regulatory Breakdown: The Crisis of Confidence in U.S. Regulation* (University of Pennsylvania Press 2012); Karthik Ramanna, *Political Standards: Corporate Interest, Ideology, and Leadership in the Shaping of Accounting Rules for the Market Economy* (The University of Chicago Press 2015). On the motivations of regulators more generally, see George J Stigler, 'The Theory of Economic Regulation' (1971) 2 Bell Journal of Economics 3.

First, the legislative framework that creates flexibility by delegating rule-making powers to regulatory institutions also makes it vulnerable to capture. Mervyn King, then Governor of the Bank of England, has expressed the concern that delegation of powers may render the exercise of regulatory judgment 'simply as a negotiation between the regulator and the regulated bank.'[90] This concern is exacerbated by the fact that most discussions concerning delegation will be highly technical in nature, far removed from the political process and likely taking place at a time when financial reform is no longer a politically salient topic.[91]

Such concerns are especially acute given that some of the provisions that can be redefined by an order from the Treasury are central to the operation of the ring-fence.[92] Article 142B of the Act, for example, defines the 'core activities' of an RFB, but Article 142B(2) of the Act allows the Treasury to exclude classes of institutions by order. Similarly, the 'excluded activities' defined by Article 142D of the Act can be carried on 'in circumstances specified by the Treasury by order'.[93] In both cases, the Treasury's powers are conditional on meeting a negative test,[94] which does not take account of the

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[90] PCBS Final Report III (n 60) Q1144-1145 (quoting Mervyn King).

[91] Culpepper (n 89) ch 1; Coffee Jr. (n 89).

[92] A similar point is made by the PCBS in its first report: PCBS, First Report (n 35) para 58, 134.

[93] Art 142D(2) and 142D(3) of the Financial Services and Markets Act 2000, as amended by the Financial Services (Banking Reform) Act 2013.

[94] See eg FSMA s 142D(3) as implemented by s 4(1) of the Act (states that the Treasury can only make exceptions by order 'if the Treasury are of the opinion that allowing the ring-fenced bodies to deal in investments as principal in the specified circumstances would *not be likely to result in any significant adverse effect on the continuity of the provision in the United Kingdom of core services*' (*emphasis* added)).

cumulative effect of these exceptions.[95] As noted by the PCBS, these provisions allow the Treasury to re-define almost any aspect of the location of the ring-fence.[96] The concern is, in sum, that political economy considerations combined with the flexibility of the legal framework might lead to an erosion of the ring-fence over time.[97]

Second, regulatory forbearance may undermine the credibility of 'electrification'.[98] Using the powers conferred by electrification could be disruptive and impose enormous costs on banks; in some cases, it may even be contrary to the PRA's 'continuity objective'.[99] The implementation and assessment of 'living wills' in the United States illustrates this problem. Regulators require living wills to ensure that banks have a plan, backed up by the necessary infrastructure, that allows them to enter orderly resolution procedures in case of insolvency. If such plans are not credible, the Federal Reserve and the FDIC can ultimately require banks to simplify their structure or sell assets (see **Chapter 1**). However, despite having concluded on multiple occasions that banks did not meet the standards required, this power has only been put to very limited

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[95] A similar concern was expressed by the PCBS: PCBS First Report (n 35) para 135, 64.

[96] PCBS First Report (n 35) para 58, 32 and para 134, 64.

[97] PCBS First Report (n 35) para 150, 68.

[98] Paul Volcker makes reference to the 'not-on-my-watch syndrome' that tends to characterise the attitude of regulators in his Foreword to Ron J Feldman and Gary H Stern, *Too Big to Fail – The Hazards of Bank Bailouts* (Brookings Institution Press 2009).

[99] FSMA s 1EA as inserted by s 2(3) of the Act. The continuity objective might conflict with the exercise of powers akin to those in FSMA s 45, which grants regulators the power to vary or cancel a firm's permission to carry out a regulated activity.

use.[100] If, *ex ante*, it is clear to bank managers that the regulator will not exercise its powers, 'electrification' loses all its beneficial incentive effects.

In sum, the three regulator-based gap-filling strategies – making it easier to change rules as they become more specific, 'electrifying' the ring-fence, and granting the PRA discretion in implementing the rules – may not reliably guarantee that managers exercise the discretion left by the incompleteness of the ring-fencing rules in line with the ring-fencing objectives.

D. The Essential Role of Governance for Credible Ring-Fencing

Given the incompleteness of the rules and the questionable reliability of regulator-based gap-filling mechanisms, the exercise of discretion by the RFB's managers will determine the credibility of the ring-fence. The resulting gaps undermine the credibility of ring-fencing to the extent that they allow directors and managers of RFBs, encouraged by the implicit subsidy they might continue to benefit from if the ring-fence were non-credible, to contravene ring-fencing policy. The ICB recognised this concern and included governance provisions for the RFB in its proposal to strengthen the ring-fence. To evaluate the efficacy of ring-fencing, it is crucial to assess whether ring-fence

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[100] This point was highlighted at a now infamous exchange between Senator Elizabeth Warren and Federal Reserve Chairman Janet Yellen, see United States Senate, 'Hearing Before the Committee on Banking, Housing, and Urban Affairs – 113th Congress, Second Session – Volume I, July 15' (2014) 30. Progress on this front is notoriously hard to evaluate, see eg Steve Bright, Paul Glasserman, Christopher Gregg and Hashim Hamandi, 'What Can We Learn from Publicly Available Data in Banks' Living Wills?' (2016) Office of Financial Research Brief Series.

governance can credibly guarantee that directors of RFBs exercise discretion in line with the ring-fencing objectives.

III. THE GOVERNANCE OF RING-FENCED BANKS

RFBs are subsidiaries within the larger banking group. Their governance is subject to general UK corporate law principles, and to those mandated by the regulatory ring-fencing framework. This Section analyses the governance of RFBs. It starts by providing some background on UK corporate law generally and the law of corporate groups specifically, and proceeds by discussing the objectives and tools of ring-fence governance. It concludes that there is a tension between the objectives of UK corporate law and ring-fence governance, and sets out how the PRA confronts that tension. Throughout, the analysis presumes that the RFB is a wholly-owned subsidiary,[101] so as to sidestep discussions on the protection of minority shareholders that are not specifically related to ring-fencing.

A. Some Background on Corporate Governance in the United Kingdom

Section I briefly described conventional corporate governance theories and noted that corporate law in the United Kingdom has a shareholder-friendly orientation. Consequently, even though directors have broad discretion, corporate law includes a

[101] To the best of my knowledge (September 2022) all RFBs are wholly-owned subsidiaries. Incidentally, this Chapter does not separately cover RFB-groups (that is, RFBs and their separate subsidiaries as opposed to single-entity RFBs), but the principles outlined in this section apply to the relation between an RFB-group and its parent company as well.

variety of tools to constrain the exercise of power by the board and to produce 'agent loyalty' and accountability to the company's shareholders (referred to as 'members').[102] These include rules granting shareholders the power to remove directors,[103] the power of shareholders to intervene in decision-making[104], and the imposition of directors' duties[105]. In particular, directors have a duty to 'promote the success of the company for the benefit of its members as a whole'.[106] The fact that directors formally should also have regard to a range of stakeholder interests[107] does not, in practice, significantly alter their focus.[108] Directors' duties are owed to the company itself, and can thus either be enforced by the company or by those acting on the company's behalf.[109] The only

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[102] Paul L Davies and Sarah Worthington, *Gower and Davies: Principles of Modern Company Law* (Ninth Edition, Sweet & Maxwell 2012) 502.

[103] The procedure to appoint directors is commonly specified in the company's articles, whereas removal rights are set out in statute; see ss 168-9 of the Companies Act 2006. This is slightly qualified in *Bushell v Faith* [1970] A.C. 1099 HL, but not in ways relevant to this Chapter.

[104] For an overview, see Davies and Worthington (n 102) ch 15.

[105] For an overview, see Davies and Worthington (n 102) ch 16.

[106] s 172(1) UK Companies Act 2006.

[107] Although directors' primary duties are owed to shareholders, they have a subordinate obligation to exercise this duty with regard to the interests of other stakeholders. s 172(a)-(f) of the Companies Act 2006 list various matters directors must have regard for in executing these duties, including 'the consequences of any decision in the long term', 'the interests of the company's employees', and 'the impact of the company's operations on the community'. In the case of banks, as noted in Section II(A), shareholder primacy has been mitigated in other ways as well.

[108] First, it is not clear what it means to 'have regard to' these interests. Paying lip service will not be enough, in part because the duty of care, skill and diligence found in s 174 of the UK Companies Act 2006 applies, see Explanatory Notes to the Companies Act 2006 para 328. However, this does not offer directors much guidance, especially when the interests of various stakeholders diverge, see Andrew R Keay, *Directors' Duties* (Second Edition, Jordans 2014) 161-166.

[109] s 170(1) UK Companies Act 2006. Some regard this duty as the 'core duty to which directors are subject', because it applies to 'every judgment which the directors undertake' and clearly articulates that the shareholders (or 'members') are to be the 'primary object of directors' efforts', see Davies and Worthington (n 102) 540, 541. See also Andrew R Keay, 'The Duty to Promote the Success of the

stakeholders that have standing are the shareholders, via a derivative suit on behalf of the company[110], which again reinforces the *de facto* primacy of shareholder interests.[111]

However, shareholder primacy is qualified when the company's fortunes begin to deteriorate and the interests of shareholders start to conflict with those of creditors.[112] To avoid 'bargaining for resurrection', the duty to 'promote the success of the company for the benefit of its members as a whole' is subject to any enactment or rule of law that requires directors to consider or act in the interests of the company's creditors.[113]

Company: Is it Fit for Purpose in a Post-Financial Crisis World?' in Joan Loughrey (ed), *Directors' Duties and Shareholder Litigation in the Wake of the Financial Crisis* (Edward Elgar 2012) 187-228.

[110] Shareholders, however, do not appear to make much use of this right: John Armour, Bernard S Black, Brian C Cheffins and Richard Nolan, 'Private Enforcement of Corporate Law: An Empirical Comparison of the UK and US' (2009) 6 Journal of Empirical Legal Studies 4, 687.

[111] Keay (n 108) 169.

[112] *West Mercia Safetywear Ltd v Dodd* [1988] 4 B.C.L.C (hereafter '*West Mercia*'), at 33, confirms the judgment of Street CJ in the Australian decision in *Kinsela v Kinsela* [1986] 4 NSWLR 722 ('[W]here a company is insolvent the interests of the creditors intrude. (…) It is in a practical sense their assets and not the shareholders' assets that, through the medium of the company, are under the management of the directors pending either liquidation, return to solvency, or the imposition of some alternative administration'), cited in Kristin van Zwieten, 'Director Liability in Insolvency and its Vicinity' (2018) 38 Oxford Journal of Legal Studies 1, 382. Generally, see Dan D Prentice, 'Creditors' Interests and Directors' Duties' (1990) 10 Oxford Journal of Legal Studies 2; John Armour, 'The Law and Economics of Corporate Insolvency: A Review' (2001) ESRC Centre for Business Research, University of Cambridge, Working Paper No. 197; Andrew R Keay, 'The Shifting of Directors' Duties in the Vicinity of Insolvency' (2015) 24 International Insolvency Review; Andrew R Keay, 'Formulating a Framework for Directors' Duties to Creditors: An Entity Maximisation Approach' (2005) 64 Cambridge Law Journal 3, 620; Andrew R Keay, 'Directors' Duties to Creditors: Contractarian Concerns Relating to Efficiency and Over-Protection of Creditors' (2003) 66 Modern Law Review 5; Paul L Davies, 'Directors' Creditor-Regarding Duties in Respect of Trading Decisions Taken in the Vicinity of Insolvency' (2006) 7 European Business Organization Law Review; Easterbrook and Fischel (n 8) 60.

[113] s 172(3) UK Companies Act 2006.

There are two principal routes towards such a shift in duties. The first is the statutory wrongful trading rule in Sections 214 (liquidation)[114] and 246ZB (administration)[115] of the Insolvency Act of 1986, enforceable by the liquidator or administrator respectively. If directors of companies in liquidation or administration (i) knew, or ought to have concluded, that there was no reasonable prospect of the company avoiding insolvent liquidation or administration, and then (ii) failed to take every step with a view to minimising the potential loss to the company's creditors, then they are personally liable to contribute to the company's losses.[116] The second, provided by common law, bites at an earlier stage.[117] According to the principle conventionally attributed to the Court of Appeal in *West Mercia Safetywear Ltd v Dodd*[118], the duties of directors owed to the company are altered in the vicinity of insolvency to become more creditor-regarding.[119]

In the context of a corporate group, like the banking group an RFB is a part of, the governance arrangements of a subsidiary are similar to those of a standalone corporate entity under UK law. Shareholders remain the subsidiary's principal and

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[114] s 214 of the UK Insolvency Act 1986.

[115] s 246ZB of the UK Insolvency Act 1986.

[116] ss 214(2)-(3) of the UK Insolvency Act 1986. For a critical appraisal, see Andrew R Keay, 'Wrongful Trading: Problems and Proposals' (2014) 65 Norther Ireland Legal Quarterly 1.

[117] Davies (n 112) 329; Davies and Worthington (n 102) 554.

[118] *West Mercia* (n 112).

[119] See Prentice (n 112); Davies (n 112); Keay (2015) (n 112); Van Zwieten (n 112). Because the duty provided by common law is owed to the company instead of directly to the creditors, it has to be enforced by the company or a party acting on its behalf, for example the liquidator. See Davies (n 112) 329.

directors and management still have to act in their interest. But, in some cases, the subsidiary nature of a company creates unique problems. A vast literature relates to the risks faced by minority shareholders, but, since this thesis focuses on wholly-owned subsidiaries for the purposes of group company law (see **Chapter 1**), this literature is beyond its scope.[120] Instead, this Chapter focuses on a critical challenge for directors of any wholly-owned subsidiary: namely, the need to reconcile *entity (independence)* and *group (interdependence)* perspectives in a group structure.[121] The *entity* perspective emphasises that a subsidiary is a separately incorporated stand-alone entity with its own legal personality and board, even though it is operated under the unifying economic interest of a common shareholder.[122] The *group* perspective, however, stresses the banking firm's interests over those of the individual subsidiaries. From a group perspective, subsidiarisation is a tool to realise financing and risk efficiencies, whilst the subsidiaries benefit from the stability, access to capital, expertise, brand, reputation and other economies of scale and scope that come with being part of a group.[123] It is clear that tensions can arise between these two perspectives, for example when the parent company asks the subsidiary board to approve intragroup transactions that are

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[120] See fn 101.

[121] For a comprehensive analysis of the topic, see Eric J Gouvin, 'Resolving the Subsidiary Director's Dilemma' (1996) 47 Hastings Law Journal.

[122] See eg *In re Scott Acquisition Corp.*, 244 B.R. 283 (Bankr. D. Delaware 2006) 347.

[123] Yannick Hausmann and Elisabeth Bechtold, 'Corporate Governance of Groups in an Era of Regulatory Nationalism: A Focused Analysis of Financial Services Regulation' (2015) 12 European Company and Financial Law Review 3, 346.

beneficial for the group but, in their own terms, harmful for the subsidiary. Cash-pooling arrangements could invite similar tensions.[124]

This creates a dilemma for the subsidiary board, to which the corporate laws of various jurisdictions respond differently.[125] In the UK, the core duty of loyalty does not recognise a duty to the group or to other companies in the group, and, accordingly, the main focus of directors must be on the interests of the subsidiary and its shareholders.[126] However, the interest of the group can be constructed as an extension of the interest of the subsidiary company, for example when the collapse of the parent company would be disastrous for the subsidiary.[127] In addition, a group policy is generally not seen to have an adverse effect on the interests of the shareholders if the subsidiary is wholly-

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[124] Hausmann and Bechtold (n 123) 347.

[125] Although the US position is not completely clear, the general position in the case of wholly-owned subsidiaries seems to be that its directors are only required to act in the interests of the parent company and its shareholders, see *North American Catholic Educational Programming Foundation, Inc. v Gheewalla* 930 A.2d 92 (Delaware 2007), which overrules *In re Scott Acquisition Corp.* (n 122) and held that the directors of a subsidiary board only owe a direct fiduciary duty to the parent company and its shareholders, even in the vicinity of insolvency. As long as the financial interests of the subsidiaries, including those of its minority shareholders and creditors, are appropriately respected, German *Konzernrecht* requires directors of subsidiaries to consider the overall group interest and to accept potential costs for the subsidiary that may arise as a consequence. However, any losses or other costs for the subsidiary must be compensated by the parent company on a yearly basis. See Hausmann and Bechtold (n 123) 348 and fn 12.

[126] The directors of a company forming part of a group cannot solely consider the benefit of the group as a whole without giving distinct consideration to that of the company alone, see *Charterbridge v Lloyds Bank* [1967] 1 W.L.R. 432. See also Davies and Worthington (n 102) 546-547 ('Directors in corporate groups must guard against their inevitable inclinations to promote the interests of the group as a whole (or some part of it).').

[127] '[T]he decision perhaps suggests that although directors must act in ways *they* consider would be most likely to promote the interests (or the success) of the company, it is also true that where, objectively, on balance, their decision can be seen to do that, it will not be overturned; the directors will not be held to be in breach of their duty to act in the interests of the company (or, under the statute, to promote the success of the company) *merely* because they did not give explicit thought to the question, at least in the absence of proven detriment.', see Davies and Worthington (n 102) 547.

owned.[128] Under UK law, directors of a wholly-owned subsidiary can meet their duty to promote the success of the company for the benefit of its shareholders by following group policy, since in this case the two are routinely found to align. When the company is in distress, however, the creditor-regarding duties discussed above[129] are triggered, which implies that directors have to direct their attention towards the creditors of the subsidiary.[130] In the case of banks, financial regulators also increasingly emphasise the role of the parent company's board in looking after the group interest, which could require it to contravene the interests of individual subsidiaries.[131]

B. The Objectives and Tools of Ring-Fence Governance

1. Some Theory: Governance Implications of the 'Group Ring-Fencing Purposes'

As the 'group ring-fencing purposes' in the relevant legislation make clear, ring-fencing adds another dimension to the group governance of affected banks:

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[128] See eg Davies and Worthington (n 102) 547 fn 157.

[129] See text accompanying notes 112-119.

[130] In some cases, the shareholders of the holding company will also be able to pursue a 'double derivative action' against the subsidiary, see *Universal Project Management Services Ltd v Fort Gilkicker Ltd & ors* [2013] All Er (D) 313; Companies Act s 260(3). Shareholder actions are, however, rare in the UK: Armour, Black, Cheffins and Nolan (n 110).

[131] The Basel Committee on Banking Supervision noted, for example, that group conflicts of interest should be resolved 'in appropriate recognition of the interest of the group', see Basel Committee on Banking Supervision , *Guidelines – Corporate Governance Principles for Banks* (2015) Principle 5, para 96, 23.

The 'group ring-fencing purposes are' –

(a) ensuring as far as reasonably practicable that the carrying on of core activities by a ring-fenced body is not adversely affected by the acts or omissions of other members of its group;

(b) ensuring as far as reasonably practicable that in carrying on its business a ring-fenced body –

(i) is able to take decisions independently of other members of its group, and

(ii) does not depend on resources which are provided by a member of its group and which would cease to be available to the ring-fenced body in the event of the insolvency of the other member;

(c) ensuring as far as reasonably practicable that the ring-fenced body would be able to continue to carry on core activities in the event of the insolvency of one or more other members of its group.[132]

The purpose of ensuring that a ring-fenced body 'is able to *take decisions independently* of other members of its group'[133] has a direct bearing on governance.

Guaranteeing independent decision-making within the RFB is important because, from the perspective of the universal banking *group*, the imposition of a ring-fence is privately costly and thus might be evaded.[134] Directors and managers of RFBs have three types of incentives to evade the ring-fence. First, led by a desire to make the *RFB thrive* they may seek scale and scope economies meant to be precluded by the ring-

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[132] FSMA s 142H(4) as inserted by s 4(1) of the Act.

[133] FSMA s 142H(4)(b) as inserted by s 4(1) of the Act (*emphasis* added).

[134] Ring-fencing is *privately* costly because it inhibits banks from engaging in subsidy-seeking behaviour and curtails economies of scale and scope, but not necessarily *socially* costly because the costs of such behaviour would be borne by the government and, indirectly, by the taxpayer.

fence.[135] These can be genuine or the result of the implicit subsidy. Ring-fencing only mitigates or removes the effects of the implicit subsidy if the market deems its implementation credible. If this perceived credibility is absent, the 'Invisible Hand' will keep incentivising managers and directors to maximise the expected value of the government subsidy.[136]

Second, efforts by managers and directors to make the *RFB survive* could require closer cooperation with, and perhaps even the provision of support to, other parts of the group. If various parts of the banking group (including the RFB) operate under a common brand, and one of these entities, say the investment banking subsidiary, suffers a loss that could result in its bankruptcy, the solvency of the RFB could be questioned by uninformed depositors (see **Chapters 3** and **4**).[137] To prevent a run on the RFB, its

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[135] Note that this Chapter does not suggest that managers of RFBs will blatantly violate the ring-fence obligations; rather, the concern is that they will exploit the incomplete and indeterminate nature of the ring-fence rules to undermine the purposes of the regime. If, *ex post*, this conduct is thought to violate the ring-fence obligations and there is effective private or public enforcement (see **Chapter 6**), the reputational costs of non-compliance may be limited because non-compliance would largely effect third parties, see John Armour, Colin Mayer and Andrea Polo, 'Regulatory Sanctions and Reputational Damage in Financial Markets' (2017) 52 Journal of Financial and Quantitative Analysis 4, 1429; Jonathan M Karpoff, 'Does Reputation Work to Discipline Corporate Misconduct?' in Michael L Barnett and Timothy G Pollock (eds), *Oxford Handbook of Corporate Reputation* (Oxford University Press 2012); Jonathan M Karpoff and JR Lott, Jr., 'The Reputational Penalty Firms Bear from Committing Criminal Fraud' (1993) 36 Journal of Law & Economics 2, 757. See also Deborah L Murphy, Ronald E Shrieves and Samuel L Tibbs, 'Understanding the Penalties Associated with Corporate Misconduct: An Empirical Examination of Earnings and Risk' (2009) 44 Journal of Financial and Quantitative Analysis 1, 55.

