Determinants of Deal Premiums

An Investigation of Macroeconomic- and Firm-Related Deal Premium Drivers in U.S. Acquisitions from 2003 to 2009

Katrine Sundgaard Christensen

Kristine Lis Kring Simonsen

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Academic Supervisor: Thomas Einfeldt, Department of Finance

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Executive Summary

The objective of this study is to examine determinants of deal premiums in U.S. acquisitions from 2003 to 2009, and the impact of target industry. We are among the first to suggest that macroeconomic factors are important determinants of premiums. We hypothesize premiums to be negatively associated with economic conditions. We also hypothesize that firm-related factors continue to be vital determinants, and test the free cash flow theory and the undermanagement hypothesis. Lastly, we propose such relationships to differ across target firm industry groups.

We use multiple linear regression to test a set of hypotheses on a sample of 255 U.S. acquisitions from 2003-2009. We examine the impact of target industry based on two overall groups, Services and Non-Services. We find strong support for differences in the impact of macroeconomic conditions on deal premiums across target industry groups. Macroeconomic conditions are more negatively associated with deal premiums when targets are in Services. We only find support for this negative associated for targets in Services. When examining firm-related premium drivers we find support for a positive association between the degree of target undermanagement and deal premiums for targets in Non-Services. We find no support for a positive association between bidder free cash flow and deal premiums, and therefore only find moderate support for our overall hypothesis that firm-related factors remain important determinants of premiums.

Our results have several implications. Firstly, prior studies in the field largely fail to take into account target industry differences and should therefore be revisited. Secondly, bidder shareholders should be aware of the impact of macroeconomic conditions on deal premiums because the results imply that announcing offers during periods of economic stress might lead to larger premiums, which would decrease bidder shareholder wealth. Thirdly, if cash abundance is not a driver of deal premiums in acquisitions bidder shareholders should investigate other sources of management's tendency to undertake value-destroying acquisitions to be able to put into place effective control measures. Lastly, the declining significance of firm-related factors in newer studies appear to stem from errors in relation to accounting-based measures, hence firm-related factors should still be examined as determinants of deal premiums going forward.

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1. Introduction

When a company acquires a target it is often at considerable cost above the current market value of the target company. This additional cost of completing the transaction is referred to as a deal premium. Empirical research firmly establishes the prevalence of large deal premiums in acquisitions dating back from the 1960s to today with some premiums well above 100% (Eckbo, 2009; Jensen, 1994; Walkling & Edmister, 1985). This indicates that bidders continue to pay substantial deal premiums in acquisitions despite several studies showing that average bidder gains from acquisitions are neutral or negative (Brealey, Myers, & Marcus, 2009; Eckbo, 2009; Gaughan, 2007; Loughran & Vihj, 1997). Yet the combined gain is found to be positive on average which indicates that most of the gain goes to target shareholders (Bradley, Desai, & E. Han, 1988; Hayward & Hambrick, 1997). Therefore an understanding of deal premium drivers may be an important prerequisite for bidders to determine the timing of an offer and the size of the premium. Previous empirical studies examine a large number of firm- and deal-related drivers of deal premiums with mixed results. Very little attention has been paid to macroeconomic deal premium drivers and heterogeneity of industries, which might affect the impact of such drivers.
This thesis therefore examines macroeconomic and firm-related drivers of deal premiums in U.S. acquisitions from 2003-2009 and assesses potential differences in impact across target industries.

1.1. Background and Motivation

The occurrences of substantial deal premiums in U.S. acquisitions have received significant attention from academics and practitioners. Walkling & Edmister (1985) report that deal premiumss ranged between 2% and 157% averaging 52% for their sample of cash tender offers announced from 1972 to 1977. Jensen (1994) also highlights that substantial deal premiums are common and reports that average deal premiums was 41% with many premiums above 100% from 1976 to 1990. Madura, Ngo & Viale (2012) report that deal premiums ranged between 0 and 99.98% for their sample of completed U.S. acquisitions announced between 1986 and 2007, though they restrict their sample to acquisitions where deal premiums lie between 0 and 100%.

Because substantial deal premiums are observed, a number of papers have attempted to explain the occurrence of deal premiums through a focus on a broad range of factors (Bhagat,

Brickley, & Loewenstein, 1987; Eckbo, 2009; Flanagan & O'Shaugnessy, 2003; Hsieh & Walkling, 2005; Jennings & Mazzeo, 1993; Varaiya, 1987; Walkling & Edmister, 1985). One of the preliminary theories of deal premium prevalence is the generalized synergy theory (Sullivan, Jensen & Hudson, 1994). Synergies are understood as the gain from either increased efficiency in the form of improved target asset utilization, management efficiency or from wealth transfers as a result of the business combination (Jensen, 1994). According to this line of theory deal premiums may emerge only if the combined post-acquisition firm is worth more than the two individual firms. Empirical studies support the existence of synergies, and acknowledge that synergies are the prime drivers of deal premiums. Bidders are also found to pay larger percentage premiums when synergies are high (Bradley, Desai, & E. Han, 1988; Gupta & Gerchak, 2002; Madura & Ngo, 2008; Sullivan, Jensen, & Hudson, 1994). Most studies focus on how a number of factors can affect deal premiums through their effect on estimated synergies. Target-, bidder-, and deal characteristics have been examined as possible drivers of deal premiums. The majority of these studies examine deal premium drivers in isolation e.g. executive compensation, leverage, capital structure, arbitrage holdings, block holdings, bid structure, and shareholder protection (Billett & Ryngaert, 1997; Comment & Schwert, 1995; Lang & Walkling, 1989; Lang & Walkling, 1991; Servaes, 1991; Travlos, 1987; Varaiya, 1987; Walkling & Edmister, 1985). Most scholars find support that these factors influence deal premiums, but results are mixed and based on older sample periods. Around the millennium the interest in the subject received renewed interest and studies using more concurrent samples were published (Flanagan & O'Shaugnessy, 2003; Hsieh & Walkling, 2005; Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012). However none of these studies include the recent financial crisis in their sample and the most contemporary sample ends in 2007.

From the large body of literature and studies on deal premium drivers, very few studies investigate the role of target industry on deal premiums and almost no attention has been paid to examining the influence of macroeconomic factors on deal premiums (Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012; Mitchell & Mulherin, 1996). The importance of macroeconomic and industry factors have long been vividly discussed in other fields such as the international asset pricing literature, but has not yet spilled over to our field of interest (Cavaglia, Brightman, & Aked, 2000).

We argue that the heterogeneity of industries is important to take into account when analyzing drivers of deal premiums. Industries may exhibit different levels of sensitivity to economic conditions, it has e.g. been suggested that for industries with higher average betas, stocks plummet more in recessions compared to industries with lower average betas (Damodaran, 2009b). In extension, when examining firm-related deal premium drivers, different industry norms could lead to different effects (Madura & Ngo, 2008). We therefore also examine deal premium drivers on industry group level.

Macroeconomic conditions may be an important determinant of deal premiums, because factors such as the growth of the economy and the cost of financing may affect estimated synergies (Madura, