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M&A Deal Premiums Across Market Cycles: Do Bull and Bear Markets Influence Acquisition Pricing?

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Abstract

This study examines whether M&A bid premiums involving US-based acquirers differ between bull and bear market conditions. The analysis uses 833 public takeover transactions announced between 1997 and 2024. Market phases are identified through an adapted implementation of the Pagan and Sossounov turning-point methodology. The relationship between market conditions and reported bid premiums is estimated using pooled deal-level ordinary least squares regression, transaction-level controls, and target two-digit NAICS fixed effects. The results identify a positive and statistically significant conditional association between bear market conditions and acquisition premiums. Transactions announced during bear markets are associated with reported bid premiums approximately 9.4 percentage points higher than those announced during bull markets. The direction of this relationship remains consistent when using the original non-winsorised premium, excluding EV/EBITDA, clustering standard errors by announcement month, excluding potentially influential observations, and omitting each bear market episode individually. The findings support the hypothesis that acquisition premiums differ across market phases and are directionally consistent with higher reported premiums during bear markets. However, the results represent conditional associations rather than causal effects and may partly reflect differences in target-price benchmarks or transaction composition across market conditions.

Keywords: Mergers and acquisitions; bid premiums; bull markets; bear markets; market cycles; acquisition pricing; takeover transactions.

Resumo

Esta dissertação analisa se os prémios de aquisição em operações de fusões e aquisições diferem entre períodos de mercado bull e bear. A análise utiliza uma amostra de 833 transações anunciadas entre 1997 e 2024, envolvendo adquirentes sediados nos Estados Unidos. As fases de mercado são identificadas através de uma adaptação da metodologia de pontos de viragem de Pagan e Sossounov (2003). O modelo de regressão utiliza dados agrupados ao nível da transação, inclui efeitos fixos para a indústria da empresa-alvo com base nos códigos NAICS de dois dígitos e considera características relacionadas com a dimensão, avaliação, método de pagamento, âmbito geográfico, proximidade industrial e estrutura das transações. Os resultados indicam que as operações anunciadas durante mercados bear estão associadas a prémios de aquisição aproximadamente 9,4 pontos percentuais superiores aos das operações anunciadas durante mercados bull. Esta relação mantém-se positiva e estatisticamente significativa em diferentes análises de robustez e sensibilidade, embora a sua magnitude seja influenciada por determinadas observações e varie entre episódios de mercado. Os resultados devem ser interpretados como associações condicionais, e não como evidência de um efeito causal das condições de mercado. Os prémios mais elevados observados durante mercados bear podem refletir preços de referência mais baixos, alterações na composição das transações ou outros fatores económicos e negociais não totalmente observados.

Palavras-chave: Fusões e aquisições; prémio de aquisição; mercados bull e bear; ciclos de mercado; ofertas públicas de aquisição; avaliação de empresas.

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1. Introduction

A central element of M&A transactions is the acquisition premium, the price paid above the target's pre-announcement market value, which reflects expectations of synergies, competitive dynamics, and prevailing market conditions. A long-standing observation in corporate finance is that M&A activity and pricing are highly cyclical, coinciding with broader fluctuations in stock market valuations and investor sentiment (Harford, 2005; Bouwman, Fuller & Nain, 2009). These cycles raise an important empirical question: Do market conditions systematically influence the size of acquisition premiums?

A growing body of research suggests that bull markets, characterised by high equity valuations and optimistic sentiment, can be associated with higher acquisition premiums. Market valuation effects matter because overconfident managers are more acquisitive when financing constraints are weaker, and broader behavioural evidence shows that managerial overconfidence affects corporate investment decisions (Malmendier and Tate, 2015; Malmendier and Tate, 2005). Investor sentiment also appears relevant: recent studies find that sentiment proxies are linked to M&A premiums and deal outcomes, while valuation-based measures often capture the market mood embedded in bidder pricing (Eaton, Liu, and Officer, 2021). Together, these mechanisms imply that premiums may be higher in bullish conditions because equity is more richly valued, financing is easier, and bidders may be more willing or able to offer a higher premium relative to the target's reference market price.

Conversely, bear markets, marked by lower valuations, greater uncertainty, and tighter financing conditions, may restrain bidding behaviour and reduce the premiums acquirers are prepared to pay. Acquirers may adopt more conservative pricing strategies, leading to lower premiums due to increased risk aversion and reduced competition for targets.

However, bear markets may also be associated with higher measured percentage premiums. If adverse market conditions depress target share prices, the benchmark against which the acquisition offer is evaluated may decline. A given offer price may therefore produce a higher percentage premium even when the absolute consideration is not unusually high. The expected direction of the relationship is consequently ambiguous.

Despite these theoretical predictions, empirical evidence does not establish a uniform relationship between bullish market conditions and acquisition premiums. Dong, Hirshleifer, Richardson, and Teoh (2006) show that bidder and target misvaluation is related to the premiums paid in takeovers, as well as to payment method, deal form, target hostility and the probability of offer completion.

Simonyan (2014) finds that takeover premiums are higher during periods of investor pessimism and market undervaluation, but lower during periods of investor optimism and market overvaluation. These findings suggest that favourable market conditions do not necessarily produce higher measured acquisition premiums.

Given the lack of consensus in the literature and the methodological limitations identified in prior work, a systematic re-examination of how market cycles affect acquisition premiums remains warranted. In particular, the measurement of acquisition premiums may create difficulties when comparing bull and bear markets, since a percentage premium depends not only on the offer price but also on the target's pre-announcement share price used as the benchmark. A higher measured premium during a bear market may therefore reflect a depressed benchmark price rather than a greater willingness to pay or higher expected synergies. Recognising this distinction is important not only for academics studying market efficiency and corporate investment behaviour but also for practitioners involved in capital allocation, deal valuation, and corporate governance.

Therefore, this study examines whether acquisition premiums differ systematically between bull and bear market conditions while considering the measurement issues associated with comparing premiums across market regimes. The analysis estimates the relationship between market phase and bid premium while controlling for observable differences in transaction size, target valuation, payment method, geographic scope, industry relatedness and transaction structure. The analysis also examines whether the main finding is sensitive to premium winsorisation, the exclusion of EV/EBITDA, alternative assumptions regarding within-month dependence, potentially influential observations and the exclusion of each bear market episode in turn. In doing so, the study contributes to the literature on acquisition pricing across market cycles by examining whether differences in measured premiums remain after accounting for premium measurement and transaction-composition concerns.

To address the research question, the relevant literature is reviewed in section 2, followed by the presentation of the research question and hypothesis in section 3. Section 4 defines the data and methodology used in the empirical analysis. Section 5 describes the final sample and presents the preliminary analysis, while section 6 reports and discusses the empirical results. The main conclusions, limitations and opportunities for future research are presented in section 7.

2. Literature Review

2.1 Market Cycles and M&A Activity

Financial markets move through recurrent phases of expansion and contraction, usually described as bull and bear markets. For the purpose of this dissertation, this distinction is important because these phases affect financing conditions, investor optimism, and firms' incentives to engage in mergers and acquisitions. The literature has long documented that M&A activity is not evenly distributed through time, but rather tends to cluster in waves, often coinciding with favourable capital-market conditions and broader periods of economic expansion.

In the empirical analysis, bull and bear markets are identified using an adapted version of the turning-point methodology developed by Pagan and Sossounov (2003). This approach is suitable for the present study because it identifies sustained market phases through peaks and troughs, subject to minimum-duration requirements, rather than classifying short-term price fluctuations as changes in market regime. The resulting classification therefore provides a consistent basis for examining whether M&A bid premiums differ across persistent bull and bear market conditions.

2.1.1 Defining Market Cycles

First, it is crucial to define bull and bear markets in order to better understand what they represent and how they can be identified in empirical work. Although their importance is widely recognised, there is not a single universally accepted definition, as authors differ mainly on the criteria used to separate one state from the other.

A relatively simple view is provided by Pagan and Sossounov (2003), who define bull and bear markets through turning points in stock prices. In their framework, markets move through extended periods of rises and declines, and the relevant task is to identify peaks and troughs that separate one phase from the next. Their procedure smooths short-term fluctuations by imposing minimum duration requirements for both phases and full cycles, making it especially useful in studies that aim to distinguish sustained market regimes from temporary corrections.

Other authors have proposed definitions that rely more explicitly on the statistical properties of returns. Maheu, McCurdy, and Song (2012) model market states through a Markov-switching process and show that bull markets can be characterised as regimes with higher expected returns and lower volatility, whereas bear markets are associated with lower expected returns and greater volatility.

Their contribution is therefore not only definitional but also methodological. Unlike approaches based on fixed turning points, the model permits the probability of being in each market regime to vary over time and estimates the likelihood of transitions between discrete states.

Lunde and Timmermann (2004) reach the same broad objective through a different route. Their study emphasises duration dependence and threshold rules, arguing that the identification of market phases should reflect persistence in stock-price movements rather than isolated monthly changes. This is an important point for the present thesis, because the definition chosen to classify bull and bear markets may directly affect which deals are considered to occur under each regime.

Taken together, these studies show that there is flexibility in the identification of market cycles, but they also suggest that this flexibility is not arbitrary. The common idea across the literature is that bull and bear markets should capture broad, persistent changes in market direction and conditions, not merely short-run noise. This matters for M&A research because the comparison of acquisition premiums across market regimes depends, at the outset, on how those regimes are defined.

2.1.2 Procyclicality of M&A Activity

Once market cycles are defined, the next step is to understand how they relate to M&A activity. The literature is quite consistent in showing that mergers occur in waves and that those waves are linked to changes in economic conditions, industry shocks, and the availability of capital.

Harford (2005) develops this argument further. He shows that industry shocks alone are not sufficient to generate merger waves; they become merger waves when capital liquidity is available. In other words, the study suggests that firms may have incentives to restructure after shocks, but actual takeover activity expands only when financing conditions allow these transactions to be completed. This is particularly relevant for a thesis on market cycles, because it directly connects M&A activity to periods of easier capital access.

A related explanation is developed by Rhodes-Kropf, Robinson, and Viswanathan (2005), who show that firm-specific misvaluation and industry-wide valuation waves help explain merger activity. This evidence is consistent with the model of Shleifer and Vishny (2003), in which acquisitions are driven by the relative stock-market valuations of bidders and targets, together with investors' perceptions of expected merger synergies. In particular, an overvalued bidder may use its relatively highly valued equity as a favourable means of payment to acquire a less overvalued or undervalued target. The model therefore links stock-market misvaluation not only to the decision to undertake acquisitions,

but also to the identity of acquirers and targets, the method of payment, and the emergence of merger waves. Rhodes-Kropf and Viswanathan (2004) provide a complementary explanation, showing that market-wide valuation deviations can generate merger waves even when targets rationally assess proposed transactions. Together, these studies show that takeover activity is influenced not only by real economic shocks, but also by the relative and aggregate valuations of firms in financial markets. Because valuation conditions can affect bidders' financing capacity, the perceived gains from a transaction, and the reference price against which an offer is assessed, they may also influence the acquisition premiums paid to target shareholders.

More recent research adds a behavioural dimension to this procyclicality. Lee et al. (2025) show that managerial sentiment helps predict merger activity and is related to more aggressive deal behaviour. This suggests that M&A waves emerge when several conditions align: economic or industry shocks create the rationale for restructuring, while liquidity, valuation, and sentiment create the environment in which deals become more likely.

Therefore, the literature provides a clear backdrop for the present dissertation. If M&A activity is itself strongly procyclical, it becomes reasonable to ask whether acquisition premiums also vary systematically across bull and bear markets, and whether those differences are related to the same forces that shape merger waves more generally.

