

# HOW TO USE MOMENTUM ANALYSIS TO EXPLAIN AND FORECAST THE OUTCOME OF INTERNATIONAL NEGOTIATIONS?

**Abstract:** Drawing on the literature of market technical analysis, the article introduces an original framework and methodology for explaining and forecasting the outcome of international negotiations based on two concepts: the relative strength negotiation index (RSNI) and the negotiation contextual conduciveness index (NCCI). By comparing the levels of interest of the parties in the negotiations, RSNI serves as a powerful indicator of the direction and intensity of the momentum accompanying international negotiations. The greater/lesser the force with which negotiations take place (e.g., strong/weak momentum), the higher/lower the probability of breakthroughs. NCCI, on the other hand, helps explain why certain potential breakthroughs may fail to materialize. Each time negotiations take place within a negative context, breakthroughs are likely to fail. By contrast, a positive context aligned with a strong negotiation momentum creates a powerful combination in support of successful breakthroughs. These insights are being tested empirically in the case of climate change negotiations in two steps: first, by back-testing the viability of the model for explaining the outcomes of past climate meetings and second, by forecasting the likelihood of a breakthrough to be achieved in the next rounds of climate talks.

## **I. INTRODUCTION**

Commenting on the progress of negotiations of the North Atlantic Pact (NATO) in June 1949, the U.S. Secretary of State, Dean Acheson, astutely pointed out “there is no such thing as standing still in this operation. You either move forward, or you move back” (Associated Press 1949). What Acheson had in mind was that United States (U.S.) and its European allies had reached by then a critical moment in their diplomatic struggle with the Soviet Union “for the soul of Europe”, which could have been lost had the Soviets been allowed to regain the diplomatic initiative (McMahon 2009: 91). Acheson’s insight proved accurate as only a few days later, following treaty ratification by the U.S. Congress, NATO was born, an institution which played a key role in keeping the Soviet Union out of Western Europe for the entire duration of the Cold War. Acheson was, of course, not the only foreign policy maker to notice the value of the diplomatic momentum in international negotiations. Henry Kissinger also credited the dramatic shift in Sino-American relations to the momentum triggered by the historic visit of President Nixon to China in 1972 (Kissinger, 1994: 729). More recently, the importance of the diplomatic momentum has been highlighted in the context of trade negotiations (Ismail 2011), nuclear disarmament talks (Hague 2013), global anti-poverty initiatives (United Nations 2013), or climate negotiations (Huettnner et al. 2010).

Despite the professed relevance of the concept for international negotiations, little agreement exists among diplomatic scholars and practitioners about what diplomatic momentum actually means, why it happens, when, and under what conditions is it more likely to generate successful outcomes. Acheson’s remark about “you either moving forward, or you move back” does capture an important aspect of the concept, the idea of drive, purpose, and fast changing expectations, but better analytical precision is obviously required. By advancing an original theory of how the diplomatic momentum shapes negotiation outcomes, this paper promises to make three important contributions to the field of

international negotiations in particular and of diplomatic studies more generally. First, it sheds light on a major point of contention among diplomatic scholars that is, whether the diplomatic momentum makes any difference in international negotiations. For some, momentum is critical for preventing both negotiators and their supporters from losing faith in the talks (Berridge 2010: 56), while for others, apart from the “illusion of momentum” nothing is actually being achieved (Gauhar 1983: 41). What is thus missing is a conceptual framework that would allow us to carefully unpack the dynamic of the negotiation process and specify the conditions under which parties may feel more determined to conclude their talks.

Second, the paper bridges an important analytical gap with respect to the structure of determinants that generates abrupt changes in negotiation patterns (i.e., breakthroughs). Only a few of studies have tried to make sense of this critical aspect of international negotiations, but thus far with ambiguous results (Watkins and Lundberg 1998 ; Druckman 2001). A theory of diplomatic momentum thus promises not only to capture the specific instances when parties may feel a sense of urgency about concluding their negotiations, but also to assess whether their increased interest in the process is sufficient to yield any tangible results and if not, why. Third, a clear understanding of how momentum in international negotiations builds up or falters has important practical implications for how diplomats can improve their bargaining position in multilateral conferences. Momentum formation is a rare occurrence during negotiations and therefore knowing how to properly recognize it and how to leverage its strength can give the parties at the table a decisive bargaining advantage. In practical terms, momentum analysis could let negotiators gauge the overall level of commitment of the other parties to the process and likely timeframe available for successfully concluding the negotiations.

As any new methodology, momentum analysis requires careful conceptual preparation. While a discussion of the core concepts will be pursued in detail in the next sections, it is also important to

spell out from the very beginning two tenets and one limitation of the proposed conceptual framework. The first tenet relates to the distinction between micro- and macro-level theorizing. The main purpose of this paper is not to develop a theory about the configuration of micro-level factors that might explain *why* momentum may develop in international negotiations, but to advance an analytical tool for capturing the macro-level negotiation pattern that may inform *when* momentum is more or less likely to occur and with *what* implications for the negotiation outcome. Micro- and macro-level theories do not exclude each other, but they have different purposes. As Wendt points out, micro-foundationalism is generally useful for explaining why one event happens rather than another, but it fails to take note of how that event may be the result of different micro-level combinations. In other words, an understanding of the micro factors does not replace an understanding of the macro mechanisms (Wendt 1999: 154). Identifying macro-level conditions to be used for forecasting momentum trends in a highly parsimonious manner is therefore an important theoretical contribution to the study of international negotiations, even in the absence of a discussion of the micro-level factors that might be responsible for such development.

Second, the analytical framework advanced in this paper does not aim to make predictions that is, to describe in a “crystal ball” fashion a specific negotiation outcome at a specific time in the future (e.g., climate negotiations will conclude with a legally binding agreement in December 2015). It instead seeks to create a forecast about a particular negotiation that is, to give a probabilistic estimate of how likely a negotiation outcome is about to happen if certain conditions are met (e.g., climate negotiation have a high/low probability to lead to a breakthrough in December 2015 if conditions A,B,C are met). Third, the model applies only to serial negotiations as opposed to one-off diplomatic meetings. In serial negotiations, diplomats do not start their talks from scratch every time they meet as their positions are being constrained by decisions taken in previous meetings. Each round of negotiation thus creates outcomes that change the level of expectations of the parties concerning the following rounds. As

explained further below, it is exactly this set of “small data” (i.e., data measuring the level of interest of the parties between successive rounds of negotiation) that provides the critical insight for capturing the diplomatic momentum.

Explaining and forecasting the outcome of serial negotiations therefore constitutes the broader research interest of this paper. More specifically, it asks *under what conditions the diplomatic momentum, understood as the process of sharply changing expectations of the negotiating parties about reaching an outcome, provides accurate explanations and forecasts of the outcome of serial negotiations?* It will be thus argued that the more intense the drive with which negotiations take place (strong momentum), the more likely that negotiations would lead to successful outcomes. By contrast, the slower the pace of negotiations (weak momentum), the more likely that negotiations would stay the course or collapse. To develop this argument, I travel outside the traditional literature on international negotiations and draw on a set of powerful techniques used by market analysts for forecasting the direction of stock/share prices. I then apply these techniques to the case of climate change negotiations in two steps: first, by empirically back-testing the viability of the model for explaining the outcomes of past climate meetings and second, by forecasting the likelihood of a breakthrough to be achieved in the next rounds of climate talks. The paper is structured in four parts. The first section reviews the analytical and methodological gaps in the momentum literature and explains how technical analysis can address them. Drawing on market trading studies, parts two and three introduce two key concepts for capturing the momentum of climate negotiations: the Relative Strength Negotiation index (RSNI) and the Negotiation Contextual Conduciveness Index (NCCI). The article concludes with a brief discussion of the broader contributions that momentum analysis can make to the theory and practice of international negotiations.



## **II. THEORIZING NEGOTIATION MOMENTUM**

The concept of momentum has been only marginally discussed in the negotiation literature and consequently, it remains poorly understood. Most commonly, the concept is being used descriptively and carries the meaning of an unexpected development in the negotiation process that raises expectations of a favorable outcome. Berridge, for instance, is keen to emphasize that diplomatic momentum is to a large extent an issue of expectation management. Parties need to keep faith that an outcome is within reach as absence of progress might demoralize both negotiators and their supporters (Berridge 2010: 56). In a similar fashion, momentum has been used to describe the expectations of the parties involved in the South African negotiations that ended the apartheid regime (Young 2007), of the various factions conducting the peace talks in Namibia, Lebanon and Afghanistan in 1970-80s (Gauhar 1983), of Armenia and Azerbaijan during the failed Russian mediation of the Nagorno-Karabakh dispute in 2011 (IISS 2011) or those of developing countries' during the Doha Round of trade negotiations (Ismail 2011). What these studies have in common is a descriptive interest in the notion of momentum. The concept is mainly invoked as a heuristic for calling attention to some important changes of circumstances in the negotiation process. What is clearly missing is an effort to place the concept of momentum at the center of the negotiation analysis. This would imply a more sustained examination of the conditions under which momentum takes shape and is being sustained during negotiations, as well as of the type of impact it may have on negotiation outcomes.

While no study has examined the concept of negotiation momentum in a systematic fashion thus far, a few authors have indirectly probed the analytical value of the concept by focusing on the process related conditions that might facilitate successful negotiation outcomes. Watkins and Lundberg argue, for instance, that key momentum-building processes include secret diplomacy and confidence-building measures as they help marginalize opponents to negotiations and build trust among parties (Watkins

and Lundberg 1998: 131-2). These measures are particularly useful in conflict related situations, especially those defined by protracted relations of enmity, as their resolution largely depends on creating an environment in which spoilers cannot undermine the prospective agreement. The scope of application of these measures significantly narrows when applied to international negotiations that rely on transparency and inclusiveness as key ingredients for their success. For example, the legitimacy of the outcome of climate negotiations would be fatally damaged, if negotiations would be conducted in secret among a handful of parties. Confidence-building measures are also irrelevant for non-security related negotiations as the critical obstacle that needs to be overcome in these particular situations is hardly the lack of trust among parties, but diverging interests and expectations concerning the negotiation outcome.

Another set of momentum conducive conditions relate to the timing and place of the negotiations. Pinfari sees, for instance, great value in applying time pressure and deadlines to negotiations as they help create a sense of urgency among parties for bridging differences and achieving results (Pinfari 2012: 23).<sup>1</sup> Coleman argues that the choice of the negotiation venue is particularly important for the success of the negotiation as it can influence the level of support necessary for an emerging norm to advance to the “cascade stage” (Coleman 2013: 167-170). The climate negotiation process pays attention to both aspects, but unfortunately there is little evidence about them being able to create a sustainable momentum for the negotiations, let alone to forecast outcomes. In the case of climate negotiations, the expiration of the first commitment period of the Kyoto protocol has put pressure on participants to conclude a new binding agreement but so far with no results. The choice of the negotiation venue heightens expectations about the diplomatic performance of the host country and its ability to steer the meeting towards a good outcome. This strategy paid off at Kyoto (COP3), less so

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<sup>1</sup> For example, the announcement by the Chinese government in September 1983 that it would take an unilateral decision about the transfer of Hong Kong if a settlement with the British government would not be achieved within a year undoubtedly helped keep negotiations on track (Berridge 2010: 58).



in Copenhagen (COP15), and the jury is still out about Paris (COP21). It remains thus unclear the extent to which time pressure and the choice of negotiation venue could be used as reliable indicators for capturing the formation of momentum in climate negotiations and forecasting outcomes.

A third group of explanations deals with the internal dynamic of the negotiation process. Druckman (2001) found, for instance, that precipitating factors (procedures, new ideas, external events) would trigger sudden departures from established patterns of negotiation, which in turn would facilitate progress toward or movement away from the achievement of agreement. His analysis also showed that unlike negotiations involving security issues, turning points in environmental talks would be primarily precipitated by internal processes of either substantive or procedural nature (Druckman 2001: 535). These findings are consistent with the conclusions of recent studies of climate negotiations, which emphasize the critical role of the negotiation skills and tactical moves of the conference presidency, the value-creating orientation of the negotiators' strategies, the degree of consensus over the underlying norms of the negotiation agenda, or the internal coherence of the national delegations (Michaelowa and Michaelowa 2012). While these approaches help shed light on the micro-level factors that may steer negotiations towards a successful outcome, they nevertheless fail to account for the fact that the same outcome could be actually explained by different micro-level combinations of precipitating factors.<sup>2</sup> This is why the stated goal of this study is not to engage in micro-level theorizing about *why* momentum may develop in international negotiations as the overlapping causal influence of these micro-level determinants is hardly possible to disentangle. By contrast, a macro-level perspective allows us to understand, in a highly parsimonious manner, *when* momentum is more likely to occur and with *what* implications for the negotiation outcome.

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<sup>2</sup> One could easily imagine, for instance, situations in which good negotiations skills of the conference presidency coupled with strong normative consensus of the negotiation agenda could lead to a similar positive outcome as when the negotiators engage in value-creation strategies and enjoy strong delegation coherence.

In sum, these studies confirm that momentum does make a difference in international negotiations and they also help identify important drivers that stimulate the interest of the parties in the negotiation. At the same time, these approaches suffer from two broader weaknesses. First, the impact of these momentum drivers on negotiation outcomes is better known with hindsight than in prospect during an ongoing process. Process tracing is a powerful method for unpacking the sequence of consequences leading up to turning points in negotiations (Druckman 2001), but hardly useful for making sense of events that are ongoing or yet to happen. To have tangible practical value, a sound theory of negotiation momentum cannot limit itself to understanding how a set of drivers explain past events, but must also provide a method for recognizing the relevance of such drivers under unfolding conditions of growing or declining momentum. Second, one should be careful about uncritically applying insights from one category of international negotiations to other cases. In fact, it is highly unlikely that any of the drivers identified by these studies would play the same important role in other type of negotiations. Only because secret diplomacy worked in the case of the Oslo Accord, or because the setting of a deadline proved effective for the Chinese-British negotiations does not mean the same factors would have a similar practical value for concluding negotiations on climate change or trade liberalization. Each negotiation comes with its own contextual characteristics, which need to be properly acknowledged if a credible theory of negotiation momentum is to be advanced.

In light of these observations, two critical questions arise: how exactly to define the negotiation momentum and how to capture it methodologically? In response to the first question, I conceptualize the *negotiation momentum as the process of sharply changing expectations of the negotiating parties about reaching an outcome*. This definition offers two conceptual insights. On the one hand, it clearly highlights the intersubjective nature of the concept. What matters are not some objectively derived criteria (confidence-building measures, stage agreements, time pressure, negotiation venues, external events etc.), but whether the parties intersubjectively find such developments to significantly alter the

dynamic of the negotiations by increasing the likelihood of an outcome. In other words, no shared expectations about the relevance of a particular negotiation driver, no momentum! On the other hand, this definition offers a good platform for advancing testable propositions about the impact of momentum on negotiation outcomes. The more sharply the expectations of the parties change about reaching an outcome (strong momentum), the more likely that negotiations would lead to breakthroughs. By contrast, the more muted the parties' expectations about the results of their diplomatic engagement (weak momentum), the more likely that negotiations would stay the course or collapse.

Methodologically, this definition raises the challenge of how to reliably measure upswings or downswings of the parties' expectations regarding the negotiation outcome. I argue that market trading analysis offers well-tested tools for addressing this problem. An in-depth overview of the various trading tools, strategies and instruments used by investment banks, private equity firms and hedge funders around the world to maximize capital gains is obviously not possible here.<sup>3</sup> The ambition of this article is much more limited. It seeks to test the relevance of a few important market analytical concepts for explaining the evolution of international negotiations in general and of climate talks in particular. A brief comparison of the roles of the market trader and the international negotiator is perhaps illuminating. The job of the market trader is to create a credible forecast of the likely price of the stock by separating the "signal" of potential breaking points from the "noise" induced by random events in the market, in a first step, and by assessing the intensity of the "signal", in the second step. The role of the negotiator is basically similar: to identify favorable conditions for negotiations by separating the "signal" of potential breakthroughs from the "noise" of political posturing and by assessing the intensity of the parties' commitment to the "signal". It thus follows that what both the market trader and the negotiator needs to be well-versed in is the science of recognizing and leveraging

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<sup>3</sup> An introduction of market trading theory to international negotiations has been offered elsewhere, see (Author 2014).

the power of the “signals” presented to them by other players as well as by the context in which they operate.

