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Reference Point Anchoring in Mergers and Acquisitions: The Effect of the 52-week High Stock Price on Offer Premium in Cross-Border Deals

Master's Thesis

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Abstract

This study utilises insights from the Anchoring and Adjustment Model of Kahneman and Tversky (1974) to examine reference dependence on the 52-week high stock price in cross-border mergers and acquisitions. Using the framework established by Baker et al (2012) on a sample of 3236 deals between 2010-2020, the study finds that the 52-week high stock price of the target significantly affects the offer premium. More specifically, a 10% increase in the 52-week high is associated with a 2% increase in the offer premium. Compared to domestic deals, this influence is higher in cross-border deals by approximately 4%. The sample is further classified based on legal origin to capture variations in legal systems, regulatory practices, negotiation styles, etc, within cross-border deals. The study finds that offer premiums in deals where the acquirer and target have different legal origins, exhibit a greater bias towards the 52-week high. The effect of the 52-week-high on the offer premium is approximately 2% higher in such deals.

Keywords: Mergers and Acquisitions, Reference Points, Cross-Border M&A, Behavioral Corporate Finance, Behavioral Finance

Table of Contents

List of Figures

List of Tables

Chapter 1 Introduction

This study is born out of the confluence of two very different yet relevant strands of literature- Reference Points, and Mergers and Acquisitions. M&A is one of the most prolifically studied topics in corporate finance, and rightfully so. As M&A volumes have grown year after year, so has the appetite to understand the characteristics and dynamics of such deals (Malmendier, 2018). Several coherent theories have sought to explain facets of M&A activity such as the volume of deals, merger waves, who acquires who, method of payment, etc (Jovanovic and Rousseau, 2002; Shleifer and Vishny, 2013; Betton et al, 2009). Standard economic theory has sufficed in explaining these concepts. One facet, that needs further examination is offer premiums. The offer premium is effectively the price offered by the acquirer for the target, expressed as a percentage of the current stock price of the target. Standard economic theories such as the neoclassical view of mergers and the market-timing approach have not been able to coherently explain how offer premiums are determined (Baker et al, 2012). This is where insights from psychology and behavioural economics come useful.

Theoretically, offer prices are driven by three components- the value of assets-in-place, the value of potential growth options, and an estimate of the synergies realised by the combined entity (Baker et al, 2012). The summation of these three components should ideally lead to a single, definitive offer price. However, this valuation process is much more complex in reality. Firstly, the process is driven by a multitude of assumptions that the target and acquirer might not see eye-to-eye on. This leads to a discrepancy in the range of valuations that the two parties arrive at. Secondly, valuation is just a node in a long network of processes needed to get a deal over the line, and hence acquirers and targets may not have the expertise or the time to conduct a thorough, objective valuation. Baker et al (2012) find that this indeterminacy in valuation allows for the process to be affected by psychological considerations. More specifically, Baker et al (2012) use the Anchoring and Adjustment Model of Kahneman and Tversky (1974) to show that offer premiums are influenced by the 52-week-high stock price of the target. In this case, the 52-week-high stock price serves as a salient reference point to which acquirer and target expectations are anchored. Apart from providing a mental shortcut for arriving at a valuation, both acquirer and target view the 52-week-high as an acceptable price that can be justified to their respective boards.

Baker et al (2012) apply reference dependence and prospect theory to a sample of US domestic deals in the years ranging from 1987 to 2007. One of the aims of this study is to apply the Baker et al (2012) framework in a more recent context. Hypothesis 1 of the study uses

methods set out by the authors on a novel dataset ranging from 2010-2020 to understand reference dependence on the 52-week-high in a novel dataset. Kahneman and Tversky (1979) note that the tendency to anchor to a particular reference point increases with more uncertainty and information asymmetry. Therefore, one can argue that the effect of the 52-week-high on the offer premium should be higher in deals with more information asymmetry and uncertainty. This is why cross-border deals form an interesting sample to study anchoring in offer price formation. Deals that span multiple geographies are subject to different cultures, negotiation styles, legal systems, regulatory practices, etc- leading to more uncertainty and asymmetry around the deal process (Smith et al, 2019). Therefore, the second hypothesis of this study is that cross-border deals should exhibit greater reference dependence than domestic deals. The study takes the examination of reference dependence in cross-border deals even further. Not all cross-border deals are equal in terms of differences in legal systems, regulatory practices, etc. For example, a deal between a United States-based acquirer and a Canadian target may be much less complex than a deal between a United States acquirer and an Indonesian target. The study uses legal origin as a proxy to represent differences between countries on the aforementioned metrics of legal systems, regulatory practices, negotiation styles, etc (based on La Porta et al, 1998). In other words, countries with different legal origins are much more different than countries with the same legal origins. From the findings of Kahneman and Tversky (1979), one can argue that within cross-border deals, deals with differing legal origins should have higher uncertainty and information asymmetry. Thereby, the third hypothesis of this study is that deals, where the legal origins of the target and acquirer differ, exhibit higher reference dependence on the 52-week high.

The findings corroborate the hypotheses of the study. For Hypothesis 1, the results suggest that there is a significant and positive influence of the 52-week high on the offer premium. For every 10% increase in the 52-week high, the offer premium is found to increase on average by 2.14%. Further, the 52-week high's effect is diminishing, implying that the further away from the current stock price the 52-week high is, the less of an influence it has on the offer premium. This is presumably because in such cases the 52-week high stops being a relevant reference point in the eyes of the acquirer and target. The sign and statistical significance of the results of Hypothesis 1 are in line with the findings in Baker et al (2012). With regards to Hypothesis 2, the results suggest that in cross-border deals the effect of the 52-week high on the offer premium is much higher than the effect in domestic deals. In the presence of controls, the added effect in cross-border deals is on average 3.34%. The non-linearity in cross-border deals is higher than in hypothesis 1, suggesting that the diminishing

effect of the 52-week high is stronger for cross-border deals. Concerning Hypothesis 3, the results are positive. Offer premiums in deals where the legal origins of the acquirer and target differ exhibit higher reliance on the 52-week high. On average, the increase in the effect of the 52-week high on the offer premium is 1.84% in deals with differing legal origins. By establishing reference dependence in cross-border deals, this study contributes to existing literature and provides potential support for future studies. The outcomes of this research may provide relevant insight for academic research on offer prices, capital allocation, and post-announcement returns in cross-border M&A deals.

The flow of this study is as follows. Chapter 2 introduces and explains key literature and empirical findings in the domains of decision making, behavioural finance, and M&A. Chapter 3 describes the key hypotheses that are to be tested in the study and the rationale behind them. Chapter 4 introduces and describes the sample of deals to be studied and also lays down the methodology to test the aforementioned hypotheses. Chapter 5 includes a discussion of the key results of the study. And lastly, Chapter 6 summarizes the study while providing insight into some limitations and the scope for future study.

Chapter 2 Literature Review

2.1 Decision Making under Uncertainty

The Expected Utility Framework has been the central model of decision making in economics ever since its inception, which can be traced back to Bernoulli in the 18th century. As per this framework, an individual faced with risky outcomes must pick the outcome with the highest 'Expected Utility'- which is the average of utilities of the outcomes, weighted by their probabilities. In classical economics, this theory is generally used as a normative theory of decision making (Keeney and Raiffa, 1976) and is widely accepted as the work-horse descriptive or predictive model of economic behaviour (Freidman and Savage, 1948). However, as pointed out by March and Simon (1958), the decision-making process as proposed by the model is extremely complex; requiring an almost impossible understanding of the outcomes and their probabilities. We also see empirical evidence that demonstrates significant departures from the model's predictions. For example, Kahneman and Tversky (1979) show that preferences of individuals towards risky prospects are contrary to the axioms of expected utility theory, in that they tend to underweight low probability events. Thaler (1980) shows that the loss of utility associated with giving up a valued good is higher than the gain associated with receiving it, a phenomenon labelled the Endowment Effect. More generally, we see in the literature that decision making under uncertainty is very complex, and therefore is vulnerable to the influence of biases and heuristics (Kahneman and Tversky, 1974; Kahneman and Tversky, 1984). As shall be elaborated on in the subsequent sections, the work on heuristics and biases has long been applied to anomalous decision-making in finance, leading to the creation of the field of Behavioural Finance.

2.2 Reference Points, Anchoring Adjustment and Prospect Theory

Kahneman and Tversky (1974) propose that beliefs about uncertain outcomes are represented through odds or subjective probabilities, and that the assessment of these probabilities is a difficult process. Thereby, individuals resort to heuristics that water down the complex tasks of judging odds and predicting future values. One such heuristic is what Kahneman and Tversky (1974) call the Anchoring Bias. They find that while forming estimates, individuals start from some salient, sometimes economically insignificant, anchor or reference point. Small and insufficient adjustments are then made from this anchor to reach a value that is acceptable to the individual. This tendency to gravitate towards the reference point is accentuated with uncertainty, information asymmetry, and the computational complexity of the decision. This

finding challenges the notion of standard economic choice models that preferences are not dependent on current holdings. Kahneman and Tversky (1979) build on their anchoring research in their seminal work on prospect theory. They propose a theory where individuals treat gains and losses differently. More specifically, they assert that when faced with a risky choice leading to gains, individuals tend to be risk-averse- leading to a concave value function. Conversely, when the choice potentially leads to losses, individuals exhibit risk-seeking behaviour- leading to a convex value function. Furthermore, they note that the potential gains and losses are judged relative to a specific reference point. The reference is derived from the context at hand, or selected based on either the status quo or aspirational levels. The combined effect of reference dependence, loss aversion, and diminishing sensitivity creates an asymmetric S-shaped value function. Essentially, Kahneman and Tversky (1979) suggest two major modifications to expected utility theory- (i) the carriers of value are gains and losses and not end states, and (ii) the utility of each outcome should be multiplied by a decision weight. This finding is further corroborated by experiments conducted by Kahneman, Knetsch and Thaler (1990), which demonstrate that two groups (buyers and sellers) exhibit significantly different preferences for the same decision problem, and this is because their reference states differ. There is some interesting insight into the relationship between risk and anchoring in Kahneman and Lovallo (1993)**.** Specifically, they conclude that decision-makers treat problems as unique (called the Isolation Effect), and therefore ignore past and future considerations. In such a scenario, there is a tendency to be over-optimistic and partake in risky behaviour as estimates are anchored to internally formed beliefs of success. Kahneman and Tversky (1992) combine the frequency model of Diener et al (1990) and Norm theory (Kahneman and Miller, 1986) to propose a framework of evaluation when there are multiple reference points. They conclude that an outcome can be attractive with respect to one reference point and unattractive when compared to another. The overall perception of the outcome in the presence of multiple reference points, according to Kahneman (1992), is driven by memory and not logic. This is similar to evidence on the effect of momentary mood and context on judgements of well-being (Schwarz and Strack, 1990).