[136] In oral evidence to the PCBS, Bob Penn (Allen & Overy) noted that 'people will seek to push at [the ring-fence boundaries] to further the commercial aims of their enterprise', see PCBS Final Report III (n 60) Q684.

[137] Other informed short-term creditors might be more sophisticated, understand the legal structure of the bank and be able to distinguish between the RFB and the nearly insolvent investment banking subsidiary. By themselves, they might not 'run' (*ie* stop rolling over their short-term debt). But the expectation that depositors may run, and that this could create financial stress on the RFB, could cause them to run nevertheless. Alternatively, these informed investors might not believe the separation

managers and directors may elect to prop up the group's investment bank to protect the RFB, even though doing so appears to contravene ring-fencing policy.[138]

Third, managers and directors may act in pursuit of *their own success*. Career aspirations, including the desire to be promoted to a more lucrative position elsewhere in the banking group, might sensitise them to requests from superiors of the RFBs parent company.

A necessary condition for independent decision-making within a subsidiary is that it be disentangled from group influences. Under conventional governance, the parent company can exercise such influence primarily through the channel of shareholder powers. The orientation of (group) governance in the UK is to ensure agent loyalty, in this case the loyalty of the directors and managers of the RFB to its parent company. Realising independence from the group would imply cutting these ties, which can be termed the 'entity orientation' of ring-fence governance. An entity orientation encapsulates the idea that ring-fence governance should prioritise the interests of the subsidiary independently of the preferences of its sole shareholder, the parent company.

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brought about by the ring-fence is credible, and run on the RFB out of fear it may not be able to survive on its own.

[138] Alternatively, an RFB's parent company might conceivably intervene if, in its view, the RFB takes on too much risk, see House of Commons Treasury Committee, 'Oral Evidence: Bank of England Bill' (20 October 2015) HC 445 (hereafter 'HC 445') Q114.

2. Tools of Ring-Fence Governance

The authority to implement ring-fence governance is delegated to the PRA. The PRA relies largely upon four[139] sets of governance tools.[140] First, the PRA sets out general rules stating the outcome it expects RFBs to achieve. Reflecting the ring-fence purposes, the RFB must (1) 'ensure that it is able to take decisions independently of other members of its group',[141] (2) establish and maintain arrangements to identify and manage any conflict between duties owed by directors and managers to the RFB and other interests they may have,[142] (3) 'take all reasonable steps to identify and manage any conflict between its interests and those of one or more members of its group',[143] and (4) demonstrate compliance with every ring-fencing obligation to the PRA.[144] The RFB itself must be able to demonstrate its compliance with these ring-fencing rules to the PRA.

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[139] A fifth tool, an RFB-specific human resources policy, seeks to minimise the RFB's dependency on employees that may become unavailable in the event of the insolvency of any other member of its group. PRA Rulebook 2016/26 rr 7.1-3.

[140] PRA Rulebook 2016/26 ch 3.

[141] PRA Rulebook 2016/26 r 3.1.

[142] PRA Rulebook 2016/26 r 3.2.

[143] PRA Rulebook 2016/26 r 3.3.

[144] PRA Rulebook 2016/26 r 3.4.

To give these ring-fencing rules teeth, the PRA mandates RFBs, as part of the Senior Managers Regime ('SMR')[145], to allocate responsibility for compliance with those rules to the majority of, if not all, managers as well as to non-executive directors that carry out a Senior Management Function ('SMF') ('senior managers') of the RFB.[146] This implies that non-compliance can be sanctioned under the 'duty of responsibility' established as part of the SMR, which the PRA and the FCA monitor and enforce.[147] The PRA or FCA may decide to enforce this duty and impose sanctions if an RFB contravenes a relevant requirement, or if the person performing an SMF does not take steps that a person in their position could reasonably be expected to take to avoid the contravention.[148]

As the second tool of ring-fence governance, which extends beyond what CRD IV requires, the Act instructs the PRA to make rules on board membership for group-ring-fencing purposes. The ring-fencing legislation mandate that the board must include

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[145] PRA, 'PRA Rulebook: CRR Firms Non-CRR Firms: Individual Accountability Instrument 2015' (17 March 2015) PRA 2015/6 (hereafter 'PRA Rulebook 2015/6'), and PRA, 'Supervisory Statement: Strengthening Individual Accountability in Banking' (May 2017, updating September 2016) SS28/15 (hereafter 'SS28/15'). The SMR has replaced the 'Approved Persons Regime', which the PCBS referred to as 'a complex and confused mess', see PCBS Final Report I (n 74) para 86. It came into force on 10 May 2016.

[146] PRA Rulebook 2015/6 rr 3.4 and 4.2(4), and SS28/15 para 2.27-28 ('This is an exception to the expectation that Prescribed Responsibilities [under the SMR] should be allocated only to the individual SMFs they are most closely linked to. The reason for the exception is to incentivise key decision-makers in RFBs to ensure compliance with the ring-fencing obligations throughout the key areas of the firm.'). For a list of SMFs, see SS28/15 Table A.

[147] FSMA ss 66A and 66B as inserted by ss 32(1) and 32(2) of the Act and amended by ss 16, 17, and 25 of the Bank of England and Financial Services Act 2016. Also see SS28/15 ch 2.

[148] FSMA ss 66A and 66B as inserted by ss 32(1) and 32(2) of the Act and amended by ss 16, 17, and 25 of the Bank of England and Financial Services Act 2016. Also see SS28/15 ch 2.

directors that are independent from other members of the RFB's group, independent from the RFB itself, and non-executive directors.[149] The PRA ensures that the board satisfies these requirements by mandating that at least half of the members of the RFB's governing body should be independent non-executive directors.[150] The chair of the RFB must be independent as well, so that there is a majority of independent directors,[151] and must not hold another chair position on the board of another group entity.[152] No more than one-third of the members of the RFB's governing body can be employees of, or directors of, any other member of the RFB's group, other than of a ring-fenced affiliate.[153] Finally, the RFB must have its own risk, audit, nomination, and remuneration committees made up of non-executive directors.[154] On top of the independence requirements contained in the ring-fencing legislation, the SMR injects sensitivity to regulatory concerns into the appointment process. It mandates that the PRA approves senior managers (which can include non-executive directors[155]) prior to them taking up

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[149] FSMA s 142H(5)(d) as inserted by s 4(1) of the Act.

[150] PRA Rulebook 2016/26 r 4.1.

[151] PRA Rulebook 2016/26 r 4.1 mandates that at least half of the member of the governing body must be independent non-executives, and according to r 4.2(1) the chairperson of an RFB's governing body is not to be counted as one of the number of independent non-executive directors or as one of the total number of members of the governing body.

[152] PRA Rulebook 2016/26 r 4.3.

[153] PRA Rulebook 2016/26 r 4.4.

[154] PRA Rulebook 2016/26 chs 5, 6, 7, 8 respectively. Also see PS10/15 para 3.20, 8.

[155] Specifically, the SMR's scope includes the following non-executive directors: 'the Chairman, Senior Independent Director (SID) and the Chairs of the Audit, Nomination, Remuneration and Risk Committees', see SS28/15 para 2.1.

the post.[156] In so doing the PRA will take account of the candidate's 'fitness and propriety' and requires firms proposing candidates to do the same[157].[158]

As a third tool of ring-fence governance, the PRA must make rules requiring the RFB to make arrangements for the identification, monitoring and management of risk.[159] Consistent with its general expectations for risk management and other control functions within banks,[160] the PRA requires the control functions of an RFB to challenge decision-making on the level of risk being run within that RFB.[161] On top of these general expectations, the PRA has designed rules to ensure this function supports the independent decision-making of an RFB.[162] To this end, it requires an RFB to have sufficient risk-management resources of its own,[163] which it must deploy to create risk-management functions that could, if necessary, operate independently from other parts of the group.[164]

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156 FSMA ss 59 and 61. In accordance with FSMA s 63ZD, the PRA states its policy in: PRA, 'Statement of Policy: Conditions, Time Limits and Variations of Approval' (May 2017).

157 Firms must vet their candidates for SMFs, see FSMA s 60A.

158 FSMA s 61(2). The PRA states its approach in SS28/15, Chapter 4 ('[T]he PRA will have regard to the person's: [1] honesty, integrity and reputation; [2] competence and capability; and [3] financial soundness.', para 4.4-5).

159 FSMA s 142H(5)(g) as inserted by s 4(1) of the Act.

160 PRA, 'The Prudential Regulation Authority's Approach to Banking Supervision' (June 2014) 23.

161 PRA, 'The Implementation of Ring-Fencing: Consultation on Legal Structure, Governance and the Continuity of Services and Facilities' (October 2014) CP19/14 (hereafter 'CP19/14') para 3.19.

162 PRA Rulebook 2016/26 r 5.3(3).

163 PRA Rulebook 2016/26 r 5.3(1).

164 PRA Rulebook 2016/26, r 5.3, and CP19/14 para 3.24.

The fourth tool of ring-fence governance relies on remuneration. Consistent with its general remuneration policy,[165] the PRA proposes rules[166] to ensure that remuneration incentivises safe and sound risk management and the long-term interests of the RFB, as distinct from those of other members of the group or the group as a whole.[167] An RFB's remuneration committee can only comprise non-executive members of its management body.[168] It must ensure that RFBs establish, implement, and maintain remuneration polices that are in line with the RFB's long-term interests and that would not encourage risk-taking that undermines its ability to comply with ring-fencing obligations.[169] The PRA adopts an outcome-based policy that allows firms flexibility on how to design such arrangements.[170]

C. Tension Between Conventional Corporate Governance and Ring-Fence Governance

It is clear that the corporate law view and the ring-fencing view of subsidiary (or RFB) governance differ. The first supports *agent loyalty* by aligning the subsidiary's board to

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165 PRA, 'Strengthening the Alignment of Risk and Reward: New Remuneration Rules' (July 2014) CP15/14.

166 FSMA s 142H(5)(e) as inserted by s 4(1) of the Act.

167 CP19/14 para 3.27.

168 PRA Rulebook 2016/26 r 8.1.

169 PRA Rulebook 2016/26 r 8.4.

170 CP19/14 para 3.28.

the interests of the parent company, whereas the second aspires to independence by producing an *entity orientation*.

At a high level of abstraction, a doctrinal clash between these two governance-orientations can be avoided. Indeed, there may be no clash, for the ring-fence obligation will trump the general duties, which apply to constrain directors' residual discretion. The general duties cannot override the ring-fence obligations. Phrased differently, the ring-fence obligation might limit the options available to directors, but, subject to that limitation, it does not affect directors' incentives. The problem lies rather with the inevitable incompleteness and indeterminacy of the ring-fence obligations[171], coupled with the directorial incentives generated by the general duties. For example, if the ring-fence duty were (simply) not to distribute more than 5% of the RFB's profits to the parent company, there would be no doctrinal clash between this clear rule and the general duties. However, the general duties might give directors an opportunity to yield to pressure to achieve, via other means, the financial arrangements preferred by the parent company.

In practice, given the indeterminacy of the ring-fencing obligations, it is hard to reconcile the demands of agent loyalty with those of an entity orientation.[172] The entity

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[171] See Section II(A).

[172] In response to the question whether 'potential inconsistencies [of RF-governance] with the provisions of the Companies Act 2006 (…) are minor or major', Bob Penn (of Allen & Overy) noted that '[i]t comes back primarily to the point about directors' duties. I see that as a major inconsistency and a serious headache for the directors.' See PCBS Final Report III (n 60), Q681. See also HC 445 (n 138), Q112 and Q113 ('You think this circle we need to try to square, where we want a subsidiary to be independent enough to fend off imposition of risk from the centre but as much a subsidiary enough so that the centre can warn it and control it if it starts to take on too much risk – that problem – can be sorted out in the

orientation of ring-fence governance calls into question how the RFB's parent company can hold the RFB's management to account once it effectively loses control over that part of the banking group. When ring-fencing was first proposed, Lloyds Banking Group submitted written evidence noting that, if the RFB makes up a substantial part of the banking group, this conflict could lead to an 'impossible situation whereby the group board was not in control of the majority of the operations of the group'.[173] Baroness Hogg noted: 'I cannot see how a ring-fenced entity could sensibly have entirely separate governance. I think that would create a vacuum of accountability to anyone other than the regulator (…), and therefore make banks less investable'.[174] The tension between the two conceptions of subsidiary governance raises the question whether the theoretically optimal form of ring-fence governance, with its entity orientation, can be effectively implemented.

When designing rules to implement ring-fence governance, the PRA acknowledged this tension. It noted that '[t]he separation introduced by ring-fencing, combined with the outcomes required by the group ring-fencing purposes, will lead to instances where conflicts of interest arise more prominently in the RFB's relationship with other group entities.'[175] However, it offered no solutions and concluded rather

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governance aspects of the ring-fence[?] (…) The Banks are constantly telling us that these governance issues are hugely problematic for them and how to create two boards in one sense but a unitary board in another is posing great problems for them.').

[173] PCBS Final Report VI (n 75) (Lloyds Banking Group, 2 November 2012).

[174] PCBS Final Report III (n 60) Q707.

[175] CP19/14 para 3.7.

vaguely: 'The PRA's expectation is that an RFB's governance framework enables the identification and management of these competing interests whilst supporting the objectives of ring-fencing.'[176]

This reasoning did not inspire confidence, and, following the publication of its consultation paper, the PRA received significant pushback on this point. In a joint statement, former members of the Parliamentary Committee on Banking Standards ('PCBS') noted that the 'tension between the independence of the ring-fenced banks and its accountability and transparency to group shareholders could present serious challenges in respect of corporate governance and financial reporting'.[177] Responding to this criticism, the PRA referred to the ring-fencing purposes, which state that independent decision-making by the RFB should be ensured 'as far as reasonably practicable'.[178] It then noted that '[i]t is important to emphasise that where an RFB forms part of a wider group it will remain a subsidiary (…).' This statement was immediately qualified: 'However, parent company actions should not cause an RFB to act in a way that is inconsistent with the ring-fencing obligations.'[179]

The PRA suggested three ways out of this conundrum, essentially adopting the position that ring-fence governance should ensure the RFB is part of a group but

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[176] CP19/14 para 3.7.

[177] Parliamentary Commission on Banking Standards ('PCBS'), 'Statement by Former Members of the Parliamentary Commission on Banking Standards' (4 November 2014) 7.

[178] PS10/15 para 2.7.

[179] PS10/15 para 2.8.

independent. First, it claimed that the RFB's ability to make decisions independently is consistent with the duty, prescribed by the UK Companies Act, on directors to promote the success of the company.[180] As discussed above,[181] this is only partially correct. Recall that Article 172 of the UK Companies Act 2006 states that a director of a company 'must act in the way he considers would be most likely to promote the success of the company *for the benefit of its members as a whole*'.[182] For a wholly-owned subsidiary, this implies that acting in the parent company's interest is not necessarily contrary to this duty. Moreover, as the sole shareholder the parent company has the machinery to hold the RFB's directors to account. Hence, the PRA may not be able to rely on that duty to safeguard the ring-fence.

In addition, the PRA noted it was 'mindful of the potential challenges in this area'. This is why, as part of its approach, it has sought to avoid disrupting the usual mechanisms of accountability more than is necessary to achieve the statutory ring-fencing objectives. In particular, it emphasises that the shareholder of an RFB (the parent company) will still appoint its directors.[183] As follows from the previous discussion, and will be argued more extensively below,[184] this will likely make matters

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[180] PS10/15 para 3.6 (although, in the same paragraph, the PRA also acknowledges 'that tensions could occur in an RFB's relationship with its parent').

[181] See Section III(A).

[182] UK Companies Act 2006, s 172(1) (*emphasis* added). Although directors should have regard for various other considerations listed in s 172(1), their primary duty is to the members of the company.

[183] PS10/15 para 3.7.

[184] See **Chapter 6**.

worse. Maintaining traditional corporate governance mechanisms more solidly entrenches agent loyalty; the RFB's directors will become accountable to the party from which they are supposed to be independent.[185]

> Finally, the PRA notes that
>
> [t]he requirement for an RFB to be able to take decisions independently does not mean that an RFB's policies are required to be at odds with those of the wider group. The PRA would typically expect to see RFBs adopt group policies, with the RFB board and management reviewing these against the ring-fencing obligations and objectives, and making additions or adopting more restrictive policies in line with those obligations and objectives *only where necessary*.[186]

That may be true, but it ignores two critical issues: it is vague as a prescriptive guide for directors' behaviour; and it is not clear that the RFB's directors have sufficiently strong incentives to preserve the ring-fence when doing so would be contrary to the interests of the parent company. Strangely, the PRA's follow-up confirms the second concern: 'Co-ordination of business planning and strategy across the group, including the RFB, is to be expected *given the need of (…) the RFB to be confident of shareholder support for its business plan and strategy*'.[187] Meanwhile, the requirement that the RFB 'must, in carrying on its business, ensure that it is able to take decisions independently of other members of its group' has been retained in the PRA's rules.[188]

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[185] Baroness Hogg made a similar proposal, noting: 'The parallel in the corporate governance code for a separately listed entity is, of course, that the board proposed its own membership, but its membership is subject to re-election by shareholders'. See PCBS Final Report III (n 60) Q707.

[186] PS10/15, 6 para 3.8 (*emphasis* added).

[187] PS10/15, 6 para 3.8.

[188] PRA Rulebook 2016/26 r 3.1 (*emphasis* added). Seemingly inconsistently, the PRA noted in the context of financial reporting requirements: 'Consolidation for financial reporting purposes is based on a control

CONCLUSION

This Chapter has studied the role of intrafirm governance in the implementation of a particular regulatory segmentation policy – the UK's ring-fencing regime. It outlined the policy objectives of the regime as well as its implementing strategy, which hinges on the ability to ensure that RFBs are truly separate and independent within the banking firm but simultaneously maintain a degree of implementation that is sufficient to ensure firmwide scale and scope economies are preserved. The ring-fencing regime relies primarily on a set of rules to construct the 'fence' around the RFB, but these rules are likely to be incomplete and indeterminate in some key areas. Gap-filling strategies are therefore necessary, and this Chapter concludes that this creates a crucial role for ring-fence governance.

Such ring-fence governance, however, operates against the backdrop of general UK corporate governance, which has a strong shareholder orientation. Within the context of a banking group, this implies that managers of RFBs may, in cases where ring-fence rules are incomplete and indeterminate, experience a tension between the interests of the RFB and the interests of the wider corporate group. It is worth noting that this tension is most acutely felt exactly when ring-fence governance matters most. The PRA's response to these concerns is to emphasise the semi-permeable (and, in

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relationship existing. Such a relationship exists only if there is both an ability to direct and an ability to benefit from that direction. *It is the PRA's view that the rules proposed to date do not in themselves necessitate arrangements that would prohibit a parent having those abilities over an RFB.*' PS10/15 para 3.10 (*emphasis* added).

particular, state-contingent) nature of the ring-fence and its governance regime, which appears unsatisfying in theory. **Chapter 6** will evaluate whether the UK's implementation of ring-fence governance lives up to its important role in ensuring the efficacy of this landmark regulatory segmentation policy.

CHAPTER 6: CONFLICTING LOYALTIES IN RING-FENCE GOVERNANCE

Chapter 5 discussed the important role of intrafirm governance in delivering on the semi-permeable segmentation that the UK ring-fencing regime envisions. More specifically, it highlighted the role of ring-fence governance in ensuring that managers of the ring-fenced entity prioritise the interests of the ring-fenced entity over those of the group, and argued it inevitably creates conflicting loyalties. These conflicting loyalties will be most pronounced in areas where the ring-fencing rules are incomplete or indeterminate, which is exactly when they matter most. In such circumstances, managers will be subject to the shareholder(s) exercising its (their) rights (which would generally enable strong influence from the entity's parent, and therefore by the group) and ring-fence obligations.

As foreshadowed by **Chapter 5**, given these conflicting loyalties it is not clear that the managers of ring-fenced entities would choose to uphold the ring-fence. This Chapter evaluates whether the UK ring-fencing regime credibly implements ring-fence governance to assuage these concerns. It proceeds as follows. Section I sets out the test for the credibility of ring-fence governance, which is articulated as being able to ensure a 'selective entity orientation' for managers of the ring-fenced body ('RFB'). In some states of the world, it needs to ensure that the ring-fence is permeable to ensure that the banking firm can benefit from economies of scale and scope across the group. In others, it needs to ensure that the ring-fence rigorously segments the bank, so that risks elsewhere in the group do not affect the RFB. Finally, it needs to ensure that the right

mode of governance is relied upon in the right state of the world – so there should be a well-functioning 'switching regime'. Section II illustrates the nature of the problems this analysis identifies by discussing how ring-fence governance might operate in the context of 'hedging exceptions', a set of indeterminate rules that have the potential to break open the ring-fence in a potentially crucial area for risk management. Section III synthesises the analysis and concludes that ring-fence governance cannot, at least as it is implemented in the UK, be considered a credible part of this regulatory segmentation regime. These findings shed an unflattering light on the role intrafirm governance can be expected to play as part of regulatory segmentation measures more generally.