Momentum trading is one fundamental strategy of share dealing by which major trading trends and potential breaking points (i.e., “signals”) in the stock price are being assessed in real-time through careful analysis of the trading volume and of the market context. In financial investment terms, the concept of momentum refers to a particular relationship between the security’s volume and price. More specifically, momentum indicators seek to capture the strength of a trading trend by measuring the amount that a security price’s has changed over a certain period following the rise or decline of the security’s volume (Schwager 1999: 110). Transferring analytical tools from market trading to negotiation theory needs, though, to be done with great care due to important conceptual and methodological differences. From a conceptual perspective, international negotiations do not feature the same type of volume-price relationship. They nevertheless follow the same underlying logic: the strength of a negotiation trend is informed by the degree to which the parties expect a particular outcome to take shape given certain contextual conditions. If we substitute volume with expectations and price with negotiation outcome, we should then be able to adapt the methodology used in momentum trading for capturing the momentum of international negotiations.

As with other interdisciplinary imports, the dual substitution I propose may sound atypical, but it enjoys conceptual validity. The trading volume of a security is informed by the expectation of market traders that the price will go up in short or medium term. Without this expectation there would be no trading as the incentive for profit would be lacking. In a similar fashion, the parties’ growing interest in the negotiations is informed by their expectation of a possible deal. Without this, their willingness to commit themselves to the negotiation process would be arguably subdued. The negotiation of the Anti-Personnel Mine Ban Convention (APMBC) offers a good illustration to this principle. The first

round of negotiations at the 1995 Review Conference of the Convention on Certain Conventional Weapons (CCW) produced no results as most of the states remained skeptical about the feasibility of the outcome. The situation drastically changed after the International Campaign to Ban Landmines (ICBL) initiated a vigorous international media operation in November 1995 directed at a worldwide ban on the production, stockpiling, transfer, and use of all AP land mines (Price 1998: 621). Soon thereafter, states such as Belgium, Canada, and Germany became outspoken proponents of a ban on landmines. Lloyd Axworthy, Canadian foreign minister, seized the momentum and hosted a meeting in Ottawa in December 1997, which led to the signing of APMBC by 133 states (Bjola and Kornprobst 2013: 84). ICBL's ability to raise expectations among key players about the possibility of a deal proved decisive for the successful negotiation and adoption of APMBC.

From a methodological perspective, the application of market trading techniques to the study of international negotiations cannot take place without first investigating whether the two data-generating processes are empirically compatible. The answer to this question revolves around an important characteristic of time series, stationarity, which refers to whether the underlying rules that generate time series change over time (Sherry and Sherry 2000: 9). Put differently, it makes a crucial difference whether the pattern-generating rules of the time series are stable (they remain the same over time) and reliable (shocks have transitory effects on the series' pattern). Otherwise, any inferences one would make about the evolution of the series, whether they would refer to the distribution of price changes as in the case of market trading or to treaty outcomes in the case of international negotiations, might be, in fact, spurious and hence empirically meaningless. The Augmented Dickey-Fuller (ADF) method (Stadnytska 2010) is most commonly used for probing the stationary assumption of time series by checking whether its mean and variance stay constant over time. The paper will also apply the ADF method for testing the stationarity level of the climate negotiation series. The ADF test will be able to tell us whether the negotiation series holds sufficiently steady so that past observations of the series

can be used to forecast change in future observations. It is therefore important to make sure the application of market trading tools to negotiation analysis is done properly and meets conditions of statistical relevance.

From an empirical perspective, does the difference in data availability between stock prices and international negotiations have a negative impact on the validity of the conclusions? While a larger data set could help improve the accuracy of the findings, the fact that there are only nineteen data points available for climate summits thus far is not necessarily problematic. The reason for that has to do with the distinction between short and long-term timeframes (Logan 2014: 27-58). For example, stock prices are being monitored by investors using 5,10,15,30 minute, hourly, daily, monthly, weekly and yearly timeframes. The shorter time frames are used to anticipate price moves in the very immediate future (hours or days), while long term periods serve to inform investors about the likely direction of stock price in the next 6-12 months or even years. Furthermore, the shorter the trading frame, the weaker the trend and the more uncertain the forecast. By contrast, the longer the time frame, the stronger the trend and the more reliable the forecast. To use a familiar analogy, similar to an aircraft carrier that changes direction very slowly, it would take considerable time for a stock price to reverse direction once a market trend has set in for 6-12 months. If we apply this insight to climate negotiations, we can reasonably conclude the 19 COP data points are insufficient for forecasting momentum in short term (days, weeks, months) since that would require corresponding data points. The data set is nevertheless useful for forecasting momentum in long term (e.g., on an annual basis), which is the main purpose of this study.

A detailed description of two trading-derived methods by which to capture and confirm the negotiation momentum and as well as of the statistical tests required for confirming their empirical validity will follow in the next sections. In the remaining part of this segment, I will make a few comments about

the relevance of the case study, the choice of the methodological approach and the replicability of the empirical data. Aside from their crucial importance for the global environment (IPCC 2013) and international stability (Lee 2009), climate negotiations offer a rich set of data for testing the validity of the proposed model. The nineteen major climate meeting that have taken place since 1995 constitute a statistically relevant sample for reviewing the conditions under which the negotiation momentum develops and the type of impact it has on negotiation outcomes. From a methodological perspective, the enhanced case study approach (ECS), whereby the case material serves to illuminate the particular theoretical perspective offered by technical analysis is particularly useful for probing “the applicability or robustness of the theoretical concepts” (Druckman 2005: 170).<sup>4</sup> Finally, the empirical data used for testing the validity of the model comes from Conference of the Parties (COP) decisions and resolutions, which are publicly available on the UNFCCC website, as well from market trending data on oil prices and the state of the global sustainability sector. The transparency of the quantitative data set is particularly important as it boost confidence in the final results by ensuring the reliability of the data-collection process and the replicability of the reasoning logic (King et al. 1994: 25-6).

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<sup>4</sup> The paper observes the four steps that are usually deemed necessary for conducting ECS: a) selection of the case to analyze (climate negotiations); b) development of a chronology of the case; c) description of the relevant concepts for the analysis (e.g., the negotiation momentum); and, d) discussion of the conclusions that provide new insights into the case.