Anchoring and Prospect Theory have found myriad applications in behavioural finance, yielding a wealth of literature. For example, Li and Yu (2012) show that analysts and traders have a propensity to use the 52-week high of the DJIA as an anchor for their forecasts, and this leads to exploitable stock return predictability. According to Cen et al (2013), Earnings-per-Share forecasts of equity analysts are subject to an anchoring bias- the median industry EPS is used as the anchor. Baker and Xuan (2009) provide evidence for the fact that stock issuance

decisions are made relative to the stock price at which the CEO joined the company. Shefrin and Statman (1985) introduce the disposition effect (the tendency to sell winners and hold on to losers) as an extension and application of prospect theory. Most disposition effect literature uses the original purchase price as the reference measure of choice, which is a natural reference against which investors can evaluate gains and losses. There is also evidence of reference-dependence influencing negotiations. Kahneman (1992) notes that reference points can be used in hopes of anchoring the other party's view to a desirable position, Negotiators take advantage of this by quoting high claims or making low offers to completely shift the opposition's perspective. We also see in Bazerman and Carroll (1987) that loss-aversion can sometimes complicate negotiations. Experimental evidence suggests that negotiations presented as a loss are much less likely to be successful than those framed as a gain. With regards to specific reference points, there is seemingly strong evidence for the salience of the 52-week high stock price. Barberis and Xiong (2009) study the disposition effect and find that investors are more likely to sell a stock as it approaches its 52-week high. Huddart et al (2009) provide evidence of discontinuous increases in trading volumes of a stock as it approaches its 52-week high. Based on research conducted by Driessen et al (2010), we know that there is a strong link between the 52-week high and option-implied stock volatility. Anecdotes from Baker et al (2012) clearly exhibit the salience of the 52-week high in shareholder and investor communications. This evidence suggests that the 52-week high stock price serves as a common anchor, primarily due to its salience as it is an easily available and commonly quoted value.

One of the most important applications of anchoring and prospect theory is in the study of mergers and acquisitions. As Baker et al (2012) point out, valuation in merger deals is a complex, subjective process and is therefore conducive to anchoring to some salient reference point. The subsequent sections highlight key developments in traditional M&A literature, explain established determinants of offer prices, and introduce the usage of reference points in understanding M&A activity.

2.3 Traditional M&A Theories

Mergers and Acquisitions are one of the most studied topics in corporate finance. Consequently, there is plenty of literature that seeks to explain the drivers, determinants, and characteristics of M&A deals. The literature on M&A has gone through several shifts in perspective. Early research applied the neoclassical model (Meeks, 1977; Jovanovic and Rousseau 2002) of mergers being instruments of efficient allocation of resources. This was followed by the irrationality-based explanations of market-timing (Shleifer and Vishny, 2003)

where market mispricing drives mergers, and managerial overconfidence (Roll, 1986; Malmendier and Tate, 2008) where overly optimistic managers undertake excessive merger activity. A more recent strand of M&A literature uses insights from prospect theory and the anchoring model to understand the various facets of M&A deals (Baker et al, 2012).

Neoclassical theories consider mergers as a vehicle for the efficient reallocation of capital, driven by some industry shock (Jovanovic and Rousseau, 2002). The use of such theories is evident in studies about the various 20th-century merger waves. During the conglomerate merger wave of the 1960s, technical know-how and capital were added to targets by financially strong bidders, leading to larger and more efficient entities (Meeks 1977). These very conglomerates were then broken apart by financial raiders in the takeover wave of the 1980s due to inefficiencies in existing corporate structure (Bhagat, Shleifer and Vishny, 1990). Deregulation drove mergers in the 1990s leading to consolidation of key industries (Holmstrom and Kaplan, 2001). Since mergers improve the allocation of capital, neo-classical theory predicts that they must increase profitability and performance. But the evidence on this is inconclusive. Schneider and Spalt (2017) show that in the period from 1987 to 2008, acquirer values declined by as much as 2.8% when acquiring a risky target and by as much as 0.6% on acquisition of a safe target. Ravenscraft and Scherer's (1989) study of the period of conglomerate mergers fails to find conclusive proof of improvements in profitability. Neo-classical explanations also fail to explain deal characteristics such as the method of payment, probability of success, etc and do not provide compelling evidence for the aggregate level of merger activity (Shleifer and Vishny, 2003).

Market-timing theories assert that merger activity is driven by misvaluation and successfully predict the time-series relation between merger volume and stock prices. They assume that financial markets are inefficient and hence value some companies incorrectly. Rational managers act on this misvaluation and therefore mergers are a form of arbitrage. Shleifer and Vishny (2003) find that deal determinants and characteristics are linked to relative valuations of the combining firms and synergies as perceived by the market. They also explain that market valuations drive the method of payment in M&A deals (periods of high valuations are associated with more cash takeovers), post-merger returns, and aggregate levels of merger activity (therefore explaining merger waves). Similar research is undertaken by Rhodes-Kropf and Viswanathan (2005), who add to the findings of Shleifer and Vishny (2003) with evidence on who acquires whom. They find that acquirers on average have a higher Market-to-Book ratio than targets, a result also corroborated in Jovanovic and Rousseau (2002). Ang and Cheng (2006) find a positive correlation between market-level mispricing and merger volume and that

acquirers tend to be more overpriced than targets. Market-timing theories are successful in explaining certain characteristics of M&A deals but are inconclusive in explaining higher-than-warranted premiums paid in deals and value-destroying mergers. This is perhaps because these theories are restricted by their assumption of rationally acting managers.

The assumptions of irrational manager behaviour have been introduced by the field of behavioural corporate finance. Managerial overconfidence leads to managers overestimating their ability to succeed and potential synergies from a merger, which causes them to pay higher premiums (Malmendier and Tate, 2008). As opposed to market-timing theories, overconfidence theories assume that markets are rational while managers are irrational. The overconfidence hypothesis is similar to the agency theory of Jensen (1986) and the empire-building argument of Harford (1999), in that it predicts an increase in acquisitive activity at the expense of shareholder value. However, it diverges from traditional agency theory in that it assumes that the manager undertakes value-destroying mergers fully believing that it is in the best interest of shareholders. Roll (1986) first introduces the overconfidence perspective by linking CEO hubris to overpaying for targets, through the winner's cruse argument. More recently, Malmendier and Tate (2005) use option-based measures to identify overconfident managers and find that overconfidence is associated with higher and riskier investment, especially when abundant internal funds are available. This prediction is applied to M&A activity as well. Malmendier and Tate (2008) show that overconfident managers tend to overestimate the synergies that they can generate from a takeover, and as a result overpay for target companies. The authors also find an association between negative market reactions and overconfident CEO-led merger announcements.

2.4 Determinants of Offer Prices in M&A

From the acquirer's perspective, Moeller et al (2004) **s**how that larger acquirers, as measured by market capitalisation, pay more for targets. The authors posit that this could be due to managerial hubris, which overpowers the effect of bargaining power in negotiations. Furthermore, Shleifer and Vishny (2003) find that acquirers with a higher market-to-book ratio relative to the target, are willing to pay higher premiums. According to Betton and Eckbo (2000), a toehold stake helps reduce the premium paid in a takeover bid by limiting competition in the bidding process. The effect of target size and relative valuation is inconclusive (Lang et al, 1991), but with a newer dataset, Betton et al (2009) show that target size has a significant negative impact on offer premiums. Deal hostility has a significant effect on offer price (Betton et al, 2009). Hostile takeovers require higher offer premiums to convince incumbent

management to accept the deal terms. With regards to tender offers, the evidence shows that the effect on offer price is positive (Moeller et al, 2004). It is noteworthy that tender offers are fundamentally similar to hostile takeovers and therefore influence the offer price in a similar mechanism **(**Betton et al, 2009). Shleifer and Vishny (2003) show that the method of payment (stock or cash) depends on the relative valuations of the target and the acquirer. They posit that when the acquirer is relatively overvalued with respect to the target, there is a tendency to acquire using stock. This stock acquisition thereby increases the offer premium paid on paper. Schwert (1996) finds that takeover bids are typically preceded by a continuous rise in the target's stock price, which happens primarily in response to rumours of the takeover bid. The authors conclude that since the run-up is in anticipation of the bid, there is no discernible effect on the offer premium. To account for this run-up, Baker et al (2012) use the 30-day lagged stock price to scale the offer price.

2.5 Anchoring and Prospect Theory in M&A

Using the anchoring and adjustment work done by Kahneman and Tversky (1974), Baker et al (2012) develop a model to test the relevance of reference points in explaining M&A activity. They assert that past stock prices do not hold any information regarding future returns, and therefore these prices, even though salient, are not economically significant. They find that the recent 52-week high stock price of the target is significant in explaining offer premiums in M&A deals. There is also a discontinuous increase in deal success probability once the offer price crosses the 52-week high of the target. Baker et al (2012) also apply prospect theory (Kahneman and Tversky, 1979) to M&A and find that influence of the 52-week high on the offer premium reduces for higher values of the 52-week-high. More specifically, for 52-week high below 25%, the influence is 3.3%, for values between 25% and 75%, the influence is 1% and for values above 75%, the influence is lower at .07%. This result is consistent with the S-shaped value function of prospect theory. Chira and Madura (2015) build on the work of Baker et al (2012) to find that the probability of deal success depends on the reference points of both the target and the acquirer. According to Guo et al (2017), the interaction between the reference points of the bidder and the target influences the method of payment. Per Lee and Yeramilli (2019), deals that are announced when the relative value of the bidder with respect to target is close to the 52-week high tend to have higher offer premiums and are likely to be stock acquisitions. Reference point theories, unlike most traditional theories of M&A activity that exclusively focus on the bidder, include considerations of the target. According to Baker et al

(2012), reference points help explain offer premiums in a 'novel and economically significant fashion', while also providing unique insights into market reactions and deal success.

2.6 Cross Border M&A

Cross Border M&A is a relatively recent extension of M&A literature. Compared to domestic M&A deals, cross border takeovers are likely influenced by a wider range of factors. Aside from common economic factors, the literature lists differences in legal and accounting standards, culture, and political dynamics as factors influencing such deals. From a market timing perspective, Baker, Foley, and Wurgler (2004) discover that FDI outflows (read CBMA), increase with the current aggregate market-to-book ratio of the acquirer's stock market. Further, there is evidence that post-merger performance is higher when the bidding firm is from a stronger economy than the target firm (Chakrabarti et al, 2009). Not surprisingly, Erel et al (2012) find a positive relationship between the level of international trade and aggregate merger activity between two countries. Barbopoulos et al (2012) examine the effect of legal systems on cross-border acquisition returns in a study of UK acquiring firms. They find that acquiring firms with targets based in civil-law countries outperform acquirers of targets based in common-law countries. Further, they add that targets based in countries with greater capital controls then to provide higher value to shareholders as compared to targets that are not. La Porta et al (1998) finds that offer premiums are lower in French Civil and German Civil Law countries as compared to British Common Law countries due to differences in shareholder protection. Bris and Cabolis (2008), find that better shareholder protection and accounting standards in the acquirer's country are associated with higher merger premiums in cross-border deals, in line with La Porta et al (1998). Chakrabarti et al (2009) provide evidence that post-merger performance is higher in CBMA transactions where there is a difference in cultural values. However, Ahern et al (2015) show that the probability of a cross-border transaction going through is negatively associated with cultural distance. Dinc and Erel (2013) find that there is a significant relationship between nationalism and cross-border acquisitions. According to their study, governments on average prefer targets to be acquired domestically- and this belief is especially strong with weak governments.

The use of the reference point framework has not been extensively used in examining cross-border deals. Smith et al (2019) use the Baker et al (2012) model on a sample of cross-border deals and test for the effect of the 52-week high stock price of the target on offer premium. Controlling for variables that are known to affect cross-border acquisitions, they find that the effect of the 52-week high on the offer premium is higher in cross-border deals than

what is estimated in the domestic sample of Baker et al (2012). They attribute this prediction to differences in culture, negotiation styles etc- factors that might increase information asymmetry and uncertainty around deals.

Chapter 3 Hypothesis

Mergers and Acquisitions are complex deals. They are long, require various legal and corporate considerations, and involve multiple processes. As pointed out by Baker et al (2012), one of these complex processes is valuation. The standard textbook approach to setting a price in M&A deals is to estimate the increased value of the combined entity through synergies and growth options. More precisely, the final value is the sum of the value of the assets-in-place and estimates of future growth options and potential synergies. This gain in value is then divided between the shareholders based on the balance of bargaining power and this should lead to a single, definitive offer price. However, this process is much more subjective in reality. Firstly, there are multiple assumptions employed to get to a certain valuation, especially while estimating synergies and growth option value. This means that no valuation can be justified without its corresponding assumptions. These assumptions also vary based on whether the party is a bidder or a target, leading to discrepant valuations. Simple logic would suggest that a bidder would use assumptions to bring the price down as much as possible, while a target would make assumptions in a manner that would push the price higher. However, this is further complicated by the Overconfidence theory (Malmendier and Tate, 2008) which states that certain bidders may overestimate synergies and thereby overpay for targets.

Because the valuation process requires expertise and is time-consuming, it is common practice to hire investment bankers and advisors to execute a formal valuation on behalf of the parties. However, Baker et al (2012) point out that this does not help reduce discrepancies between buyer and seller, as bankers come up with a range of valuations based on either the acquirer's assumptions or the target's assumptions. Setting a single price therefore becomes difficult as this range of valuations needs to be negotiated on, along with other considerations. Secondly, there is a level of information asymmetry between the acquirer and the bidder. This might mean that valuation assumptions may be less informed and therefore harder to justify. This also manifests itself in negotiations where the more informed party has the upper-hand and might drive the negotiations (Kahneman, 1992). Taking all of this into consideration, it is reasonable to assume that parties in M&A deals might resort to certain shortcuts to arrive at an acceptable bid. For example, Gompers et al (2016) point out the growing use of multiples such as EV/EBITDA and EV/EBIT, especially by Private Equity funds, to arrive at a quick estimate of value. The extensive use of these multiples is in large part due to the salience of EBITDA and EBIT metrics- which are widely reported and easily understood.

On arriving at a certain valuation, the acquirer has to judge whether the bid will be accepted by the target and also justify it to its shareholders. While receiving the bid, the target has to judge whether this estimate of value is correct and, like the acquirer, justify it to its shareholders. Therefore, there are two challenges- estimating value, and judging if this value is correct and acceptable. This is where the Anchoring and Adjustment model of Kahneman and Tversky (1979) becomes useful and relevant. In the presence of uncertainty about the valuation and information asymmetry, there is a tendency to anchor expectations about the valuation to some salient reference point or anchor, and then make adjustments from the anchor to arrive at an acceptable value. As Baker et al (2012) show, bidders use the 52-week high as an anchor to arrive at a valuation, and hence a price, for the target's shares. This anchor can also be used to justify the offer price to the bidder's shareholders since the 52-week high serves as a reflection of the target's value in the past. In the bidder's eyes, the 52-week high also serves as a minimum price that the target might accept. When an offer is made, it falls on the target shareholders to either accept or reject it. Target shareholders do not have the means, expertise, or time to conduct a thorough valuation, and therefore display a tendency to use the 52-week high as a reference point (Baker et al, 2012; Chira and Madura, 2015). They also view it as the highest attainable price that they can receive for their shares. Baker et al (2012) apply Prospect Theory to show that the influence of the 52-week high on the offer premium reduces the further away the 52-week-high gets from the current stock price. The first hypothesis of this study has to do with applying the framework used by Baker et al (2012) on a novel dataset and test the reliance of the offer price on the 52-week high and examine any possible non-linearity in the relationship-

Hypothesis 1*: There is a positive relationship between the offer premium and the 52-week high stock price of the target. This relation diminishes as the 52-week high stock price increases as compared to the current stock price.*

According to Kahneman and Tversky (1979), the tendency to use an anchor increases with higher uncertainty and information asymmetry. By that logic, the tendency to use the 52-week high as an anchor for the offer premium should be higher in cross-border deals. These deals potentially have higher information asymmetry and uncertainty as compared to domestic deals due to differences in legal systems, accounting standards, financial practices, culture,

negotiation styles, etc. Therefore, the tendency to rely on heuristics should be higher. As long as the target is a listed company, the 52-week high should serve as a salient anchor for the offer price and should exert a higher influence on the offer premium than in domestic deals. Though it is also important to note that due to the information asymmetry and uncertainty surrounding these deals, there could be stricter due diligence, more regulatory stringency, and greater involvement of consultants- leading to a lower reliance on reference points. The second hypothesis tests for the influence of the 52-week high on the offer premium in the context of cross-border mergers and acquisitions-

Hypothesis 2: *The positive relationship between the offer premium and the 52-week high stock price of the target is higher in cross-border deals as compared to domestic deals.*

Based on the metrics of legal systems, regulatory practices, negotiation styles, culture, etc, a pair of countries might be more "different" than another pair. This leads to a variation within cross-border deals. For example, a deal between a US acquirer and Canadian target might be prone to less uncertainty and information asymmetry than a deal between a US acquirer and Indonesian target. Therefore, the effect of the 52-week high must be less in deals between similar countries than that in deals between different countries. This study uses legal origin as a proxy to measure the proximity or difference between countries in terms of laws, regulations, culture etc, as per La Porta et al (1998). Smith et al (2019) also use legal origin in their analysis of cross-border mergers and acquisitions to estimate the impact of shareholder rights on deal activity and reference dependence. Differences in the legal origin of the acquirer and the target, represent differences in laws, regulatory standards, and maybe even corporate culture for the parties involved- creating more uncertainty and asymmetry. The third hypothesis tests for the influence of the 52-week high on the offer premium in the context of differing legal origins of the acquirer and the target-

Hypothesis 3: *The positive relationship between the offer premium and the 52-week high stock price of the target is higher in deals where the legal origins of the acquirer and target differ.*

Chapter 4 Data and Methodology

4.1 Description of Sample

The M&A deal data for this study comes from the Thomson One database. Thomson One provides deal-wise data on the offer price, type of deal, type of payment, deal hostility, announcement date, and various financials of the target and acquirer. All stock price data is collected from Worldscope. US Dollar values are used for all monetary data points. The final sample is created based on the following parameters in line with Baker et al (2012):

1. The deal is announced between 01/01/2010 and 06/17/2020. This is different from the sample used in Baker et al (2012) which consists of deals announced between 01/01/1987 and 31/12/2007. The rationale behind using a newer dataset is to make the study more relevant. Furthermore, deals in 2008 and 2009 are excluded to avoid any potential anomalous effects of the global financial crisis. Since this is a study of cross-border deals, the sample is not limited to domestic US deals like Baker et al (2012).
2. The deal is conditionally or unconditionally completed.
3. The offer price for the target's shares is available in the Thomson One Database
4. The target is publicly listed.
5. The deal is accretive, i.e., the earnings-per-share of the combined entity is greater than the earnings-per-share of the acquirer in the last twelve months before the acquisition.
6. The deal is not classified as a recapitalisation, leveraged buyout, repurchase, spin-off, or privatization in the Thomson One database.
7. Rumoured deals are excluded.
8. Deals solicited by the target are also excluded as in such a deal the target might be inclined to accept a deal below the 52-week high, regardless of reference dependence.
9. Deals where the intention is to buy a minority participation are excluded. Thereby, only deals where the acquirer purchases at least 50% of the target's shares are included.