I. TWO TESTS FOR RING-FENCE GOVERNANCE

Chapter 5 concluded that managers of RFBs are subjected to conflicting obligations when ring-fencing rules are incomplete or indeterminate. When confronted with this criticism, the Prudential Regulation Authority ('PRA') initially suggested that these concerns were, in practice, of limited significance. Ultimately, the PRA opted for a solution that, it suggests, acknowledges the RFB's independent position as part of a larger corporate group – a solution that attempts to retain the benefits of independence as well as those associated with being part of a larger group.[1] This compromise will be referred to as a 'selective entity orientation': it requires directors to the RFB to be

[1] In addition, it has been noted that the precise degree of independence would depend on the proportion of the bank's assets that are inside the ring-fence. For example, Andrew Bailey has suggested that waivers could be used to loosen the independence requirements 'where substantially the ring-fenced [body] is the same as the whole', see House of Commons Treasury Committee, 'Oral Evidence: Bank of England Bill' (20 October 2015) HC 445 (hereafter 'HC 445') Andrew Bailey, Q116. Since it is not clear whether (or how) this view would be operationalised, it is not covered in this Chapter.

independent when they are required to preserve the ring-fencing purposes, but also that they remain perceptive to the parent company's interests where possible.

A selective entity orientation must meet two conditions. First, directors of the RFB must be subject to sufficiently strong entity-oriented incentives to let the interests of the RFB prevail over those of the parent company when necessary. Second, the entity orientation must be 'switched on' under the right circumstances. The following two sections discuss each test in turn, emphasising the interplay between general UK corporate law and ring-fence governance, and the third concludes.

A. Test 1: Independent Decision-Making by Directors of Ring-Fenced Banks

The provisions setting out ring-fence governance mandate that an RFB ensures it can take decisions independently of other members of its group,[2] establishes arrangements that identify conflicts with the group,[3] takes reasonable steps to maintain such arrangements[4] and, critically, demonstrates compliance with every ring-fencing obligation to the PRA.[5] The PRA has adopted three strategies – independent directors, compensation policy, and director liability – that should ensure an RFB's board

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[2] PRA, 'PRA Rulebook: CRR Firms and Non-Authorised Persons: Ring-Fenced Bodies Instrument 2016' (4 July 2016) PRA 2016/26 (hereafter 'PRA Rulebook 2016/26') r 3.1.

[3] PRA Rulebook 2016/26 r 3.2.

[4] PRA Rulebook 2016/26 r 3.3.

[5] PRA Rulebook 2016/26 r 3.4; PRA, 'The Implementation of Ring-Fencing: Consultation on Legal Structure, Governance and the Continuity of Services and Facilities' (October 2014) CP19/14 (hereafter 'CP19/14') para 3.42.

identifies and manages conflicts with the group that might undermine independent decision-making. The following sections will cover these three strategies in turn.

1. Independent Directors

The first strategy, on which ring-fence governance heavily relies, is to set rules on the RFB's board composition.[6] At least half the RFB's board must consist of independent non-executive directors.[7] The principal that is safeguarded is not primarily the RFB's shareholder (the parent company); in fact, the independent non-executive directors are presumed to lean against influence from the parent company and to act in the interest of the RFB, the integrity of the ring-fence and, by proxy, the 'public good' as defined by the ring-fencing obligations. The applicable independence criteria are based on those in the UK's Corporate Governance Code,[8] but the group of people and organisations from which directors should be independent has been extended to include the RFB, its parent company, and other members of the corporate group.[9] In addition, an independent director cannot reasonably be identified as representing, or being otherwise associated with, the interests of a particular shareholder or shareholders of a parent

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[6] Also referred to as a 'trusteeship strategy', see Reinier Kraakman, John Armour, Paul Davies, Luca Enriques, Henry Hansmann, Gerard Hertig, Klaus Hopt, Hideki Kanda, Mariana Pargendler, Wolf-Georg Ringe, and Edward Rock, *The Anatomy of Corporate Law – A Comparative and Functional Approach* (Third Edition, Oxford University Press 2017) 35-36.

[7] PRA Rulebook 2016/26 rr 4.1 and 4.2(1) together with 4.3(1).

[8] PRA, 'The Implementation of Ring-Fencing: Consultation on Legal Structure, Governance and the Continuity of Services and Facilities' (October 2014) CP19/14 (hereafter 'CP19/14') para 3.11; Financial Reporting Council, *UK Corporate Governance Code* (2014), especially 'Supporting Principle B.1.1.'.

[9] PRA Rulebook 2016/26 r 1.3.

undertaking of the RFB where that shareholder is able to exercise 'significant influence' over the management of the parent undertaking.[10]

This extension of the scope of independence is necessary but insufficient to ensure an entity orientation. First, these independence criteria do not comprehensively capture the type of independence required for independent decision-making. Avoiding close family ties,[11] material business relationships[12] or the receipt, up to three years prior or presently, of remuneration[13] from potentially conflicted parties is certainly helpful, but it does not curtail many other channels of influence. Similarly, the premise that *only* directors with executive positions on the RFB's board and that of another group entity can be inherently conflicted between the two related duties[14] is mistaken.

The parent company's power, as sole shareholder, to remove an RFB's directors at will may most strongly qualify the exercise of independent judgment by these directors.[15] In fact, such removal rights are purposely designed to solidify accountability

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[10] PRA Rulebook 2016/26 r 1.3(g).

[11] PRA Rulebook 2016/26 r 1.3(d).

[12] PRA Rulebook 2016/26 r 1.3(b).

[13] PRA Rulebook 2016/26 r 1.3(c).

[14] This premise is expressed in CP19/14 para 3.15.

[15] Ss 168-9 of the Companies Act 2006, slightly qualified in *Bushell v Faith* [1970] A.C. 1099 HL. Paul L Davies and Sarah Worthington, *Gower and Davies: Principles of Modern Company Law* (Ninth Edition, Sweet & Maxwell 2012) 409-412. When shareholders are dispersed, inter-shareholder transaction costs and incentives to free-ride might limit the usage of this power, but in the case of a wholly-owned subsidiary such transaction costs are absent.

of the directors to the shareholders. In effect, removal powers are tantamount to powers of informal instruction, because directors 'will be aware that disobedience may trigger their removal from office'.[16] Given that the parent company is the party from which the RFB's directors are supposed to be independent, these removal powers cast doubt on the credibility of the actual independence of the RFB's formally 'independent' directors.

In an attempt to mitigate this concern, the PRA has noted it considers it undesirable that entities carrying out excluded or prohibited activities have ownership rights in an RFB. However, it remains possible for the RFB's parent company to also own entities carrying out these activities.[17]

The Senior Managers Regime ('SMR') may offer a more promising fix.[18] Because senior managers require *ex ante* approval by the PRA at the appointment stage,[19] the RFB's parent company may exercise its removal powers with greater restraint now that it cannot fully control the selection of the director's replacement. Moreover, the removal

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[16] See eg Davies and Worthington (n 15) 411. This removal power is considered to be 'at the very core of corporate governance', see Armour et al. (n 6) 37.

[17] CP19/14 para 4.1. Also see PRA, 'Supervisory Statement: Ring-Fenced Bodies (RFBs)' (February 2017, updating July 2016) SS8/16 (hereafter 'SS8/16') ch 2 (specifically, see para 2.8). Note that, in its assessment of the structure of the banking group, the PRA will also look at its effect on the safety and soundness of the RFB. If the structure is such that it could adversely affect the ability of the RFB to 'provide continuity of provision of core services', the PRA can use its powers under FSMA s 55M or s 192C to impose additional requirements on such an RFB. For an explanation, see SS8/16 para 2.2.

[18] See **Chapter 5**.

[19] Financial Services and Markets Act 2000 ('FSMA'), as amended by the Financial Services (Banking Reform) Act 2013 ('the Act') s 61. Also see PRA, 'Senior Managers Regime: Submitting, Amending, Withdrawing' (retrieved on 24 November 2017 from: http://www.bankofengland.co.uk/pra/Pages/authorisations/smr/default.aspx).

of a director will focus the attention of the regulator on the RFB and its group. If the PRA suspects that the removal of a senior manager is related to that manager's reluctance to conform to the parent company's wishes, it could exact more intense scrutiny in the appointments process to ensure that the ring-fence will be appropriately protected by a new and reputable recruit. More generally, following the removal of a director, the PRA may decide to scrutinise the relations between the RFB and its parent company more rigorously. As a consequence of the potential regulatory costs associated with the removal of an RFB's director, these directors may deem the threat by the parent company to use this power to be less credible than it would normally be. However, the RFB's parent company may respond by appointing RFB directors to short terms, reasoning that *not reappointing* a director will attract less regulatory scrutiny than *removing* one – even though the effect is largely similar. At the moment, RFB directors do not have legally required minimum terms, and although the PRA scrutinises the *appointment* process, there is no legally mandated exit interview for a director *ending* her term.

No matter the reason for hiring new directors, the PRA could require banks to find people who have demonstrably responded in the past to incentives of 'conscience, pride, and reputation',[20] and who may therefore be less susceptible to potential pressure from the parent company to undermine the ring-fence. Whether the PRA will be able to act so vigilantly is questionable, in part because of its limited information and

[20] Armour et al. (n 6) 35. For a classic expression of the view that outside directors are primarily motivated by reputational concerns, see Eugene F Fama and Michael C Jensen, 'Separation of Ownership and Control' (1983) 26 Journal of Law and Economics 2, 315.

resources,[21] and in part because the market for RFB-directors appears to be thin as is; banks are reportedly having difficulty finding qualified people to fill the boards of their RFBs.[22] Moreover, the SMR only applies to a subset of the RFB's non-executive directors,[23] leaving the others exposed to the parent company's unmitigated removal powers.[24]

A second concern with the 'independence' of an RFB's independent directors is that the association criteria for independence focus on the past, whereas directors making decisions may mostly look to the future. These criteria do not, for example, treat a director as independent if she (1) has been an employee of the RFB or other members of the group 'within the period of *five years before* his or her appointment as a director',[25] (2) has or has had a material relationship with the RFB or any other member of its group *within the period of five years before appointment*[26], (3) has received or is receiving remuneration

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[21] Generally, see **Chapter 5**.

[22] See eg M Arnold, 'Barclays Lines Up Sir Ian Cheshire to Head UK Subsidiary' (7 December 2016) Financial Times ('[The c]hoice of [the] former Bradford & Bingley director reflects difficulties hiring top bankers. (…) Sir Ian's appointment would be the second time that a director of a failed bank has been asked to chair one of the new standalone British lenders created to comply with the country's "ringfencing" *[sic]* law that forces big banks to split themselves in two.').

[23] The SMR only covers 'the Chairman, Senior Independent Director (SID) and the Chairs of the Audit, Nomination, Remuneration and Risk Committees', see PRA, 'Supervisory Statement: Strengthening Individual Accountability in Banking' (May 2017, updating September 2016) SS28/15 (hereafter 'SS28/15') para 2.1. Also see **Chapter 5**.

[24] However, the PRA retains the ability to prohibit non-executive directors failing outside the scope of the SMR under FSMA s 56. See eg *R (on the application of Christopher Willford) v Financial Services Authority* [2013] All ER (D) 114.

[25] PRA Rulebook 2016/26 r 1.3(2)(a) (*emphasis* added).

[26] PRA Rulebook 2016/26 r 1.3(2)(b) (*emphasis* added).

from the RFB or other members of its group (other than director's remuneration) attributable to a period of service that *concluded five years before* her appointment as a director,[27] or (4) has served on the governing body of the RFB or of any other member of its group for *more than nine years from the date of first election*[28]. These exclusions fail to capture the incentive effects of potential future career moves, whether in the same baking group or laterally. This critique, which would be valid for any independent director, is more pronounced in the context of subsidiaries like the RFB because directors can more easily be rewarded with better seats or positions within the same group. Specifically, if an independent director of an RFB aspires to become a (non-independent) director at the group level, which is generally considered to be a more prestigious (and better compensated) role, she may attach more weight to the group interest than ring-fence governance envisages.[29]

A third concern is that up to one third of the board can consist of employees or directors of the RFB's group.[30] Even though these 'inside directors' are a minority,

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[27] PRA Rulebook 2016/26 r 1.3(2)(c) (*emphasis* added).

[28] PRA Rulebook 2016/26 r 1.3(2)(h) (*emphasis* added).

[29] The point that career aspirations may lead directors to bypass the ring-fence was also made in **Chapter 5**. Here, the emphasis is on the fact that the applicable governance standards do not curtail such incentives. It should be noted that this argument is strongest with regard to the areas of the ring-fence that are indeterminate, where options to bypass the ring-fence can be exercised with subtlety because the meaning of 'bypassing the ring-fence' is ambiguous. This could for example be the case when directors have to walk the fine line between engaging in risk management and proprietary trading, see Section II. A blatant violation of the ring-fence, especially one that attracts regulatory scrutiny, may do little to improve a director's future career trajectory.

[30] PRA Rulebook 2016/26 r 4.4.

they may still dominate in the social setting of board meetings.[31] Consider, for example, that at least half the board will consist of independent, non-executive directors who, no matter how experienced and skilled they may be, will be at an informational disadvantage vis-à-vis directors that are 'insiders'.[32] As a result, such insiders may have more authority within the group dynamics. The prohibition on executive directors from other parts of the group[33] to serve as executive directors of the RFB only partially addresses this concern.[34] Moreover, if these insiders are also employed at the level of the RFB's parent company, the (implicit) threat posed by the parent company's removal rights could make 'independent' directors of the RFB more susceptible to their point of view. Finally, up to half of the directors of the board can consist of employees from the RFB or its subgroup. Such employee directors will have a similar informational advantage over independent directors and may, for example due to a desire to be

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[31] For a more general argument along similar lines, see Paul L Davies and Klaus J Hopt, 'Boards in Europe – Accountability and Convergence' (2013) 61 *American Journal of Corporate Law* 2, 326; Suzanne Le Mire and George Gilligan, 'Independence and Independent Company Directors' (2013) 13 Journal of Corporate Law Studies 2, 474 ('[A] growing recognition that a reliance on formal independence, as it has been conceived in corporate governance regulation, is unsatisfactory').

[32] See eg Luca Enriques and Dirk A Zetsche, 'Quack Corporate Governance, Round III? Bank Board Regulation Under the New European Capital Requirement Directive' (2015) Theoretical Inquiries in Law 211.

[33] Unless it concerns a ring-fenced affiliate, see PRA Rulebook 2016/26 r 4.7(2).

[34] PRA Rulebook 2016/26 rr 4.7 and 4.8. This does not preclude independent non-executive directors on the RFB's board from being independent non-executive directors on other group boards provided they can be considered independent from both bodies. Moreover, an executive from another part of the group can still be permitted to sit on the RFB board as a non-executive, although they would not be considered independent. See CP19/14 para 3.12.

promoted to a more prestigious or lucrative position elsewhere in the group, not be independent either.[35]

In sum, it is questionable that the formally independent directors of the RFB will effectively safeguard independent decision-making by the RFB's board. Moreover, their presence might come at a cost in the form of lower quality RFB governance. It has been suggested that formal independence implies a lack of firm-specific knowledge, which would reduce the ability of independent directors to effectively manage risk.[36] This could explain the lack of a positive correlation, or even the presence of a negative one, between board independence and the performance of banks during the financial crisis of 2007-2010.[37]

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[35] cf PRA Rulebook 2016/26 rr 4.1, 4.2(1) and 4.3(1). However, diversity requirements may prevent the appointment of employee directors to half the seats of the board, see Directive (EU) 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (hereafter 'Capital Requirements Directive IV' or 'CRD IV') Arts 87(2)(1) and 88(10) and PRA Rulebook, 'Capital Requirements Directive (Governance and Remuneration) Amendment Instrument 2013' (PRA 2013/32), rr 4.3A.9 and 4.3A.10.

[36] Wolf-Georg Ringe, 'Independent Directors: After the Crisis' (2013) 14 European Business Organization Law Review 401; Jakob De Haan and Razvan Vlahu, 'Corporate Governance of Banks: A Survey' (2015) 30 Journal of Economic Surveys 2. Others suggest that independent directors may be meaningfully informed by the stock markets, which reduces their need for firm-specific knowledge: Jeffrey N Gordon, 'The Rise of Independent Directors in the United States, 1950-2005: Of Shareholder Value and Stock Market Prices' (2007) 59 Stanford Law Review 6, 1465. This only works, however, if share prices are informationally efficient and reflect the externalities of SIBs, which they almost by definition do not do: John Armour and Jeffrey N Gordon, 'Systemic Harms and Shareholder Value' (2014) 6 Journal of Legal Analysis 1, 35-85. In the case of wholly-owned, and thus unlisted, RFBs, the signals from the market would in any case be noisy, as they would relate to the whole banking group. Depending on the importance of the RFB relative to the whole group, this noise would be more or less pronounced.

[37] Marco Becht, Patrick Bolton and Ailsa Röell, 'Why Bank Governance is Different' (2011) 27 Oxford Review of Economic Policy 3, 437; Andrea Beltratti and René M Stulz, 'The Credit Crisis Around the Globe: Why Did Some Banks Perform Better?' (2012) 105 Journal of Financial Economics 1; De Haan and Vlahu (n 47) 21-23.

2. Compensation Policy ('the Carrot')

The second strategy the PRA pursues to create an entity orientation is to align an RFB's compensation policy with the interests of the RFB. The PRA's goals are twofold. First, to dissuade excessive risk-taking in the RFB.[38] Second, to ensure that employee incentives do not compromise the ring-fence. An RFB must have its own remuneration committee composed of non-executive directors of its board,[39] which in turn must ensure that its remuneration policies 'are consistent with and promote the sound and effective risk management' of the RFB,[40] not those of the other members of the group or the group as a whole,[41] and 'do not encourage risk-taking that exceeds the level of tolerated risk' of the RFB.[42] In addition, remuneration policies must be 'in line with the business strategy, objectives, values and long-term interests' of the RFB,[43] and, critically, do not encourage an RFB to 'bear any risk that would undermine its ability to comply

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[38] See eg Financial Stability Forum, *FSF Principles for Sound Compensation Practices* (2009); Lucian A Bebchuk & Holger Spamann, 'Regulating Bankers' Pay' (2009) 98 Georgetown Law Journal 280; Lucian A Bebchuk, Alma Cohen and Holger Spamann, 'The Wages of Failure: Executive Compensation at Bear Stearns and Lehman 2000-2008' (2010) 27 Yale Journal on Regulation 257; Rüdiger Fahlenbrach and René M Stulz, 'Bank CEO Incentives and the Credit Crisis' (2011) 99 Journal of Financial Economics 11; Joel F Houston and Christopher James, 'CEO Compensation and Bank Risk: Is Compensation in Banking Structured to Promote Risk Taking?' (1995) 36 Journal of Monetary Economics 405.

[39] PRA Rulebook 2016/26 r 8.1.

[40] PRA Rulebook 2016/26 r 8.4(1).

[41] CP19/14 para 3.27.

[42] PRA Rulebook 2016/26 r 8.4(2).

[43] PRA Rulebook 2016/26 r 8.4(3).

with any ring-fence obligation'.[44] These rules are strongly inspired by, or implemented as part of, the CRD IV package.[45]

In practice, remuneration policies are notoriously hard to calibrate[46] and susceptible to arbitrage, and they are often complied with in form rather than spirit.[47] It is not clear that the governance framework for RFBs provides a sufficient safeguard against these risks. Two examples illustrate the relevance of these general criticisms in the specific context of RFBs. First, references to the 'level of tolerated risk' or the 'business strategy, objectives and long-term interests of the RFB' are indeterminate and leave substantial discretion. The precise meaning of such terms will presumably, within a range deemed acceptable by the PRA, be determined by the independent directors that make up the remuneration and risk committees. But, as discussed above, their 'independence' may prove illusory. Independent directors remain accountable to the parent company, and it is to be expected that the parent company will want to use remuneration to align employees' interests with its own. Even the fact that the independent non-executive director responsible for remuneration is subject to the

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[44] PRA Rulebook 2016/26 r 8.4(4).

[45] CRD IV Art 92(2).

[46] See eg Kevin J Murphy, 'Regulating Banking Bonuses in the European Union: A Case Study in Unintended Consequences' (2013) 19 European Financial Management 4, 631.

[47] See Daniel Schäfer and Martin Arnold, 'City Banks to Evade EU Bonus Cap with "Role-Based" Allowances' (13 April 2014) Financial Times. The European Banking Authority, however, subsequently disallowed this form of arbitrage: EBA, 'Opinion of the European Banking Authority on the Application of Directive 2013/36/EU (Capital Requirements Directive) Regarding the Principles on Remuneration Policies of Credit Institutions and Investment Firms and the Use of Allowances' (15 October 2014).

SMR[48] need not change that, since it is plausible that regulators do not understand the workings of financial firms as well as insiders and may fail to spot violations.[49]

Second, and exacerbating the latter point, nothing in the remuneration framework for RFBs restricts an RFB from 'enabling the receipt by its employees of remuneration in the form of shares or other instruments of another member of the ring-fenced body's group', provided that the general remuneration principles are met.[50] Given that the latter restriction may be loosely applied by the RFB's directors, this exception implies that an RFB's employees can still be sensitised to the interests of other parts of the group through their compensation without *a priori* breaching ring-fence objectives.