### III. FORECASTING NEGOTIATION OUTCOMES

#### *3.1. Conceptual development*

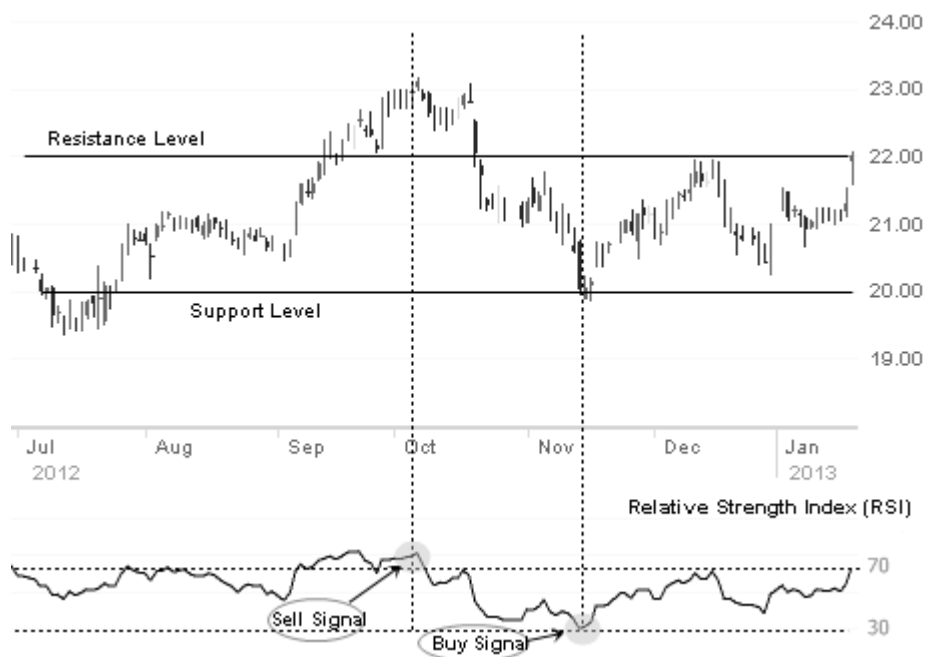
Market trading analysts have developed a wide range of momentum indicators (on balance volume, relative strength index, slow & fast stochastic oscillator, rate of change, moving average convergence/divergence, etc.), but all are based on the same principle: reversals and possible breakouts of stock prices are informed by the rate at which prices change that is, the strength of the momentum of the trading trend. Breakout trends usually exhibit strong momentum (e.g., prices move up or down with greater force), while weakening trends have stagnant or decreasing momentum. At the same time, momentum indicates possible exhaustion points in the market, which are usually referred to as overbought or oversold levels. Studies have shown that momentum strategies are highly profitable, especially for intermediate horizons, and they applicable to different markets (Chan et al. 2000 ; Cheng and Wu 2010 ; Serban 2010). Momentum trading strategies largely owe their success to the logic that expectations of higher prices are self-driven, within certain limits. Put simply, success breeds success. Stocks with high recent performance continue to earn higher average returns in short and medium term than stocks with low recent performance (Jegadeesh and Titman 1993). Explanations of why this happens range from price interpretation biases (Daniel et al. 1998) to risk compensatory strategies (Conrad and Kaul 1998), but for the purpose of this paper what is most critical to understand is how momentum strategies work.

One of the most used momentum indicators in market analysis is the relative strength index (RSI), an equally-weighted moving average, which compares the magnitude of recent gains to recent losses by averaging a certain number of time intervals in which shares close up vs. when they close down (Wilder 1978: 63). The indicator is plotted between zero and 100, where 100 is the highest overbought limit and zero is the highest oversold condition (see Fig 1). The overbought and oversold boundaries are



usually set at 70 and 30, respectively. A cross above the 70 level is considered an indication of the price being potentially overbought and hence an opportunity for a short trade or share selling (see *sell* signal in Fig 1), while a cross below the 30 level is considered an indication of the price being potentially oversold and hence an opportunity for a long trade or share buying (see *buy* signal in Fig 1) (Chen 2010: 153). As a momentum tracking indicator, RIS has been consistently found to outperform traditional buy-and-hold strategies (Chong and Ng 2008), especially when used for trading stocks of companies with high capitalization (Rosillo et al. 2013).

**Fig 1:** *Trading Momentum (RSI) - General Electric Company (NYSE:GE)*



The momentum concept also calls attention to the notion of failed breakout which occurs when the share price moves outside the resistance or support levels, but then fails to generate a new trading range for lack of sufficient trading pressure. As Fig 1 illustrates, GE shares briefly broke through the \$22 level in Sept-Oct 2012, but the shares soon returned to the \$20-22 trading range due to lack of buying pressure. RSI actually indicated an overbought condition for GE shares (above the 70 level), and in so doing it signaled the likely short-term reach of the breakout. Tellingly, failed breakouts are

considered to be one of the most reliable signals in market analysis. When the share price fails to follow through in the direction of the breakout, then there is strong possibility of a significant move in the opposite direction (Schwager 1999: 152). This is exactly what happened to GE shares in Oct-Nov 2012, when after breaking through the \$22 resistance level, they failed to follow through and soon thereafter they dropped to the \$20 support level. As the GE series remained stationary between July-Dec 2012<sup>5</sup> the results enjoy empirical validity: prices changes during that period were not random but informed by the previous distribution of the stock price.

A momentum indicator similar to RSI has potentially great relevance for international negotiations as it can signal possible breakout and exhaustion points during the talks. The greater the force with which negotiations take place (e.g., strong momentum), the more likely they would be able to breach the points of resistance in the negotiation agenda and lead to breakthroughs. By contrast, the slower the pace of negotiations (weak momentum), the more likely they would continue as business as usual or result in breakdowns. However, in order to make sense of how such a momentum indicator would apply to international negotiations we need a reliable indicator to measure it. Arguably, a critical metric for capturing the negotiation momentum is the level of interest of the parties in attending the negotiations. One could reasonably assume that the larger the number of participants to international negotiations, the greater the importance that parties attach to these negotiations and by extension the stronger their motivations to achieve certain results or to avoid others in the final agreement. By contrast, the smaller the size of the delegations, the less relevant these negotiations are perceived by the relevant parties as a source of influence on their domestic strategies and policies. It is this particular insight, the varying size of the delegations, which provides the methodological link between market trading and international negotiations. To show concretely how this can be done empirically, I will

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<sup>5</sup> The ADF test was conducted with the NumXL econometric package (Excel add-in) and returned positive values for two scenarios: a) constant and trend; b) constant, trend, and trend squared (5% significance level).

construct in the next section a RSI indicator for climate negotiations.

### 3.2. Methodology

The indicator I have developed to capture the momentum of climate talks is called the relative strength negotiation index (RSNI), which compares the parties' interest in the negotiations by averaging increases and drops of registered participants to UNFCCC meetings (see table 1).<sup>6</sup> Methodologically, RSNI pursues the same analytical objectives as RSI (i.e., to capture the trend's strength and directional change), but with two adjustments. First, RSI uses broad time frames (e.g., fourteen unit intervals) to average gain/losses. UNFCCC negotiations have been convened only nineteen times thus far and hence RSNI measures the negotiation momentum using much shorter time intervals (e.g., consecutive COPs). Second, potential breakout and exhaustion points in climate negotiations will be assessed not against overbought and oversold thresholds (which make little sense in this context), but against the level of dispersion of momentum values around the mean. The indicator so developed will be able to provide a precise measure of the momentum of climate negotiations and of the likelihood of breakthroughs.

**Table 1:** *Participation to UNFCCC COPs (1995-2013)*

UNFCCC meeting	Year	Location	Registered participants (RP)	Moving Average (MAVG)	RSNI	RSNI (%)
<b>COP1</b>	1995	Berlin	757	-	-	-
<b>COP2</b>	1996	Geneva	979	757.00	222.00	29.33
<b>COP3</b>	1997	Kyoto	2244	868.00	1376.00	158.53
<b>COP4</b>	1998	Buenos Aires	2073	1611.50	461.50	28.64
<b>COP5</b>	1999	Bonn	1634	2158.50	-524.50	-24.30
<b>COP6a</b>	2000	The Hague	2195	1853.50	341.50	18.42
<b>COP6b</b>	2001	Bonn	1813	1914.50	-101.50	-5.30

<sup>6</sup> The data used for calculating RSNI originate from the official lists of registered participants prepared by UNFCCC for each COP. Participation lists are publicly available online for COP 6a,6b,7, and 9-19 (see example (UNFCCC 2013)), but less so for COP 1-5 and 8. Participation data for COP 1-5, 8 have been acquired from M.M. Cabré (2011: 11). To avoid empirical distortions generated by the inclusion of NGOs, media or other parties with an exogenous interest in the negotiations, the analysis measures only the level of interest of UNFCCC parties (RP column).

<b>COP7</b>	2001	Marrakech	2414	2004.00	410.00	20.46
<b>COP8</b>	2002	New Delhi	1456	2113.50	-657.50	-31.11
<b>COP9</b>	2003	Milan	1931	1935.00	-4.00	-0.21
<b>COP10</b>	2004	Buenos Aires	2210	1693.50	516.50	30.50
<b>COP11</b>	2005	Montreal	2804	2070.50	733.50	35.43
<b>COP12</b>	2006	Nairobi	2264	2507.00	-243.00	-9.69
<b>COP13</b>	2007	Bali	3264	2534.00	730.00	28.81
<b>COP14</b>	2008	Poznan	3958	2764.00	1194.00	43.20
<b>COP15</b>	2009	Copenhagen	8041	3611.00	4430.00	122.68
<b>COP16</b>	2010	Cancun	6164	5999.50	164.50	2.74
<b>COP17</b>	2011	Durban	6164	7102.50	-938.50	-13.21
<b>COP18</b>	2012	Doha	4343	6164.00	-1821.00	-29.54
<b>COP 19</b>	2013	Warsaw	4011	5253.50	-1242.50	-23.65
<b>Mean</b>			3035.95	2890.41	265.63	20.09
<b>STDev</b>			1902.41	1852	1291.69	48.95

In line with the prescriptions of the enhanced case study approach (ECS), two conditions need to be met in order to conduct momentum analysis of climate negotiations: a) the development of a chronology of the case, and b) the description of the relevant analytical concepts (e.g., the negotiation momentum). The first requirement is accomplished in Table 1, which provides data of registered participants to all COP meetings that have taken place thus far. As regards the second requirement, the methodology of determining the momentum of climate negotiations involves three steps:

- Calculation of the moving average of the number of participants (MAVG column): this is done by dropping old data ( $COP_{n-1}$ ) and adding new values ( $COP_{n+1}$ ) to the moving delegation size ( $COP_n$ );<sup>7</sup> MAVG is important for two reasons. First, it helps smooth out casual fluctuations in the number of registered participants and by doing so it allows us to discriminate between structural vs. occasional variations of the overall level of interest in the negotiations. Second, by placing more weight on recent data, three interval MAVG gives a good estimate of the level of participation to the following meeting. Failure to meet the MAVG estimate indicates a declining interest in the negotiations, while better than expected participation signals the opposite.

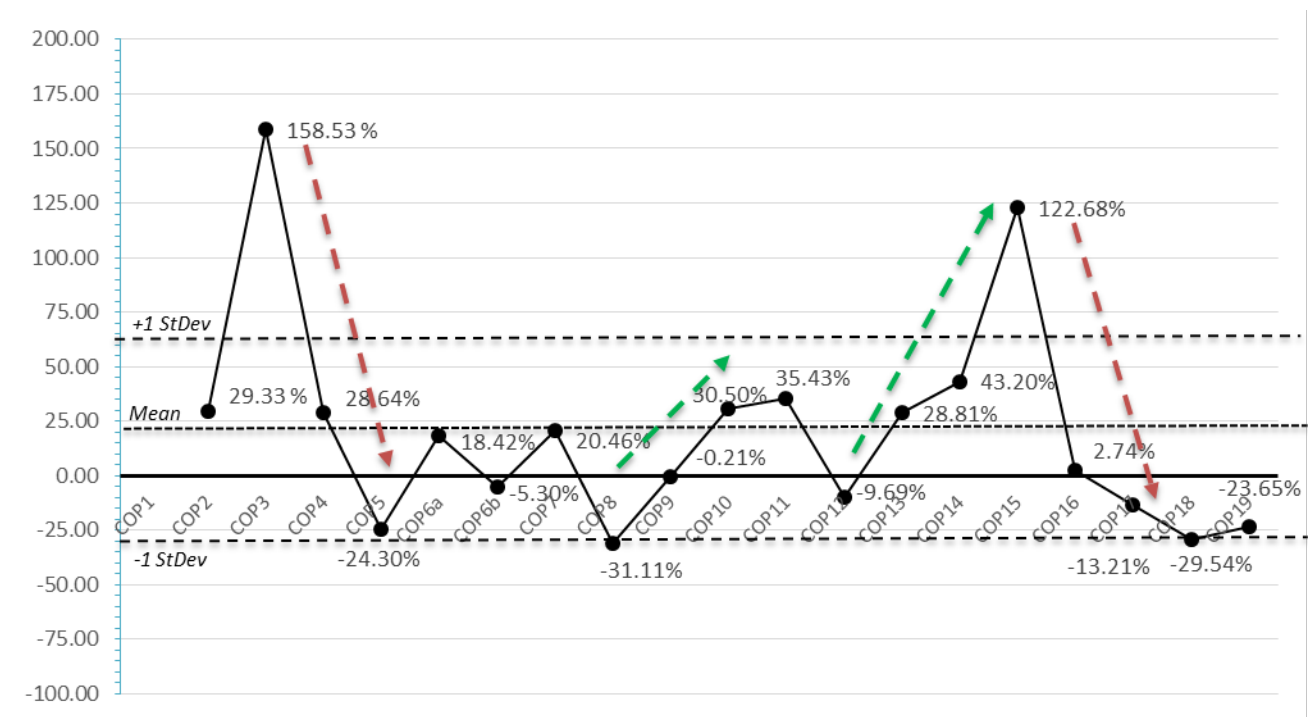
<sup>7</sup> For example, MAVG (COP 2, 3) = 868; MAVG (COP 3, 4) = 1611.5 etc.

- Calculation of the difference between the estimate provided by MAVG and the real number of registered participants (RSNI column).<sup>8</sup> This difference is critical for measuring the negotiation momentum. By showing how significantly the parties' expectations about reaching an outcome have changed between successive COP meetings, RSNI gives a clear indication of the relative strength of the parties' interest in the negotiations (i.e., how solid/weak is the trend of support for the negotiations). To make the results easier to grasp, RSNI values are also converted in percentage points (last column in Table 1).
- Calculation of the level of dispersion of RSNI momentum values, which are normally distributed, around the mean. 84% of RSNI values fall within one standard deviation from the mean (see mean and standard deviation bars in Fig 2). It thus follows the remaining 16% provide statistically significant evidence about the strength of the momentum at certain points during the negotiation process. Put differently, the larger the deviation from the mean, the more significant the momentum to accompany a particular negotiation session.

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<sup>8</sup> For example, the RSNI value for COP 3 is 1376, which results from the difference between the number of registered participants at COP3 (2244) and the MAVG estimate (868). In percentage points, this represents a 158% increase of the parties' expectations between COP2 and 3.

**Fig 2: Climate Negotiation Momentum (RSNI)**



The results are plotted in Fig 2. Similar to the trading momentum indicator (RSI), the negotiation momentum (RSNI) offers an accessible and reliable method for tracing the evolution of the parties' interest in the negotiations and the extent to which their expectations about reaching a successful outcome are being met between successive meetings. At the same time, RSNI makes easy to locate points of potential breakthrough by highlighting instances when the negotiation momentum significantly moves outside the boundaries of regular engagement. The ADF test finds the RSNI series to be driven by a deterministic trend<sup>9</sup> which means the series is non-stationary in itself but stationary around a trend. In other words, the series' pattern is not random but revolves around a well-defined trend, despite occasional departures from the mean (e.g., COP 3 and COP 15). In short, the RSNI indicator can be reliably used for predicting changes in the level of participation to climate negotiations and in so doing it turns itself into an excellent tool for conducting momentum analysis.

<sup>9</sup> The ADF test was conducted with the NumXL econometric package (Excel add-in) and returned positive values for three scenarios: a) no constant; b) constant and trend, and c) constant, trend, and trend squared (5% significance level).

### 3.3. *Momentum analysis*

The underlying logic of RSNI is straightforward: the higher/lower the number of participants *relative* to the moving average of the number of participants to the previous two meetings, the stronger/weaker the negotiation momentum. In other words, every time when the number of participants beats the expectations, negotiations are likely to pick up momentum. By contrast, every time when the number of participants fails to meet the expectations, then negotiations are at risk of stagnation or collapse depending on the magnitude of RSNI decline. The RSNI indicator can therefore be used for conducting momentum analysis in two ways: directional and scalar. First, the direction of the momentum is determined by the RSNI value. When the latter is positive then the negotiation momentum is picking up. Parties share a good level of interest in the negotiations and their support for a successful outcome is getting stronger. By contrast, when the RSNI value goes negative then negotiations lose steam. Parties signal a rather soft interest in the negotiations and their willingness to stay engaged in the process is fading. Second, the scale of the momentum is determined by RSNI's spread from the mean. More specifically, if the RSNI value is greater than one positive standard deviation from the mean, then negotiations enjoy strong momentum and hence the possibility of a breakthrough is high. On the other hand, if RSNI goes below one negative standard deviation from the mean, then negotiations are in serious danger of collapse.