This selection process yields 3799 deals. There are 3236 deals left after eliminating deals for which the offer price, the target stock price 30 days before the announcement date and the target 52-week high stock price leading up to 30 days before the announcement date are not available. Table 4-1 describes the sample. Out of the 3236 deals, 758 (23.4%) are cross border acquisitions. The majority of the deals, 1767 (52.60%), are cash financed. The sample also consists of 796 (24.59%) stock financed deals and 673 (20.79%) deals where the mode of

payment is not primarily cash or stock. There are 116 deals where the approach was hostile (3.5%). The annual average offer premium ranges between 21% and 30%. This range is much more moderate than that in the Baker et al (2012) sample- which ranges from 20% to almost 40% in some cases. Most importantly, there are 304 deals where the legal origin changes (acquirer and target legal origins are not the same), which represents 9.39% of the total sample and around 40% of the cross-border deals.

Table 4-1: Sample Description. *(CBMA represents Cross-Border Deals)*

Year	Total Deals	Total CBMA	Cash Deals	Stock Deals	Other Payment	Hostile Deals	Offer Premium
2010	374	101	215	66	93	12	26.78%
2011	319	72	179	64	76	23	28.20%
2012	302	76	169	64	69	6	29.52%
2013	279	55	167	64	48	10	26.16%
2014	345	74	185	84	76	12	21.49%
2015	363	84	194	98	71	9	24.22%
2016	337	72	194	83	60	11	24.20%
2017	307	76	171	84	52	17	24.32%
2018	337	72	152	105	80	14	22.34%
2019	250	70	127	76	47	2	28.60%
2020	23	6	14	8	1	0	29.74%
Total	3236	758	1767	796	673	116	

Following La Porta et al (1998) and Smith et al (2019) findings that shareholder rights vary based on legal origin and therefore influence mergers and acquisitions, the deals in the sample are categorized into 4 key legal origins- British Common Law, French Civil Law, German Civil Law, and Scandinavian Civil Law. The sample spans 73 countries and legal origins are determined per La Porta et al (1998). Table 4-2 describes the legal origins of the deals in the sample. The majority of acquirers and targets in the sample are domiciled in countries with English Common Law origins, with 72.65% and 76.89% representation respectively. This is because major countries such as the US, UK, Canada, and India all have legal origins based in English Common Law. The second most represented legal origin is German Civil Law, which makes up 18.63% of the acquirer sample and 15.20% of the target sample. Most European

countries, China and Japan have legal origins in German Civil Law. French Civil Law origin represented by 6.61% of acquirers and 5.93% of targets, consists of Spain, Italy, and Southeast Asian countries among others. The least represented is Scandinavian Civil Law with 2.10% of targets and 1.98% of targets, consisting of Scandinavian countries.

Table 4-2: Description of Sample based on Legal Origin

	All Deals		Cross Border Deals	
	N	%	N	%
Acquirer Legal Origin				
English Common Law	2351	72.65%	479	63.19%
French Civil Law	214	6.61%	90	11.87%
German Civil Law	603	18.63%	158	20.84%
Scandinavian Civil Law	68	2.10%	31	4.09%
Target Legal Origin				
English Common Law	2488	76.89%	616	81.27%
French Civil Law	192	5.93%	68	8.97%
German Civil Law	492	15.20%	47	6.20%
Scandinavian Civil Law	64	1.98%	27	3.56%
Change of Origin Deals	304	9.39%	304	40.11%

4.2 Description of Variables

For purposes of this study, the dependent variable of interest is the offer price paid per share for the target, and the independent variable of interest is the 52-week high of the target prior to the announcement date. The study includes dummy variables to represent cross-border deals, legal origin, and changes in legal origin. For purposes of robustness, control variables for deal hostility, method of payment, and size of the target are included. The variables and their definitions used for this study are as follows:

LnOfferPrice is the Offer price per share of the target expressed as a log difference from the target's stock price 30 days prior to the announcement date. This serves as a good measurement for offer premium (Baker et al, 2012). In case of multiple bids, the bid that is accepted is used

as the offer price. This variable serves as the dependent variable of interest and is winsorized at 98% (top 1% and bottom 1%) to account for outliers. Figure 1 shows the distribution of this variable. The average in the sample is 0.255 and the median is 0.258.

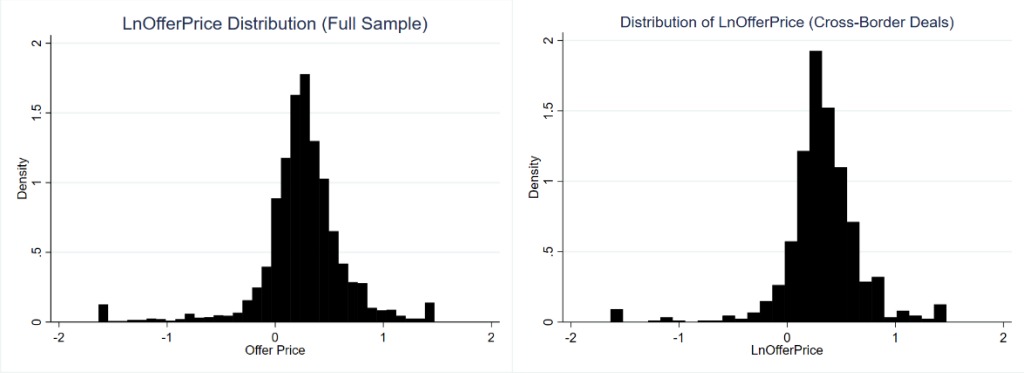

Figure 1: Distribution of LnOfferPrice for full sample and for a sample of cross-border deals only

Ln52wkhigh is the 52-week-high stock price of the target in the period leading up to 30 days before the announcement date, expressed as a log difference from the target's stock price 30 days before the announcement date. Both the offer price and 52-week-high are scaled in this manner to avoid heteroskedasticity issues. This variable is also winsorized at 98% to account for outliers. Figure 2 shows the distribution of this variable. As in Baker et al (2012), the 30-day lagged stock price is used to scale offer price and 52-week-high variables to attenuate the effect of any run-up in the target stock price that may be caused due to rumours about the bid. Figure 2 plots the distribution of this variable. The mean in the total sample is 0.361 and the median is 0.221.

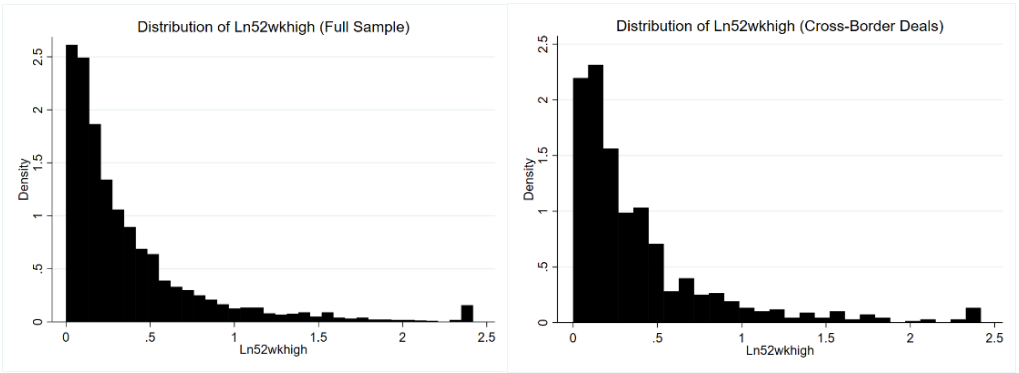

Figure 2: Distribution of Ln52wkhigh for the full sample and a sample of cross-border deals only

CBMA is a dummy variable that indicates whether a deal is cross-border. Takes value 1 for cross-border deals and 0 for domestic deals.

Target Ln(marketcap) is the natural logarithm of the market capitalization of the target firm 30 days prior to the announcement date. Betton et al (2009) note that target size has a significantly negative effect on the offer price because smaller firms are easy to integrate and thereby are more valuable. Baker et al (2012) also find a negative effect of target size on offer premiums.

Difference is the difference between LnOfferPrice and Ln52wkhigh

Hostility is a dummy variable indicating if the deal approach was hostile. Takes value 1 for a hostile takeover. According to Betton et al (2009), hostile takeover attempts often require higher premiums to be successful.

Stock Payment is a dummy variable indicating if the mode of payment was common stock. Takes value 1 for stock financed deals.

Other Payment is a dummy variable indicating if the mode of payment was primarily not common stock or cash. Takes value 1 for such cases. Shleifer and Vishny (2003) show that the method of payment does have an influence on the offer premium based on the relative valuations of the target and acquirer. Since there are dummies for stock and other payment, naturally, the baseline is cash financed deals.