2.2 Determinants of Acquisition Premiums

After establishing that M&A activity moves through cycles, it becomes necessary to examine what determines the price paid in each transaction. The literature on acquisition premiums shows that premiums do not depend on one single factor. Instead, they reflect a combination of market conditions, firm characteristics, deal features, and behavioural influences. For that reason, the study of premiums is especially relevant for a dissertation that seeks to understand whether bull and bear markets influence acquisition pricing.

2.2.1 Market Valuations and Investor Sentiment

A first group of studies emphasises the role of market valuations and sentiment. The general idea is that pricing in takeover markets is affected by the broader financial environment in which deals are negotiated.

A central behavioural explanation for acquisition premiums is Roll's (1986) hubris hypothesis. Roll argues that takeover bids need not be motivated solely by genuine expected synergies or value creation. Instead, managers of acquiring firms may be overconfident in their ability to identify undervalued targets, assess future cash flows, or realise post-acquisition synergies. This overconfidence can lead bidders to overestimate the target's value to their own firm and to offer a price above its fundamental value. In this framework, an acquisition premium may therefore reflect not only the value of control or anticipated synergies, but also managerial hubris. The theory is particularly relevant to periods of favourable market conditions, when high valuations and optimistic beliefs may reinforce managers' confidence in their own valuation judgements.

This behavioural mechanism complements the valuation-based explanation of Shleifer and Vishny (2003). Whereas Roll (1986) focuses on biased managerial judgement, Shleifer and Vishny model acquisitions as being driven by the relative stock-market valuations of bidders and targets, managers' investment horizons, and the market's assessment of merger synergies. Their framework explains the identity of acquirers and targets, the choice between cash and equity consideration, the valuation consequences of mergers, and merger waves. Thus, an observed premium may arise from expected synergies and relative market valuations, but it may also reflect overconfidence in the bidder's ability to create value.

Jensen's (1986) free-cash-flow theory provides an agency-based alternative: managers with excess cash may pursue acquisitions rather than distribute funds to shareholders, even where the transaction does not maximise shareholder value. More recent evidence by An et al. (2024) shows that managerial sentiment predicts more aggressive merger behaviour and is associated with weaker long-run performance.

Simonyan (2014) examines 2,116 U.S. takeover transactions announced between 1985 and 2005. The paper relates takeover premiums to market misvaluation, investor sentiment, market returns and volatility, and finds that premiums are higher during periods of investor pessimism and market undervaluation but lower during periods of investor optimism and market overvaluation. The study also reports that premiums tend to be higher following lower market returns and during periods of greater stock-market volatility, suggesting that takeover pricing is influenced not only by firm and deal specific characteristics but also by broader financial market conditions.

Evidence from Europe points in a similar direction, although with some nuance. Brixius, Perret, Schröder and Taujanskaitė (2025), analysing European control premiums from 2009 to 2022, find that stock-market volatility is positively associated with premiums in the full sample, but that this relation weakens in the post-Covid period. Their conclusion is not that volatility always raises premiums, but rather that the effect of uncertainty may depend on the persistence and nature of the market environment. In that sense, the study is particularly useful because it shows that the effect of market-wide conditions on premiums may vary across subperiods rather than remain constant.

Taken together, these studies indicate that acquisition premiums are sensitive to valuation conditions, investor sentiment and market uncertainty, although the direction of the relationship is not uniform across studies. Favourable financing and sentiment conditions may support acquisition activity, while depressed target valuations may increase measured percentage premiums in less favourable market environments.

2.2.2 Financial Conditions, Liquidity, and M&A Deal Premiums

A second strand of literature focuses on financial conditions and liquidity. While valuations and sentiment affect how firms are perceived, liquidity and financing conditions affect what bidders are actually able and willing to pay.

The method of payment may be an important link between market conditions and acquisition pricing. Cash and share offers expose bidders and target shareholders to different risks and can convey different information about the transaction. Hansen (1987) shows that, under asymmetric information, share consideration allows target shareholders to retain exposure to the value of the combined firm, whereas cash gives them a fixed and immediate payment. Fishman (1988, 1989) further argues that payment method can affect the bidding process itself. A cash offer may signal a bidder's confidence in the target's value and discourage rival bidders, while a share offer can be more appropriate when the bidder holds private information about the value of the combined firm.

Shleifer and Vishny (2003) add a valuation-based perspective. Their model predicts that firms are more likely to use equity when their shares are relatively highly valued and to rely on cash when valuations are lower. Payment method may therefore vary across bull and bear markets and may be associated with differences in the premiums offered to target shareholders. However, the direction of this relationship is ultimately an empirical question, as cash and share consideration can reflect valuation, financing capacity, information asymmetry, and bargaining conditions simultaneously.

Madura, Ngo, and Viale (2012) show that takeover premiums vary systematically across industries and over time, and that part of this variation is explained by industry growth, capital liquidity, and stock-market conditions. Their conclusion is that stronger growth opportunities and more abundant liquidity are associated with higher premiums, even after taking into account firm- and deal-specific controls. This finding is important because it supports the idea that market conditions influence acquisition pricing through financing capacity as well as through expectations.

Yang, Guariglia, and Guo (2019) examine Chinese listed firms and find that cash-rich firms are more likely to attempt acquisitions, particularly where agency concerns related to tunnelling are more pronounced. They also find that bidders with stronger growth opportunities are less likely to use cash consideration, especially when they face financial constraints, reflecting the higher opportunity cost of retaining cash. Finally, cash-financed acquisitions underperform stock-financed acquisitions in both short- and long-run measures. Although the study does not examine acquisition premiums directly, it shows that corporate liquidity affects acquisition decisions, payment choice, and post-acquisition performance.

Crisis periods further complicate the picture. Magnanelli, Nasta and Ramazio (2022), studying transactions announced during the Covid-19 period, find that bid premiums measured relative to target prices 30 days before the announcement are higher during the pandemic than in a non-crisis sample, even though cumulative abnormal returns are lower. Their conclusion is that sharp pre-announcement declines in target prices can mechanically inflate percentage premiums when offer prices do not fall by the same magnitude. This contribution is particularly relevant for a comparison across market cycles because it shows that premium measures may rise in distressed periods even when the underlying economic value of the deal is weaker.

Overall, this literature suggests that acquisition premiums are shaped by broad financial conditions, including liquidity, credit costs, and the pricing of illiquidity. It also shows that the interpretation of premiums becomes more difficult in crisis periods, when benchmark prices themselves may be strongly affected by stress and uncertainty.

2.2.3 Deal Characteristics and Acquisition Premiums

Besides market-wide conditions, the literature also shows that acquisition premiums depend on the characteristics of the transaction itself. These studies are important because they explain why premiums may differ not only across market regimes, but also across deals within the same regime.

Fieberg et al. (2021) study investor reactions to announced premiums in cross-border M&A. They find that political affinity between the acquirer's and target's countries moderates how investors interpret those premiums. Although the study focuses on market reactions rather than on premium determination itself, it remains useful because it shows that the same premium may be read differently depending on the institutional and political environment of the deal.

Bao, Lyu, Wu, and Lian (2022) examine Chinese cross-border acquisitions and develop a measure of overbidding relative to a profit-maximizing benchmark. Their results suggest that acquirers often pay above the target's estimated fundamental value and that the extent of this overbidding varies with transaction characteristics such as region and ownership structure. This is relevant for the present thesis because it highlights that some observed premiums may reflect not only bargaining outcomes, but also deviations from benchmark value that depend on specific deal features.

Officer (2003) finds that transactions with target termination fees tend to involve both higher premiums and higher completion rates, while providing only weak evidence that such fees deter rival bidders. These provisions may therefore compensate bidders for the costs and uncertainty of pursuing a transaction, rather than merely insulate an agreed deal from competition.

Consistent with the importance of negotiation structure, Fidrmuc and Xia (2022) find that target insiders pre-announcement trading reflects expected deal completion, offer premiums and transaction characteristics. Insiders particularly favour bidder-initiated, cash-financed, privately negotiated and strategic transactions. Taken together, this evidence suggests that acquisition premiums reflect the interaction between bargaining conditions, deal structure and the negotiation process, rather than market conditions alone.

2.3 Methodological Challenges in Measuring Acquisition Premiums

After reviewing the main determinants of acquisition premiums, it becomes clear that comparing those premiums across bull and bear markets is not a straightforward exercise. The difficulty does not lie only in establishing whether premiums are higher or lower in a given market regime, but also in understanding whether the premium measure captures the same economic reality across different market environments. More recent literature has given particular attention to this issue, especially by showing that standard premium measures may be affected by deal leaks, pre-announcement price movements, and the duration of takeover processes.

2.3.1 Measuring Acquisition Premiums Across Different Market Conditions

A first challenge concerns the way acquisition premiums are measured. In most empirical studies, the premium is calculated by comparing the final offer price with the target's market price at a certain date before the announcement. Although this measure is widely used, the literature shows that it may not always represent the full economic gain offered by the bidder, especially when information about the transaction is incorporated into prices before the formal announcement.

This point is developed directly by Eaton, Liu, and Officer (2021), who question the conventional use of short-window benchmark prices to measure M&A deal premiums. As discussed in later literature, their contribution shows that traditional premium measures may be incomplete when takeover processes unfold over longer periods and when market prices react before the official announcement due to rumours, leaks, or early market anticipation. In this sense, the observed premium can understate the bidder's effective willingness to pay because part of the value transfer may already be embedded in the target's stock price by the time the benchmark is observed.

A closely related argument is made by Mulherin and Simsir (2015), who show that merger rumours and earlier abnormal returns can materially affect the measurement of deal premiums. Their results suggest that the benchmark chosen before the announcement is not innocuous: if the target's price already reflects a positive probability of acquisition, then the conventional premium will capture only part of the takeover gain. This is particularly relevant for the present dissertation because market cycles may affect both the frequency of deals and the extent to which markets anticipate them, making premium measures potentially less comparable across bull and bear periods.

Pre-announcement target-price movements also affect the interpretation of observed acquisition premiums. Schwert (1996) distinguishes between the pre-bid run-up in the target's stock price and the post-announcement markup. Using successful tender offers and mergers involving NYSE- and AMEX-listed targets, he finds that the pre-bid run-up and the post-announcement markup are generally uncorrelated. Consequently, a larger pre-bid run-up is not normally offset by a lower post-announcement markup; instead, the run-up represents an additional cost to the bidder. This evidence shows that the measured premium depends critically on the reference price used: a benchmark after the run-up may capture mainly the post-announcement markup, whereas a benchmark before the run-up captures a larger proportion of the total takeover-related price increase.

2.3.2 Sample Composition, Endogeneity, and Interpretation

A second challenge concerns the interpretation of cross-regime differences once the composition of deals is taken into account. Even if acquisition premiums are measured consistently, the types of transactions observed in bull and bear markets may differ systematically, making direct comparisons difficult.

Baldi and Salvi (2022), analysing 403 completed acquisitions worldwide between 2007 and 2015, show that acquisition premiums reflect a combination of bidder, target and transaction characteristics. Their findings indicate that premiums are associated with factors such as bidder overconfidence, cash generation, target size, growth opportunities, industry relatedness and payment method. This suggests that an average difference in premiums across market regimes may partly reflect changes in the composition of transactions occurring in each regime, rather than a pure effect of market conditions on pricing.

More broadly, acquisition premiums may vary across industries, countries and periods because market conditions can affect target selection, bidder participation, financing capacity and transaction structure. Consequently, differences in premiums across bull and bear markets may reflect both market conditions and changes in the types of firms and transactions reaching the announcement stage. This creates potential confounding and selection concerns in the interpretation of cross-regime comparisons.