In conclusion, although the remuneration-setting procedures of RFBs have been tightened[51] and the obligation to report to the PRA might invite more regulatory scrutiny, the remuneration framework for RFBs is unlikely to assure that the RFB's independent decision-making is safeguarded. This analysis illustrates a recurring weakness that undermines the credibility of ring-fence governance. Many of the proposed measures – such as a separate risk committee, audit committee and

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[48] The chair of the RFB's remuneration committee is subject to the prescribed responsibility of preserving the ring-fence, see SS28/15 para 2.1, in conjunction with: PRA Rulebook 2015/6 rr 3.4 and 4.2(4) and SS28/15 para 2.27.

[49] Armour and Gordon (n 36) 59. On the challenges related to regulator-based gap-filling, see **Chapter 5**.

[50] PRA Rulebook 2016/26 r 8.5.

[51] Many of these procedures were already mandatory under CRD IV.

nomination committee – presume that creating bodies specific to the RFB staffed with independent directors will lead to independent decision-making that promotes the interests of the RFB and fill gaps left by incomplete and indeterminate rules. But, if these committees are filled with people who may be 'independent' but remain largely accountable to the party they are supposed to be independent from, that presumption is untenable.

3. Liability Strategy ('the Stick')

The third strategy the PRA employs to support the 'entity orientation' of ring-fence governance is to impose liability on those responsible for ensuring compliance with the ring-fence obligations. Although ring-fencing obligations are incomplete and indeterminate[52], directors' duties stemming from private and public law could potentially be called upon to fill the gaps *ex post*. Doctrinally, this might plausibly be achieved in three ways.

First, gap-filling could rely on the 'proper purposes' doctrine, which provides that a director of a company 'must only exercise powers for the purposes for which they are conferred'.[53] The doctrine does not prescribe specific responsibilities for directors,

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[52] See **Chapter 5**.

[53] s 171(1)(b) UK Companies Act 2006, part of the broader 'duty to act within powers'. The provision itself does not clarify features of the duty, but sets out the pre-existing law on the subject, see s 170(4) UK Companies Act 2006 and *Re West Coast Capital (LIOS) Ltd* [2008] CSOH 72, 21. More generally, see Andrew R Keay, *Directors' Duties* (Second Edition, Jordans 2014) paras 5.10-86; Sarah Worthington, 'Reforming Directors' Duties' (2001) 64 Modern Law Review 3, 439.

but 'imposes a criterion by which the actions of directors can be reviewed'.[54] Decisions made for improper purposes are voidable.[55] It may seem reasonable to argue that a director acting contrary to the ring-fence obligations exceeds the proper purpose of her power, so that this action can be captured by the proper purposes doctrine. Even if the ring-fence obligations are indeterminate *ex ante*, the proper purposes doctrine could then be called upon to clarify its reach and fill gaps *ex post*.

However, the viability of this approach is questionable. To begin with, it is debatable whether an action that contravenes the ring-fence obligations could be considered an 'improper' exercise of powers under the proper purposes doctrine. In determining, as a matter of law, the boundary between a power's proper and improper exercise, the provision in the company's constitution (usually its articles of association) will be taken as a starting point.[56]. However, there may be nothing in the RFB's constitution that helps directors or the court to construe a power's proper purpose,[57] in which case that proper purpose has to be determined on other grounds.

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[54] Richard Nolan, 'The Proper Purposes Doctrine and Company Directors', in Barry AK Rider (ed), *The Realm of Company Law* (Kluwer 1998) 15.

[55] See eg *Hunter v Senate Support Services Ltd* [2004] EWHC 1085 (Ch) 173-179.

[56] Keay (n 53) para 5.15.

[57] As of yet, there is no obligation to include the ring-fence obligations in the RFB's articles of association.

In *Eclairs Group Ltd. and Glengary Overseas Ltd. v JKX Oil & Gas plc.*[58], Lord Sumption held that 'it is usually obvious from its context and effect why a power has been conferred'[59], to which Worthington justifiably responds that 'however "obvious", reasonable minds are very likely to differ, and it is this which makes the proper purposes doctrine so fraught'[60]. So far, 'courts have tended to interpret the purposes subject to the general limitation of the powers being exercised so at to benefit the company's interests'[61], and proper purposes can be 'sourced in (…) equitable constraints applicable to the exercise of powers generally'[62]. Doctrinally, it is not clear how ring-fence obligations, ultimately a creature of regulation, could be invoked in such considerations.

Another complication with invoking the proper purposes doctrine to support the ring-fence is that most cases invoking the doctrine concern share issues, commonly as a defensive strategy in the context of a hostile takeover bid. Given this context, these cases tend to be 'fundamental to the constitutional distinction between the respective domains of the board and the shareholders'.[63] Alleged violations of ring-fence obligations hit a similar chord, presumably involving directors of an RFB's exercising

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[58] *Eclairs Group Ltd v JKX Oil & Gas plc; Glengary Overseas Ltd v JKX Oil & Gas plc* [2015] UKSC 71 (hereafter '*Eclairs Group Ltd*').

[59] *Eclairs Group Ltd* (n 58) 31.

[60] Sarah Worthington, 'Directors' Duties and Improper Purposes' (2016) 75 Cambridge Law Journal 2, 214.

[61] Saul Fridman, 'An Analysis of the Proper Purpose Rule' (1998) 10 Bond Law Review 2, 164.

[62] Worthington (n 60), 214, citing *Asséngagon Asset Management SA v Irish Bank Resolution Corporation Ltd* [2012] EWHC 2090.

[63] *Eclairs Group Ltd* (n 58) 37. More generally, see Keay (n 53) para 5.31; Worthington (n 60) 213.

powers contrary to the wishes of its shareholder (parent company), but will likely arise outside of the context of a hostile takeover. This makes it difficult to predict how, if at all, the proper purposes doctrine would operate.[64]

Second, *ex post* liability for RFB directors who violate ring-fence obligations could plausibly be derived from the shift in the orientation of directorial duties from shareholders to creditors in insolvency, when insolvency is inevitable, or in the vicinity of insolvency.[65] In the context of RFBs, this implies a shift away from the parent company (shareholder) and towards the RFB's creditors, which resembles a shift towards an entity orientation. However, in the case of the judicially developed rule that directors should prioritise the interests of a company's creditors in the vicinity of insolvency, the precise effect of this shift on the duties it affects is questionable.[66] To start with, case law is not entirely consistent on whether, once this duty is enlivened, the shift requires directors to focus exclusively on creditor interests[67], treat creditor interests

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[64] In fact, given the discretion created by the open-textured and indeterminate nature of the ring-fence obligations, it is not impossible to imagine that the court would find in favour of shareholders trying to enforce their authority on directors. See eg *Eclairs Group Ltd* (n 58), 37 ('The rule that the fiduciary powers of directors may be exercised only of the purposes for which they were conferred is one of the main means by which equity enforces the proper conduct of directors.').

[65] See **Chapter 5**.

[66] That is, how strongly this shift establishes an entity orientation. Generally, see Andrew R Keay, 'The Shifting of Directors' Duties in the Vicinity of Insolvency' (2015) 24 International Insolvency Review 156-159, and Kristin van Zwieten, 'Director Liability in Insolvency and its Vicinity' (2018) 38 Oxford Journal of Legal Studies 1, 7, and references therein.

[67] See eg *Miller v Bain* [2002] 1 BCLC 266, 67-68, 71.

as 'paramount'[68], or merely balance creditor interests against the interests of shareholders[69].

A more significant concern, one that also negatively affects the efficacy of the proper purposes doctrine in anchoring an entity orientation[70], relates to enforcement. Creating an entity orientation in an otherwise overwhelmingly shareholder-oriented (agent loyalty) corporate law environment requires that duties to prioritise creditor interests provide a more salient influence on director behaviour than shareholder-regarding duties. In making that calculation, the probability that each of these duties is successfully enforced plays a central role.[71] The RFB's shareholder has strong enforcement machinery[72], particularly given the fact that the parent company is the sole shareholder and thus faces no coordination costs. But, as alluded to before[73], the duties designed to protect other constituencies do not benefit from similarly strong enforcement mechanisms, because they are not directly owed to those constituencies, but indirectly via the company. Only the company itself or a party acting on its behalf

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[68] See eg *Colin Gwyer & Associates Ltd v London Warf (Limehouse) Ltd* [2003] BCC 855, [2002] EWHC 2748 (Ch), 74; *Re Idessa (UK) Ltd* (sub nom *Burke v Morrison*) [2011] EWHC 804 (Ch), [2012] BCC 315, 54.

[69] See eg *Vivendi SA v Richards* [2013] BCC 771, [2013] EWHC 3006 (Ch); *MDA Investment Management Ltd* [2004] 1 BCC 217, 245; *Ultraframe (UK) Ltd v Fielding* [2006] FSR 17, [2005] EWHC 1638 (Ch), [1304].

[70] The duty to have regard to the interests of creditors in the vicinity of insolvency also intrudes on the proper purposes doctrine, see *Westpac Banking Corporation v The Bell Group Ltd (in liquidation)* [2012] WASCA 157.

[71] Generally, see Gary S Becker, 'Crime and Punishment: An Economic Approach' (1968) 76 Journal of Political Economy 2, 169.

[72] See **Chapter 5**.

[73] See **Chapter 5**.

can enforce them, and as long as the company is flourishing only the shareholders will be able to act on the company's behalf through a derivative suit.[74] There is no reason why an RFB's parent company should do so in order to establish or entrench an entity orientation.

Realistically, enforcement can usefully be initiated by a liquidator or administrator, who would likely be appointed as part of a resolution procedure, or by a purchaser following a purchase and assumption resolution of the RFB. Whether the prospect of this enforcement route can seriously affect directors' behaviour depends on at least three considerations.

The first is the probability that enforcement is initiated, conditional on the probability of entering a resolution in the first place.[75] Barring the clearest cases, a liquidator will be cautious to use a company's assets available to unsecured creditors for such litigation,[76] and administrators might rely on the directors to execute the rescue

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[74] s 261 UK Companies Act (derivative suits).

[75] If an RFB, despite the regulator's best efforts, remains strongly intertwined with the rest of the banking group, the regulator might not be willing to take the financial stability risks associated with a resolution procedure for the RFB, especially given the 'core activities' RFBs fulfil and the PRA's continuity objective, see **Chapter 5**. Resorting to other means to stabilise a failing institution, such as providing liquidity assistance, might be considered preferable. On regulatory forbearance, see eg Ron J Feldman and Gary H Stern, *Too Big to Fail – The Hazards of Bank Bailouts* (Brookings Institution Press 2009).

[76] Paul L Davies, 'Directors' Creditor-Regarding Duties in Respect of Trading Decisions Taken in the Vicinity of Insolvency' (2006) 7 European Business Organization Law Review 326.

plan and thus want to retain them[77]. Liquidators, administrators, and purchasers will have to weigh these interests against the likely payoff from a successful action.

The second determinant of the credibility of the threat of enforcement of directors' duties is the probability that, once an action has been brought, a court will find it successful. As a general matter, UK courts avoid using hindsight when assessing the actions of directors,[78] and they traditionally refrain from reviewing the business decisions of directors in the context of the duty of care.[79] Keay notes that 'provided directors can demonstrate that they have acted in good faith and endeavoured to take creditors' interests into account, then a court might feel that it is unreasonable to find them liable'.[80] The nature of the cases that are successfully pursued, which often involve directors clearly not acting in good faith and engaging in excessive risk-taking or improper actions, reflect this point.[81] Although actions undermining the ring-fence could potentially have such characteristics, many of them will likely be regular business judgments concerning the relation between a subsidiary and its parent company. In such

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[77] Davies (n 76) 324.

[78] See eg *Re Kudos Business Solutions Ltd* [2011] EWHC 1436 (Ch), [2012] 2 BCLC 65. More generally, see Keay (n 66) 168 fn 284.

[79] Keay (n 66) 167-168. It might even be argued that UK courts are generous towards directors, see eg *Re Continental Assurance Co* [2001] BPIR 733.

[80] Keay (2015) (n 66) 162.

[81] Keay (2015) (n 66) 162. The cases pursued in the vicinity of insolvency often involve some improper benefit to creditors or their associates, see Van Zwieten (n 66). As noted above, the type of case that is successfully pursued in relation to the proper purposes doctrine tends to concern share issues in the context of a hostile takeover bid, see text accompanying notes 63-74. See also Worthington (n 60) 213. For other examples, see Keay (n 53) para 5.30 and references therein.

cases, the court might be even more reluctant to second-guess decisions given the highly complex nature of the judgments RFB directors have to make to run the business[82] and evaluate the RFB's relationship with the rest of the group.[83]

The third factor that determines the effect of the threat to enforce directors' duties on directors' behaviour is the nature of the sanction once enforcement is successful. For example, it may be that this sanction is not valuable enough to justify pursuing such cases in the first place,[84] which erodes the credibility of the threat of enforcement.

Given that private law directors' duties only apply to a subset of potential violations of the ring-fence, and that it may be hard or costly to enforce them, it is worthwhile to consider a third option to create *ex post* liability for RFB directors: enforcement by public agencies.[85] However, as we have seen, agencies lack standing under UK law to pursue private law obligations. Instead, they can enforce the parallel regulatory regime of 'directors' duties' designed to generate individual accountability –

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[82] Incidentally, RFB directors will likely benefit from having sophisticated advisors, so that blatant violations may be less probable.

[83] Insofar as a case involves an alleged violation of the ring-fence {obligations}, their indeterminacy may not help courts either. For example, an alleged violation of the proper purposes will only be successful of the directors 'predominantly' exercised the power for that improper purpose. See *Eclairs Group Ltd* (n 58). More generally, see Keay (n 53) 96-104.

[84] Generally, see John Armour, Bernard S Black, Brian C Cheffins and Richard Nolan, 'Private Enforcement of Corporate Law: An Empirical Comparison of the UK and US' (2009) 6 Journal of Empirical Legal Studies 4, 687.

[85] John Armour, Dan Awrey, Paul Davies, Luca Enriques, Jeffrey N Gordon, Colin Mayer and Jennifer Payne, *Principles of Financial Regulation* (Oxford University Press 2016) 389-390.

a key objective of post-crisis reform in the UK.[86] A first option is the recently introduced criminal offence for bank senior managers whose reckless misconduct *causes* their firm to fail[87], at least if such reckless misconduct involved undermining the ring-fence. But given the high burden of proof required to show that the behaviour of an individual, working in an environment as complex as a (large) bank, *caused* that bank's failure, this criminal offense will likely be a paper tiger.

The 'duty of responsibility' of the SMR, which the PRA monitors and enforces, creates a second and more promising path to enforcement by public agencies.[88] Directors carrying out the prescribed responsibility of ensuring compliance with the ring-fence obligations[89] can be held personally liable for a breach of a ring-fence obligation and face a fine or a ban.[90] Although this approach has potential, there are drawbacks. To start with, not all non-executive directors will be subject to its

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[86] Generally, see Parliamentary Commission on Banking Standards ('PCBS'), *Changing Banking for Good*, HL Paper 27-I; HC 175-I (HMSO 2013) (hereafter 'PCBS Final Report I'). Andrew Bailey, 'Irresponsible Conduct Carries Consequences in British Finance' (23 February 2015) Financial Times ('In any profession, people who break rules and neglect their duties should face serious consequences. Failure means losing your job, losing pay or being stopped from continuing in that profession. Financial institutions should be no different.'); Caroline Binham, 'FCA Expects More Enforcement Cases Against Individuals' (14 April 2016) Financial Times ('The idea of the regime was to improve accountability and the reputation of the City after a string of scandals, as well as addressing why no head of a bank has been punished as a result of the financial crisis.').

[87] Financial Services and Markets Act 2000 ('FSMA'), as amended by the Financial Services (Banking Reform) Act 2013 ('the Act') s 36. Directors convicted of this offense may face up to seven years of imprisonment.

[88] See **Chapter 5** and text accompanying notes 18-24. FSMA ss 66A and 66B as inserted by ss 32(1) and 32(2) of the Act and amended by Ss 16, 17, and 25 of the Bank of England and Financial Services Act 2016. See also: SS28/15.

[89] See **Chapter 5**.

[90] FSMA s 66(3).'

application.[91] The fact that directors outside the scope of the SMR will, in theory, be least compromised by conflicts of interest and least able to directly affect compliance with the ring-fence obligations somewhat mitigates this concern. At the same time, these directors are also most exposed to the removal powers of the parent company.

In addition, to be able to enforce the SMR's duty of responsibility, the PRA needs to have sufficient information about the actions of directors and the degree to which these actions (could) undermine the ring-fence. Specifically, the duty of responsibility requires regulators to prove, first, that the firm contravened a relevant requirement, and second that the senior manager[92] was responsible for the management of any activities in that firm in relation to which the contravention occurred. Given the opacity of banks generally, and the incomplete nature, indeterminacy and technical quality of the ring-fence rules and obligations specifically, it could be hard to establish whether a particular policy contravenes the ring-fencing obligations. Even the most capable regulator would face an uphill struggle to overcome the informational asymmetry vis-à-vis the RFB, especially when coupled with legal uncertainty due to indeterminate ring-fence rules, and enforce the duty.[93]

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[91] See **Chapter 5**.

[92] Or possibly, in the case of a failure to ensure compliance with the ring-fence obligations, senior manager*s*.

[93] More generally, see **Chapter 5**.

To alleviate this concern, the first proposal of the 'duty of responsibility' included a 'presumption of responsibility'.[94] If a firm contravened a requirement, the relevant senior manager would automatically have been deemed guilty of misconduct. The only available defence to a senior manager would be to satisfy the regulator that she took any steps as a person in their position could reasonably have been expected to take to avoid the contravention occurring or continuing.[95]

This provision was dropped in response to concerns that, when enforced, it might both lead to legal challenges as to whether the rules breached EU human rights laws on due process, and also foster a 'tick-box' mentality within the banking industry.[96] The burden of proof is now reversed,[97] again putting the regulator in the difficult spot of having to bridge the informational asymmetry with the RFB to collect a substantial body of evidence before enforcing the duty.

This informational problem facing the regulator might be somewhat mitigated by the nature of the SMR. By design, the SMR does not require regulators to pinpoint specific actions or inactions, which would require detailed information and insight into

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[94] See eg PRA, 'Strengthening Accountability in Banking: A New Regulatory Framework for Individuals' (July 2014) CP19/14 paras 2.4, 7.34-37. In the context of the ring-fence, see eg CP19/14 para 3.41.

[95] Initially introduced under FSMA s 66(B)(6). For an overview of the PRA's proposed approach, see PRA, 'Supervisory Statement: Strengthening Individual Accountability in Banking' (July 2015) SS28/15 paras 2.72-76.

[96] See eg HC 445 (n 1) Andrew Bailey (at the time the PRA's Chief Executive Officer) 8.

[97] In other words, the regulator must show that the senior manager did not take such steps as a person in their position could reasonably be expected to take to avoid the firm's contravention occurring or continuing.

corporate processes. Instead, the SMR focuses on areas of individual responsibility, allowing the regulator to assign a breach to the responsible SMF.[98] However, this helpful feature of the SMR may be blunted in the context of the ring-fence, because contrary to other SMFs the prescribed responsibility to ensure compliance with the ring-fence obligations is shared.[99] Relative to private enforcement, the PRA has the significant advantage that it can use its regulatory powers to obtain information and review a specific decision *ex post*, when the more blatant breaches might already have revealed themselves.[100]

A final concern with the SMR relates to the vigilance of its enforcement. This vigilance will be critical to the *ex ante* effect that the SMR has upon directors' actions.[101] Regulators have to strike a balance: enforcement that is too lax will erode *ex ante* incentive effects on directors, including the incentive to act to preserve the ring-fence;

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[98] See eg HC 445 (n 1) Andrew Bailey (at the time the PRA's Chief Executive Officer) 8 ('[The SMR] shifts [the requirement] from having to prove they did something or they deliberately did not do something to responsibility in their stated area, and you are not relying on finding individual actions. That is crucial. If there were any suggestion in this legislation that that was changing, I would be here telling you that I did not support it.').

[99] See **Chapter 5**. Despite this shared responsibility, a person 'will only be in breach of any of the conduct rules where they are personally culpable', SS28/15 para 5.8. Against this backdrop, concerns expressed about the Approved Persons Regime might become salient. For such concerns, see eg Bailey (n 86) ('In practice it has been almost impossible to hold *individual* senior bankers accountable for serious failures and misdeeds. This was in large part because of the *difficulty of establishing who was responsible* for the areas where these problems occurred.' (*emphasis* added)).

[100] However, the initially proposed requirement on firms to report breaches and suspected breaches by all firms to regulators – s 64B(5) FSMA – has been scrapped, see PRA, 'Strengthening Individual Accountability in Banking: Responses to CP1/16, and the Certification Part of CP 29/15' (March 2016) PS9/16.

[101] For general concerns about regulatory enforcement, see **Chapter 5**. See also Armour and Gordon (n 36) 73 ('Agencies are (…) subject to the problems of influence by regulated firms.').

at the same time, overly stringent enforcement risks further diluting the already thin market for RFB directors.[102] Unsurprisingly, the industry has focused on the latter concern.