FR is a dummy variable equal to 1 when the acquirer is from a French Civil law country

DE is a dummy variable equal to 1 when the acquirer is from a German Civil law country

SC is a dummy variable equal to 1 when the acquirer is from a Scandinavian Civil law country

Change is a dummy variable equal to 1 when the acquirer's and target's legal origins are not the same

Table 4-3: Summary Statistics.

Variable	N	Mean	Std. Dev	5%	25%	50%	95%
Offer Price (%)	3236	25.5%	40.3%	-26.9%	10.2%	25.8%	82.9%
52-week-high (%)	3236	36.1%	42.9%	2.1%	9.5%	22.1%	127.9%
Target Ln(marketcap)	3236	5.149	2.223	1.542	2.249	5.120	8.717
CBMA	3236	0.234	0.424	0	0	0	1
Hostility	3236	0.036	0.186	0	0	0	1
Stock Payment	3236	0.246	0.431	0	0	0	1
Other Payment	3236	0.208	0.405	0	0	0	1

FR	3236	0.066	0.249	0	0	0	1
DE	3236	0.186	0.389	0	0	0	1
SC	3236	0.021	0.143	0	0	0	0
Change	3236	0.094	0.292	0	0	0	1

Table 4-3 provides a description of the variables used in the study- the frequency, mean, standard deviation, and various percentile values. The average offer premium in the sample is 25.5% which is lower than the average in Baker et al (2012) (32.36%), whilst the standard deviation of 40.3% is higher (27.68% in Baker et al (2012)). This wide variation persists despite winsorization. The scaled 52-week-high stock price has a mean of 36.1% and a standard deviation of 42.9%, both of which are higher than the statistics in Baker et al (2012) (34.88% and 41.45% respectively). The two variables are close in terms of mean and dispersion. Target Ln(marketcap) has a mean of 5.149 and a standard deviation of 2.223. Factor variables used as controls show summary statistics in line with the description provided in Table 1. Dummy variables used to denote legal origin are in line with the description provided in Table 2.

4.3 Methodology

4.3.1 Hypothesis 1

To test the first hypothesis, this paper utilises the framework set out by Baker et al (2012). The influence of the 52-week high stock price of the target on the offer premium is tested in the presence of several controls for deal and target characteristics, while also controlling for year effects. The dependent variable of interest is LnOfferPrice which is the offer price per share of the target normalized by the target's stock price 30 days before the announcement. The independent variable of interest is Ln52wkhigh which is the target's 52-week high stock price in the up until 30 days before the announcement period, normalized by the target's stock price 30 days prior to announcement. The basic functional form is specified as,

$$LnOfferPrice_{i,t} = \alpha + \beta Ln52wkhigh_{i,t-30} + \epsilon_{it} \qquad (\boldsymbol{i})$$

For purposes of robustness, various controls are added to Eq (i), in which case the functional form is specified as,

$$LnOfferPrice_{i,t} = \alpha + \beta_1 Ln52wkhigh_{i,t-30} + \beta_n Vector\ of\ Controls + \epsilon_{it} \qquad (\boldsymbol{ii})$$

Eq. (i) and (ii) are estimated as fixed effects regressions where the year effects are controlled for. Fixed year effects are used to account for any influence of aggregate trends in the data. The regressions are conducted on three different samples. Firstly, on the entire sample of 3236 deals, followed by samples consisting of only cross-border deals and only domestic deals.

This study also looks into possible non-linearity in the relationship between the offer premium and the 52-week high. In line with prospect theory, Baker et al (2012) show that the influence of the 52-week high on the offer premium diminishes for higher values of the 52-week high. In other words, the further this reference point is from the current stock price (in our case the stock price of the target 30 days before the announcement), the less of an influence it has on the offer premium. This is perhaps because the further away the reference point (the 52-week high) is from the current situation (current stock price), the less relevant the reference point becomes in the eyes of the participants of the deal. This leads to a lower influence of the reference point and maybe a change of reference point itself. To examine potential non-linearity, the RESET-test and Gaussian Kernel Regressions on the specification expressed in Eq. (i) are conducted. The Ramsey Regression Equation Specification Test (RESET) is a test used to identify potential misspecification of the functional form (Ramsey, 1969). More specifically, it tests whether a non-linear combination of the independent variables has better explanatory power compared to a linear specification. To that end, it is an F-test of the difference in the R-squared values of linear and non-linear specifications. The RESET test is used in conjunction with a Gaussian Kernel Regression to inspect for potential non-linearity. The Gaussian Kernel Regression is a form of non-parametric regression that does not impose any assumption on the shape of the relation (Eubank, 1988). A formal test would involve comparing the average derivative of the 52week high obtained from the Gaussian Kernel Regression to the coefficient of the 52-week high as found in the OLS estimation of Eq. (i). For purposes here, examining the plot of the conditional means of the offer premium suffices. After inspection through the RESET and Gaussian Kernel methods, the functional form specified in Eq. (iii) is extended to include a quadratic term to account for non-linearity,

$$LnOfferPrice_{i,t} = \alpha + \beta_1 Ln52wkhigh_{i,t-30} + \beta_2 \left(Ln52wkhigh_{i,t-30}\right)^2$$

$$+\beta_n Vector\ of\ Controls + \epsilon_{it} \qquad (\boldsymbol{iii})$$

As with the previous estimation, this equation is estimated using a fixed-effects regression with year effects fixed. Furthermore, it is estimated for the entire sample of 3236 deals as well as a

purely cross-border and purely domestic sample. The coefficient of the squared Ln52wkhigh term provides information on the nature and significance of the non-linearity.

4.3.2 Hypothesis 2

Next, the study aims to understand the effect of the 52-week high on offer premiums in the context of cross-border deals. Deals spanning different geographies also span different legal systems, regulatory practices, negotiation styles, and cultures; which may increase the reliance on a reference point in price formation. The analysis starts with defining a variable *Difference* which is the difference between LnOfferPrice and Ln52wkhigh. Preliminary T-test and Wilcoxon Rank Sum Test are conducted on this variable to test differences between the cross-border and domestic samples. After this preliminary analysis, a dummy variable is introduced to indicate if a deal is cross-border. Therefore, the specification then is,

$$LnOfferPrice_{i,t} = \alpha + \beta_1 Ln52wkhigh_{i,t-30} + \beta_2 CBMA +$$

$$\beta_3\left(CBMA * Ln52wkhigh_{i,t-30}\right) + \beta_n(Vector\ of\ Controls) + \epsilon_{it} \qquad (\boldsymbol{iv})$$

Eq. (iv) is estimated on the entire sample, using a fixed-effects regression where the year effects are controlled for. The interaction term between the cross-border dummy and Ln52wkhigh is key here as it indicates the incremental effect of the cross-border nature of the deal on the influence of the 52-week high on the offer premium. Further, the study also examines the non-linearity in cross border deals. Inspection of possible non-linearity is done using the RESET-test and Gaussian Kernel Regression. Post this, the following specification is estimated using year fixed effects regression,

$$LnOfferPrice_{i,t} = \alpha + \beta_1 Ln52wkhigh_{i,t-30} + \beta_2\left(Ln52wkhigh_{i,t-30}\right)^2 + \beta_3 CBMA +$$

$$\beta_4\left(CBMA * Ln52wkhigh_{i,t-30}\right) + \beta_4 CBMA * \left(Ln52wkhigh_{i,t-30}\right)^2$$
$$+ \beta_n(Vector\ of\ Controls) + \epsilon_{it} \qquad (\boldsymbol{v})$$

The coefficient of the interaction term between CBMA and the squared Ln52wkhigh term indicates the effect of the cross-border nature of the deal on the non-linearity of the relationship between the 52-week high and the offer premium.

4.3.3 Hypothesis 3

Hypothesis 3 deals with the effect of the 52-week high reference point in the context of deals where the acquirer and target have different legal origins. A difference in legal origin is used to represent differences in legal systems, regulatory practices, negotiation styles etc that are characteristic of cross-border deals. It is hypothesized that offer premiums in deals spanning multiple legal origins should exhibit higher reliance on a reference point owing to greater uncertainty and information asymmetry. To test this, the study begins with a T-test and Wilcoxon Rank Sum test to examine the Difference variable in deals with the same and different legal origins. After this preliminary analysis, the following specification is estimated using a fixed-effects regression-

$$
\begin{aligned}
LnOfferPrice_{i,t} &= \alpha + \beta_1 Ln52wkhigh_{i,t-30} + \beta_2 CBMA + \beta_3\left(CBMA * Ln52wkhigh_{i,t-30}\right) \\
&+ \beta_{4-6}(Legal\ Origin\ Dummies) \\
&+ \beta_{7-9}(Legal\ Origin\ Dummies * Ln52wkhigh) \\
&+ \beta_{10}\left(Change\ Dummy * Ln52wkhigh_{i,t-30}\right) + \beta_n(Vector\ of\ Controls) \\
&+ \epsilon_{it} \qquad (\boldsymbol{vi})
\end{aligned}
$$

Chapter 5 Results

5.1 Hypothesis 1: Effect of 52-week-high on Offer Premium

Figure 3 plots the distribution of the difference between the offer premium and 52-week-high for the entire sample. In line with Baker et al (2012), the values are clustered around zero and there is a noticeable spike for values just above zero. The difference variable has a mean of -0.115 but a positive median of 0.0157. The fact that the offer premium and 52-week high are this close to each other for a large majority of deals, suggests that the offer premium is biased towards the 52-week high.