For this reason, comparisons of acquisition premiums across bull and bear markets require caution. A higher or lower observed premium in one regime may reflect differences in bargaining outcomes, pre-announcement information, transaction timing, deal composition or the characteristics of firms able to transact during that period. The empirical analysis should therefore examine market-cycle differences alongside controls for observable firm and deal characteristics, while interpreting the results as conditional associations rather than causal effects.

3. Research Question

The purpose of this study is to examine whether M&A bid premiums differ systematically between bull and bear market conditions. Prior literature identifies several mechanisms through which market phases may influence acquisition pricing. Stronger valuations, favourable financing conditions and greater investor and managerial optimism may support higher premiums during bull markets. Conversely, lower target valuations during bear markets may increase measured percentage premiums by reducing the benchmark price against which the acquisition offer is evaluated.

The expected direction of the relationship is therefore theoretically ambiguous. In addition, the composition of transactions may differ across market phases because market conditions can influence target selection, financing availability, bidder participation and the decision to undertake an acquisition. The empirical analysis consequently examines whether a systematic difference exists without imposing a directional prediction.

Consequently, the research question is formulated as follows:

Research question: Do M&A bid premiums involving US-based acquirers differ between bull and bear market conditions?

Hypothesis 1 (H1): M&A bid premiums involving US-based acquirers differ between bull and bear market conditions.

This hypothesis is evaluated through two competing directional alternatives. On the one hand, bear markets may be associated with lower premiums because lower valuations, greater uncertainty, and reduced bidder competition may constrain acquirers' willingness or ability to pay:

Hypothesis 1a (H1a): M&A bid premiums involving US-based acquirers are lower during bear market conditions than during bull market conditions.

On the other hand, bear markets may be associated with higher measured premiums because lower pre-announcement target share prices reduce the benchmark against which the offer price is compared:

Hypothesis 1b (H1b): M&A bid premiums involving US-based acquirers are higher during bear market conditions than during bull market conditions.

4. Data and Methodology

This section presents the data and empirical methodology used to investigate whether M&A bid premiums differ between bull and bear market conditions. It first describes the empirical approach adopted to address the research question. It then presents the transaction sample, the selection criteria applied to the initial data extraction and the procedures used to obtain the final sample. Subsequently, this chapter explains the construction of the bull and bear market classification and defines the dependent variable, the main explanatory variable and the control variables included in the analysis. Finally, the regression specification and the procedures used for statistical inference are presented.

The purpose of this study is to examine whether the bid premium offered to target shareholders differs systematically according to the prevailing equity-market phase. The empirical analysis uses pooled deal-level data covering transactions announced between 1997 and 2024. The bid premium is explained by a bear market indicator and a set of controls for transaction size, target valuation, payment method, geographic scope, industry relatedness and transaction structure. Target two-digit NAICS fixed effects are also included to account for systematic differences in acquisition premiums across target industries.

4.1 Empirical Approach

The empirical analysis uses a pooled deal-level regression framework in which each observation represents an individual M&A transaction announced between 1997 and 2024. The bid premium is measured at the transaction level, while the market phase prevailing during the transaction's announcement month constitutes the main explanatory variable. Transactions announced during bear markets are assigned a value of one, whereas transactions announced during bull markets are assigned a value of zero. Accordingly, the estimated coefficient on the bear market indicator measures the average conditional difference in bid premiums between bear and bull market transactions.

Although each transaction is observed only once, the analysis is not purely cross-sectional in the conventional sense because the transactions occur at different points over an extended period and the principal explanatory variable changes over time. Transactions announced within the same month receive the same market classification and may also be exposed to common market, financing and information conditions. The data are therefore treated as pooled deal-level observations over time.

Pooled ordinary least squares regression is used because the bid premium is a continuous transaction-level measure and the objective is to examine whether it differs systematically across market phases. The regression framework also allows the analysis to account for observable differences in the composition of transactions occurring during bull and bear markets. This is important because an unconditional difference in average premiums may reflect not only the prevailing market phase but also differences in transaction size, target valuation, payment method, geographic scope, industry relatedness, transaction structure and target-industry composition.

The model includes controls for the logarithm of deal enterprise value, the target's pre-deal EV/EBITDA multiple, cash and share consideration, cross-border status, industry relatedness between the acquirer and target, and hostile or unsolicited, contested, leveraged-buyout and recommended transactions.

The analysis uses the bid premium at announcement reported by Orbis M&A. The exported data identify the variable as the percentage premium offered relative to the target's reference market price, although the precise benchmark date and price convention are not specified. In addition, measured acquisition premiums may be affected by takeover rumours, information leakage and target-price movements before the formal announcement. Consequently, the reported premium may not capture the bidder's complete economic willingness to pay.

This measurement issue cannot be eliminated through the regression specification. The same Orbis M&A field is applied consistently across the analysed transactions, while the treatment of extreme premium observations is evaluated through the sensitivity analysis described later in this chapter. The empirical results are interpreted as conditional associations rather than causal effects of market conditions on acquisition pricing.

4.2 Sample

4.2.1 Selection criteria and data

The transaction-level data used in this study were obtained from the Orbis M&A database, which provides information on mergers, acquisitions and other corporate transactions across countries and industries. Although Orbis M&A offers global transaction coverage, the empirical sample was restricted to transactions involving acquirers headquartered in the United States. This restriction

provides a common market setting for the analysis and supports the use of the S&P 500 as the reference market index for classifying the equity market into bull and bear phases.

The initial Orbis M&A search covered transactions announced or completed between 1 January 1980 and 31 December 2024. The cumulative application of the preliminary search criteria produced an initial extraction of 52,587 transactions. Table 1 presents the filters applied during the database search and reports the number of observations remaining after each criterion.

Table 1: Search Steps

Search Step		Step result	Search result
1. Deal type	Acquisition	1,042,144	1,042,144
2. Deal status	Completed	2,796,509	852,441
3. Time Period	With status Announced, Completed - confirmed, from 01/01/1980 12:00:00 AM until 31/12/2024 12:00:00 AM	2,830,184	800,989
4. Country (primary adresses)	United States of America (US) (Acquirer OR Target OR Vendor)	950,954	199,974
5. Methods of payment	Business assets, Cash, Cash assumed, Cash Reserves, Converted Debt, Liabilities, Deferred payment, Dividend, Earn-out, Bonds, Other, Services, Shares, Third party shares	1,600,380	52,587
Total			**52,587**

Most of the transactions contained in the initial extraction did not satisfy the final sample requirements or lacked the information necessary to construct the variables used in the empirical analysis. The sample was therefore restricted according to transaction status, acquirer location, target listing characteristics and the availability of relevant deal-level information.

The initial Orbis M&A extraction included different transaction types and was not restricted exclusively to public takeovers. However, following the application of the sample-selection and cleaning procedures described below, all transactions retained in the final sample were classified by Orbis M&A as public takeovers. This final sample composition is consistent with the use of the bid premium at announcement as the dependent variable, since the calculation of a percentage premium requires an identifiable offer and a reference market price for the target. Accordingly, the empirical results apply specifically to public takeover transactions satisfying the study's remaining selection and data-availability criteria.

The preliminary transaction sample covers the period from 1997 to 2024. Although the database search allowed transactions from 1980 onwards, no observations satisfying the applied criteria were identified in the earlier part of the search period. The period used in the analysis is determined by the

bid-premium announcement date, as this is the date relevant for matching each transaction with the corresponding bull or bear market phase.

All monetary transaction values are expressed in US dollars. The following transaction-level information was extracted from Orbis M&A:

- acquirer and target names;
- acquirer and target country codes;
- bid-premium announcement date;
- bid premium at announcement;
- deal enterprise value;
- pre-deal enterprise value to EBITDA multiple;
- deal structure and attitude;
- method of payment; and
- acquirer and target six-digit NAICS industry classifications.

4.2.2 Sample-cleaning procedure

The preparation of the transaction sample was conducted in two stages. The first consisted of an initial screening of the Orbis M&A extraction according to the geographical scope of the study and the availability of the principal transaction-level variables. The second involved a detailed review of the observations retained after this screening, focusing on the availability and validity of the dependent variable, deal-structure information, duplicate transactions and industry classifications.

During the initial screening, transactions without available information on deal enterprise value or the pre-deal EV/EBITDA multiple were excluded. These variables were considered relevant to the empirical analysis because they allow the regression to control transaction size and the target's pre-deal valuation. No other appropriate and consistently available target-valuation measure was identified in the extracted data; consequently, pre-deal EV/EBITDA was retained as the valuation control in the main specification. The application of this criterion resulted in the removal of more than 50,000 observations from the initial Orbis M&A extraction.

Given the substantial reduction in sample size associated with this requirement, Chapter 6 also reports a robustness specification excluding EV/EBITDA to assess whether the principal finding within the final sample depends on the inclusion of this control.

The sample was subsequently restricted to transactions involving acquirers headquartered in the United States. This restriction is consistent with the geographical focus of the study and supports the use of the S&P 500 as a common benchmark for identifying the market phase prevailing at the time of each transaction announcement.

Based on the recorded extraction criteria, the reconstructed application of these two initial filters produces a sample of 1,109 transactions. Following the initial screening, four additional procedures were applied to obtain the final analysis sample.

First, transactions without sufficient deal-structure information were excluded. The deal-structure field was required to construct several transaction-level controls, including the hostile or unsolicited, contested, leveraged buyout and recommended transaction indicators. A total of 106 transactions did not contain sufficient information to construct these variables consistently and were therefore removed, reducing the sample from 1,109 to 1,003 transactions.

Second, the availability and numerical validity of the dependent variable were assessed. Transactions for which the bid premium was unavailable, undisclosed or reported as a non-numerical entry were excluded because they could not be incorporated into the empirical analysis. This procedure resulted in the removal of 160 transactions, leaving 843 transactions with a valid numerical bid premium.

Third, the sample was reviewed for duplicate observations. Transactions involving the same acquirer and target on the same transaction date, together with identical or nearly identical deal values and bid premiums, were treated as duplicate records. Two duplicate observations were identified and removed, reducing the sample from 843 to 841 transactions.

Fourth, the industry classification data was reviewed to ensure that industry relatedness could be measured consistently. The acquirer and target NAICS codes were standardised as six-digit classifications before the industry-match variables were constructed. Eight transactions contained an invalid or unavailable acquirer NAICS code.

These observations were not classified as transactions involving companies from different industries because the absence of valid industry information does not provide evidence of industry dissimilarity. Instead, the eight observations were excluded, reducing the sample from 841 to 833 transactions. This final exclusion represented less than 1% of the sample available at that stage.

Following the initial screening and the subsequent transaction-level cleaning procedures, the final sample used in the empirical analysis comprises 833 M&A transactions. Each observation represents a unique public takeover transaction involving a US-based acquirer, with a valid numerical bid premium, sufficient transaction-structure information and valid industry classifications for both the acquirer and target.

The sample-selection process may be summarised as follows.

Table 2: Sample cleaning procedures

Sample-selection stage	Transactions excluded	Transactions remaining
Initial Orbis M&A extraction		52,587
Initial screening based on the availability of deal enterprise value and pre-deal EV/EBITDA, and restriction to US-based acquirers	51,478	1,109
Transactions without sufficient deal-structure information	106	1,003
Missing, undisclosed or non-numerical bid premium	160	843
Duplicate transaction observations	2	841
Invalid or unavailable acquirer industry classification	8	833
Final analysis sample		**833**

Note: The initial screening combined the exclusion of transactions lacking the required deal enterprise value or pre-deal EV/EBITDA information with the restriction to US-based acquirers.

4.3 Market data

The transaction-level information obtained from Orbis M&A did not include historical equity market data. Therefore, daily historical prices for the SPDR S&P 500 ETF Trust, identified by the ticker SPY, were retrieved through Microsoft Excel using the STOCKHISTORY function. SPY was selected as a proxy for the US equity market because it tracks the S&P 500 and all acquirers included in the sample are headquartered in the United States.

The same market benchmark was applied to all transactions, including those involving foreign targets, to provide a consistent measure of the equity market conditions faced by US acquirers. The market series began in July 1996, preceding the earliest transaction announcement in the final sample.

4.3.1 Bull and Bear Market Split

The SPY price series was divided into bull and bear phases following an adapted implementation of the turning-point methodology developed by Pagan and Sossounov (2003). This approach identifies sustained market cycles through local peaks and troughs, subject to duration and censoring rules designed to distinguish persistent market regimes from temporary price fluctuations.

The classification was conducted as follows:

i) Conversion to monthly observations - The daily SPY price series was converted into monthly observations by retaining the closing price on the final available trading day of each month.

ii) Identification of potential turning points - Potential peaks and troughs were identified using a centred window of eight months before and eight months after each observation. A potential peak corresponded to the highest price within this window, while a potential trough corresponded to the lowest.

iii) Alternation of turning points - Peaks and troughs were required to alternate. Where consecutive peaks were identified, only the highest was retained. Similarly, where consecutive troughs were identified, only the lowest was retained.

iv) Application of censoring rules - Turning points within six months of the beginning or end of the series were removed. Complete peak-to-peak or trough-to-trough cycles were required to last at least 16 months, while individual phases were required to last at least four months.

v) Classification of market phases - The month containing a retained peak was treated as the final month of the corresponding bull market phase, while the month containing a retained trough was treated as the final month of the corresponding bear market phase. Accordingly, bear market phases began in the month following a peak and ended in the month containing the subsequent trough. Bull market phases began in the month following a trough and ended in the month containing the subsequent peak. Each transaction was assigned the market phase corresponding to its bid-premium announcement month.

The main explanatory variable was defined as:

$$BearMarket_i = \begin{cases} 1, & \text{if transaction } i \text{ was announced during a bear market} \\ 0, & \text{if transaction } i \text{ was announced during a bull market} \end{cases}$$

Bull markets therefore constitute the reference category in the regression. The classification is retrospective because observations surrounding a potential turning point are required to identify peaks and troughs. It should therefore be interpreted as an ex-post classification of historical market cycles rather than a real-time forecasting measure.

Table 3 presents the complete sequence of bull and bear market phases identified by the classification. For each phase, the table reports its start and end dates, start-turn and end-turn prices, duration and cumulative market movement. Presenting the complete sequence provides transparency regarding the construction of the main explanatory variable and the distribution of transactions across individual market episodes. Acquisition-premium statistics by market cycle are presented separately in Section 5.3.2.

Table 3: Market-Cycle Episodes

Market phase	Phase period	Duration (months)	Start-turn price	End-turn price	Market change
Bull*	Jul. 1996 to Aug. 2000	50	64.1	152.3	138%
Bear	Sep. 2000 to Sep. 2002	25	152.3	81.8	(46%)
Bull	Oct. 2002 to Oct. 2007	61	81.8	154.7	89%
Bear	Nov. 2007 to Feb. 2009	16	154.7	73.9	(52%)
Bull	Mar. 2009 to Apr. 2011	26	73.9	136.4	85%
Bear	May 2011 to Sep. 2011	5	136.4	113.2	(17%)
Bull	Oct. 2011 to May 2015	44	113.2	211.1	87%
Bear	Jun. 2015 to Sep. 2015	4	211.1	191.6	(9%)
Bull	Oct. 2015 to Dec. 2021	75	191.6	475.0	148%
Bear	Jan. 2022 to Sep. 2022	9	475.0	357.2	(25%)
Bull**	Oct. 2022 to Dec. 2024	27	357.2	586.1	64%
Total		**342**			

Note: Start-turn and end-turn prices correspond to the monthly closing values used to identify the boundaries of each market phase. Market change is calculated as the percentage variation between the start-turn and end-turn prices.
*The initial bull phase is left-censored because the price series begins in July 1996 and the preceding trough is not observed. **The final bull phase is right-censored because no subsequent peak is confirmed within the available market series. The transaction sample ends on 16 July 2024, while the market-price series extends to December 2024.

The classification does not identify the COVID-19 market decline as a separate bear market phase. Although the S&P 500 experienced a substantial daily peak-to-trough decline between February and March 2020, the classification uses month-end prices and identifies turning points within a centred

window of eight months on either side of each observation. The February 2020 month-end observation was not identified as a local peak because higher monthly closing prices were observed within the following eight months. March 2020 was identified as a potential trough but was subsequently removed under the alternation rule because it represented the higher of two consecutive candidate troughs. Consequently, the COVID-19 decline did not form a separate peak-to-trough phase and was included within the longer bull market extending from October 2015 to December 2021.

The first and final bull market phases require additional caution. The first bull phase is left-censored because the market-price series begins in July 1996 and the preceding trough is not observed. The final bull phase is right-censored because no subsequent peak is confirmed within the available series. Moreover, the final transaction in the sample was announced on 16 July 2024, while the market-price series extends to December 2024. The classification therefore provides five subsequent monthly observations rather than the complete eight future months normally used in the centred-window procedure. This endpoint limitation does not alter any of the identified historical bear market episodes, although the final months of the classification should be interpreted with appropriate caution.

Finally, the classification is retrospective because observations occurring after a potential turning point are required to determine whether that observation qualifies as a local peak or trough. It should therefore be interpreted as an ex-post classification of historical market cycles and not as a real-time market-timing or forecasting measure.

4.4 Definition of Variables

This chapter defines the variables used in the empirical analysis. The bid premium represents the dependent variable, while the bear market dummy constitutes the main explanatory variable. The remaining variables are included as controls to account for observable differences in transaction size, valuation, payment method, geographic scope, industry relatedness and deal structure.

4.4.1 Dependent Variable

The dependent variable is the bid premium at announcement, obtained from Orbis M&A. The variable represents the percentage premium offered by the acquirer relative to the target's reference market price, as reported by the database. However, the exported data does not identify the precise benchmark date or price convention used by Orbis M&A to calculate the premium, and an official field definition could not be retrieved. The same reported field is applied consistently across all transactions, but the

comparability of the measure is subject to this limitation. Accordingly, the variable is interpreted as the reported percentage premium at announcement rather than as a complete measure of the bidder's economic willingness to pay.

The bid premium is expressed in decimal form. Therefore, a value of 0.25 corresponds to a premium of 25%. Maintaining the variable in decimal form also facilitates the interpretation of the regression coefficients. For example, an estimated coefficient of 0.05 on a dummy variable would represent an average difference of five percentage points in the bid premium, holding the remaining explanatory variables constant.

The bid premium is appropriate for the purposes of this study because it directly measures the acquisition pricing outcome being examined. However, the distribution includes both negative premiums and unusually high positive values. Negative premiums were not automatically removed because they may represent economically valid transactions in which the offer price was below the reference market price reported by Orbis M&A. Similarly, high premiums were not subjectively excluded because they may reflect genuine transaction circumstances.

To limit the influence of extreme observations on the ordinary least squares estimates, the bid premium is winsorised at the 1st and 99th percentiles. Values below the 1st percentile are replaced by the value at the 1st percentile, while values above the 99th percentile are replaced by the value at the 99th percentile. The original premium variable is retained for descriptive purposes, while its winsorised version is used in the main regression analysis.

4.4.2 Main Explanatory Variable

The main explanatory variable is the bear market dummy, constructed from the market-cycle classification described in Section 4.3.1. The variable equals one when a transaction was announced during a bear market phase and zero when it was announced during a bull market phase:

$$BearMarket_i = \begin{cases} 1, & \text{if transaction } i \text{ was announced during a bear market} \\ 0, & \text{if transaction } i \text{ was announced during a bull market} \end{cases}$$

Bull market transactions therefore constitute the reference category. The estimated coefficient on the bear market dummy measures the average difference in bid premiums between bear and bull market transactions, after controlling for the remaining deal characteristics included in the model.

The expected direction of this relationship is theoretically ambiguous, as explained in Section 2. Bear markets may be associated with lower premiums because greater uncertainty, tighter financing conditions and reduced risk tolerance can limit the price acquirers are willing or able to pay. Conversely, depressed target valuations may allow acquirers to offer a higher percentage premium relative to the target's prevailing market price, even if the absolute consideration offered is not unusually high. The sign and statistical significance of the bear market coefficient are therefore determined empirically.

4.4.3 Description of the Variables

Table 4 summarises the independent variables used in the empirical analysis. The first variable represents the principal explanatory variable, and the remaining variables are included as controls based on their potential relationship with acquisition pricing.

Table 4: Description of the variables

Independent Variable	Type	Description
Bear Market	Main explanatory variable	Dummy equal to 1 if the transaction was announced during a bear market phase and 0 if announced during a bull market phase.
Log Deal EV	Deal control	Natural logarithm of deal enterprise value expressed in USD millions.
EV/EBITDA	Valuation control	Pre-deal enterprise value to EBITDA multiple reported by Orbis M&A and winsorised at the 1st and 99th percentiles.
Cash	Payment control	Dummy equal to 1 if cash consideration is included in the transaction and 0 otherwise.
Shares	Payment control	Dummy equal to 1 if share consideration is included in the transaction and 0 otherwise.
Cross-border	Geographic control	Dummy equal to 1 if the acquirer and target are located in different countries and 0 otherwise.
NAICS 2-digit match	Industry-relatedness control	Dummy equal to 1 if the first two digits of the acquirer and target NAICS codes are identical and 0 otherwise.
Hostile or unsolicited	Deal-structure control	Dummy equal to 1 if the transaction is classified as hostile or unsolicited and 0 otherwise.
Contested	Deal-structure control	Dummy equal to 1 if the transaction is classified as contested and 0 otherwise.
Leveraged buyout	Deal-structure control	Dummy equal to 1 if the transaction is classified as a leveraged buyout and 0 otherwise.
Recommended	Deal-structure control	Dummy equal to 1 if the transaction is classified as recommended and 0 otherwise.

4.5 Empirical Model

The relationship between market cycles and acquisition premiums is examined using a pooled ordinary least squares regression. The dependent variable is the winsorised bid premium, while the

bear market dummy is the main explanatory variable. The model also includes a set of transaction-level controls intended to account for observable differences between deals announced during bull and bear markets, together with target two-digit NAICS fixed effects.

The empirical model is specified as follows:

$$\begin{aligned} BidPremium_i^W = {} & \beta_0 + \beta_1 BearMarket_i + \beta_2 LogDealEV_i + \beta_3 EVEBITDA_i^W \\ & + \beta_4 Cash_i + \beta_5 Shares_i + \beta_6 CrossBorder_i + \beta_7 NAICSMatch_i \\ & + \beta_8 HostileUnsolicited_i + \beta_9 Contested_i + \beta_{10} LBO_i + \beta_{11} Recommended_i \\ & + \sum_{j=1}^{J-1} \gamma_j \, TargetNAICS_{ij} + \varepsilon_i \end{aligned}$$

where i represents an individual M&A transaction. $BidPremium_i^W$ is the bid premium winsorised at the 1st and 99th percentiles, while $BearMarket_i$ is a dummy variable equal to one when the transaction was announced during a bear market and zero when it was announced during a bull market. $LogDealEV_i$ represents the natural logarithm of deal enterprise value, and $EVEBITDA_i^W$ represents the winsorised pre-deal EV/EBITDA multiple.