Keiran Ford, chief risk officer at Santander UK, expressed concerns about 'a big team from the FCA turning up at my officers with 30 guys to go through the minutes of every meeting to second guess a decision I made a few years ago'.[103] Jon Pain, head of conduct and regulatory affairs at Royal Bank of Scotland, noted that '[t]his is [already] a difficult industry to recruit non-executive directors into (…). If you terrify them with that level of [record-keeping that could potentially serve as] evidence; you make their job almost impossible'.[104]

In response to industry concerns that heavy-handed regulation may undermine the market for directors, the FCA and the PRA have stressed that the SMR is not for 'putting heads on spikes'. The two regulators nevertheless state that they anticipate more enforcement cases.[105] Past experience on striking a balance between rigorous enforcement whilst also avoiding the creation of a climate that is hostile to directors provides a cautionary tale, with an apparent reticence on the part of the FSA to come

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[102] See text accompanying note 22. Anecdotal evidence suggests that the new rules prompted some bankers to quit, see Martin Arnold and Caroline Binham, 'Bankers 'Terrified' at New Regulations' (8 March 2016) Financial Times.

[103] Arnold and Binham (n 102).

[104] Arnold and Binham (n 102).

[105] Binham (n 86).

forward and take action against bank's executives after the financial crisis.[106] However, around the time the regime was introduced there indeed appeared to be an uptake in enforcement. Despite its tradition of focusing on tackling issues proactively, the PRA has concluded more enforcement cases in 2016 (four) than in 2013, 2014 and 2015 combined (three),[107] and it is likely that there is more to come.[108] Some lawyers conclude that, under the SMR, 'it is generally considered that senior managers are at greater risk of disciplinary action when things go wrong on their watch' than under comparable private law duties in the UK.[109]

In sum, the effectiveness of the liability strategy in supporting an entity orientation is dubious. Private law directors' duties will only support such an orientation in insolvency or its vicinity. Their effectiveness is further limited by the questionable incentives for a liquidator or administrator to enforce the duty, and, even if such enforcement takes place, it would likely only be successful in the most outlandish of violations to the ring-fencing rules. In theory, public law directors' duties offer more promise. Their effectiveness will hinge on the ability and willingness of the PRA and

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[106] Armour and Gordon (n 36) 74.

[107] Sarah Hitchins, 'The PRA: Starting to Flex its Enforcement Muscles?' (2016) Allen & Overy Investigations Insight (retrieved on 24 November 2017 from: http://www.aoinvestigationsinsight.com/the-pra-starting-to-flex-its-enforcement-muscles/).

[108] Sarah Hitchins, 'The PRA's Annual Report for 2016/16: An Enforcement Perspective' (2016) Allen & Overy Investigations Insight (retrieved on 24 November 2017 from: http://www.aoinvestigationsinsight.com/the-pras-annual-report-for-201516-an-enforcement-perspective/).

[109] See eg Baker & McKenzie, *Extending the Senior Managers Regime: A New Individual Accountability Regime for all FSMA Authorised Persons* (2017) 11.

FCA to gather information and enforce the duty of responsibility vigorously. The general problems regulators face in regulating banks, the balance regulators must strike between strict enforcement and maintaining a pool of talent willing to become an RFB directors, and the history of the approved persons regime provide reasons for scepticism. For both private and public law directors' duties, the indeterminacy of the ring-fence rules creates a significant enforcement challenge; such rules complicate the determination whether a certain policy violates regulatory obligations, especially in the presence of informational asymmetries.

B. Test 2: Switching Regimes

The second test of the PRA's 'selective entity orientation' is whether, provided the incentives supporting a 'entity orientation' could be generated, they will indeed be generated *when necessary*. Because the ring-fencing regime explicitly maintains the accountability measures to the parent company (the shareholder) as a baseline, this requires a 'switch' between the incentive and accountability structures under which RFB directors operate. This switch, away from agent loyalty and towards an entity orientation, should provide RFB directors the opportunity to act truly independently from the whims of the parent company when necessary.

Designers of the ring-fence seem to presume that RFB directors make the shift from agent loyalty to an entity orientation themselves. This requires these directors to recognise when a decision could potentially lead to non-compliance with the ring-fencing objectives and acting independently to avoid that outcome. The PRA provides

limited guidance as to what these circumstances; its public statements essentially note that the switch should take place 'when necessary'. Moreover, acting with an entity orientation could run counter to the parent company's wishes, in which case the parent company will be able to employ its strong accountability mechanisms to ensure agent loyalty.[110] It follows that, all else equal, directors have few incentives to act in accordance with the entity orientation. An RFB's directors are therefore helped in their task to ensure compliance with ring-fencing objectives if, in such circumstances where the PRA deems an entity orientation 'necessary', directors' duties shift to mitigate their accountability to the parent company.

As discussed, private law directors' duties become more creditor-regarding, and therefore more aligned with an entity orientation, in insolvency, when insolvency is unavoidable, or in the 'vicinity of insolvency'.[111] The problem with this 'switching mechanism' is that its trigger remains unclear. Andrew Keay has reviewed the case law, finding several similar but distinct circumstances that can cause the switching mechanism to operate:

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[110] See **Chapter 5**.

[111] See **Chapter 5** and text accompanying notes 65-86.

First, when their company is nearing,[112] approaching,[113] on the borderline of[114] or on the verge of[115] insolvency. Second, where their company is of doubtful solvency.[116] Third, where the company is subject to a risk of insolvency occurring.[117] Fourth, where to the knowledge of the directors there is a real and not a remote risk of insolvency, and creditors would be prejudiced by the action considered.[118] Finally, there are cases where there is no reference to insolvency at all, and the courts have been content merely to say that the company must be in a dangerous financial position,[119] a parlous financial state,[120] financially unstable[121] or in financial difficulties (to the extent where the creditors are at risk) and where the state of affairs would endanger the creditors' interests.[122] [123]

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[112] *Nicholson v Permakraft (NZ) Ltd* [1985] 3 ACLC 453, 459; *Re New World Alliance* [1994] 51 FCR 425, 444-445, [1994] 122 ALR 531; *The Liquidator of Wendy Fair (Heritage) Ltd v Hobday* [2006] EWHC 5803, 66.

[113] *Geneva Finance Ltd v Resource and Industry Ltd* [2002] 20 ACLC 1427.

[114] *Eastford Limited v Gillespie, Airdrie North Limited* [2010] CSOH 132, 22.

[115] *Colin Gwyer & Associates Ltd v London Warf (Limehouse) Ltd* [2002] EWHC 2748 (Ch), [2003] BCC 855, 74.

[116] *Nicholson v Permakraft (NZ) Ltd* [1985] 3 ACLC 453; *Brady v Brady* [1988] 3 BCC 535 at 552; *Colin Gwyer & Associates Ltd v London Warf (Limehouse) Ltd* [2002] EWHC 2748 (Ch), [2003] BCC 855, 74. Also, see the comments of Templeman LJ in *Re Horsley and Weight Ltd* [1982] 1 Ch 442, 455.

[117] For example, see *Grove v Flavel* [1986] 11 ACLR 161, 170; *Kinsela v Russell Kinsela Pty Lt* [1986] 4 ACLC 215, 223 (agreeing with Cooke J in *Nicholson v Permakraft (NZ) Ltd* [1985] 3 ACLC 453; *Winkworth v Edward Baron Development Ltd* [1986] 1 WLR 1512; *Hilton International Ltd (in liq) v Hilton* [1989] NZLR 442.

[118] *Kalis Enterprises Pty Ltd v Baloglow* [2007] NSWCA 191, 162; *Re HLC Environmental Projects Ltd* [2013] EWHC 2876 (Ch) 89.

[119] *Facia Footwear Ltd (in administration) v Hinchliffe* [1998] 1 BCLC 218, 228.

[120] *Williams v Farrow* [2008] EWHC 3663 (Ch) 21.

[121] *Linton v Telnet Pty Ltd* [1999] NSWCA 33, [1999] 30 ACSR 465.

[122] *Re MDA Investment Management Ltd* [2003] EWHC 227 (Ch), [2004] EWHC (Ch) 42, [2005] BCC 783, 70; *Re Idessa (UK) Ltd* (sub nom *Burke v Morrison*) [2011] EWHC 804 (Ch), [2012] BCC 315, 55.

[123] Keay (2015) (n 66) 152-153 and references therein. See also Van Zwieten (n 66).

In addition to the uncertainty about the trigger point, it is an open question how such a trigger operates in relation to banks. An interesting take on the case law could be that banks, because of their highly levered capital structures, are arguably always in the 'vicinity of insolvency', at least in a corporate law sense. In turn, this could imply that the shift to more creditor regarding directors' duties is near-permanent for banks, including RFBs. A more conventional reading of the case law would do little to further elucidate the uncertainty around the trigger point for the switch.

The important question is whether infringements of the ring-fence would be captured by this shift. First, and sidestepping the boundary issues, even if the infringement takes place in insolvency or its vicinity, it is not clear that having more creditor-regarding duties would imply that an actionable case against the infringing director would be feasible; only specific, and rather blatant, infringements of the creditor-regarding duties are commonly upheld by courts,[124] and the indeterminacy of the ring-fence obligations is likely to aggravate that problem. Second, and perhaps more fundamentally, it is clear that infringements of the ring-fence can conceivably take place outside insolvency or its vicinity.[125] Decisions that increase the risk of a conflict of interests between the RFB and its parent company, or decisions that more profoundly curtail the RFB's independence, should also call for a switch. But in those cases, the

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[124] See text accompanying notes 80-84.

[125] See eg James Proudman, 'Putting Up a Fence' (2017) Bank of England (Speech Given to the British Bankers' Association), 4 ('Strong arrangements are necessary at board level to ensure that the ring-fenced banks can take decisions independently *both in times of crisis and, in good times*, to maintain the integrity of the ring-fence. Where conflicts of interests do arise, firms are expected to be able to identify and manage these.' (*emphasis* added)).

switching mechanism based on private law directors' duties does not operate, leaving directors exposed to the accountability measures of the parent company. In sum, of the total set of situations where an entity orientation would be required to preserve compliance with the ring-fencing obligations, the switching mechanism provided under private law directors' duties only captures a small, poorly defined, subset.

It is an open question whether directorial incentives generated under public law, and notably the 'duty of responsibility' under the SMR, will meaningfully enlarge that subset. At this stage, little guidance is available as to the nature of the decisions that would trigger the switch under the SMR. Here, too, the switching regime largely relies on RFB directors making a judgment about the potential of a particular action to undermine the ring-fence obligation. This lack of clarity could be an example of constructive ambiguity, used by the PRA and the FCA to have directors of RFBs err on the safe side of compliance with the SMR. Certainly, directors will be more careful knowing that, if the action would end up undermining the ring-fence, the regulator can hold them personally liable *ex post*.

Yet, as was the case before, the extent to which directors err on the side of compliance with the SMR depends on their judgment about the likelihood that public enforcement would actually take place and be successful. Moreover, this likelihood will be balanced against the expected likelihood that the parent company will exercise its many tools to create agent loyalty.[126] If the regulator only pursues the most egregious

[126] Note that constructive ambiguity can backfire on the regulator; if RFB directors are uncertain about the circumstances causing the PRA and FCA to initiate enforcement, but they know that going against

violations of the ring-fence obligations – because the rules are indeterminate, and because the regulator lacks the information, capacity and willingness to act vigilantly on more subtle violations – the deterrence effect on the more subtle or technical violations of the ring-fence obligations (especially given their general indeterminacy) might be limited.[127] It is no stretch to be sceptical in this regard.[128] As the SMR regime matures, there will be more guidance for directors in terms of what type of actions tend to lead to accountability, which will further clarify the precise nature and extent of this regulatory switching mechanism. In addition, there will be more clarity about the vigilance of the enforcement efforts of the PRA and FCA. Taken together, more guidance and clarity about the enforcement strategy will elucidate its effect on the *ex ante* behaviour of RFB directors.

II. ILLUSTRATING THE PROBLEM: HEDGING VULNERABILITY

To see how the combination of indeterminate rules and directors' incentives renders the ring-fence vulnerable, it is helpful to think about an acid test for its success. Arguably, one of the central objectives of the regime is to ensure that the RFB's assets are protected from risks elsewhere in the banking group and preserved for the RFB's creditors. Ostensibly, the ring-fence leaves myriad ways in which risks that undermine

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the parent company's wishes will certainly elicit a response from the parent company, it may be more appealing to comply with the parent company's wishes.

[127] Note that even many subtle violations of the ring-fence can, according to the principle of 'death by a thousand cuts', frustrate the ring-fence's objective of creating a truly independent RFB within the group that can, if necessary, be sustained even if the rest of the group fails.

[128] Generally, see **Chapter 5**. See also text accompanying notes 101-109.

this objective could be taken on; the exceptions to the excluded activities and prohibitions[129] read like 'an arbitrageur's wish list'.[130] The example of hedging exceptions illustrates the broader problem.

In short, dealing in investments as principal, commonly chided as 'speculation' or 'casino banking', is prohibited for RFBs on the grounds that such transactions generate unacceptable risks and foster a culture that regulators judge incompatible with engaging in core banking activities.[131] However, because of the limitations on the types of transactions it can engage in, an RFB is likely to lose out on diversification benefits and thus become riskier. To allow for better management of that risk, the exceptions to the excluded and prohibited activities allow an RFB to engage in hedging transactions.[132] In principle, this is sound policy from a risk management perspective. However, there are at least two ways in which these exceptions allow for the undermining of the ring-fence.

First, hedges can go wrong in major ways. Famously, the JP Morgan 'London Whale' trade started out as a hedge, albeit a large and monoline one that, when it went

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[129] See **Chapter 5**.

[130] Nick Railton-Edwards, 'UK Ring-Fencing – Quite Exceptional' (2014) Retrieved from: http://www.drsllp.com/blog/uk-ringfencing-quite-exceptional/ ('There is nothing in this Order to prevent an RFB from self-immolation by tried and tested methods').

[131] Independent Commission on Banking ('ICB'), *Final Report: Recommendations* (ICB 2011) ('ICB Report') 59-62.

[132] Excluded Activities Order rr 6, 14.

wrong, inflicted a $6.2 billion trading loss on JP Morgan.[133] Such concerns are exacerbated for RFBs; because of their monolithic balance sheets that tend to be strongly exposed to UK mortgages, an RFB's hedges will likely resemble such large monoline hedges designed to offset risks coming primarily from a single variable: changes to the interest rate. Consequently, these hedges will in fact constitute large directional trades that, if they go wrong, can inflict serious financial losses on the RFB.

Second, there are no strong conceptual tools for distinguishing a hedge from a proprietary trade, which RFBs are barred from engaging in. Both informationally and legally, the distinction is murky not only in intent but also in effect.[134] That complicates regulatory scrutiny, especially *ex ante*, of transactions qualified as hedges.[135] Moreover, given the blurred boundaries between hedges and proprietary trades, managers of RFBs could engage in *de facto* proprietary trades under the guise of hedging transactions. Such a trade, when represented as a hedge, need not contravene the principle of safe and sound risk management.[136]

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[133] United States Senate Permanent Subcommittee on Investigations, 'Staff Report on JP Morgan Chase Whale Trades: A Case History of Derivatives Risks and Abuses' (March 15, 2013).

[134] It is particularly hard to draft a complete rule regarding the determination that '*the sole or main purpose* of an exceptions transaction is and continues to be' (emphasis added) for a hedging exception transaction. See PRA Rulebook 2016/26, r 17.1(3). The case of the 'London Whale' illustrates this difficulty: United States Senate Permanent Subcommittee on Investigations (n 133).

[135] See note 93 and accompanying text.

[136] Arguably, this is what ultimately happened in the case of the JP Morgan 'London Whale' trade. See **Chapter 5** as well as notes 40-44 and accompanying text. United States Senate Permanent Subcommittee on Investigations (n 133).

In fact, engaging in such trades is not only possible, but it could also be desirable from the perspective of the RFB's and its parent's managers. Proprietary trading can boost profits which, as we have seen, can translate into higher salaries and improved career prospects for managers of the RFB even under ring-fence governance.[137] The RFB's parent company might encourage the RFB's managers to engage in such transactions, because they benefit from these transactions taking place within the RFB rather than in another subsidiary.[138] And as long as the RFB is sufficiently capitalised – and there is no reason to assume otherwise as long as these transactions are profitable – there are few restrictions on the RFB passing on these profits to the parent company.[139]

III. THE MISSING CREDIBILITY OF RING-FENCE GOVERNANCE

Directors of RFBs are faced with competing incentive structures. On the one hand, they remain accountable to the parent company (agent loyalty), and on the other they must take decisions independently from the parent company in the interests of the RFB (entity orientation). If agent loyalty dominates, gaps in the incomplete and indeterminate ring-fencing rules may be exploited to compromise the efficacy of the ring-fence in order to convey benefits on the banking group. Regulatory segmentation measures

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[137] See Section I(A). Also see notes 40-42, 46-47, 49 and accompanying text.

[138] Within the banking group, RFBs uniquely benefit from unpriced deposit insurance, and arguably even from an implicit government guarantee. Consequently, funding costs for such 'hedging' transactions will be lower in the RFB than elsewhere in the banking group. See eg ICB Report (n 131) fn 33 and accompanying text. See also Section I(A) and notes 40-42, 46-47, 49 and accompanying text.

[139] PRA Rulebook 2016/26 ch 11.

would be permeable. If the entity orientation is paramount, the banking group may disintegrate, since the parent company may no longer be able to control its subsidiary. The impact of regulatory segmentation would be too strict.

The PRA's approach to managing this tension, the selective entity approach, implies that agent loyalty as prescribed under general UK corporate law is maintained as a baseline case. However, when necessary to protect the ring-fence, directors of RFBs must relieve themselves of this accountability and take decisions independently and in the interest of the RFB. For this arrangement to be credible, it must be clear that directors could act truly independently when necessary, and that the switch towards a governance structure that allows for such independent decision-making operates in the relevant circumstances. That way, ring-fence governance would generate incentives for RFB directors to act in line with the spirit of ring-fencing even when the ring-fence rules are incomplete and indeterminate.

It is doubtful whether ring-fence governance currently meets these two tests. First, whether RFB directors can take decisions independently of the rest of the banking group is questionable. 'Independent' directors remain accountable to the parent company and subject to its removal powers, even if these are qualified; remuneration policies leave gaps for arbitrage and are notoriously difficult to calibrate; and it is not clear that private law directors' duties could, and whether they would, be deployed to hold directors of RFBs to account for violating ring-fencing obligations. Second, the operation of the switching mechanism remains marred with uncertainty. Moreover, the shift towards an entity orientation provided for by private law directors' duties will likely

only capture a small subset of the total set of cases where preservation of the ring-fence warrants an entity orientation.

Public law directors' duties enforced by the PRA and the FCA may meaningfully strengthen ring-fence governance. Vigilant enforcement of the SMR, coupled with intense screening of the appointed of RFB directors and increased scrutiny on the circumstances surrounding the departure of RFB directors, would allow directors to act independently with more confidence. At the same time, intense enforcement should be balanced against the concern that qualified people could be deterred from becoming RFB directors. If the liability risks of enforcement, the invocation of hindsight by regulators, or uncertainty around the circumstances that might lead to enforcement are too pronounced, the market for RFB directors might dry up. Improved guidance on the circumstances where the PRA and the FCA expect independent decision-making could alleviate such concerns, and would also allow RFB directors to more confidently rely on an entity orientation. It is currently unclear whether the PRA and the FCA will reliably fulfil this role, but past experience provides ground for scepticism. For both private and public law directors' duties, the indeterminacy of the ring-fence rules creates obstacles to effective enforcement. As it stands, the governance of RFBs does not credibly safeguard the ring-fencing objectives.

This conclusion casts doubt on the efficacy of ring-fencing as a regulatory segmentation strategy – particularly in relation to the aim of creating a semi-permeable membrane between the RFB and the rest of the banking firm. At the core, the problem

is one of incomplete and indeterminate rules[140], which render the ring-fence vulnerable to the exercise of discretion in ways contrary to its objectives. These rules are an expression of the regime's objective to simultaneously capture the benefits of two conflicting goals – full structural separation and unstructured universal banking[141] – which requires nuanced and context-sensitive rules. To capture that nuance with *ex ante* complete rules is impossible and, even if it were possible, would likely be *ex post* inefficient[142]; redesigning these rules to make them more complete and determinate would add credibility to the regime at the cost of sacrificing some of the scale and scope economies ring-fencing attempts to preserve.[143]

The question then becomes whether this vulnerability can be managed to the point that it is no longer problematic.[144] This brings back the focus on the essential role of ring-fence governance in making ring-fencing a success.[145] Financial regulation is notoriously hard to evaluate using cost-benefit analysis[146], but the conceptual framework

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[140] See **Chapter 5**.

[141] See **Chapter 5**.

[142] See **Chapter 5**.

[143] In practice, it is likely that doing so would move the regime towards either unstructured universal banking or full structural separation.

[144] A comprehensive evaluation of whether it is desirable to retain the ring-fence at all is beyond the scope of this Chapter.

[145] See eg Parliamentary Commission on Banking Standards ('PCBS'), *Changing Banking for Good – Oral Evidence*, HL Paper 27-III; HC 175-III (HMSO, 2013) (hereafter 'PCBS Final Report III') Q797 (Lord Lawson of Blaby, paraphrasing the conclusions of the ICB, when posing a question to Sir John Vickers), and Q596 (quoting Andy Haldane).

[146] See eg John C Coates IV, 'Cost-Benefit Analysis of Financial Regulation: Case Studies and Implications' (2015) 124 Yale Law Journal 4, 882.

could usefully be invoked to identify whether ring-fence governance does enough to ensure that its benefits outweigh its costs.

The costs of ineffectual ring-fence governance come primarily in the form of uncertainty. The ring-fencing regime relies on ring-fence governance to ensure that managers and directors of RFBs exercise discretion left by the ring-fence rules to support the ring-fence, rather than to exploit its permeability. If the credibility of ring-fence governance to meet that objective is compromised, regulators may be reluctant to rely on the intra-group separation that ring-fencing should ensure. Especially in crisis times, that reluctance, coupled with general informational asymmetry of banks vis-à-vis regulators, could foster regulatory forbearance;[147] regulators might, for example, opt to bail out the entire banking group out of fear that the RFB would not survive independently. If the bank's management and investors realise this *ex ante*, SIB-governance might continue to be corrupted, which could in turn create stronger incentives to undermine the ring-fence.

Given the vulnerability of the current ring-fence governance, this conceptual framing suggests that even marginal improvements in ring-fence governance might in principle be useful. Such improvements should primarily aim to enhance the ability of private and public enforcement to act as credible gap-fillers and protect the integrity of the ring-fence. Given their important role in supporting ring-fence governance through the SMR, the PRA and FCA should be adequately resourced and staffed, and have

[147] On regulatory forbearance, see eg Stern and Feldman (n 75).

incentives to act vigilantly in enforcing public law directors' duties – especially given the challenges in enforcing private law directors' duties.

In addition, the PRA and FCA could consider targeted modifications to ring-fence governance to make the selective entity orientation more credible. For example, with a few changes, private and public law directors' duties might together create stronger incentives to support the ring-fence. Compulsory minimum multiple-year terms for RFB directors,[148] coupled with a mandatory exit interview with the PRA or FCA for each RFB director leaving her post, would make the parent company's removal powers less pronounced in cases where such removal powers are abused to compromise the independent decision-making of RFB directors. To provide a proper counterweight against the accountability measures the parent company can deploy, the PRA should extend the SMF of preserving the ring-fence to include all directors of an RFB. Moreover, directors of the parent company of an RFB could be made responsible for violations of the ring-fence,[149] for example by extending the SMF to ensure compliance with the ring-fence rules to them.[150] Finally, the PRA could mandate that RFBs include the ring-fencing obligations in their charter, so that RFB directors acting contrary to those obligations could be held liable by creditors of that RFB under the proper purposes doctrine.

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[148] RFB directors could conceivable also negotiate such a minimum term in their employment contract. Whether they do so is an empirical question, but there is no anecdotal evidence to suggest this.

[149] Generally, see Armour and Gordon (n 36) 65.

[150] Currently, these duties are not imposed on the parent. Cf SS28/15 para 2.27; PS10/15 para 3.10.

CONCLUSION

The hallmark of the post-crisis regulatory regime for large banks in the United Kingdom is the requirement that they move their vital retail banking activities into RFBs. This ring-fencing is a mode of structural regulation which aims to curtail the incentives for excessive risk-taking by insulating vital services from risk elsewhere in the banking group, whilst maintaining scale and scope economies. Curtailing the incentives for excessive risk-taking is critical to combat systemic risk, hence the ring-fencing framework deploys a range of regulatory tools to credibly insulate the RFB – in effect, it intends the create partial segmentation between the RFB and the rest of the banking firm by creating a 'semi-permeable' membrane between them.

Managers and directors of RFBs have an interest in undermining the efficacy of the ring-fence, and because ring-fencing rules are incomplete and indeterminate (**Chapter 5**) they can exercise their residual discretion to do so. As discussed in **Chapter 5**, regulator-based gap-filling mechanisms seeking to ensure that RFBs are run in a manner consistent with the ring-fencing objectives may not reliably prevent the undermining of the ring-fence. Therefore, UK policymakers have acknowledged that, for the ring-fencing policy to succeed, the corporate governance regime applicable to RFBs must ensure that managers and directors of RFBs exercise this discretion in line with the ring-fencing objectives.

Ordinarily, UK corporate governance seeks to render managers accountable to shareholders. In the case of RFBs, which are wholly-owned subsidiaries of their parent company, the concern is that the parent company may use its powers to exploit the gaps

ring-fencing rules to undermine the ring-fence if doing so would benefit the parent company. Hence, ring-fence governance adopts an entity perspective that seeks to ensure that RFB directors can take decisions independently from the rest of the banking group. To reconcile these two potentially conflicting perspectives on governance, the PRA requires that ring-fence governance adopts a selective entity orientation. Directors and managers of an RFB remain accountable to the parent company but must be able to take decisions independently when necessary to protect the ring-fence.

To be effective, this selective entity orientation must meet two tests. First, directors and managers of an RFB must be able to act independently from the parent company when circumstances warrant. As part of the ring-fencing regime, the legislator has mandated a (1) cohort of independent directors for the RFB, (2) control of remuneration policies in the RFB so as to mitigate incentives to undermine the ring-fence, and (3) liability of RFB directors in case they undermine, or fail to prevent the undermining of, the ring-fence. Second, independent decision-making, as opposed to the baseline of being accountable to the RFB's parent company, should be 'switched on' at the right time – that is, when independent decision-making is required to support the ring-fence. Andy Haldane, Chief Economist at the Bank of England, described the role of ring-fence governance as 'essential if this ring-fence is not to prove permeable'[151], whereas others noted it is 'absolutely essential' to the ring-fencing model.[152]

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[151] PCBS Final Report III (n 145), Q596 (quoting Andy Haldane).

[152] PCBS Final Report III (n 145) Q797 (Lord Lawson of Blaby, paraphrasing the conclusions of the ICB, when posing a question to Sir John Vickers).

However, the analysis in this Chapter casts doubt on the ability of ring-fence governance to credibly safeguard a selective entity orientation. Although private and public law directors' duties together could support independent decision-making, it is dubious whether they currently do so. Independent directors remain appointed – and subject to removal – by the parent company, remuneration policies are notoriously hard to calibrate and leave room for arbitrage, and it remains to be seen how credible the threat of liability is for RFB directors that enable or fail to prevent violations of the ring-fence obligations. Moreover, the operation of the switching mechanisms under private and public law is marred with uncertainty, providing little guidance to RFB directors as to when they are free to take decisions independently. The incompleteness and indeterminacy of the ring-fence rules and obligations that necessitate a role for governance in the first place also complicate the credible enforcement of these governance tools.

Whether ring-fence governance, and by implication the ring-fencing policy, can be credibly implemented remains to be seen. So far, the economic climate has not necessitated trade-offs of the kinds that put serious pressure on the relationship between the RFB and the broader banking group. The vigilance and assiduity that the PRA and FCA bring to their enforcement will be critical to ensuring credible ring-fence governance. But even if the PRA and FCA vigilantly enforce the SMR, it is dubious whether they can resolve the conflicting governance obligations lingering at the heart of the ring-fencing regime.

This Chapter highlights that the interplay between incomplete and indeterminate regulatory obligations and the incentives generated by ring-fence governance together compromise the credibility of the ring-fencing regime. Because making ring-fencing rules more complete and determinate would likely compromise the nature of the regime, managing the vulnerabilities that result from incomplete and indeterminate rules is key to the success of ring-fencing as a regulatory strategy. This conclusion highlights the important and underexplored role of interacting private and public law directors' duties in the context of indeterminate regulatory obligations, as well as that of intrafirm governance in relation to regulatory segmentation measures.

A. Postscript: The Skeoch Review

An independent review of the UK's ring-fencing regime carried out at the request of the UK government in 2021-2022 (the 'Skeoch Review'), disagrees with the findings of **Chapters 5** and **6**.

The committee considered[153] the published version of these chapters[154] and I was invited to discuss the findings with its members. Nonetheless, in its final report the

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[153] The review's focus on this issue was in part prompted by the published version of **Chapters 5** and **6** of this thesis, which I discussed with the committee. See eg Ring-fencing and Proprietary Trading Independent Review, *Final Report* (March 2022) (hereafter 'Skeoch Review') C.5 ('Respondents to the Review's Call for Evidence raised concerns that certain corporate law rules prevent an RFB that forms part of a larger group from acting independently from its parent or its wider group, thereby creating a conflict with ring-fencing governance requirements.').

[154] Thom Wetzer, 'In Two Minds: The Governance of Ring-Fenced Banks' (2019) 19 Journal of Corporate Law Studies 179.

committee concludes that '[t]here does not seem to be a conflict between the duties to a shareholder and obligations to comply with the ring-fencing regime's regulations'[155]. The report continues: 'There would only be a conflict if a shareholder directed the Board to act in breach of ring-fencing regulations, which would be similar, for example to a scenario where shareholders directed a Board not to comply with consumer protection laws.' [156]. Because the committee assumes that enforcement would lead to penalties for the RFB's managers and potentially for managers of the parent company, it concludes that '[t]he net effect is that there will normally be a commonality of interest between a parent and a subsidiary in relation to the latter's compliance with the law'[157].

This analysis fundamentally misses the point. After all, the argument is not that managers of the RFB would blatantly flaunt ring-fencing rules, but rather that where the rules are incomplete or indeterminate – therefore granting RFB managers a degree of discretion, particularly given the asymmetric information vis-à-vis the PRA and FCA – they may act in ways that undermine the ring-fencing objectives. The Skeoch Review concludes by re-emphasising that 'RFBs are not expected to be independent in all respect. RFBs are expected to comply with parent instructions, except where those instructions have the potential to lead to a breach of the ring-fencing rules.'[158]. In that

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[155] Skeoch Review para 5.51.

[156] Skeoch Review para 5.51.

[157] Skeoch Review C.13 (it concludes: 'Where there is [no such commonality of interest], there is likely to be significant pressure to resolve the situation amicably in order to avoid negative publicity and regulatory scrutiny of both the board of the RFB and the parent.').

[158] Skeoch Review para 5.54.

sense, the UK Government's basic position remains unchanged and the problem discussed in this Chapter remains unaddressed.

CONCLUSION

Alan Page wrote in 1991 that the advent of large corporate groups required few, if any, fundamental changes to company law. Instead, he predicted that the greatest challenges presented by groups would be in the field of financial regulation.[1] A quarter century later, the global systemically important banks ('G-SIBs') that have come to dominate modern finance consist of thousands of subsidiaries that are connected through a complex and opaque web of explicit and tacit relationships. Their intrafirm structures generate prudential risks which, so far, have been widely acknowledged but only little understood. Research so far has, instead, focused on indeterminate notions of corporate 'complexity' to characterise these risks, and policy has resorted to siloed approaches apparently without a cohesive framework to describe the relationship between intrafirm structure and prudential risk.

This thesis has articulated a framework for the analysis of intrafirm structures, applies that framework to G-SIBs to explore how intrafirm segmentation contributes to prudential risk, and explores the role of intrafirm governance to the success of regulatory intrafirm segmentation policies. As outlined in **Chapter 1**, the objective of this thesis has not been to provide a complete account of the prudential regulation of G-SIBs and their corporate structure, nor to suggest detailed policy solutions to the problems their intrafirm structures generate. Instead, the goal is more modest: to

[1] Alan Page, 'The State and Corporate Groups in the United Kingdom' in Clive M Schmitthoff and Frank Wooldridge (eds), *Groups of Companies* (Sweet & Maxwell 1991) 111, 120-121. This example is cited in Charles HR Morris, *The Law of Financial Services Groups* (Oxford University Press 2019) para 1.001.

advance our understanding of the relationship between a G-SIB's *intrafirm structure* and its *prudential risk* profile, and to articulate a set of conceptual contributions that policymakers can draw upon in their design of prudential regulatory policy. This short chapter summarises the key contributions of this thesis.

I. THE THESIS FINDINGS

A. An Analytical Framework to Study the Intrafirm Structure of G-SIBs

A first contribution of the thesis is its articulation of a framework for a more analytically comprehensive and rigorous study of intrafirm structure in the context of G-SIBs. Inevitably, this framework is not complete, nor does it purport to be – it would take more than one thesis to develop it. The thesis has, however, laid the groundwork for novel analyses that are pertinent to prudential policy.

This thesis has outlined why a rigorous and analytically comprehensive conceptualisation of intrafirm structure in the context of G-SIBs would be valuable. Risk-taking by banks that are deemed 'too big to fail' is under-priced, which amounts to an 'implicit subsidy' conferred by the expectation of a bailout. The bank's shareholders and managers benefit from maximising the expected value of this implicit subsidy and therefore are incentivised to entrench their 'too big to fail' status (or to become 'too big to fail' to begin with). Amongst other things, this leads to more elaborate intrafirm structures that complicate orderly resolution. The role that intrafirm structure plays in rendering a bank (systemically) risky and prudentially important is intuitively clear but analytically fuzzy. Regulatory practice conflates the prudential

relevance of intrafirm structure with a bank's 'complexity', but measures of complexity do not normally relate to intrafirm structure. Economists, too, refer to the 'legal fiction' created by the legal construction of firms. If nothing else, such references to 'legal fiction' highlight the degree to which the legal and economic structures of firms may be disjointed – an observation that provides a hint about the source of prudential risks associated with intrafirm structures.

The thesis' discussion of the origins of 'complex' G-SIB intrafirm structures has provided more insight into the economic functions that the use of multiple legal entities within an economically integrated firm can play, and why these functions are likely particularly attractive to banks.[2] Some of these functions may, however, be privately beneficial but socially harmful. That wedge is also particularly pronounced in the context of banks, especially once these banks become 'too big to fail'. It is therefore unsurprising that, where this wedge becomes pertinent to the point of posing a threat to financial stability, regulators have sought to intervene in the intrafirm structures of banks using a menu of policy tools. These policy tools suffer, however, from the lack of analytical coherence around what the relationship between intrafirm structure and prudential risks looks like. Moreover, because these various regulatory tools operate in a siloed fashion, they may end up at cross purposes, for example when structural regulation complicates single-point-of-entry resolution. These two challenges are illustrative of the need for a more holistic, comprehensive, and analytically rigorous view of intrafirm structure and its relationship to prudential policy.

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[2] See **Chapter 1**.

The thesis has laid the analytical foundation for such a conception of intrafirm structure. A fundamental question is how to characterise a G-SIB's intrafirm structure to begin with. Our review of conventional quantitative and qualitative approaches that are commonly deployed in the academic literature and by policymakers suggests that such answers remain relatively superficial.[3] Quantitative approaches focus, again, on the notion of 'complexity', but do so with limited substantive reference to intrafirm structure. Qualitative approaches shed light on salient dimensions of intrafirm structure, but do not produce a coherent analytical framework. Against that backdrop, an important analytical contribution of the thesis is to articulate how G-SIBs' intrafirm structures can be helpfully characterised using network theory.[4] This methodology, which is already widely used to study the *inter*firm structure of the financial system, can describe *intra*firm structures in ways that are both qualitatively rich and amenable to quantitative analysis. To illustrate how this might work, the thesis has provided stylised but empirically-grounded network representations of US G-SIBs. It also outlines how such representations have been, and could be, analysed through a prudential lens by drawing on the extensive toolkit network theory provides.

The representation of firms as networks raises the question of which relationships should be considered *intra*firm rather than *inter*firm and how that perimeter is drawn. The thesis has set out how this is done in practice, by discussing the various

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[3] See **Chapter 2**.

[4] See **Chapter 2**.

vertical and horizontal relationships that regulators can consider as *intra*firm. A firm's perimeter is highly contextual, informed by the functional objective adopted in attempts to locate it. For the purposes of this thesis, and for the study of intrafirm structures through a prudential lens more generally, the appropriate approach is to define the firm's 'prudential perimeter'. This notion, which focuses on the nature of economic relationships between entities and their impact on the firm's risk-profile as opposed to a narrower focus on the nature of legal relationships, is conceptually closely related to the regulatory concept of 'consolidation groups'. A distinction is that consolidation groups are, in practice, delineated with a view to jurisdictional boundaries and boundaries of agency authority (the prudential perimeter is not affected by such considerations). Moreover, where consolidation groups may at times be conservatively operationalised due to concerns about regulatory overreach, the delineation of the prudential perimeter should be expansive and, where edge cases inevitably arise, err on the side of being over-inclusive.[5]

B. Sources and Prudential Implications of Intrafirm Segmentation

The second main contribution of the thesis is to outline the sources and prudential implications of G-SIBs' intrafirm segmentation and to show how a network-based

[5] In other words: the distinction between the prudential perimeter and the consolidation group is not primarily analytical in nature. In fact, the two concepts share the same logic. The distinction is informed by the fact that consolidation groups are creatures of regulatory constraints that strongly inform how these groups are defined in practice, whereas the prudential perimeter is a purely analytical concept that can be defined, at least in the first instance, without regard to such constraints.

conception of intrafirm structure can be used to study this phenomenon and inform prudential policy.

The core observation informing the analysis in this part of the thesis is that banks, despite commonly being analysed and regulated as if they are monolithic institutions that engage in full asset pooling, are economically segmented along legal entity lines. The economic concept of segmentation is closely related to the legal concept of asset partitioning in corporate law theory. Intrafirm segmentation is, however, about the economic result and thus encompasses a broader array of segmentation sources than corporate law alone. Such segmentation can be voluntary or involuntary in nature and it is frequently state-contingent.[6] Financial regulation is itself an important source of involuntary segmentation. Financial regulatory segmentation is often introduced in response to a (perceived) wedge between privately and socially optimal intrafirm structures. Different segmentation regimes interact and, at times, conflict.

Building on this analysis of legal sources of intrafirm segmentation and their interaction, the thesis has outlined how various segmentation measures among legal entities in a firm combine to form segmentation patterns.[7] Every pair of legal entities has a segmentation relationship that can be characterised, roughly speaking, on a scale from full segmentation to full integration (full de-segmentation). Starting, for purposes

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[6] See **Chapter 3**.

[7] See **Chapter 3**.

of exposition, from a baseline of full segmentation, entities can take various actions that lead to de-segmentation, such as the provision of intrafirm guarantees between them. Such de-segmentation measures can be partial of full, symmetric or asymmetric, and explicit or tacit. Frequently, they are also state-contingent (potentially on different states). The pairwise segmentation relationships within a firm can be combined to characterise that firm's intrafirm segmentation pattern.[8] A representation of the firm rooted in network theory can be used to study such patterns. Specifically, the segmentation adjacency matrix, which indicates for each pair of entities whether they are segmented or not. On this basis, patterns of segmentation within a firm can be characterised. These patterns, in turn, shed light on various prudentially relevant properties of intrafirm structure, such as the direction of intrafirm exposures. A more analytically rich version of the segmentation adjacency matrix also accounts for the nature of the segmentation relationship between two entities by weighting them to indicate the degree of segmentation. This produces the segmentation-weighted adjacency matrix, which could be the basis for an intrafirm stress test that studies how financial shocks might propagate within the firm.

The aim in this thesis has not been to present a fully operationalised version of the segmentation-weighted adjacency matrix and its potential use in stress tests, but rather to illustrate how that might be done. To that end, the thesis has highlighted some of the challenges that modellers will inevitably encounter and has suggested how these challenges might fruitfully be tackled. As with any model, however, it is unavoidable

[8] See **Chapter 3**.

that salient features of reality will not be captured. This model should, therefore, be treated with intellectual humility and be used to complement, rather than to substitute for, the qualitative analyses that are currently carried out. The contention, however, is that the perfect should not be the enemy of the good: regulators are, as illustrated throughout the thesis, grappling with the prudential implications of intrafirm structure without a cogent approach to studying the issue. The network-based approach proposed in this thesis, however imperfect and subject to qualifiers, might, if developed further, offer a scalable and analytically rigorous approach that can offer complementary insights to more conventional approaches.

The thesis has discussed two types of risks that relate to intrafirm segmentation, thereby suggesting various contexts where a network-based analysis of intrafirm segmentation patterns might prove valuable.[9] The first risk, referred to as misallocation risk, arises when banks' shock absorbing capital or liquidity, because of intrafirm segmentation, is inaccessible to the legal entity experiencing the shock. Various studies suggest that segmentation, through this channel, has the potential to increase (or at least alter) a bank's risk-profile. If so, it should affect the level and location of capital, liquidity, and TLAC/MREL. For the purposes of this thesis, the point is not that risks *necessarily* go up as a result of segmentation, but rather that they *plausibly* go up and that, in any case, the risk profile of banks is likely affected by segmentation. That alone is sufficient ground to investigate the issue further. Such an investigation can be conducted using the network-based methods that this thesis has proposed.

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[9] See **Chapter 4**.

The second segmentation-related risk this thesis has discussed is that presented by segmentation shifts. A segmentation shift involves a sudden, (mostly) unanticipated, and large-scale change to intrafirm segmentation patterns. Such a shift may disrupt the operation of a bank, for example when it relies on liquidity flows throughout the firm that are suddenly discontinued. The impact of such segmentation shifts can be studied using the network-based methods introduced in this thesis. Just as important, however, is to understand under what conditions segmentation shifts are likely to take place. That understanding can, in turn, inform the design of intrafirm structures to minimise the risk that a segmentation shift takes place. Coming up with such designs requires a holistic understanding of the interaction between various policies that affect intrafirm structure, notably resolution strategies, structural regulation, and capital and liquidity frameworks. Drawing on these insights, the thesis has sketched out various implications for policymakers and research.

C. Intrafirm Governance as a Segmentation Tool

Regulators have an extensive toolkit at their disposal to alter banks' intrafirm structures. The third main contribution of this thesis is to examine how intrafirm governance affects the efficacy of one of these tools, structural regulation, by evaluating the case study of the UK ring-fencing regime.