The analytical edge of RSNI is thus the result of the way in which it aggregates the behavior of all participants and helps smooth out casual variations in their level of interest in the negotiations. In other words, what matters is not how individual parties expect negotiations to go, but the aggregate measure of these expectations. The larger the number of parties with high expectations, the stronger the momentum and vice-versa. In short, there is no need to focus on micro-level motivations as their impact on parties' negotiation strategies is well captured by RSNI at the macro-level. For example, one would expect increased public awareness about the risks of not addressing climate change to

influence differently the motivations of the parties. This potential development is properly captured by RSNI. For example, a party may become increasingly aware of its vulnerability to climate change and hence it would probably take a growing interest in the negotiations. If other parties feel the same, then the overall (aggregate) interest in the negotiations will grow, the momentum (RSNI) will intensify and the likelihood of a negotiation breakthrough will increase.

A review of the negotiation outcomes of the nineteen COP meetings that have taken place thus far provides strong empirical support for these conclusions. As indicated by the up/down trending lines in Fig 2, climate negotiations lost significant momentum after the adoption of the Kyoto Protocol at COP 3, temporarily regained speed before COP11 in Montreal when the Protocol entered into force, significantly advanced in the run-up of the COP 15 meeting in Copenhagen and it has dangerously degraded since then. The RSNI chart in Fig. 2 also identifies COP3 and COP 15 as the meetings most likely to lead to negotiation breakthroughs on account of their significant deviation from the mean.<sup>10</sup> This assessment makes perfect sense for COP3, which concluded with the adoption of the Kyoto Protocol, but less so for COP 15. In the latter case, the negotiating parties decided to substitute legally binding reduction targets with voluntary pledges (UNFCCC 2009) and therefore the Copenhagen meeting could be considered a negotiation setback not a breakthrough. This is a puzzling result, as COP15 should have led to a major negotiation breakthrough given the strong momentum that accompanied the meeting. As this did not happen, a good explanation of the COP15 outcome is required in order to understand the limits of momentum analysis and to help improve its empirical accuracy (see next section). However, the fact that negotiations failed to follow through in the direction of the COP15 momentum breakout explains the significant move in the opposite direction. After COP15, the momentum of climate negotiations has never recovered and it continues to drift in a

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<sup>10</sup> Even we regard COP3 and 15 as outliers, RSNI still delivers analytically by accurately identifying COP11 and COP14 as meetings concluded with strongly positive outcomes and COP8 and 18 as meetings concluded with the least favorable outcomes.



negative area.

What about forecasting? Can momentum analysis be used not only for explaining but also for anticipating potential negotiation breakthroughs? Two of the most intriguing aspects of the momentum graph in Fig 2 are that breakthroughs do not happen abruptly and they are followed by abrupt declines. The strong momentum accompanying COP 3, 11 and 15 did not emerge unexpectedly, but it followed the positive trend set off by previous rounds of negotiation. At the same time, these meetings led to sharply declining levels of momentum in the next rounds of negotiation. Two working hypotheses follow from this observation. First, that potential breakthroughs require at least one preceding RSNi value above the mean. Second, that the sharper the decline of the negotiation momentum after a successful meeting, the less likely the probability of a negotiation breakthrough in short term. Put differently, negotiation breakthroughs are more likely to happen when parties already share an above the average level of positive expectations and when the meeting is preceded by no immediate breakthrough. For example, a negotiation breakthrough at COP21 in Paris remains feasible if the parties' expectations at COP 20 rise well above the average but without generating a breakthrough.

The micro-causal link between momentum and breakthroughs is more difficult to decode, largely because it is overdetermined. More specifically, the macro-level effect of the COP15 negotiation momentum could have been realized in multiple ways at the micro-level. The election of President Obama in 2009 and his political support for the climate agenda, at least in comparison to his predecessor, fuelled, for instance, high hopes of success prior to COP15. The negotiation progress made at COP 14 in Poznan, the finalization of the draft of the concrete negotiating text for a global climate change deal at the UNFCCC gathering in Bonn in June 2009, or the European Union's strong climate leadership and diplomatic mobilization prior to the meeting could offer equally valid alternative explanations of the sharply increasing interest of the negotiating parties before COP15.

Despite this, the Copenhagen climate summit did not conclude with a breakthrough.

To be sure, micro-level causal explanations are useful to explore, not least because they can shed light on the role of particular agents and events in creating conditions for momentum formation. However, the multiple realizability<sup>11</sup> of the state of optimism preceding the COP15 talks calls attention to the importance of macro-level analysis of the negotiation momentum. As mentioned above, the core idea behind macro-level theorizing is to offer proper explanations of variables' behaviour when the latter cannot be reduced to the properties and interactions of micro-level factors. The methodological challenge, therefore, is not to find a way to compare and assess the relative causal validity of competing discrete factors, but rather to develop a tool for understanding what broader developments may connect these discrete explanations together and how do they account for the evolution of the negotiation momentum. To address this final puzzle, a second indicator capturing the context of the negotiations will be examined in the next section.

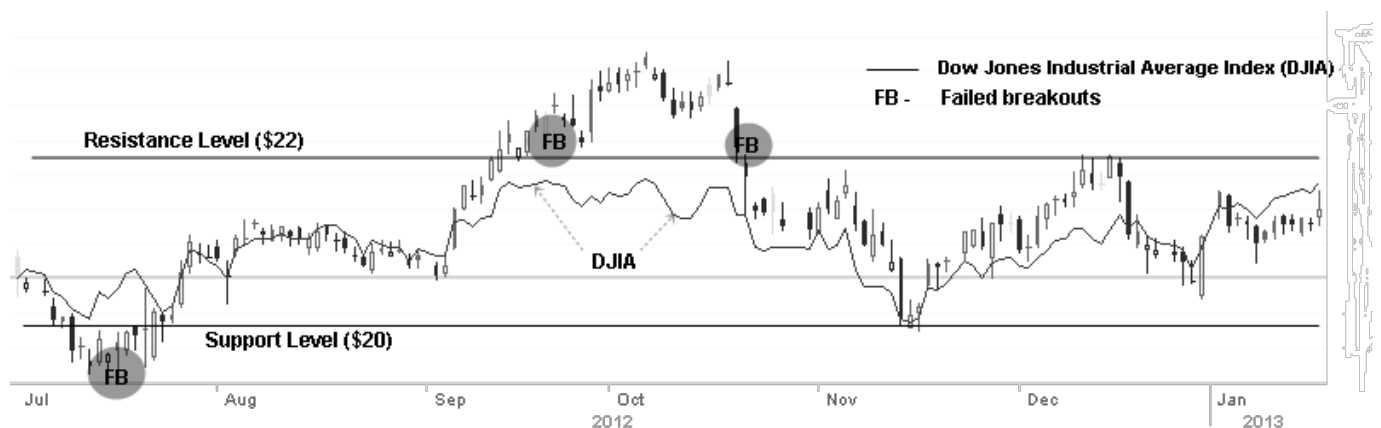
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<sup>11</sup> The concept of multiple realizability refers to the situation when many different micro-level combinations can result in same macro-level state (Wendt 1999: 154). In my example, different micro-level factors (Obama's election as US President, post-Poznan negotiation preparations, or EU climate leadership), could have been equally responsible for the rising interest of the parties in the COP15 talks.

#### IV. CONFIRMING MOMENTUM TRENDS

Market analysts use different means to confirm momentum trends and reversals and by extension, the viability of trade breakouts. One such important measure is the state of the market. Empirical studies have consistently found the momentum effect to be much stronger in periods of economic growth and upmarket states (Cooper et al. 2004 ; Muga and Santamaria 2007). In other words, a positive-looking market builds confidence among investors and fuels the momentum. By contrast, a downward market makes investors more risk-averse and in so doing it weakens or even breaks the momentum. Fig 3 convincingly illustrates the empirical validity of this indicator in market analysis. First, after breaking through the \$22 resistance level at the end of September 2012, the GE share price appeared to have escaped the gravitational force of the trading range and to have set itself on a course of upward gains. However, the breakout eventually proved false. By the end of October, the share price returned to the \$20-22 trading range.

**Fig 3:** Breakout confirmation analysis - General Electric Company (NYSE:GE)



Similarly, the breakout through the support level in July proved short-lived as it returned to the original boundaries of the trading range within a week. The state of the market, as illustrated by the overlaid value of the Down Jones Industrial Average index (DJIA), accurately explains why the breakout failed

in both cases. The share price pierced the support level in July at the time when the market was moving upwards, thus pulling the price up on its coattails. By contrast, when the share price broke upwards in September, the market turned negative and this proved enough to halt the momentum. The correlation factor between GE stock prices and DJIA values is extremely high (0.819),<sup>12</sup> a fact that strongly validates the practical value of DJIA as a confirmation marker of the momentum trading trend.

The state of the global economy undoubtedly also influences the dynamic of climate negotiations. This is so because the costs of abating climate change are daunting<sup>13</sup> and arguably only few states have the adequate financial resources to cover them, especially in conditions of economic downturn. It should be nevertheless noted that the costs of inaction may offset by a large margin the costs of climate change mitigation.<sup>14</sup> That being said, it is not very clear what indicator is particularly relevant to use as a metric for capturing the contextual dynamic of climate negotiations. DJIA acts as a useful confirmation signal for trade breakouts of US stocks because it has been specially designed to measure the state of the US financial market. Climate negotiations bring into focus, however, a broader geographical scope of international markets and certain economic elements (e.g., carbon trading, adaptation finance) that are not properly captured by DJIA. Alternatively, the evolution of the oil price might serve as a proxy indicator for assessing the level of contextual conduciveness of climate negotiations. The strength of the carbon-intensive industry lobby has been long recognized as a key factor holding back climate change policies (Dunlap and McCright 2011 ; EBRD 2011: 65). Higher oil prices may therefore assist climate negotiations by encouraging parties to adopt policies in support of renewable sources of energy. By contrast, cheap oil would likely discourage governments from engaging in ambitious

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<sup>12</sup> The correlation factor was calculated using Excel. GE and DJIA historical data are available from General Electric (2013) and Wall Street Journal (2013) respectively.

<sup>13</sup> UNFCCC estimated, for instance, that USD 200–210 billion would be necessary to reduce carbon dioxide equivalent (CO<sub>2</sub> eq) emissions by 25 per cent below 2000 levels in 2030 (UNFCCC 2008: 7).

<sup>14</sup> It has been estimated, for instance, that a 2 – 2.5°C increase in temperature is likely to depress Africa's GDP by 4%, South and South East Asia by 3%, the Middle East by 3%, Latin America by 2%, and China by 1%. By contrast, Europe, North America and developed countries in Asia are expected to suffer relatively minor economic setbacks (OECD 2008: 26; Elzen et al. 2009: 35). See also the Stern Report on the Economics of Climate Change (Stern 2006).

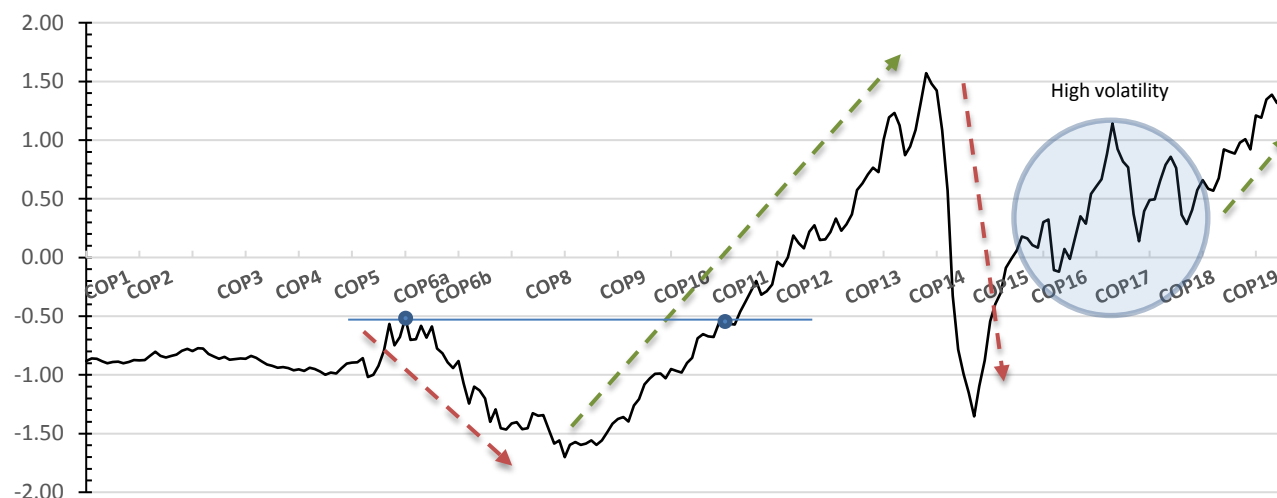
climate mitigation policies.

The oil price indicator nevertheless understates the influence of the sustainable economic sector. While still relying on fossil fuels for maximizing economic output, various governments and corporations around the world have already taken major steps to developing sustainable policies and products (Boyd and Folke 2012). One way to capture this development is by taking into consideration the Dow Jones Sustainability World Index (DJSWI), which measures the performance of the world's sustainability leaders. The companies selected to be included in DJSWI come from 52 countries, cover 57 industry groups and have to meet a comprehensive set of long-term economic, environmental and social criteria, in addition to industry-specific sustainability trends (S&P Dow Jones Indices LLC 2013). In order to properly capture the dual influence of the carbon-intensive and the sustainable economic sectors on climate negotiations, I use oil prices and DJSWI values to develop the negotiation contextual conduciveness index (NCCI). As the oil price and the DJSWI index employ different scales, I first rescale their values on a numerical scale between -2 and 2 and then average the rescaled values to calculate NCCI.<sup>15</sup>

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<sup>15</sup> As DJSWI was launched in September 1999, the NCI values up to that moment represent only the rescaled values of the oil price. The data used for calculating NCI originate from the U.S. Energy Information Administration in the case of the oil prices (USEIA 2014) and RobecoSAM and Dow Jones Indexes in the case of DJSWI (RobecoSAM 2014). Rescaling involves setting the smallest observed value equal to the minimum value of the new scale, the largest observed value equal to the maximum value in the new scale, and fitting all other values in between while maintaining the relative distances between them (Hartwig and Dearing 1979: 60-1). The rescaling formula is the following: Rescaled Value=  $a + (x-A)(b-a)/(B-A)$ , where  $x$ =Output value to be rescaled,  $a$ = -2 (min value of the new scale),  $b$ =2 (max value of the new scale),  $A$ =min Output value,  $B$ =max Output value.

**Fig 4:** *Negotiation Contextual Conduciveness Index (NCCI)*



The correlation factor between NCCI and the delegation size variable is reasonably high (0.61) despite the volatility area of COP15-18. NCCI thus offers a compelling explanation for the evolution of the climate negotiation momentum (see also up/down trend lines in Fig 2 and 4). Against the backdrop of declining oil prices and sustainability incentives shortly after the adoption of the Kyoto Protocol, UNFCCC parties become more reluctant about following through with bold climate mitigation initiatives. It actually took them eight years to finally ratify the Kyoto Protocol at COP 11 in Montreal and NCCI explains why. After entering a period of decline in 1999, the sustainability sector reached its lowest point of development at COP8, but it steadily began to improve soon thereafter. Confidence in the sustainability market returned, however, to healthy levels only in 2005 at COP11, when the NCCI “gap”, opened at COP6, was finally closed (see Fig 4). NCCI then continued to surge, up to moment of COP13 in 2008, only to collapse in the following year under the tremendous pressure of the global financial crisis. After passing through a period of high volatility between 2008 and 2011 (see volatility region in Fig 4), NCCI has since embarked on a steady ascending course, a development that holds out the promise of positive outcomes in the next rounds of climate talks.