The remaining variables control for payment method, geographic scope, industry relatedness and transaction structure. $TargetNAICS_{ij}$ represents the set of target two-digit NAICS fixed effects.

4.5.1 Coefficient of Interest

The principal coefficient of interest is β_1, which measures the conditional difference in bid premiums between transactions announced during bear and bull markets. Since bull market transactions constitute the reference category:

- a positive and statistically significant β_1 indicates that bid premiums are higher during bear markets;
- a negative and statistically significant β_1 indicates that bid premiums are lower during bear markets and therefore higher during bull markets; and
- a statistically insignificant β_1 indicates that the analysis does not provide sufficient evidence of a systematic difference between the two market phases.

4.5.2 Treatment of Extreme Observations and Robustness Checks

The preliminary assessment of the database identified extreme observations in both the bid-premium and EV/EBITDA distributions. These observations were not removed subjectively, as unusually high or negative premiums may represent genuine transaction circumstances. Instead, both variables are winsorised at the 1st and 99th percentiles.

For any variable X_i, the winsorised measure is defined as:

$$X_i^W = \begin{cases} P_1(X), & \text{if } X_i < P_1(X) \\ X_i, & \text{if } P_1(X) \leq X_i \leq P_{99}(X) \\ P_{99}(X), & \text{if } X_i > P_{99}(X) \end{cases}$$

where $P_1(X)$and $P_{99}(X)$represent the 1st and 99th percentile values, respectively. This procedure limits the influence of extreme observations while retaining the complete analysis sample. The original variables remain available for descriptive analysis, whereas their winsorised versions are used in the regression.

Deal enterprise value is not winsorised because it is already transformed using the natural logarithm, which substantially reduces the influence of the largest transactions.

Two additional specification sensitivity checks are estimated. First, the model is re-estimated using the original, non-winsorised bid premium as the dependent variable. The observations, explanatory variables, target two-digit NAICS fixed effects and standard-error assumptions remain unchanged. This specification evaluates whether the direction, magnitude and statistical significance of the bear market coefficient depend materially on the winsorisation of the dependent variable.

Second, the main regression is re-estimated without the pre-deal EV/EBITDA control. The unusually dispersed distribution of this variable may reflect observations with comparatively small EBITDA denominators, while its availability substantially restricted the initial extraction. The robustness specification therefore evaluates whether the estimated bear market association within the final sample depends on the inclusion of EV/EBITDA. As the same 833 transactions are retained, this check does not eliminate the sample-selection effect associated with requiring EV/EBITDA availability during the original sample construction.

4.5.3 Fixed Effects and Statistical Inference

Target two-digit NAICS fixed effects are included to account for systematic differences in acquisition premiums across target industries. These classifications provide a more precise industry control than the broad Orbis major-sector categories. To avoid estimating separate fixed effects from extremely small groups, target NAICS categories containing fewer than ten transactions are combined into a residual Other category.

The main model is estimated using OLS, while statistical inference is based on HC3 heteroskedasticity-robust standard errors. HC3 inference is used because the residual-diagnostic tests indicate unequal residual variance and because HC3 provides additional protection against observations with comparatively high leverage. Statistical significance is evaluated at the conventional 1%, 5% and 10% levels.

Since transactions announced within the same month may be exposed to common economic, financial and information conditions, the assumption that all transaction-level residuals are independent may be restrictive. As an additional inference check, the main specification is therefore estimated using standard errors clustered by announcement month. This approach allows the regression residuals of transactions announced within the same month to be correlated, while treating observations from different months as separate clusters. The final sample contains 271 distinct announcement months.

A correlation matrix and variance inflation factors are examined before estimation to assess potential multicollinearity among the substantive explanatory variables. Regression diagnostics also include the Breusch-Pagan and White tests for heteroskedasticity and Cook's distance for potentially influential observations. Observations identified through Cook's distance are not automatically removed from the reported model because statistical influence does not demonstrate that the underlying transaction is invalid. Instead, the complete specification is re-estimated after their exclusion as an influence-based diagnostic comparison rather than as an alternative primary sample.

The pooled regression and alternative standard-error specifications are intended to estimate conditional associations. Although the model controls for several observable transaction characteristics and target-industry differences, it does not eliminate potential omitted-variable bias arising from unobserved transaction characteristics or broader time-varying conditions. The results

should therefore not be interpreted as evidence that bear market conditions independently cause changes in acquisition premiums.

5. Sample Description and Preliminary Analysis

This chapter describes the final transaction sample and presents the preliminary analysis conducted before estimating the multivariate regression model. The chapter first examines the distribution of transactions over time and across bull and bear market phases. It then describes the geographic, transaction and industry composition of the sample. Finally, the chapter presents the descriptive statistics, preliminary comparison of bid premiums across market phases and multicollinearity assessment.

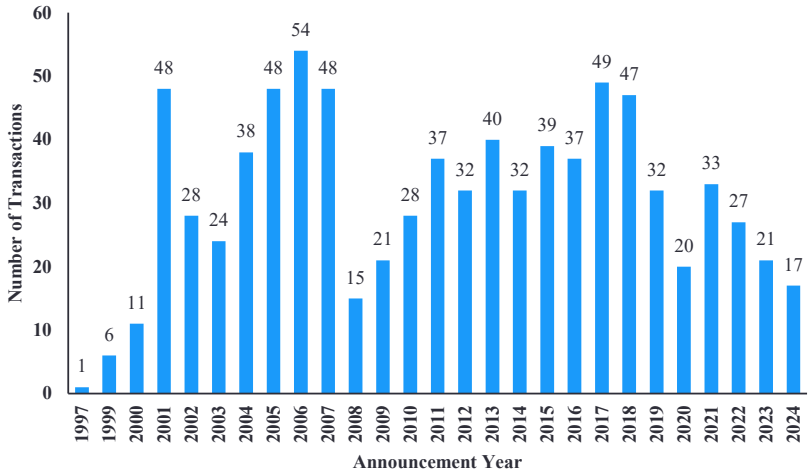
5.1 Sample Distribution

5.1.1 Distribution over Time

The final sample comprises 833 public takeover transactions announced between 25 November 1997 and 16 July 2024. Although the sample period begins in 1997, only one transaction was recorded in that year, while no qualifying transactions were identified in 1998. The number of transactions increased considerably from 1999 onwards, although the distribution remained uneven across the sample period.

The limited number of qualifying transactions in the earliest years should not be interpreted as evidence of limited aggregate M&A activity during that period. It may instead reflect the study's selection criteria, particularly the availability requirements imposed on bid premiums, deal enterprise value, EV/EBITDA and transaction-structure information. Figure 1 presents the distribution of transactions by announcement year.

Figure 1: M&A transactions by announcement year



Transaction activity was particularly strong during the mid-2000s, with 48 transactions in 2005, 54 transactions in 2006 and 48 transactions in 2007. The year 2006 recorded the largest number of transactions in the sample. This period of relatively high activity was followed by a substantial reduction in 2008, when the number of qualifying transactions declined to 15.

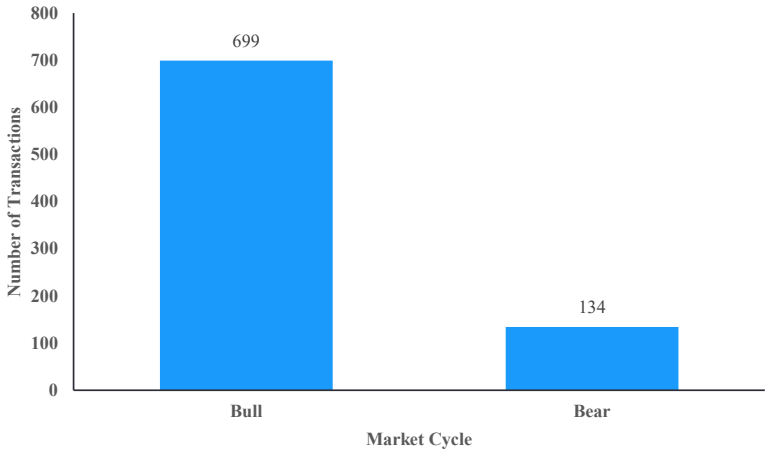
A second period of stronger transaction activity was observed between 2011 and 2018. During this period, the annual number of transactions exceeded 30, reaching 49 transactions in 2017 and 47 transactions in 2018. Transaction activity subsequently declined to 20 observations in 2020, before increasing to 33 transactions in 2021. The final years of the sample contain 27 transactions in 2022, 21 in 2023 and 17 in 2024. Since the 2024 data end on 16 July, the number reported for that year does not represent a complete calendar year.

Overall, the transaction distribution confirms that M&A activity was not uniform throughout the sample period. The observed clustering is consistent with the merger-wave literature, including Mitchell and Mulherin (1996), Harford (2005), and Rhodes-Kropf, Robinson and Viswanathan (2005), and supports the importance of accounting for prevailing market conditions when analysing acquisition pricing. Nevertheless, the annual figures should be interpreted as the distribution of transactions satisfying the study's selection criteria, rather than as a complete representation of total US M&A activity.

5.1.2 Distribution across Bull and Bear Markets

Each transaction was assigned to the bull or bear market phase prevailing during its bid-premium announcement month, based on the market-cycle classification described in Section 4.3.1. Figure 2 presents the number of transactions announced during each market phase.

Figure 2: Transactions by market phase



Of the 833 transactions included in the final sample, 699 were announced during bull market phases and 134 during bear market phases, representing 83.9% and 16.1% of the sample, respectively. The distribution therefore shows that most transactions satisfying the study's selection criteria occurred during bull markets.

The greater number of bull market transactions partly reflects the longer duration of bull phases within the period analysed. Consequently, the difference in the number of transactions should not, by itself, be interpreted as conclusive evidence that firms are more likely to undertake acquisitions during bull markets. Such a conclusion would require an analysis of transaction frequency relative to the duration of each market phase, which is outside the primary scope of this study.

The imbalance between the two pooled groups is nevertheless relevant to the empirical analysis. The 134 bear market transactions are also concentrated within only five bear market episodes. Although each transaction remains a separate observation, transactions announced within the same episode share the same market classification and may be exposed to common economic and financial

conditions. Table 11 therefore reports transaction counts and mean and median acquisition premiums separately for each bull and bear market phase, allowing the preliminary analysis to determine whether the pooled comparison conceals substantial variation across individual episodes.

5.2 Sample Characteristics

5.2.1 Geographic and Transaction Characteristics

The sample is strongly concentrated in domestic US transactions. Of the 833 transactions, 774 involved US targets and were classified as domestic transactions, representing 92.9% of the sample. The remaining 59 transactions, or 7.1%, involved foreign targets and were classified as cross-border transactions.

Table 5: Geographic Composition of the Sample

	Transactions	**Percentage**
Domestic	774	92.9%
Cross-border	59	7.1%

Although the sample-selection criteria required all acquirers to be headquartered in the United States, foreign targets were not excluded. The cross-border indicator is therefore included in the regression to control for differences in regulatory complexity, information asymmetry, institutional environments and transaction execution that may distinguish international acquisitions from domestic transactions.

With respect to the method of payment, 487 transactions were financed exclusively with cash, representing 58.5% of the sample. A further 209 transactions included both cash and share consideration, while 126 transactions used shares without identified cash consideration. For 11 transactions, neither cash nor share consideration was identified in the corresponding payment-method indicators. These observations remain in the sample because the remaining transaction information required for the analysis is available.