The thesis has outlined how the UK ring-fencing regime attempts to create a ring-fenced body (RFB) that is part of but, from a risk perspective insulated from, the

rest of the banking group. The ring-fence that is meant to achieve this objective must therefore strike a balance between, on the one hand, allowing integration with the rest of the banking group on the one hand and, on the other hand, being robust against undue risk-transfers to the RFB. Such a semi-permeable ring-fence relies on detailed rules that are inevitably indeterminate and incomplete. Given the gaps in the rules, the efficacy of ring-fencing thus relies on the gap-filling mechanisms that incentivise managers and directors to exercise their residual discretion in line with the ring-fencing objectives.

Against that backdrop, the thesis has argued that the role of ring-fence governance in achieving this aim is particularly critical.[10] It describes how ring-fence governance has been implemented in the UK through a combination of rules and regulatory powers, and argues that there is a tension between conventional corporate governance and ring-fence governance. Whereas conventional corporate governance in the UK is designed to ensure the loyalty of the entity's management to its shareholders, which translates to strong accountability of RFB managers to the rest of the banking group, ring-fence governance is designed to safeguard the interests of the RFB especially when those conflict with the interests of the banking group as a whole. At a high level of abstraction, a doctrinal clash between these two orientations can be avoided. There might indeed not be a clash at all, given that general corporate law duties cannot override the ring-fence obligations. The problem lies rather with the indeterminacy of the ring-fence obligations, coupled with the directorial and managerial incentives generated by

[10] See **Chapter 5**.

the general corporate law duties. Whenever rules afford discretion in an area where the interests of RFBs might diverge from those of the larger banking group, that tension will take centre stage, creating the risk that discretion is exercised in ways that undermine the ring-fence objectives.

The key question is therefore whether UK ring-fence governance manages to overcome that tension with conventional governance. In other words, what is the efficacy of governance as an intrafirm segmentation method? In line with the ring-fencing objectives, the test of ring-fence governance is whether it can implement a 'selective entity orientation' for managers of the RFB. That is, in some states of the world it should ensure that the ring-fence is permeable so that the banking firm can benefit from economies of scale and scope across the group. In others, it needs to ensure that the ring-fence rigorously segments the bank, so that risks elsewhere in the group do not negatively affect the RFB. Finally, ring-fence governance needs to ensure that the right mode of governance is relied upon in the right state of the world – so there should be a well-functioning 'switching regime'.

The thesis has concluded that, as it stands, ring-fence governance does not credibly guarantee that directors will 'switch regimes' and that, even if they were likely to do so, there are substantial reasons for concern about them exercising their discretion independently in line with ring-fencing objectives.[11] The thesis has proposed several tweaks to ring-fence governance that might enhance its efficacy and suggests that the

[11] See **Chapter 6**.

vigilance of the Prudential Regulation Authority ('PRA') and the Financial Conduct Authority ('FCA') in their enforcement of the ring-fencing regime, and in particular of the relevant parts of the Senior Managers Regime ('SMR'), will be critical.

The takeaway from this analysis comes in two forms. To start with, it is a reflection on the efficacy of intrafirm governance as part of the UK ring-fencing regime. The analysis developed in this thesis, which appeared in the published version of these chapters[12], was not shared by the Skeoch Review – an independent review of the UK's ring-fencing regime carried out at the request of the UK government in 2021-2022. As discussed, the Skeoch Review fundamentally missed the point around the importance of incompleteness and indeterminacy of ring-fence rules by suggesting that any tension might be resolved because RFB managers should not act in contravention of ring-fence rules. The problems with ring-fence governance as unveiled by this thesis are therefore likely left unresolved.

The analysis relating to UK ring-fence governance has broader relevance, however, because it sheds light on the challenges of designing and implementing semi-permeable segmentation within G-SIBs. The findings may, therefore, be relevant in two contexts. First, when regulators design policies with the intention of altering intrafirm structures generally and intrafirm segmentation patterns specifically, they should be mindful of the practical limitations that will inevitably arise in calibrating their policies. This may caution against a dependence on conceptually elegant and sophisticated policy

[12] Thom Wetzer, 'In Two Minds: The Governance of Ring-Fenced Banks' (2019) 19 Journal of Corporate Law Studies 179.

designs that rely on careful calibration, as exemplified by the UK ring-fencing regime. Second, when regulators assess the degree to which entities in a firm are segmented, as the network-based approach as reflected in the segmentation-weighted adjacency matrix developed in this thesis requires, they should be mindful of the incentives of the parties and the degree to which those, rather than the letter of contracts and rules, ultimately are determinative to segmentation outcomes.

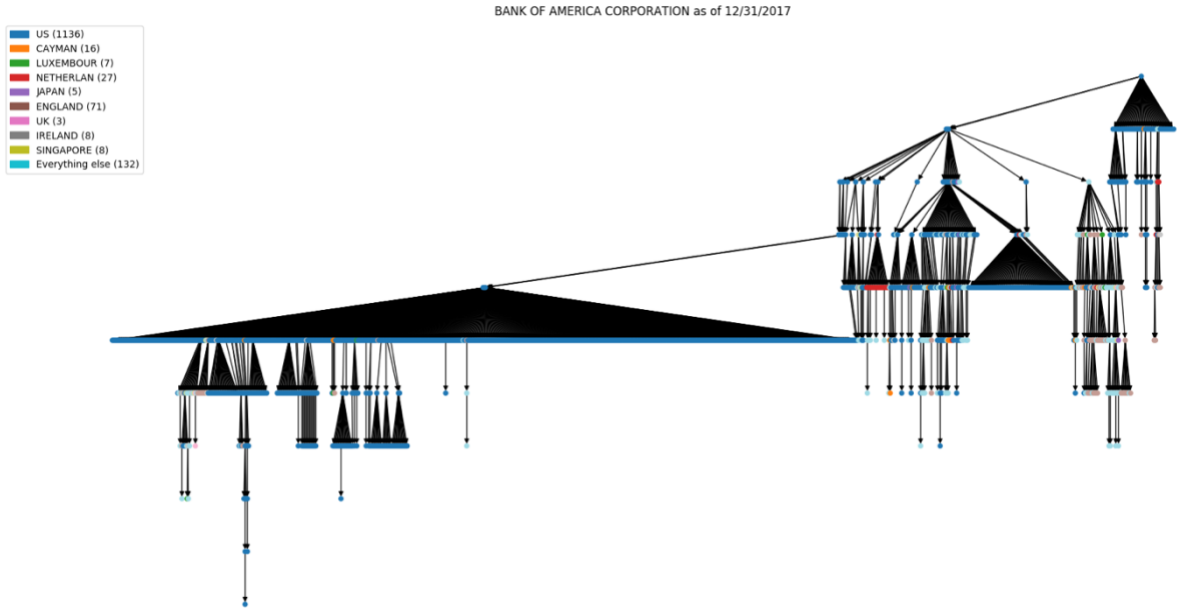
II. CONCLUDING THOUGHTS

The risks facing G-SIBs cannot be understood if divorced from a proper understanding of intrafirm structures. In turn, understanding G-SIBs' intrafirm structures and their prudential implications requires much more than 'complexity' metrics or counting the number of a G-SIB's subsidiaries. Equally, effective policy to alter these structures with a view to limiting the social harm they impose needs to be informed by a more cohesive and rigorous conception of what intrafirm structure is and why it is prudentially relevant. This point may appear trite, but despite extensive policy interventions in G-SIBs' intrafirm structures such a larger framework appears to be missing. This thesis has proposed a novel and more holistic way to conceive of some, but by no means all, key issues in this space. Its findings can be developed further and could be generalised to other types of financial institutions. After all, the relationship between intrafirm structure and prudential policy is relevant beyond banks.

APPENDIX I

This Appendix contains the intrafirm network graphs of US-based G-SIBs on 31 December 2017, as discussed in **Chapter 2**. In these network graphs, nodes represent legal entities, and the edges controlling equity relationships. For each G-SIB, there are two network graphs: in the first, the colour of the nodes refers to the jurisdiction in which the entity is incorporated, and in the second the colour of the nodes refers to the type of activity the legal entity is (primarily) engaged in. The empirical exercise relies on publicly available data reported by US Bank Holding Companies in form FR Y-6 ('Annual Report of Bank Holding Companies').

Figure A1: Intrafirm network graph of Bank of America as reported on 31 December 2017.



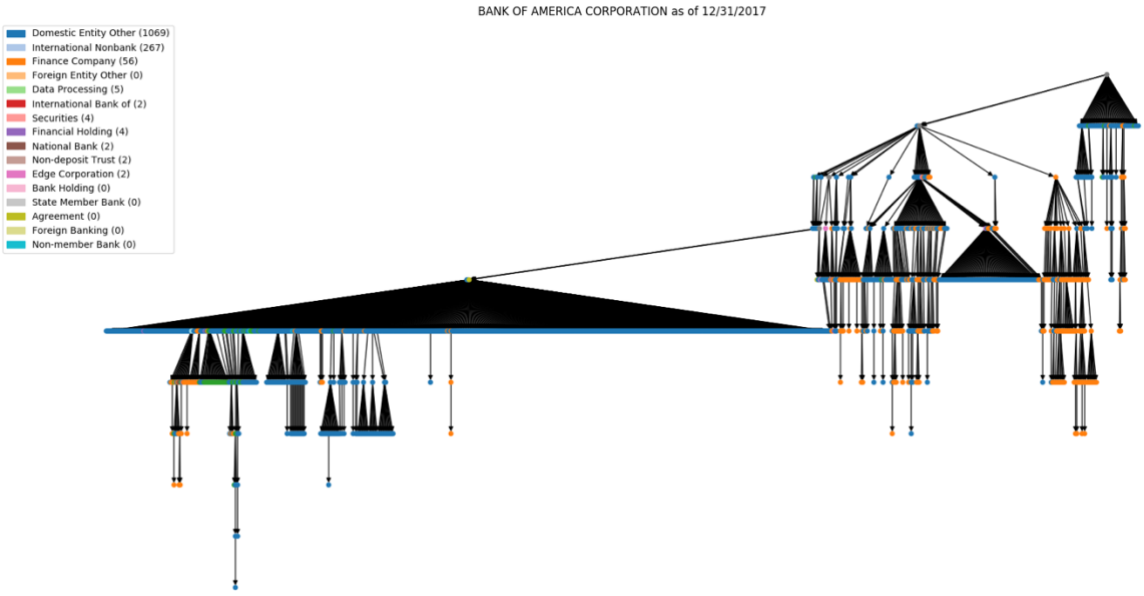
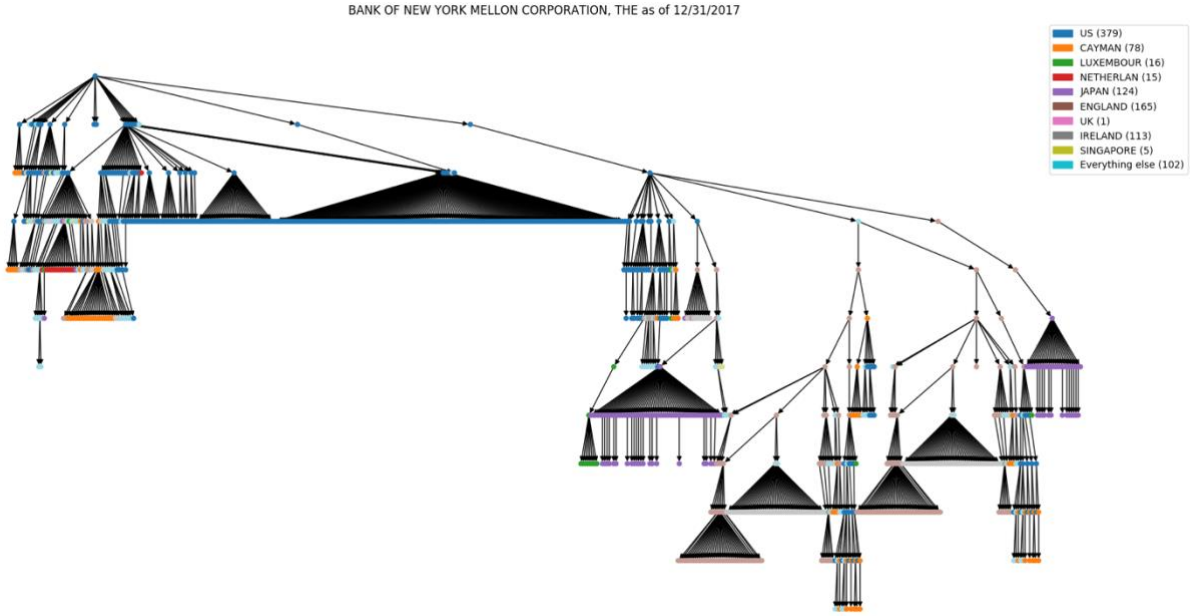


Figure A2: Intrafirm network graph of Bank of NY Mellon as reported on 31 December 2017.



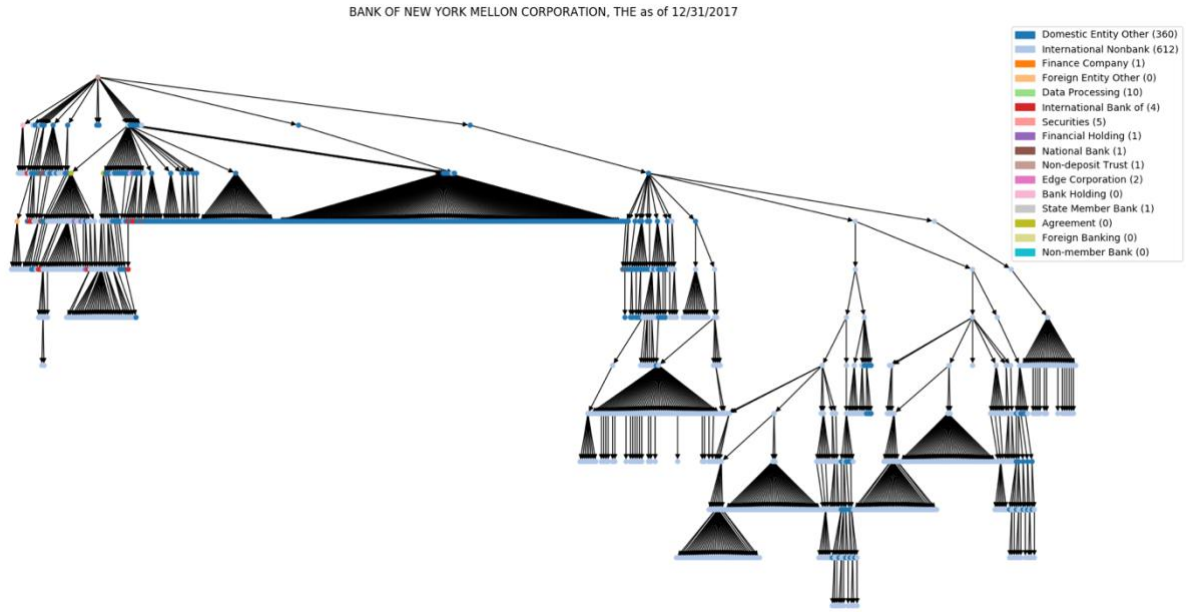


Figure A3: Intrafirm network graph of Citigroup as reported on 31 December 2017.

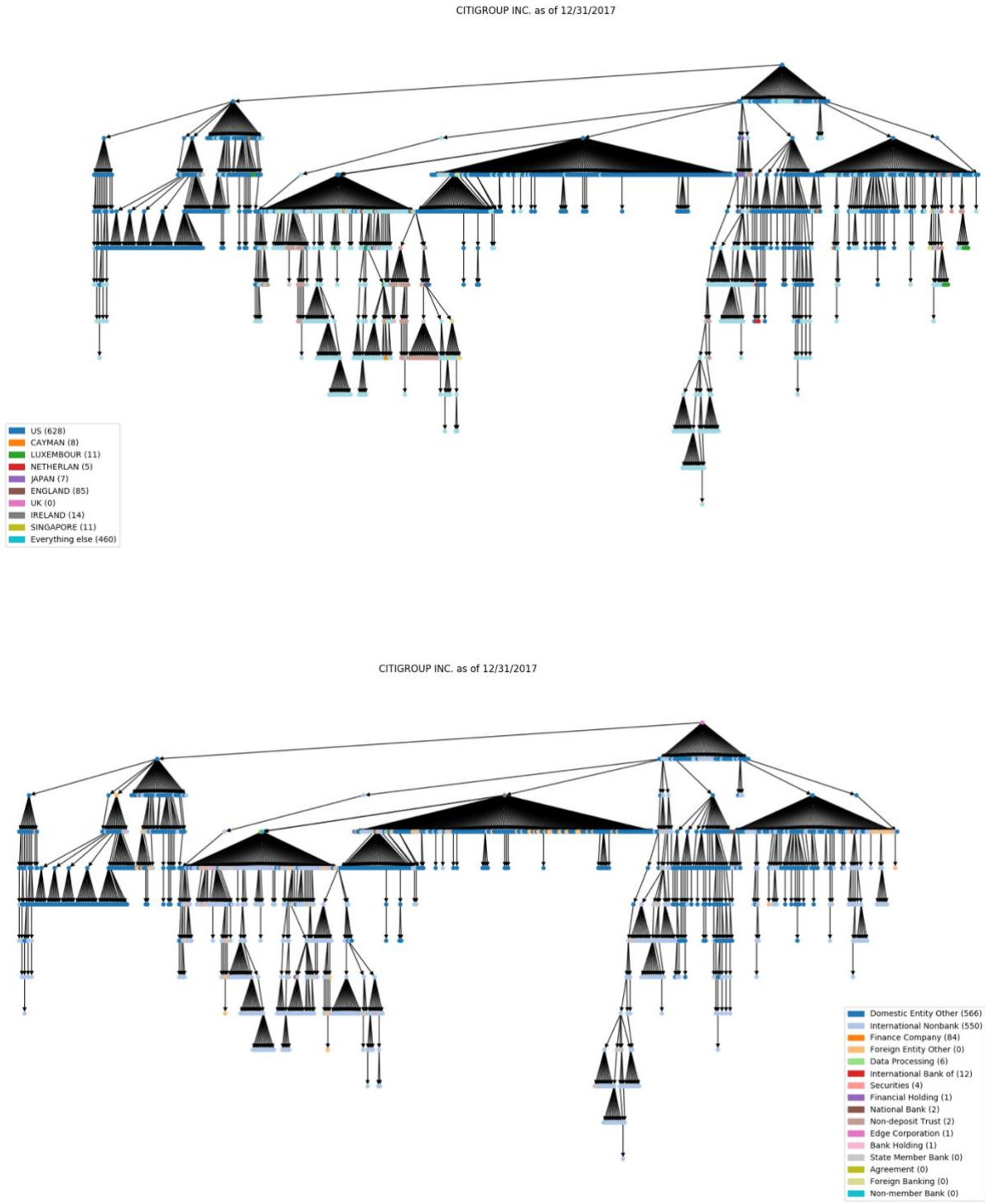
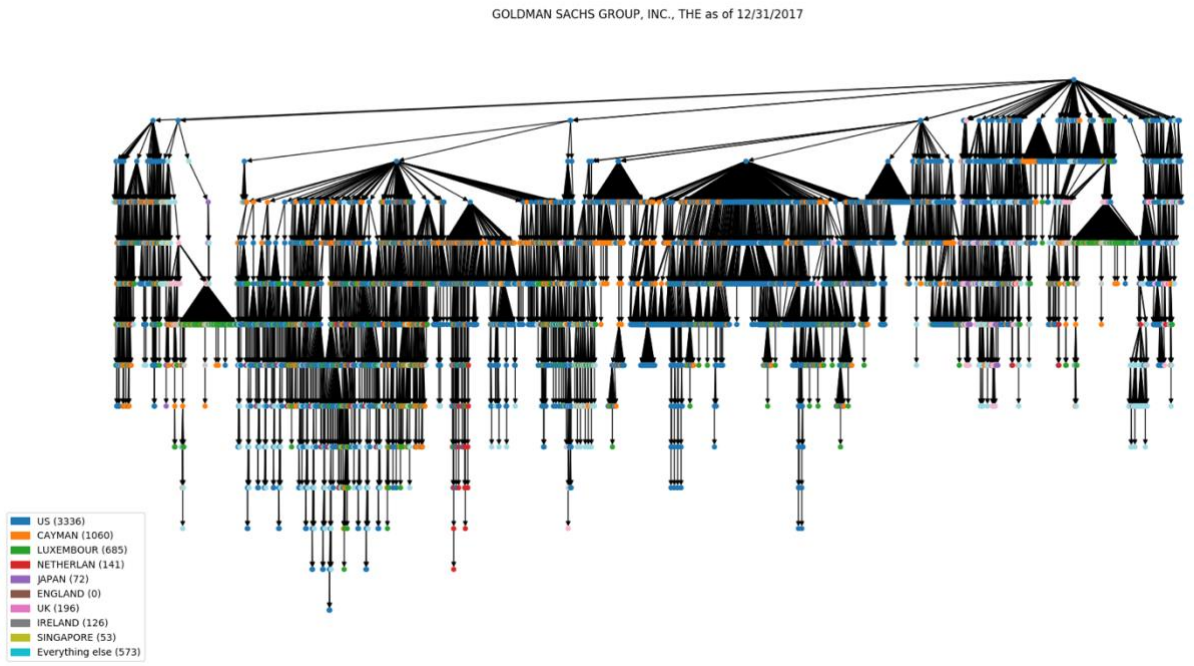


Figure A4: Intrafirm network graph of Goldman Sachs as reported on 31 December 2017.