The negative outcome of COP 15 is also adequately explained by NCCI. Despite the parties' strong interest in reaching a positive outcome in Copenhagen, negotiations failed to achieve a comprehensive deal for reducing GHG emissions as the structure of economic incentives for such policies changed for the worst almost overnight. As indicated by the momentum indicator, parties had high expectations about a new binding agreement to be concluded in Copenhagen and hence COP15 *should* have led to a major negotiation breakthrough. However, the negative economic context induced by the global financial crisis drastically undercut the enthusiasm among developed countries for exclusively bearing the financial burden of climate mitigation. The case of the failed breakthrough at COP15 also reveals the inertial power of the momentum. Steady growing optimism about the outcome of international negotiations is quite difficult to break. For example, COP15 was prepared by three successive meetings (COP 12, 13 and 14), each being accompanied by a better momentum value than the previous one (see Fig 2). This explains the slight delay in the reaction of the UNFCCC parties to understanding the impact of the financial crisis on their negotiation positions.

The opposite view holds true as well. Entrenched pessimism is difficult to overcome in the absence of a consistently positive negotiation context. As illustrated by the declining momentum at COP16, 17, and 18, the financial crisis and the subsequent global economic uncertainty severely dampened the parties' motivation for negotiating a new climate agreement. On the positive side, the negotiation context currently shows signs of reversal. NCCI has left behind the volatility area of 2008-2011 and it has steadily improved in the past two years. The modest but promising recovery of the negotiation momentum at COP19 parallels well this development. The negotiation context must nevertheless continue to improve if optimism is to return to climate meetings. For example, in order to set the course for a potential breakthrough at COP 21 in Paris, COP 20 in Lima must push the negotiation momentum above the mean value, which in turn means that NCCI should top the previous high set by COP 13. For this to happen, the oil price must stay above the \$100-110 level and DJSI should reach around

2000 points. A more favorable negotiation context would help generate a reversal of the negotiation momentum at COP 20 by pushing RSNI up to 20% or 6000 participants. However, for a breakthrough to happen at COP21 in Paris, the negotiation context must stay positive and strong enough to increase the number of participants to at least 11-12,500 (35% RSNI). To be sure, the outcome at COP 21 is not pre-determined, but a positive negotiation context and a strong momentum, along the lines suggested above, would significantly increase the probability of a breakthrough.



## **V. CONCLUSIONS: IMPLICATIONS FOR NEGOTIATION RESEARCH AND PRACTICE**

The paper has promised to make three contributions to the study of international negotiations: first, to advance a model for capturing the concept of negotiation momentum both analytically and methodologically; second, to explore its value for explaining abrupt changes in negotiation patterns (i.e., breakthroughs) and third, to examine how diplomats can leverage its analytical weight for improving their bargaining position in multilateral conferences. Drawing on the literature of market technical analysis, the paper addressed the first two objectives via two original concepts: the relative strength negotiation index (RSNI) and the negotiation contextual conduciveness index (NCCI). By comparing the levels of interest of the parties in the negotiations, RSNI serves as a powerful indicator of the direction and intensity of the momentum accompanying international negotiations. The greater/lesser the force with which negotiations take place (e.g., strong/weak momentum), the higher/lower the probability of breakthroughs. NCCI, on the other hand, helps explain why certain potential breakthroughs may fail to materialize. Each time negotiations take place within a negative NCCI context, the potential breakthrough is likely to fail. By contrast, a positive NCCI context aligned with a strong negotiation momentum creates a powerful combination in support of successful breakthroughs.

When applied to the case of climate negotiations, the two concepts have demonstrated great empirical value. Most importantly, RSNI and NCCI allow us to explain and forecast the evolution of climate negotiations in a highly parsimonious manner. While the same conclusions could probably be reached by engaging in laborious and multi-layered analyses of the negotiation positions and domestic constraints of UNFCCC parties, momentum analysis offers an accessible and reliable framework for understanding the dynamic of climate negotiations based on a key insight: multilateral negotiations

are serial processes in which previous outcomes constrain and inform future outcomes. RSNI thus provides an accurate picture of the evolution of the parties' interest in the negotiations and of the extent to which their expectations about reaching a successful outcome have been met between successive meetings. In addition, RSNI makes possible to locate points of potential breakthrough (COP3 & 15) by highlighting instances when the negotiation momentum has significantly moved outside the boundaries of regular engagement. NCCI, on the other hand, reveals how the combined performance of the global carbon-intensive and sustainable economic sectors affects the viability of negotiation breakouts. The global financial crisis created, for instance, such a negative context for climate negotiations after 2008 that the strong momentum built up before COP15 simply could not overcome. The recent improvement of the global economic conditions represents a step in the right direction, but much more is needed in order to remove the deep-seated pessimism that has developed about the state of climate negotiations during the financial crisis.

The technical analytical framework described in this article could work for a broader range of multiparty negotiations such as the Doha Round of trade negotiations or the negotiations surrounding the European sovereign-debt crisis. All that is needed is for the negotiations to have a sufficiently long track record, be reasonably transparent in terms of outcomes and participation, and the context of the negotiations must be reliably quantifiable. Multilateral arms control and disarmament negotiations undertaken at the UN Conference on Disarmament (UNCD) since 1979 offer another good example for testing the empirical validity of the technical analytical approach. Benefiting from the annual participation of 65 countries, the UNCD has managed to conclude several important conventions, including the Treaty on the Non-Proliferation of Nuclear Weapons, the Comprehensive Nuclear-Test-Ban Treaty, or the Convention on the Prohibition of Bacteriological (Biological) Weapons (UNOG 2013). By juxtaposing already known breakthroughs against the global security context within which

these negotiations took place, a useful indicator could then be derived that could be subsequently used for identifying potential breakthroughs in future disarmament negotiations.

Momentum analysis has not only theoretical relevance, but it also presents valuable practical implications. This is the third important contribution the paper has promised to make to the study of international negotiations. A diplomat attending a multilateral negotiation could apply this method for improving her bargaining position in two distinct ways. First, she can use momentum analysis for gauging the overall level of optimism vs. pessimism of the parties vis-à-vis the negotiations. The stronger the level of optimism, the more intense the momentum surrounding a particular round of negotiations and by implication, the more likely for the negotiations to conclude with a positive outcome. By contrast, the more entrenched the parties' pessimism about the negotiation outcome, the weaker the momentum and consequently the more difficult for diplomats to make progress on major issues on the negotiation agenda. In practical terms, this suggests a diplomat must carefully select the issues to pursue at each stage of the negotiation process. For example, it would make little sense to insist on negotiating the much disputed issue of binding GHG reductions in periods of declining momentum as only "soft" issues (e.g., climate technical assistance, negotiation road maps, technological transfer partnerships etc.) actually have a reasonable chance of success.

Second, a diplomat could also assess the level of conduciveness of the negotiation context in order to make sense of whether a potential breakthrough it is going to happen or, equally importantly, whether it is going to last, once it happens. Due to cyclical corrections and reversals of global economic trends, one could expect, for instance, a longer timeframe to be available for achieving a breakthrough in climate talks when the negotiation context has just turned positive after a protracted period of decline, as opposed to when the global economy has been steadily improving for a relatively long period of time. The latter case should normally signal negotiators that time is slowly running out and hence they

ought to act more decisively in building the necessary coalition for delivering a positive outcome. At the same time, a good reading of the negotiation context allows the diplomat to better tailor the political or financial commitment of his country to the negotiation result. For example, if the negotiation context is adverse to an outcome calling for significant financial contributions, it probably makes better sense to follow rather than to lead other parties in implementing the agreement. In short, what momentum analysis offers diplomats from a practical perspective are two crucial tools for making sense of the issues that are more suitable for negotiation at each stage (what to negotiate - “soft” vs “hard” issues?) and the likely timeframe available for successfully concluding the negotiations (when and how urgently to negotiate?).

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