Table 6: Distribution of Transactions by Method of Payment

	Transactions	Percentage
Cash only	487	58.5%
Shares only	126	15.1%
Mixed	209	25.1%
Unknown	11	1.3%

The mutually exclusive categories presented above are used to describe the sample. In the regression model, payment method is represented by separate cash and share indicators because a transaction may include both forms of consideration. The coefficients should therefore be interpreted as the association between the inclusion of each payment method and the bid premium, holding the other model variables constant.

Most transactions in the sample were classified as recommended. Specifically, 715 transactions, representing 85.8% of the sample, involved recommended offers. Hostile or unsolicited transactions and leveraged buyouts each accounted for 22 observations, or 2.6%, while 27 transactions, or 3.2%, were classified as contested.

Table 7: Deal-Structure Characteristics

	Transactions	Percentage
Recommended	715	85.8%
Hostile or unsolicited	22	2.6%
Leveraged buyout	22	2.6%
Contested	27	3.2%

These transaction-structure indicators are not mutually exclusive, meaning that one transaction may be included in more than one category. The relatively limited number of hostile, contested and leveraged buyout transactions should be considered when interpreting their regression coefficients, as the estimates for these variables may be less precise than those based on more frequent transaction characteristics.

5.2.2 Industry Relatedness and Target-Industry Composition

Industry relatedness between the acquirer and target was assessed using their two-digit NAICS classifications. A total of 563 transactions, representing 67.6% of the sample, involved acquirers and targets operating within the same broad NAICS sector. The remaining 270 transactions, or 32.4%, involved companies classified in different two-digit NAICS sectors.

Table 8: Acquirer-Target Industry Relatedness

	Transactions	Percentage
Same 2-digit NAICS sector	563	67.6%
Different 2-digit NAICS sector	270	32.4%

The distribution indicates that most transactions involved some degree of broad industry relatedness, although approximately one-third crossed two-digit NAICS sector boundaries. This provides sufficient variation for the NAICS match indicator to control for potential differences between related and diversifying acquisitions.

In addition to the industry-relatedness indicator, the target's two-digit NAICS classification is used to describe the industry composition of the sample. Unlike the broad Orbis major-sector categories, the two-digit NAICS classification provides a more standardised representation of the target's principal economic activity. This is particularly relevant because the Orbis classification places a substantial proportion of transactions within broad categories such as Other services, potentially concealing meaningful differences across target industries.

Table 9 presents the distribution of transactions according to the target's two-digit NAICS classification. The observed variation confirms that the sample includes targets from a broad range of economic activities. Target two-digit NAICS fixed effects are therefore included in the regression model to account for systematic differences in acquisition premiums across target industries. The existing NAICS-match indicator remains in the model because it captures a different characteristic, namely whether the acquirer and target operate within the same broad two-digit NAICS industry.

Table 9: Distribution of Transactions by Target Two-Digit NAICS Industry

Two-digit NAICS	Target industry	Transactions	Percentage
21	Mining, Quarrying, and Oil and Gas Extraction	91	10.9%
22	Utilities	27	3.2%
23	Construction	12	1.4%
31	Manufacturing	33	4.0%
32	Manufacturing	63	7.6%
33	Manufacturing	153	18.4%
42	Wholesale Trade	31	3.7%
44	Retail Trade	16	1.9%
45	Retail Trade	13	1.6%
48	Transportation and Warehousing	30	3.6%
51	Information	92	11.0%
52	Finance and Insurance	27	3.2%
53	Real Estate and Rental and Leasing	93	11.2%
54	Professional, Scientific, and Technical Services	74	8.9%
56	Administrative and Support and Waste Management and Remediation Services	17	2.0%
62	Health Care and Social Assistance	22	2.6%
72	Accommodation and Food Services	22	2.6%
Other	Two-digit NAICS categories with fewer than 10 transactions	17	2.0%
Total		**833**	**100.0%**

Note: The associated target-industry descriptions are based on the official 2022 North American Industry Classification System sector definitions published by the U.S. Census Bureau. NAICS uses two-digit codes to identify sectors, although Manufacturing, Retail Trade, and Transportation and Warehousing are officially represented by the code ranges 31–33, 44–45, and 48–49, respectively. For consistency with the regression specification, the individual two-digit codes within these ranges are presented separately in the table. The Other category combines codes 11, 49, 55, 61, 71, 81, and 92, each containing fewer than ten transactions.

The target-industry distribution is concentrated in several categories. NAICS 33, Manufacturing, represents the largest category, with 153 transactions or 18.4% of the sample. This is followed by Real Estate and Rental and Leasing, with 93 transactions, Information, with 92 transactions, Mining, Quarrying, and Oil and Gas Extraction, with 91 transactions, and Professional, Scientific,

and Technical Services, with 74 transactions. Together, these five categories account for 60.4% of the final sample. The remaining transactions are distributed across a broad range of target industries.

Within NAICS 33, Computer and Electronic Product Manufacturing, corresponding to the three-digit code 334, is the largest subsector, comprising 63 transactions. It therefore represents 41.2% of the observations classified under NAICS 33 and 7.6% of the complete sample. This subsector includes manufacturers of computers and peripheral equipment, communications equipment, semiconductors and electronic components, and navigational, measuring and electromedical instruments. Machinery Manufacturing is classified separately under NAICS 333 and accounts for 20 transactions in the sample.

The prominence of NAICS 334 is economically plausible given the importance of technology, electronics, semiconductors and advanced manufacturing in US acquisition activity during the sample period. However, the observed distribution reflects the study's specific selection criteria and should not be interpreted as a complete representation of sectoral M&A activity in the US.

Target two-digit NAICS fixed effects are included in the regression to account for systematic differences in acquisition premiums across target industries. Categories containing fewer than ten transactions are grouped into a residual Other category to avoid estimating separate fixed effects from extremely small groups. The NAICS match indicator remains in the model because it captures a distinct transaction characteristic, namely whether the acquirer and target operate within the same broad industry, rather than the target's industry itself.

5.3 Descriptive Statistics and Preliminary Analysis

This section presents the descriptive statistics for the variables included in the empirical analysis and provides a preliminary comparison of acquisition premiums between bull and bear markets. It also examines the correlations among the explanatory variables and assesses whether multicollinearity may affect the estimation of the main regression model.

5.3.1 Descriptive Statistics

The raw measures describe the original sample distribution, while the winsorised bid premium and EV/EBITDA variables correspond to the measures used in the main regression. Target-industry

composition is controlled through two-digit NAICS fixed effects, which are not individually reported in the descriptive-statistics table.

Table 10 presents the descriptive statistics for the full sample of 833 transactions. The statistics include the number of observations, mean, median, standard deviation, minimum and maximum for the dependent variable, the main explanatory variable and the transaction-level controls.

Table 10: Descriptive Statistics for the Full Sample

Variable	Observations	Mean	Median	Std. deviation	Minimum	Maximum	Skewness	Kurtosis
Bid premium (raw)	833	0.2787	0.2054	0.3701	(0.6649)	4.8200	4.7213	40.0339
Bid premium (winsorised)	833	0.2718	0.2054	0.3007	(0.2043)	1.7921	2.4330	8.4633
Bear market	833	0.1609	-	0.3676	-	1.0000	1.8494	1.4238
Deal enterprise value (USD m)	833	4,762.79	1,508.00	11,346.13	1.03	181,950.00	7.7305	89.1950
Log deal enterprise value	833	7.2324	7.3185	1.6933	0.0334	12.1115	(0.3302)	0.2734
EV/EBITDA (raw)	833	45.31	12.47	543.96	0.01	15,384.62	27.1538	763.0253
EV/EBITDA (winsorised)	833	21.37	12.47	37.63	2.62	292.21	5.6477	35.0348
Cash consideration	833	0.8355	1.0000	0.3709	-	1.0000	(1.8136)	1.2921
Share consideration	833	0.4022	-	0.4906	-	1.0000	0.3998	(1.8446)
Cross-border	833	0.0708	-	0.2567	-	1.0000	3.3519	9.2575
NAICS 2-digit match	833	0.6759	1.0000	0.4683	-	1.0000	(0.7529)	(1.4367)
Hostile or unsolicited	833	0.0264	-	0.1604	-	1.0000	5.9175	33.0963
Contested	833	0.0324	-	0.1772	-	1.0000	5.2902	26.0486
Leveraged buyout	833	0.0264	-	0.1604	-	1.0000	5.9175	33.0963
Recommended	833	0.8583	1.0000	0.3489	-	1.0000	(2.0590)	2.2450

The raw bid premium had a mean of 27.9% and a median of 20.5%, indicating a positively skewed distribution. This pattern is further supported by the long upper tail, with the maximum raw premium reaching 482.0%. After winsorisation at the 1st and 99th percentiles, the mean premium decreased slightly to 27.2%, while the median remained unchanged at 20.5%. The standard deviation declined from 37.0% to 30.1%, showing that winsorisation reduced the influence of the most extreme observations without materially changing the central tendency of the premium distribution.

Deal enterprise value also displayed substantial variation across transactions. The mean deal enterprise value was approximately USD 4,762.8 million, compared with a median of USD 1,508.0 million. The difference between these measures indicates that the distribution was positively skewed and influenced by a relatively small number of very large transactions. For this reason, the natural logarithm of deal enterprise value is used in the regression rather than its untransformed value.

The raw EV/EBITDA multiple exhibited particularly high dispersion, with a small number of observations containing exceptionally large values. Such values may arise when the target's EBITDA

denominator is comparatively close to zero and should therefore be interpreted cautiously. Following winsorisation, the variable had a mean of 21.4x and a median of 12.5x. Winsorisation reduces the influence of the most extreme multiples but does not fully resolve the economic interpretation or sample-selection concerns associated with the variable. Chapter 6 therefore reports an additional specification that excludes EV/EBITDA while retaining the remaining observations and explanatory variables.

The means of the binary variables correspond to the proportions of transactions presenting each characteristic. Their descriptive values are consistent with the sample composition discussed in Section 5.2.

Overall, the descriptive statistics show substantial variation in acquisition premiums, transaction size and valuation multiples. The natural logarithm of deal enterprise value reduces the influence of the largest transactions, while winsorisation limits the effect of extreme bid-premium and EV/EBITDA observations. These procedures improve the suitability of the variables for regression analysis but do not eliminate the underlying measurement and sample-selection concerns, particularly those associated with the premium benchmark and the requirement for EV/EBITDA availability. Differences in transaction characteristics and target-industry composition across the sample further support the inclusion of controls for observable deal composition in the regression analysis.

5.3.2 Premium Comparison across Market Cycles

Table 11 reports the mean and median bid premiums for each individual bull and bear market phase, using both the original and winsorised premium measures. The table also presents pooled statistics for all bull market transactions, all bear market transactions and the full sample.

Table 11: Bid Premiums across Individual Market Cycles

Market phase	Period	Transactions	Winsorised mean	Raw mean	Median
Bull	Jul. 1996 to Aug. 2000	15	0.287	0.287	0.230
Bear	Sep. 2000 to Sep. 2002	71	0.333	0.335	0.250
Bull	Oct. 2002 to Oct. 2007	217	0.206	0.225	0.154
Bear	Nov. 2007 to Feb. 2009	19	0.428	0.455	0.307
Bull	Mar. 2009 to Apr. 2011	70	0.390	0.395	0.318
Bear	May 2011 to Sep. 2011	10	0.261	0.261	0.285
Bull	Oct. 2011 to May 2015	125	0.278	0.276	0.222
Bear	Jun. 2015 to Sep. 2015	12	0.412	0.408	0.351
Bull	Oct. 2015 to Dec. 2021	229	0.237	0.233	0.188
Bear	Jan. 2022 to Sep. 2022	22	0.365	0.365	0.305
Bull	Oct. 2022 to Dec. 2024	43	0.319	0.361	0.183
All bull phases		699	0.256	0.263	0.198
All bear phases		134	0.354	0.358	0.271
Full sample		**833**	**0.272**	**0.279**	**0.205**

Note: Transaction counts are based on the bid-premium announcement month. Raw premiums correspond to the original bid-premium variable, while winsorised premiums are capped at the 1st and 99th percentiles of the full-sample distribution. The first market phase begins before the first qualifying transaction in November 1997, while the final market phase extends beyond the final transaction announcement in July 2024.