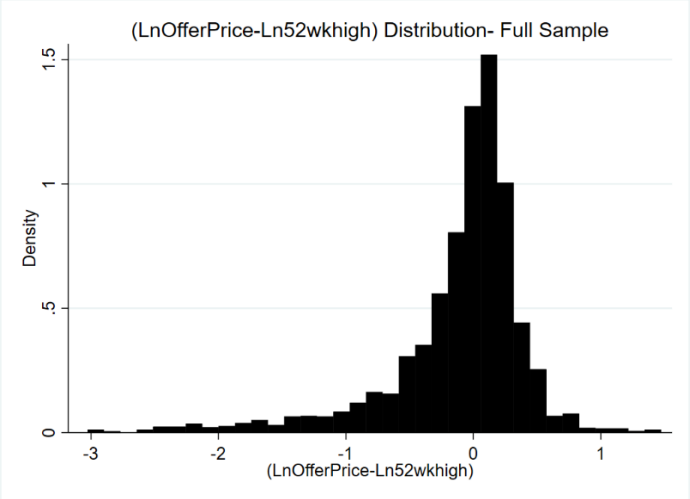

Figure 3: Distribution of Difference= (LnOfferPrice-Ln52wkhigh) for the entire sample

Along with examining the influence of the 52-week high on the offer price, this study also aims to examine a possible non-linear relationship between the two. The conditional mean function plot in Figure 4 from the Gaussian Kernel Regression points towards a potential non-linear relationship. The bandwidth for the kernel regression is between 10 and 40 estimation points. Designated breakpoints at 0.5 and 0.68 are noticeable and the relationship seems to breakdown beyond 0.68. These breakpoints are similar to what Baker et al (2012) find (breakpoints at 0.25, 0.5, and 0.75). Table 5-1 provides the results of the RESET-test for checking the specification of the functional form. In line with the results of the kernel regression, the linear specification has a significant F-value 3.82 resulting in rejection of the null hypothesis that the functional form is correctly specified. The RESET-test is re-run with a squared term for different samples based on the breakpoints suggested in the kernel regression. Both tests return insignificant F-

stat values of 1.47 and 0.66, suggesting that the functional form is correctly specified. This is in agreement with the piecewise regressions run by Baker et al (2012).

Table 5-1: Results of RESET-test (Full Sample)

Specification: $LnOfferPrice = \alpha + \beta Ln52wkhigh + \epsilon$		
H0: Functional form is correctly specified		
	F-stat	P-value
Without squared term	3.82	0.0042
With squared term		
Ln52wkhigh<0.5	1.47	0.2088
0.5<Ln52wkhigh<0.68	0.66	0.5193

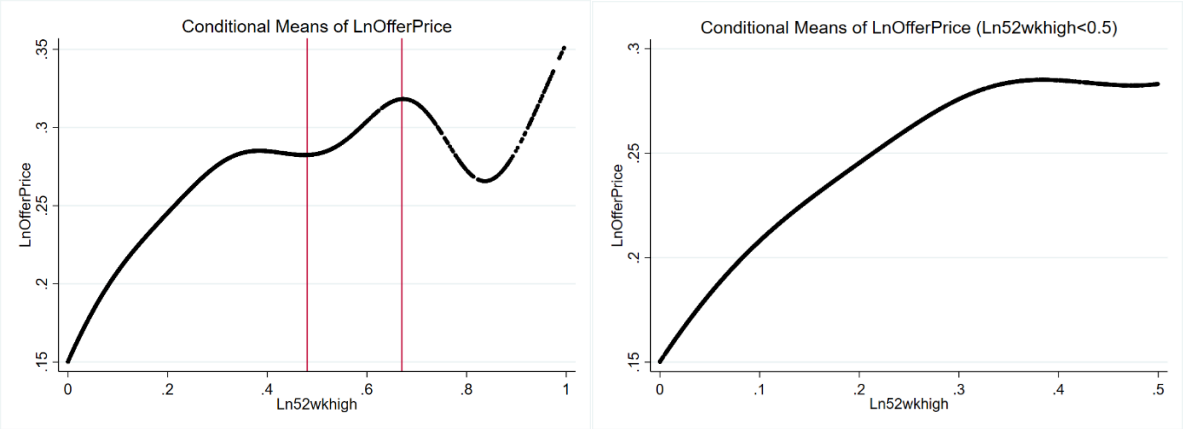

Figure 4: Non-Linear Effects. Conditional Means from Gaussian Kernel Regression estimation of Eq (i)

Table 5-2 describes the results of the estimation of Eq (i), (ii), and (iii). As mentioned earlier, LnOfferPrice is the offer price for the target's shares expressed as a log difference from the target's stock price 30 days before the announcement date. Ln52wkhigh is the 52-week high stock price of the target in the period leading up to 30 days before the announcement date, expressed as a log difference from the target's stock price 30 days before the announcement. The rationale behind using the 30-day lagged price is to account for any stock price run-ups due to rumours about the deal. The regressions are estimated by keeping year effects fixed.

The simple linear relationship between the offer premium and the 52-week high is represented in Model 1. The influence of the 52-week high is positive and significant. The coefficient of 0.176 implies that for every 10% increase in the 52-week high, the offer premium

goes up by 1.76%. Model 3 adds control variables for robustness purposes, and the results persist- the coefficient of the 52-week high is still positive and significant in the presence of control variables. The RESET-test and Kernel Regression indicated the potential for a non-linear relationship. From Model 2, it is evident that the squared 52-week high term is significant and negative, which points towards the diminishing effect of the 52-week high. The non-linearity also holds up in the presence of controls.

Table 5-2: Estimation Results for Hypothesis 1. Influence of 52-week-high on offer premium.

DV: LnOfferPrice	Full Sample			
	1	2	3	4
Ln52wkhigh	0.176***	0.224***	0.166***	0.214***
	(10.93)	(13.21)	(10.04)	(12.30)
$(Ln52wkhigh)^2$		-0.044***		-0.043***
		(-8.20)		(-8.25)
Stock Payment			-0.119***	-0.117***
			(-5.52)	(-5.46)
Other Payment			-0.182***	-0.179***
			(-8.01)	(-7.94)
Hostility			-0.044	-0.049
			(-0.93)	(-1.05)
Target Ln(marketcap)			-0.020***	-0.020***
			(-4.80)	(-5.02)
Constant	0.191***	0.192***	0.367***	0.372***
	(18.07)	(18.40)	(13.38)	(8.71)
N	3236	3236	3236	3236
Fixed Year Effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.036	0.056	0.064	0.083

*, **, *** represent significance at 10%, 5%, 1% respectively. T-stat reported in parenthesis.

The positive coefficient is in line with Baker et al (2012), who also find a positive and significant relationship between the 52-week high and the offer premium in the range of 0.096 and 0.434, compared to the range of 0.166 to 0.224 found in this study. This difference could be down to several reasons. Firstly, this study uses a newer dataset with a smaller range of offer premiums than in Baker et al (2012). Secondly, since Baker et al (2012) also aim to find the

influence of the 52-week high on other results such as deal success and post-acquisition return, they control for a lot more variables such as the acquirer's market capitalisation, target's ROA and target's LTM stock returns. Lastly, and most importantly, Baker et al (2012) use a sample of US domestic deals only, whereas this sample spans multiple nations and has domestic and cross-border deals. The negative coefficient of the squared 52-week high term is in agreement with Baker et al (2012), who run piecewise regressions at the estimated breakpoints and find that the effect of the 52-week high diminishes at higher levels. Given the shape of the function seen in Figure 4, the coefficient of the squared term cannot be interpreted quantitatively- however, the t-stat and negativity are still significant. The diminishing effect of the 52-week high is in line with the S-shaped function of Prospect Theory, which implies that the further away the reference point (52-week high) is from the current stock price, the lesser is the marginal perceived loss (Kahneman and Tversky, 1979; Baker et al, 2012**)**. In other words, the further away the 52-week-high is from the current stock price, the higher the tendency for the target to view an offer as a good deal. An alternative explanation is that a far-removed 52-week-high (from the current stock price), stops being a relevant enough reference point and therefore exerts a smaller influence on the offer premium.

In line with the literature, the method of payment has a significant effect on offer premium, with stock financed deals having lower premiums than cash financed deals. Unlike in Baker et al (2012), hostility does not seem to have a significant effect on offer premiums. This could be because of the low representation of hostile deals in the sample (3.5%). The negative, significant effect of the size of the target on offer premiums is as expected from previous evidence (Betton et al, 2009).

5.2 Hypothesis 2: Effect of 52-week-high on Offer Premium- Cross Border Deals

According to Kahneman and Tversky (1979), reference point anchoring increases with higher uncertainty and information asymmetry. Hypothesis 2 applies this finding to cross-border deals. Such deals span different geographies, legal systems, regulatory practices, negotiation styles, culture, etc, and might, therefore, exhibit greater reference dependence compared to domestic deals. The analysis of cross-border deals begins with doing a two-sample T-test (see Table 5-3) and a Wilcoxon Rank Sum Test (see Table 5-4). The subject of these tests is a variable called Difference, which is the difference between the LnOfferPrice and Ln52weekhigh for each deal. This is the variable that is plotted in Figure 5. As expected, the mean of the Difference variable is larger for cross-border deals as compared to domestic deals. The T-stat of -2.53 is significant enough to conclude that the two means are not equal and that

the mean of CBMA is higher than that of Domestic. Further, much like the distribution for the entire sample in Figure 3, the distribution in Figure 4 is centred around 0 and has a peak just above 0., this corroborates the results of the T-test in Table 5-3.