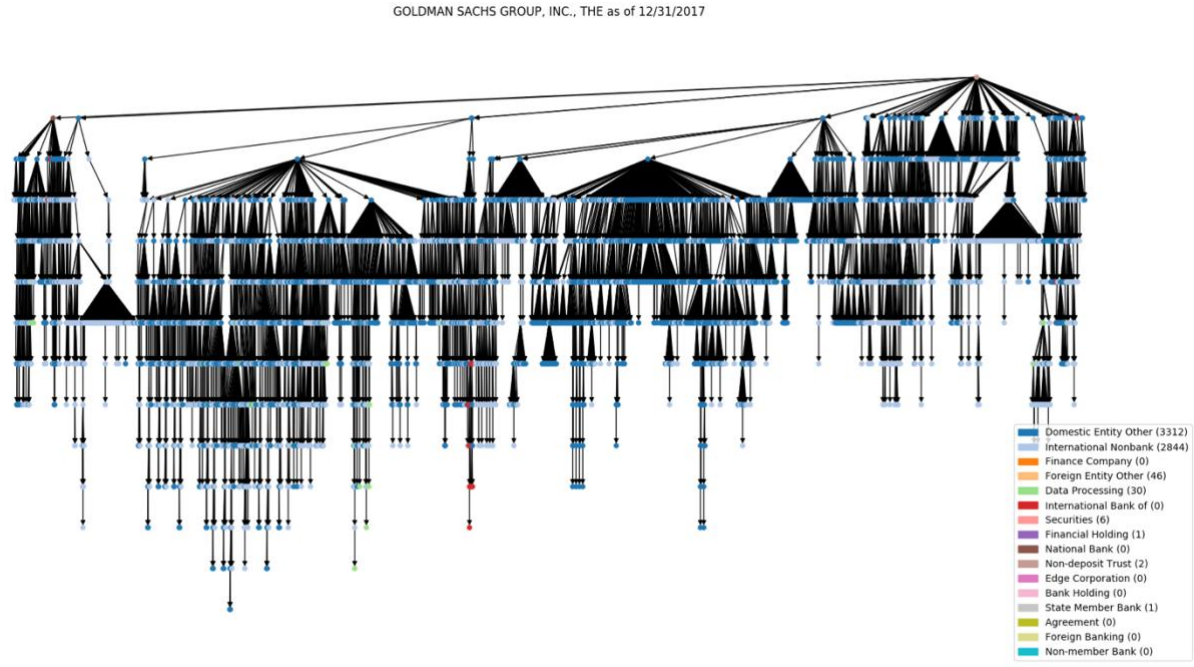


Figure A5: Intrafirm network graph of JPMorgan as reported on 31 December 2017.

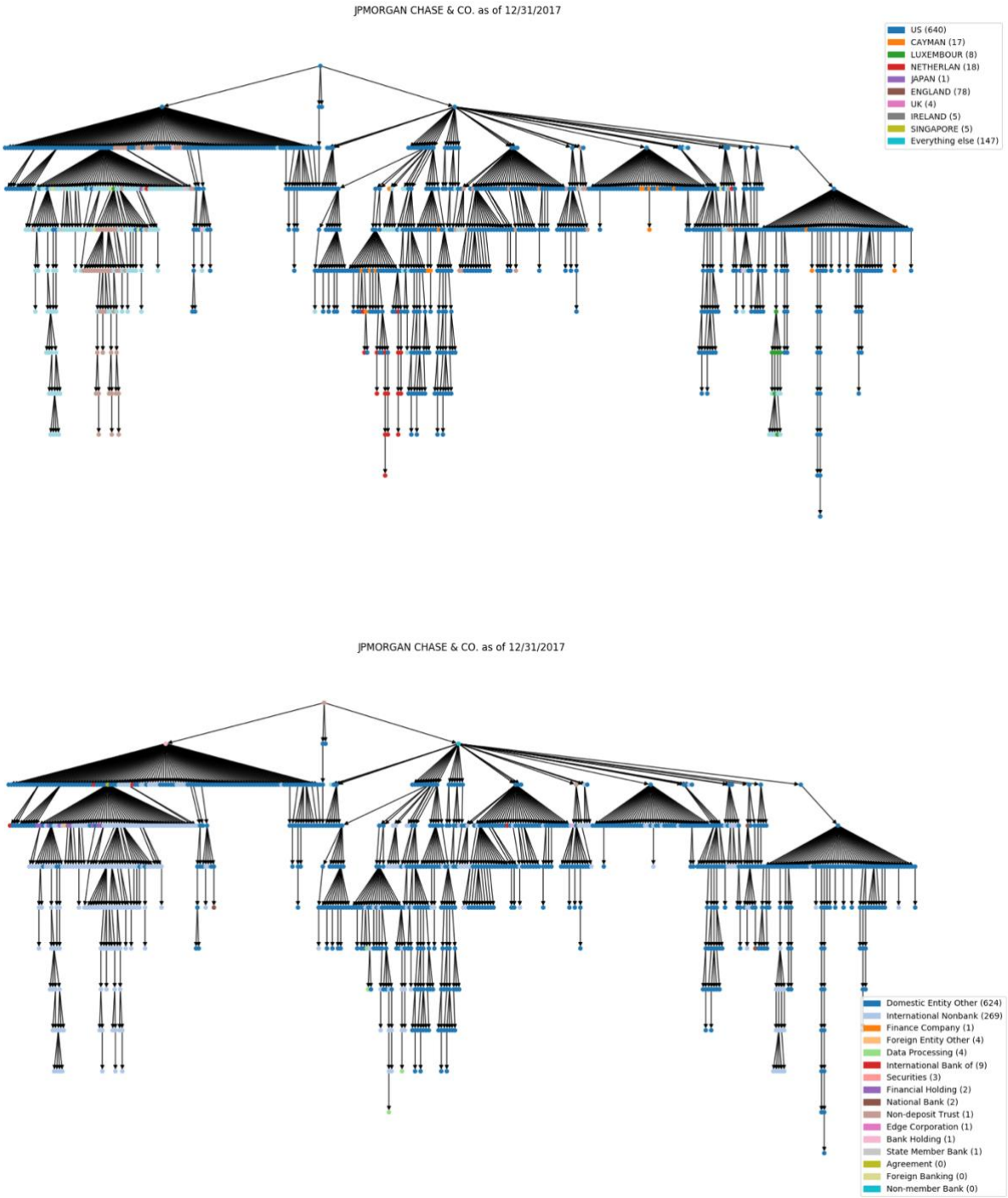
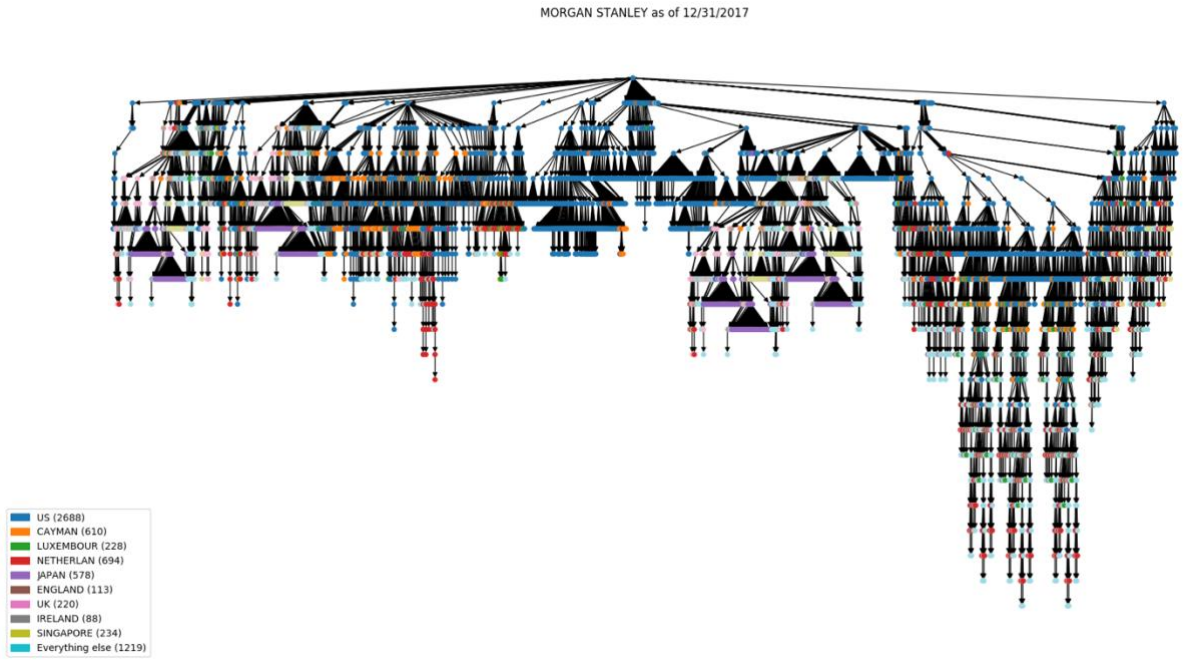


Figure A6: Intrafirm network graph of Morgan Stanley as reported on 31 December 2017.



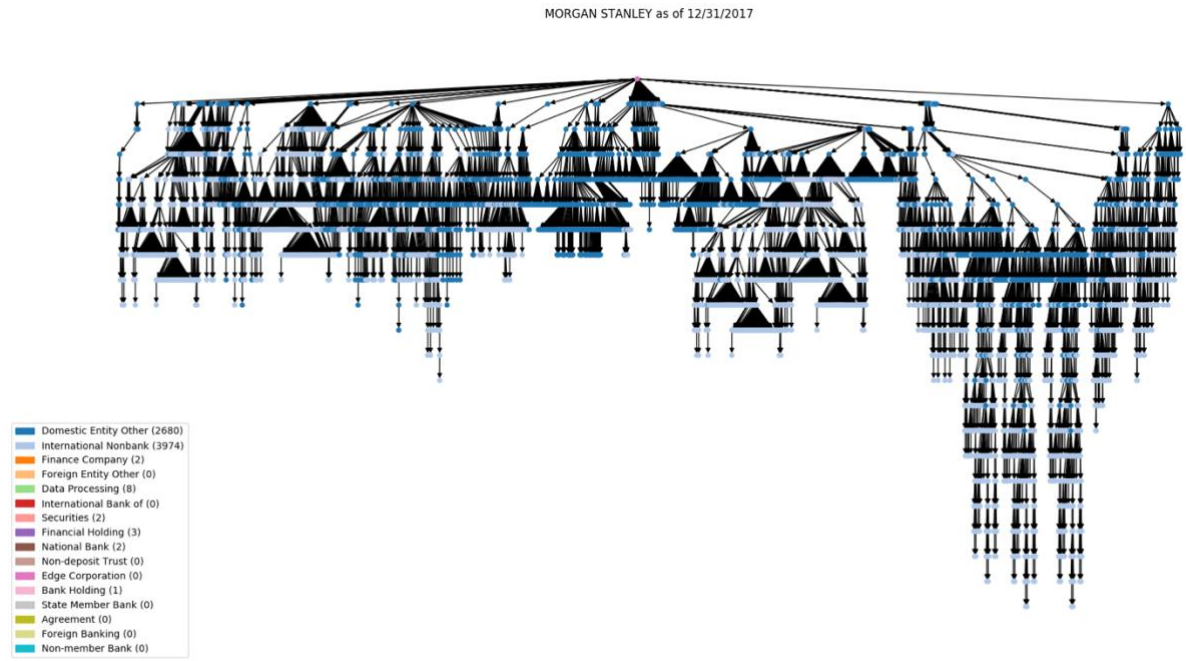


Figure A7: Intrafirm network graph of State Street as reported on 31 December 2017.

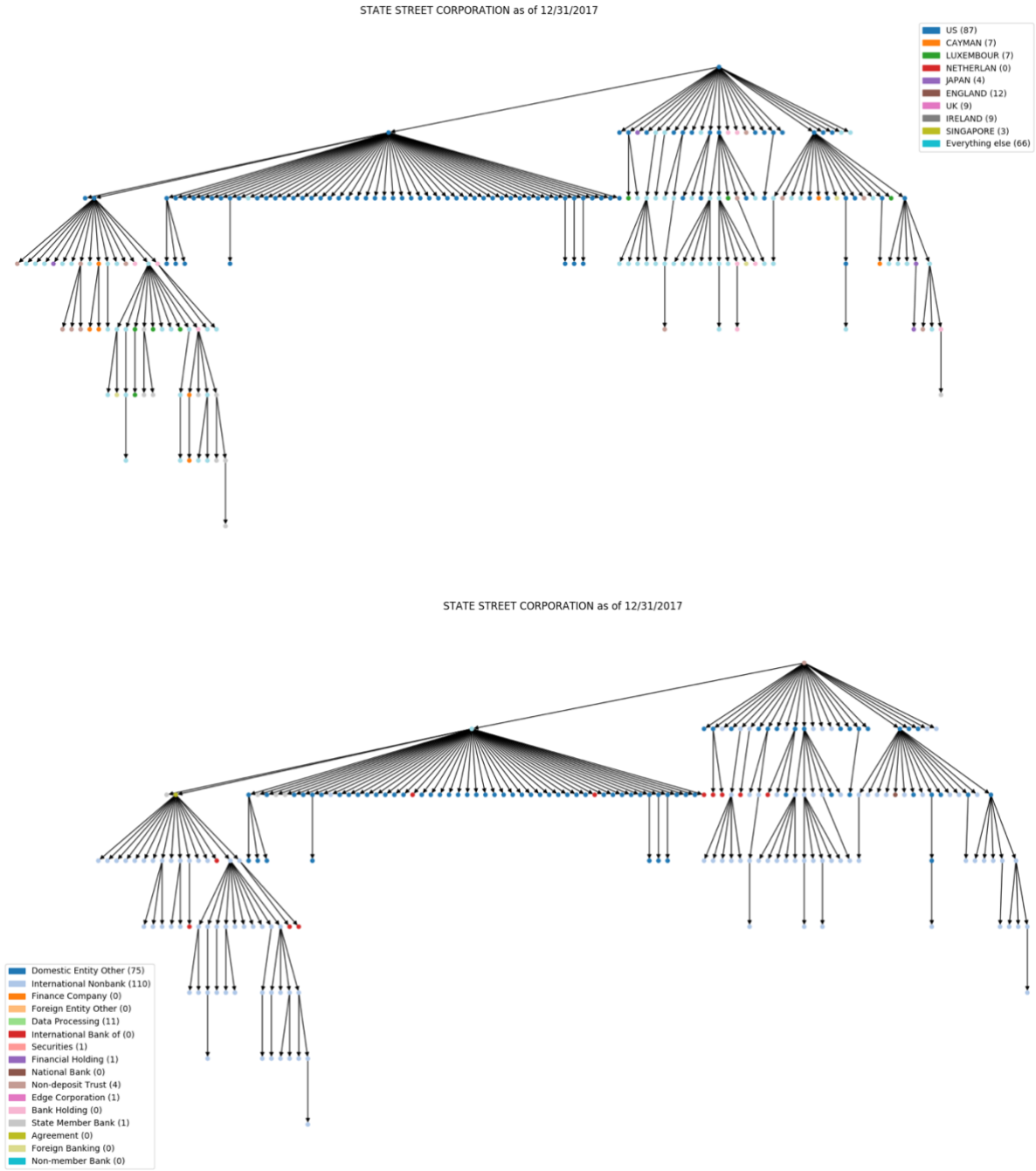
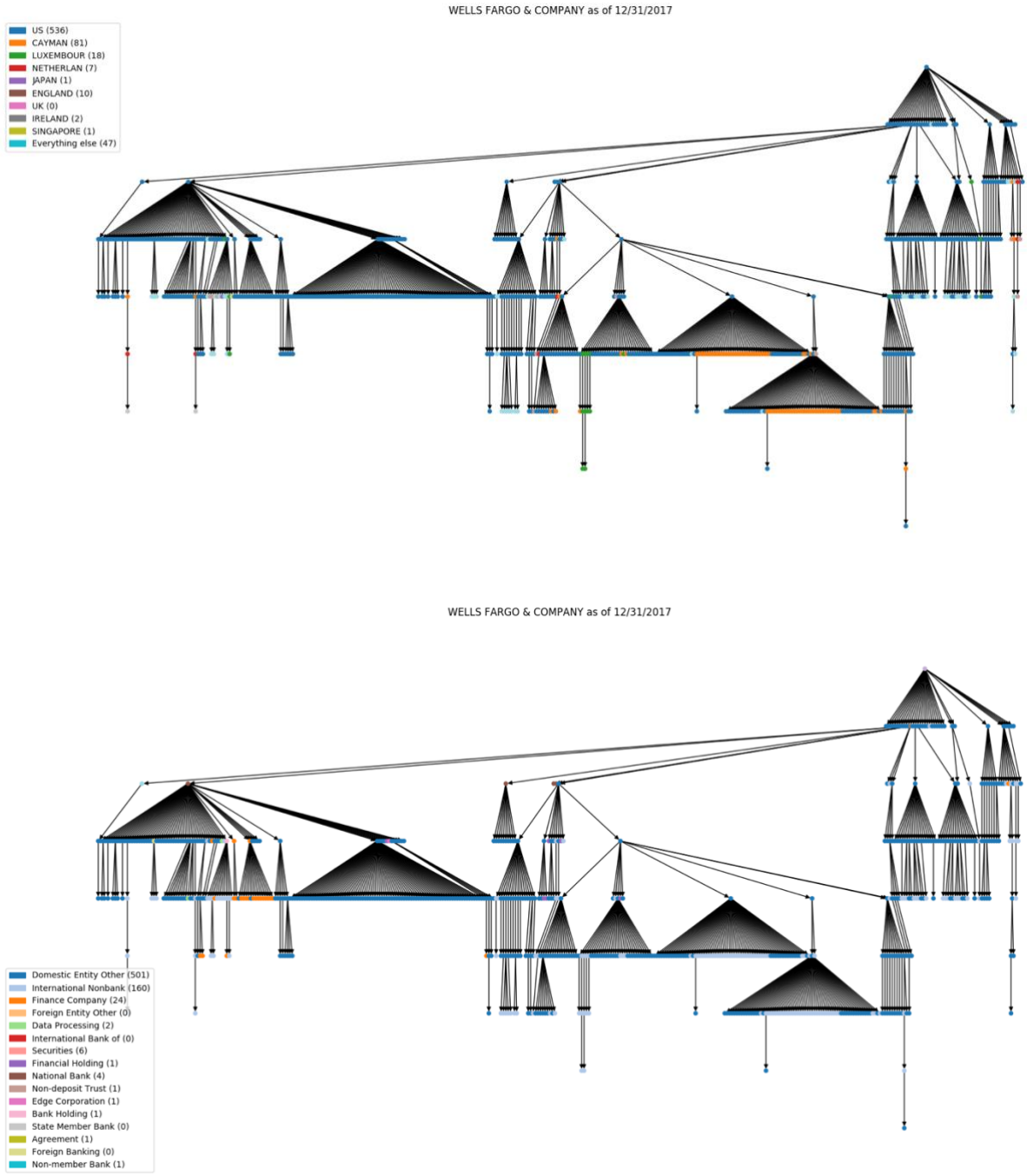


Figure A8: Intrafirm network graph of Wells Fargo as reported on 31 December 2017.



The same data can be used to create intrafirm adjacency matrices of the type described in **Chapter 3**. However, based on this data these matrices can only be sparsely filled because the dataset only reports on controlling equity relations between entities. Especially for larger banks, this makes it nearly impossible to say anything meaningful based on the intrafirm adjacency matrix, even when it is expressed as an adjacency matrix heatmap, see **figure A9**. That is why no further results on intrafirm adjacency matrices are included in this Appendix or, indeed, in this thesis.

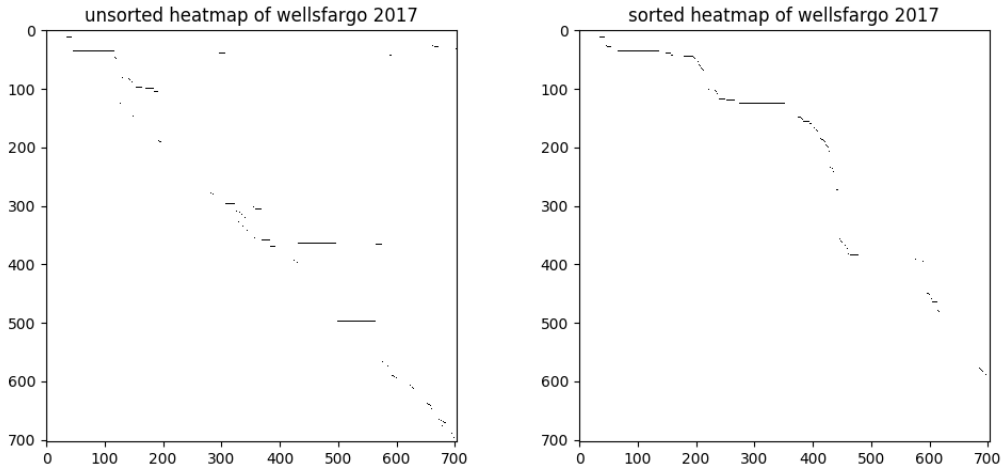


Figure A9: Heatmaps of the adjacency matrix of Wells Fargo. The relationships captured by this adjacency matrix represent controlling equity stakes. The left panel is unsorted, and the right panel is sorted.

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