In the pooled comparison, the mean winsorised bid premium was approximately 25.6% during bull markets and 35.4% during bear markets, corresponding to an unconditional difference of approximately 9.7 percentage points. The median premium was also higher during bear markets, at approximately 27.1%, compared with 19.8% during bull markets.

The episode-level results show considerable variation within both market regimes. Using the winsorised measure, mean premiums during individual bull phases range from 20.6% in the October 2002 to October 2007 phase to 39.0% in the March 2009 to April 2011 phase. Mean premiums during bear phases range from 26.1% in the May to September 2011 phase to 42.8% during the November 2007 to February 2009 phase. Median premiums display a similarly heterogeneous pattern.

The same general pattern was observed using the original bid-premium measure. The raw mean premium was approximately 26.3% during bull markets and 35.8% during bear markets, producing a difference of approximately 9.4 percentage points. The similarity between the raw and winsorised comparisons suggests that the observed difference is not primarily driven by the treatment of extreme premium observations.

Although the episode-level analysis reveals substantial heterogeneity, the pooled tests provide an initial assessment of whether the overall bid-premium distributions differ between bull and bear markets. Welch's unequal-variance t-test was used to evaluate whether the mean premiums differed significantly across market phases. For the winsorised bid premium, the test produced a t-statistic of 3.039 and a p-value of 0.0028. The null hypothesis of equal mean premiums is therefore rejected at the 1% significance level. The result was unchanged in economic direction when the raw premium was used, for which the test produced a t-statistic of 2.699 and a p-value of 0.0076.

Table 12: Bull versus Bear Statistical Tests

Premium measure	Bull mean	Bear mean	Mean difference (Bear - Bull)	Welch t-statistic
Bid premium (raw)	0.2635	0.3578	0.0943	2.6994***
Bid premium (winsorised)	0.2561	0.3535	0.0974	3.0388***

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

The preliminary evidence therefore indicates that bid premiums were higher in the pooled bear market subsample. However, Table 11 demonstrates that this relationship was not uniform across every individual episode. The pooled difference may reflect a combination of prevailing market conditions, the target-price benchmark used to calculate percentage premiums and changes in the composition of transactions across market cycles.

One potential interpretation is that depressed target share prices during adverse market conditions reduce the benchmark against which the acquisition offer is evaluated. A given offer value may consequently produce a higher measured percentage premium when the target-price benchmark is depressed. Other possible explanations include differences in target selection, bargaining conditions and the types of transactions continuing to occur during market downturns. These mechanisms are not tested directly in the preliminary analysis and should therefore be treated as possible interpretations rather than established explanations.

The results in this subsection are unconditional and do not control for transaction size, target valuation, payment method, geographic scope, industry relatedness, transaction structure or target-industry composition. The pooled tests also treat individual transactions as separate observations despite the concentration of bear market transactions within five episodes. Chapter 6 therefore

examines whether the positive conditional association remains after controlling for observable transaction characteristics and target two-digit NAICS fixed effects.

5.3.3 Correlation and Multicollinearity Assessment

Before estimating the main regression, Pearson correlation coefficients were calculated to examine the relationships among the dependent variable and the explanatory variables.

Table 13: Pearson Correlation Matrix

Variable	Bid premium (winsorised)	Bear market	Log deal enterprise value	EV/EBITDA (winsorised)	Cash consideration	Share consideration	Cross-border	NAICS 2-digit match	Hostile or unsolicited	Contested	Leveraged buyout	Recommended
Bid premium (winsorised)	1.0000											
Bear market	0.1191	1.0000										
Log deal enterprise value	(0.2702)	(0.0597)	1.0000									
EV/EBITDA (winsorised)	0.0473	(0.0428)	0.0183	1.0000								
Cash consideration	0.1009	(0.0173)	(0.0888)	0.0846	1.0000							
Share consideration	(0.0847)	0.0074	0.1903	(0.1270)	(0.4683)	1.0000						
Cross-border	0.0722	(0.0063)	(0.0882)	0.0191	0.0468	(0.0737)	1.0000					
NAICS 2-digit match	(0.0326)	(0.0877)	0.0656	(0.0943)	(0.0651)	0.1234	(0.0787)	1.0000				
Hostile or unsolicited	(0.0818)	0.0094	0.0342	0.0106	(0.0077)	(0.0129)	(0.0455)	(0.0139)	1.0000			
Contested	(0.1283)	0.0121	0.0663	(0.0335)	0.0812	0.0158	(0.0505)	0.0254	0.3080	1.0000		
Leveraged buyout	(0.0223)	(0.0314)	0.0426	(0.0326)	0.0125	(0.0282)	(0.0455)	0.0181	(0.0271)	(0.0301)	1.0000	
Recommended	0.0116	0.0092	0.0786	0.0423	0.0334	0.0383	0.0451	0.0055	(0.2122)	(0.0617)	0.0025	1.0000

The winsorised bid premium was positively correlated with the bear market indicator, which is consistent with the unconditional comparison presented in Section 5.3.2. Nevertheless, the pairwise correlation does not control for the remaining transaction characteristics and should not be interpreted as an independent market-cycle effect.

The strongest absolute correlation among the substantive explanatory variables was observed between the cash and share consideration indicators, with a coefficient of -0.468. The negative relationship indicates that transactions including share consideration were less likely also to include cash consideration, although mixed-payment transactions mean that the two indicators are not mutually exclusive. The magnitude of the correlation does not indicate a serious multicollinearity concern.

The remaining explanatory variables displayed relatively low pairwise correlations. This suggests that the controls capture distinct dimensions of transaction size, valuation, payment method, geographic scope, industry relatedness and deal structure rather than measuring the same underlying characteristic.

Variance inflation factors were calculated to provide an additional assessment of multicollinearity. The results are presented in Table 14.

Table 14: Variance Inflation Factors

Variable	VIF	1 /VIF
Bear market	1.0159	0.9844
Log deal enterprise value	1.0654	0.9386
EV/EBITDA (winsorised)	1.0337	0.9674
Cash consideration	1.3032	0.7673
Share consideration	1.3557	0.7376
Cross-border	1.0236	0.9770
NAICS 2-digit match	1.0384	0.9630
Hostile or unsolicited	1.1583	0.8634
Contested	1.1275	0.8869
Leveraged buyout	1.0094	0.9907
Recommended	1.0638	0.9400
Mean	**1.1086**	**0.9106**

Note: 1/VIF represents tolerance

The highest VIF was 1.356, corresponding to the share consideration indicator. This value is substantially below the threshold of 5, above which multicollinearity may warrant further investigation, and the threshold of 10, which is generally associated with serious multicollinearity. Accordingly, the explanatory variables do not present material multicollinearity concerns. The cash and share consideration indicators can therefore remain together in the regression specification, as their inclusion does not materially inflate the variance of the estimated coefficients.

The VIF assessment focuses on the substantive explanatory variables and excludes the target two-digit NAICS fixed-effect indicators. Overall, the correlation matrix and variance inflation factors provide no evidence of material multicollinearity. The results therefore provide no multicollinearity based reason to exclude the substantive explanatory variables from the main specification.

6. Empirical Results

This chapter presents the results of the regression model specified in Section 4.5. The main model uses the winsorised bid premium as the dependent variable and includes transaction-level controls, target two-digit NAICS fixed effects and HC3 heteroskedasticity-robust standard errors. The subsequent analysis evaluates the sensitivity of the principal result to the use of the original bid premium, the exclusion of EV/EBITDA, potential dependence among transactions announced within the same month, influential observations and the exclusion of individual bear market episodes.

Table 15: Main Regression and Premium-Winsorisation Sensitivity Results

Variable	Main model: Winsorised premium	Sensitivity model: Raw premium
Bear market	0.0939***	0.0900***
	(0.0320)	*(0.0348)*
Log deal EV	(0.0425)***	(0.0502)***
	(0.0079)	*(0.0114)*
EV/EBITDA	0.0004	0.0004
	(0.0003)	*(0.0003)*
Cash consideration	0.0625**	0.0711**
	(0.0278)	*(0.0320)*
Share consideration	0.0019	0.0045
	(0.0257)	*(0.0332)*
Cross-border	0.0508	0.0433
	(0.0544)	*(0.0595)*
NAICS two-digit match	0.0109	0.0023
	(0.0247)	*(0.0286)*
Hostile or unsolicited	(0.0712)	(0.0672)
	(0.0503)	*(0.0549)*
Contested	(0.1800)***	(0.1838)***
	(0.0317)	*(0.0385)*
Leveraged buyout	(0.0103)	(0.0117)
	(0.0462)	*(0.0467)*
Recommended	0.0211	0.0472
	(0.0335)	*(0.0444)*
Constant	0.5017***	0.5420***
	(0.0701)	*(0.0886)*
Target two-digit NAICS fixed effects	Yes	Yes
Observations	833	833
R-squared	0.1447	0.1315
Adjusted R-squared	0.115	0.1012
Robust F-statistic	4.573	3.579
Prob(F-statistic)	<0.001	<0.001

Note: Coefficients are reported in decimal form, with HC3 heteroskedasticity-robust standard errors in parentheses. Both models are estimated using pooled OLS and include target two-digit NAICS fixed effects. NAICS 33, Manufacturing, is the reference category. The reported F-statistics use the HC3 robust covariance estimator. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

6.1 Main Regression Results

6.1.1 Market-Cycle Relationship

The bear market indicator has an estimated coefficient of 0.0939, with an HC3 robust standard error of 0.0320 and a p-value of 0.0034. The estimate is statistically significant at the 1% level. Its 95% confidence interval ranges from 0.0311 to 0.1566 and therefore excludes zero.

The coefficient indicates that transactions announced during bear markets were associated with bid premiums approximately 9.4 percentage points higher than transactions announced during bull markets, holding the included transaction characteristics and target two-digit NAICS fixed effects constant. This conditional difference is close to the unconditiona l difference of approximately 9.7 percentage points reported for the winsorised premium in Section 5.3.2.

The estimated magnitude is economically substantial. The 9.4 percentage-point conditional difference represents approximately 45.7% of the full-sample median bid premium of 20.5%. This comparison illustrates the economic relevance of the estimate, although the coefficient should not be interpreted as a causal effect of bear market conditions on acquisition pricing.

6.1.2 Control Variables and Model Fit

The logarithm of deal enterprise value has an estimated coefficient of -0.0425 and is statistically significant at the 1% level. Larger transactions were therefore associated with lower percentage premiums, holding the remaining explanatory variables constant.

Cash consideration has a coefficient of 0.0625 and is statistically significant at the 5% level. Transactions involving cash consideration were associated with bid premiums approximately 6.3 percentage points higher than transactions without identified cash consideration, conditional on the share indicator and the remaining variables.

Contested transactions have a coefficient of -0.1800 and are statistically significant at the 1% level, indicating a conditional difference of approximately 18.0 percentage points relative to non-contested transactions. Given the unexpected direction and magnitude of this result, the 27 contested transactions were reviewed individually to verify their classification and bid-premium values. This review did not identify coding errors; the transactions were correctly classified as contested and had an average raw bid premium of approximately 6.0%. Of these transactions, 22 were announced during

bull markets and five during bear markets. The negative coefficient is therefore consistent with the comparatively low premiums observed among the contested transactions in the sample, rather than being attributable to an apparent data-classification error. Nevertheless, the result should be interpreted cautiously because it is based on a small subgroup and the contested, hostile or unsolicited, and recommended indicators are not mutually exclusive.

The coefficients on EV/EBITDA, share consideration, cross-border status, acquirer-target industry relatedness, hostile or unsolicited status, leveraged-buyout status and recommended status are not statistically significant at conventional levels. The analysis therefore does not provide sufficient evidence of statistically significant conditional associations between these characteristics and bid premiums within the final specification.

The model includes all 833 transactions and target two-digit NAICS fixed effects. It reports an R^2 of 0.1447 and an adjusted R^2 of 0.1150. The robust F-statistic is 4.5730, with a p-value below 0.001, indicating that the explanatory variables are jointly statistically significant. The moderate explanatory power is consistent with acquisition premiums being influenced by transaction-specific factors that are not fully observable in the available database. The model is therefore intended to estimate conditional associations rather than provide a comprehensive prediction of acquisition premiums.

6.2 Sensitivity and Diagnostic Analysis

6.2.1 Sensitivity to Winsorisation

The regression was re-estimated using the original, non-winsorised bid premium as the dependent variable, while retaining the same 833 observations, explanatory variables, target two-digit NAICS fixed effects and HC3 robust standard errors.

The bear market coefficient in the raw-premium model is 0.0900, with an HC3 robust standard error of 0.0348 and a p-value of 0.0098. Transactions announced during bear markets were therefore associated with raw bid premiums approximately 9.0 percentage points higher than transactions announced during bull markets, conditional on the remaining model variables. The coefficient remains statistically significant at the 1% level.

Replacing the winsorised premium with the original premium slightly reduced the coefficient and increased its p-value. However, the direction, magnitude and statistical significance remained similar,

with both estimates significant at the 1% level. The principal finding is therefore not materially dependent on the winsorisation of the bid premium.

6.2.2 Robustness to EV/EBITDA and Alternative Statistical Inference

The main regression was re-estimated without the winsorised pre-deal EV/EBITDA control. This robustness check addresses concerns regarding the unusually high dispersion of the valuation multiple and assesses whether the principal result within the final sample depends on including that variable.

The bear market coefficient in the specification without EV/EBITDA is 0.0920, with an HC3 robust standard error of 0.0320 and a p-value of 0.0042. The estimated conditional difference therefore remains approximately 9.2 percentage points and statistically significant at the 1% level.

The coefficient is approximately 0.2 percentage points lower than the main estimate of 0.0939. Model fit also changes only modestly, with R^2 declining from 0.1447 to 0.1422 and adjusted R^2 declining from 0.1150 to 0.1135. The results indicate that the estimated bear market association within the final sample does not depend materially on the inclusion of EV/EBITDA.

This robustness check does not eliminate the sample-selection concern arising from the requirement that EV/EBITDA be available during the original sample construction. Both specifications use the same 833 transactions. The test therefore demonstrates specification robustness within the final sample rather than robustness to the broader observation loss associated with the original EV/EBITDA availability filter.

Transactions announced within the same month may also be exposed to common market, financing and information conditions, potentially creating correlation among their regression residuals. As an additional inference check, the main model was therefore estimated using standard errors clustered by announcement month. The final sample contains 271 distinct announcement months.

The estimated bear market coefficient remains 0.0939 because the underlying OLS specification and observations are unchanged. The announcement-month-clustered standard error is 0.0301, compared with the HC3 standard error of 0.0320 in the main model, and the corresponding p-value is 0.0020. The positive association therefore remains statistically significant at the 1% level when residuals are allowed to be correlated among transactions announced within the same month.

The clustered-inference check addresses potential within-month dependence but does not control for all omitted time-varying conditions. Financing conditions, market volatility and aggregate sentiment may vary throughout the sample period and may be correlated with the identified market phases. The result should therefore continue to be interpreted as a conditional association rather than as a causal market-cycle effect.

Table 16 compares the main model with the specification excluding EV/EBITDA and with the main specification estimated using standard errors clustered by announcement month.

Table 16: EV/EBITDA and Statistical-Inference Robustness Checks

Statistic	Main model	Without EV/EBITDA	Announcement-month clustered
Bear-market coefficient	0.0939***	0.0920***	0.0939***
Standard error	0.0320	0.0320	0.0301
p-value	0.0034	0.0042	0.0020
Observations	833	833	833
Target two-digit NAICS fixed effects	Yes	Yes	Yes
EV/EBITDA control	Yes	No	Yes

Note: The dependent variable is the winsorised bid premium. The model without EV/EBITDA retains the same 833 observations as the main model. The announcement-month model uses standard errors clustered across 271 distinct announcement months. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively

Because the underlying observations and regression specification are unchanged, clustering by announcement month affects the estimated standard errors and statistical inference but not the OLS coefficient estimates.

6.2.3 Influential Observations and Bear-Episode Sensitivity

The Breusch-Pagan and White tests reject the null hypothesis of homoskedasticity. The Breusch-Pagan test produces a p-value below 0.001, while the White test also produces a p-value below 0.001. Statistical inference in the primary model is therefore based on HC3 heteroskedasticity-robust standard errors.

Using the conventional Cook's-distance threshold of $4/n$, 46 transactions were identified as potentially influential. These observations were not removed from the reported model because a Cook's-distance flag indicates that an observation affects the fitted regression but does not demonstrate that the underlying transaction is erroneous.

Of the 46 flagged transactions, 34 occurred during bull market phases and 12 during bear market phases. The bear market observations comprise six transactions from the 2000 to 2002 episode, four from the 2007 to 2009 episode and two from the 2015 episode. No transactions from the 2011 or 2022 bear market episodes exceed the $4/n$ threshold.

The complete model was re-estimated after excluding the 46 flagged transactions. The resulting diagnostic sample contains 787 transactions. The bear market coefficient declines from 0.0939 to 0.0611, with an HC3 robust standard error of 0.0199 and a p-value of 0.0022. The coefficient therefore remains positive and statistically significant at the 1% level, but its magnitude falls by approximately 34.9%.

The reduction in magnitude is economically meaningful and indicates that influential observations contribute to the size of the principal estimate. The diagnostic result is consistent with the direction and statistical significance of the association, but it should not be described as evidence of complete coefficient stability. The full sample remains the basis of the main model because the flagged observations represent valid transactions and their automatic exclusion would introduce an additional sample-selection rule.

Bear market observations are concentrated within five market episodes. To assess whether the principal result is driven by a single episode, the main regression was estimated repeatedly after excluding each bear market period in turn. The complete specification, target two-digit NAICS fixed effects and HC3 robust standard errors were retained in each estimation. Table 17 compares these results with the main model and the diagnostic specification excluding observations identified as potentially influential through Cook's distance.

Table 17: Influential-Observation and Bear-Episode Sensitivity Analysis

Specification	Observations	Bear coefficient	HC3 SE	p-value
Main model	833	0.0939***	0.032	0.0034
Excluding Cook's-distance observations	787	0.0611***	0.0199	0.0022
Excluding 2000 to 2002 bear phase	762	0.1361***	0.0447	0.0024
Excluding 2007 to 2009 bear phase	814	0.0835***	0.031	0.0072
Excluding 2011 bear phase	823	0.0971***	0.0339	0.0043
Excluding 2015 bear phase	821	0.0900***	0.0332	0.0068
Excluding 2022 bear phase	811	0.0805**	0.0375	0.0322

Note: All specifications use the winsorised bid premium, the transaction-level controls included in the main model and target two-digit NAICS fixed effects. HC3 heteroskedasticity-robust standard errors are reported. The Cook's-distance specification excludes observations exceeding the 4/n threshold. The remaining specifications exclude all transactions announced within the identified bear-market period shown. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

The bear market coefficient remains positive in all five leave-one-episode-out specifications and ranges from 0.0805 to 0.1361. It remains statistically significant at the 1% level when the 2000 to 2002, 2007 to 2009, 2011 and 2015 episodes are excluded. When the 2022 episode is excluded, the coefficient remains positive and statistically significant at the 5% level.

Excluding the 2000 to 2002 episode increases the coefficient to 0.1361, suggesting that this episode does not drive the positive full-sample association and instead moderates its magnitude. Excluding the 2007 to 2009 episode reduces the coefficient to 0.0835, while excluding the 2022 episode produces the lowest estimate of 0.0805. No individual bear market episode appears solely responsible for the positive direction of the estimate, and the coefficient remains statistically significant after each episode is excluded. Nevertheless, the significance level falls to 5% when the 2022 episode is removed, while the variation in coefficient magnitude confirms meaningful heterogeneity across episodes.

7. Conclusion

This study examined whether M&A bid premiums involving US-based acquirers differ between bull and bear market conditions. The empirical analysis used 833 public takeover transactions announced between 1997 and 2024. Market phases were identified through an adapted implementation of the Pagan and Sossounov turning-point methodology, while the relationship between market conditions and acquisition premiums was estimated using pooled deal-level OLS regression with transaction-level controls and target two-digit NAICS fixed effects.

The results identify a positive and statistically significant conditional association between bear market conditions and reported acquisition premiums. Transactions announced during bear markets were associated with higher percentage premiums than transactions announced during bull markets, after controlling for observable deal characteristics and target-industry composition. The positive direction remained consistent across the reported sensitivity and diagnostic analyses. The empirical evidence therefore supports the general hypothesis (H1) that premiums differ across market phases and, directionally, the alternative hypothesis (H1b) that reported percentage premiums are higher during bear markets.

This finding is consistent with Simonyan (2014), who reports that takeover premiums are higher during periods of investor pessimism and market undervaluation and lower during periods of optimism and market overvaluation. Nevertheless, higher percentage premiums during bear markets do not necessarily indicate that acquirers pay higher absolute offer values or engage in greater overpayment. The result may partly reflect depressed target share prices, differences in the transactions that continue to reach announcement during market downturns, or other factors that were not directly observed in the analysis. The estimated relationship should therefore be interpreted as a conditional association rather than a causal effect of bear market conditions on acquisition pricing.

The study contributes to the literature by distinguishing between the cyclicality of M&A activity and the pricing of the transactions that occur within each market phase. While transaction activity was concentrated in bull markets, the results indicate that the reported percentage premiums associated with bear market transactions were higher on average. This distinction is relevant when comparing acquisition premiums across time, since an observed premium may reflect both the terms of the offer and the market-price benchmark against which it is calculated.

Several limitations should be considered. The requirement for deal enterprise value and EV/EBITDA availability substantially reduced the initial sample and may have selected more profitable and better-covered targets. Excluding EV/EBITDA from the regression did not materially change the result, but this check retained the same selected sample. In addition, the precise target-price benchmark underlying the Orbis M&A premium field could not be independently verified, and several transaction-specific factors were unavailable. Finally, the monthly turning-point methodology may not capture short but severe market contractions, such as the COVID-19 decline.

Future research could construct a broader sample without requiring EV/EBITDA availability, use alternative valuation controls and calculate premiums over multiple pre-announcement benchmark windows. Incorporating target-price run-ups could help distinguish changes in offer valuation from higher measured premiums arising from depressed reference prices. Further research could also apply alternative market-cycle definitions, including predefined rules for short but severe market declines, and incorporate more detailed measures of financing conditions, bidder competition and negotiation structure. These extensions would provide a stronger basis for identifying the mechanisms underlying the relationship between market conditions and acquisition pricing.

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