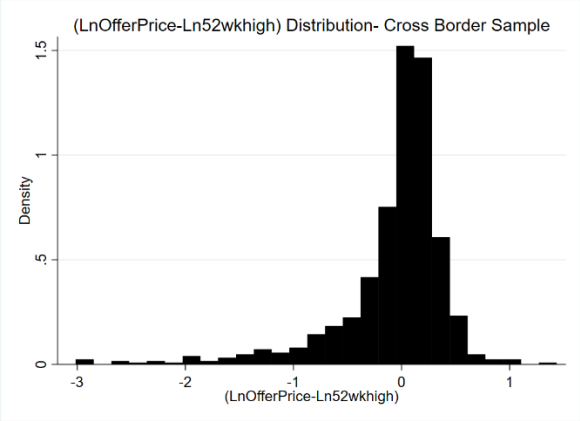

Figure 5: Distribution of Difference= (LnOfferPrice-Ln52wkhigh) for the cross-border sample

Table 5-3: Two-Sample t-test for Means of cross-border and domestic samples

H0: $\mu_{Domestic} = \mu_{CBMA}$					
Group	N	Mean	T-Stat	T-crit	P-value
Domestic	2478	-0.1286	-2.53	-1.96	0.0113
CBMA	758	-0.0708			

Since the distribution of Difference is not normal, this study also employs the Wilcoxon Rank Sum Test to check for possible equality of medians. In line with expectations, the median of the cross-border sample is greater than that of the domestic sample. The test's Z-stat of -3.51 is significant enough to conclude that the medians are not equal and that the median of the CBMA group is higher than the median of the Domestic group.

Table 5-4: Wilcoxon Rank Sum test for Medians of cross-border and domestic samples

H0: Medians are equal					
Group	N	Median	Z-stat	Z-crit	P-value
Domestic	2478	0.001	-3.51	-1.65	0.000
CBMA	758	0.059			

Even though it is not mentioned as a formal hypothesis, the non-linearity of the relationship between the offer premium and the 52-week high is examined in the context of cross-border

deals. The inspection of non-linearity begins with the RESET-test and a Gaussian Kernel Regression. Based on the highly significant F-stat of 8.54 in the RESET-test (see Table 5-5), it can be concluded that the linear specification is not correctly specified. On the addition of the squared term, however, the F-stat becomes insignificant, suggesting a correctly specified functional form. The case for non-linearity is strengthened based on the plot of conditional means obtained from the kernel regression (see Figure 6). Unlike in Figure 4, there are no discernible breakpoints for values less than 1. After 1, the relationship tends to break down due to missing values. All in all, there is enough evidence to suggest that there might a non-linear relationship.

Table 5-5: Results of RESET-test (Cross-Border Sample)

Specification:		
H0: Functional form is correctly specified		
	F-stat	P-value
Without $(Ln52wkhigh)^2$	8.54	0.000
With $(Ln52wkhigh)^2$	1.44	0.2178

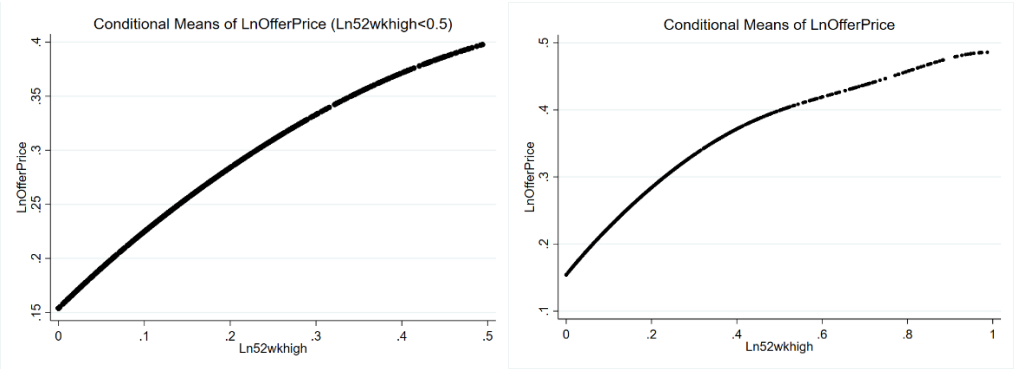

Figure 6: Non-Linear Effects. Conditional Means from Gaussian Kernel Regression estimation of Eq (i) on a cross-border sample

The specification from hypothesis 1 is extended to include a dummy variable for cross-border deals (CBMA). The specification is estimated using a fixed-effects regression where the year effects are fixed. Table 5-6 describes the results of the estimation. The Ln52wkhigh coefficient in this case represents the effect of the 52-week high on the offer price in domestic deals. The range of coefficients between 0.081 and 0.098 is in line with what Baker et al (2012) observe in their domestic-only sample. The insignificant coefficient of the CBMA variables suggests

that the cross-border nature of the deal does not directly affect the offer premium. The coefficient of interest here is the coefficient of the interaction variable between CBMA and Ln52wkhigh. In the absence of any controls, there is an addition of 0.290 to the effect of the 52-week high in cross-border deals. This leads to a total effect of 0.388. This implies that, in cross-border deals, a 10% increase in the 52-week high leads to a 3.88% increase in the offer premium, compared to 0.95% in domestic deals. In the presence of controls, this effect is 0.383 and significant. This is enough evidence to prove that the influence of the 52-week-high reference point on offer premium in this sample is higher in cross-border deals compared to domestic deals. A coherent explanation for this is that because parties in cross-border deals face more uncertainty and information asymmetry due to differences in legal systems, regulatory practices, negotiation styles, culture, etc, the tendency to use reference points in offer price formation is much higher. This result is in agreement with Smith et al (2019) analysis of offer premiums in cross-border deals.

The squared term is negative and significant. The interaction term between $(Ln52wkhigh)^2$ and CBMA is also negative and significant, making the total effect of the squared term stronger in cross-border deals (-0.079) as compared to domestic deals (-0.014). This is contrary to the findings of Smith et al (2019), who find that the diminishing effect weakens in cross-border deals. One possible explanation is that a 52-week-high which is very far away from the current stock price is much more readily shunned as a reference point because foreign acquirers view it as unreliable. This can lead to another reference point being used instead of the 52-week-high. Though testing this is beyond the scope of this paper, there is an opportunity for future research on whether reference points change in cross-border deals.

Table 5-6: Estimation Results for Hypothesis 2. Influence of 52-week-high on offer premium in cross-border deals.

DV: LnOfferPrice			
	1	2	3
Ln52wkhigh	0.095***	0.081***	0.098***
	(5.10)	(4.28)	(4.78)
CBMA	-0.031	-0.057***	-0.035
	(-1.26)	(-2.30)	(-1.40)
CBMA*Ln52wkhigh	0.290***	0.302***	0.334***
	(8.20)	(8.62)	(9.30)
$(Ln52wkhigh)^2$			-0.014***
			(-2.17)

CBMA*(Ln52wkhigh)^2			-0.065***
			(-6.11)
Stock Payment		-0.110***	-0.108***
		(-5.07)	(-5.01)
Other Payment		-0.182***	-0.176***
		(-7.99)	(-7.86)
Hostility		-0.037	-0.042
		(-0.79)	(-0.91)
Target Ln(marketcap)		-0.021***	-0.022***
		(-5.11)	(-5.45)
N	3236	3236	3236
Fixed Year Effects	Yes	Yes	Yes
Adjusted R^2	0.059	0.087	0.113

*, **, *** represent significance at 10%, 5% and 1% respectively. T-stat reported in parenthesis.

5.3 Hypothesis 3: Effect of 52-week-high on Offer Premium- Different Legal Origins

Hypothesis 3 extends the research on cross-border deals. So far, the study has presented evidence on the fact that there is a higher level of reference dependence in cross-border deals compared to domestic deals. This is mainly due to differences in regulatory practices, financial standards, negotiation styles, culture, etc. However, these differences may be lower for some pairs of countries and higher for some pairs of countries. Based on the findings of La Porta et al (1998) and Smith et al (2019), this study uses legal origin to identify such differences. The acquirers and targets are categorized into 4 distinct legal origins- English Common, French Civil, German Civil, and Scandinavian Civil, based on their country of origin. A dummy variable, Change, is introduced to represent deals where the legal origins for acquirer and target are different.

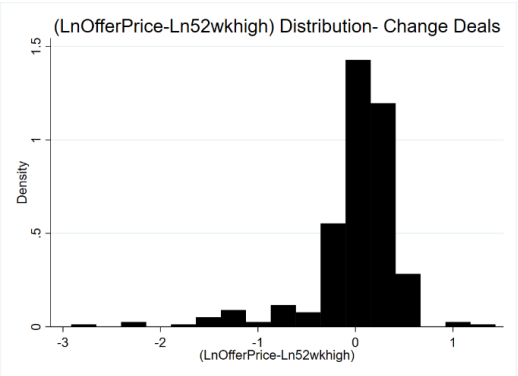

Figure 7: Distribution of Difference= (LnOfferPrice-Ln52wkhigh) for a sample of deals with differing legal origins

Figure 7 plots the distribution of the difference between the offer premium and 52-week-high variables for cross-border deals where the legal origins are different. Apart from a few values in the tail, most of the observations are centred around zero, with a peak in density just above zero. This graphical interpretation suggests that the offer premium and 52-week high are close to each other for such deals. Next, the results of the T-test shown in Table 5-7 point to the fact that the means of the difference are close to each other but are not exactly equal, based on the significant T-stat of -2.53. The t-stat allows to conclude that the mean of the difference is higher in cross-border deals with different legal origins, compared to cross-border deals where the legal origin of both parties is the same. Because the distribution is not normal, a Wilcoxon rank-sum test is also conducted (see Table 5-8). The null hypothesis that the medians are equal is rejected. The significant negative Z-stat points towards a similar conclusion as the T-test. The median is higher in the change group compared to the group with the same legal origins.

Table 5-7: Two-sample t-test for Means of no change in legal origin and change of legal origin samples

H0: $\mu_{Change} = \mu_{NoChange}$					
Group	N	Mean	T-Stat	T-crit	P-value
No Change	454	-0.121	-2.53	-3.23	0.001
Change	304	0.003			

Table 5-8: Wilcoxon Rank Sum test for Medians of no change in legal origin and change in legal origin samples

H0: Medians are equal					
Group	N	Median	Z-stat	Z-crit	P-value
No Change	454	0.023	-4.06	-1.65	0.000
Change	304	0.1			

The results of the fixed effects estimation of Eq. (vi) are present in Table 5-9. The effect of just the 52-week high term on the offer premium ranges from 1.12% to 1.3% for 10% changes in the 52-week high. The added effect of CBMA on the influence of the 52-week high ranges from 0.208 to 0.268. Based on findings from La Porta et al (1998) and Smith et al (2019), compared to the baseline of English Common law, French and German civil law acquirers should experience lower offer premiums due to worse shareholder rights in these regions. The

results do provide evidence of this negative effect, but the effect is significant only in the case of French Civil Law acquirers. Also, in line with Smith et al (2019), the interaction term between legal origins and Ln52wkhigh is significantly negative for German Civil Law and Scandinavian Civil Law bidders. The precise reason and channel of this effect, however, is not clear. The interesting interaction term here is the one between Change and the 52-week high. The effect is positive and significant. The results from Model 3 implies that if the deal is between two parties that originate from different legal origins, the influence of the 52-week high on the offer premium is higher by 0.184, compared to deals where the two parties originate from the same legal origin. This supports the hypothesis that within cross-border deals, there are deals where the information asymmetry and uncertainty is higher, and that reference dependence on the 52-week high of offer premiums is higher in such deals.

Table 5-9: Estimation results for Hypothesis 3. Influence of 52-week-high on offer premium in deals with differing legal origins of acquirer and target.

DV: LnOfferPrice			
	1	2	3
Ln52wkHigh	0.119***	0.130***	0.112***
	(5.74)	(6.23)	(5.24)
CBMA	-0.007	0.208	-0.035
	(-0.27)	(-0.36)	(-1.41)
CBMA*Ln52wkHigh	0.268***	0.208***	0.221***
	(7.60)	(5.26)	(5.63)
FR	-0.208***	-0.203***	-0.201***
	(-5.32)	(-5.20)	(-5.10)
DE	-0.041	-0.039	-0.033
	(-1.48)	(-1.42)	(-1.14)
SC	0.0441	0.037	0.028
	(0.56)	(0.47)	(0.36)
FR*Ln52wkHigh	0.049	-0.002	0.025
	(0.97)	(-0.05)	(0.47)
DE*Ln52wkHigh	-0.144***	-0.187***	-0.187***
	(-3.12)	(-3.92)	(-3.96)
SC*Ln52wkHigh	-0.337***	-0.361***	-0.369***
	(-3.00)	(-3.21)	(-3.31)
Change		0.0546	0.0623

		(1.10)	(0.67)
Change*Ln52wkHigh		0.198***	0.184***
		(3.32)	(3.11)
Stock Payment			-0.140***
			(-6.30)
Other Payment			-0.142***
			(-5.97)
Hostility			-0.031
			(-0.66)
Target ln(marketcap)			-0.023***
			(-5.46)
N	3236	3236	3236
Year Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.077	0.080	0.105

*, **, *** represent significance at 10%, 5% and 1% respectively. T-stat reported in parenthesis.

Chapter 6 Conclusion

This study is an attempt to contribute to a growing strand of Mergers and Acquisitions literature that inculcates insights from behavioural economics and finance to understand the characteristics of M&A deals. It builds on research conducted by Baker et al (2012) on the applications of reference point theory and prospect theory (Kahneman and Tversky, 1979) in explanations of offer premiums. More specifically, this study examines the effect of a reference point, the 52-week-high stock price of the target, on the offer premium paid for the target's shares. The analysis revolves around three hypotheses. First, that there is an influence of the 52-week high stock price of the target on the offer premium paid and that this effect diminishes over high values of the 52-week-high. Second, owing to greater uncertainty and information asymmetry (Kahneman and Tversky, 1979), the effect of the 52-week-high on the offer premium is greater in cross-border M&A as compared to domestic deals. The diminishing property of the 52-week-high is also studied in this context. On the metrics of legal systems, regulatory practices, negotiation styles, culture, etc., some country-pairs are more different than some others. Based on the findings of La Porta et al (1998), the study utilises legal origin as a proxy to represent the aforementioned differences. Therefore, the third hypothesis is that deals where the legal origin of the acquirer and target is different should exhibit a higher influence of the 52-week-high reference point on the offer premium. Using a sample of 3236 deals that spanned 10 years, 73 countries and 4 legal origins, the results found are as follows:

1. There is a significant influence of the 52-week high on the offer premium. The offer premium increases on average by 2.14% for every 10% increase in the 52-week-high. There is a significant non-linear pattern observable and this non-linear pattern points towards a diminishing effect of the 52-week-high the further away this value gets from the current stock price (lagged 30-day stock price in this case). Thus, corroborating Hypothesis 1.
2. The influence of the 52-week-high on the offer premium is higher in cross-border deals as compared to domestic deals. For domestic deals, the offer premium goes up on average by 0.98% for every 10% increase in the 52-week-high, whereas for cross-border deals, the increase on average is 4.32%. This represents an incremental effect of 3.34% in cross-border deals. Thus, proving Hypothesis 2. The non-linearity and the diminishing effect of the 52-week-high are also observed to be stronger in cross-border deals compared to domestic deals.

3. The effect of the 52-week-high stock price on the offer premium is higher in deals where the legal origins of the acquirer and target are different as compared to deals where the legal origins are the same. The offer premium goes up on average by 3.3% for every 10% increase in the 52-week-high for same-legal origin deals, whereas the offer premium goes up by 5.17% for deals with differing legal origins. This represents an incremental effect of 1.84% for deals with differing legal origins. Thus, proving hypothesis 3

Using reference point theory and the work of Baker et al (2012), this study was able to analyse and present positive findings on the influence of the 52-week-high of the target on the offer premium paid in a deal. However, acknowledgement of certain limitations is also due. Firstly, the study does not use the full repertoire of control variables that Baker et al (2012) use in their framework. While the study controls for deal and target characteristics, acquirer characteristics are not controlled for. This is because of a lack of data availability. Unlike Baker et al (2012), the sample consists of unlisted acquirers as well, and therefore certain data-points are either not available or are not reliable. Secondly, this study does not explore alternative explanations for the observed results along the lines of the market-timing approach or the overconfidence approach. Baker et al (2012) analyse post and pre-announcement returns to compare the anchoring approach to more traditional theories. Their findings suggest that the reference point theory provides a more coherent explanation of offer premiums compared to the traditional approaches. Lastly, the study assumes that difference in legal origin is a good enough proxy to incorporate the effects of different legal systems, regulatory practices, negotiation styles, culture, etc. By establishing reference dependence in cross-border deals, this study contributes to existing literature and provides potential support for future studies. The outcomes of this research may provide relevant insight for academic research on offer prices, capital allocation, and post-announcement returns in M&A deals:

1. Studying the effect of reference dependence on deal success in cross-border deals can provide some relevant insight into the real capital allocation effects of the anchoring bias. Similar to Baker et al (2012), there is scope to perform probit or logit analysis on this framework to analyse the impact of anchoring to the 52-week high on deal success.
2. Baker et al (2012) find that bidder's shareholders react negatively if the offer premium is influenced by peak price anchors. This is reflected in the post-announcement returns of the bidder's stock price. There is scope to perform similar returns analysis in the

context of cross-border deals to understand whether investors view offer premiums as synergy estimates or overpayment.

3. The legal origin dummy in this study is supposed to capture the combined effect of differences in legal systems, regulatory practices, negotiation styles, culture, etc in one variable. There is a possibility to break these effects down even further for attribution analysis. Especially for negotiation styles and culture, separate dummies can be used to represent differences. For example, a case can be made to group countries by region or use physical distance to represent similarities or differences in country pairs.
4. Shareholder communication anecdotes from Baker et al (2012) suggest that the 52-week high is salient to a variety of parties involved in the deal- shareholders, investors, advisors, boards, media, etc. Because reference dependence affects such a wide variety of agents, it is relevant to study the anchoring bias in M&A deals empirically. Practitioners can gain relevant insight into their own biases while also being cognizant of biases that affect counterparties in the deal-making process.

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Appendix I: Legal Origin Classification (La Porta et al, 1998)

Country	Legal Origin	Country	Legal Origin
Argentina	English Common	Lithuania	English Common
Australia	English Common	Luxembourg	English Common
Austria	German Civil	Malaysia	English Common
Bahamas	English Common	Malta	English Common
Bahrain	English Common	Mexico	English Common
Bangladesh	English Common	Morocco	English Common
Barbados	English Common	Namibia	English Common
Belgium	English Common	Netherlands	German Civil
Bermuda	English Common	New Zealand	English Common
Brazil	English Common	Nigeria	English Common
Bulgaria	German Civil	Norway	Scandinavian Civil
Canada	English Common	Pakistan	English Common
Chile	English Common	Papua N Guinea	English Common
China	German Civil	Peru	English Common
Colombia	English Common	Philippines	English Common
Croatia	German Civil	Poland	German Civil
Cyprus	English Common	Portugal	English Common
Denmark	Scandinavian Civil	Russia	English Common
Egypt	English Common	Saudi Arabia	English Common
Finland	Scandinavian Civil	Singapore	English Common
France	English Common	South Africa	English Common
Germany	German Civil	South Korea	German Civil
Gibraltar	English Common	Spain	English Common
Greece	English Common	Sri Lanka	English Common
Guernsey	English Common	Sweden	Scandinavian Civil
Hong Kong	English Common	Switzerland	German Civil
Hungary	German Civil	Taiwan	German Civil
India	English Common	Thailand	English Common
Indonesia	English Common	Trinidad & Tobago	English Common
Ireland-Rep	English Common	Tunisia	English Common
Israel	English Common	Turkey	English Common
Italy	English Common	Ukraine	English Common
Japan	German Civil	United Kingdom	English Common
Jersey	English Common	United States	English Common
Kazakhstan	English Common	United Arab Emirates	English Common
Kenya	English Common	Vietnam	English Common
Kuwait	English Common		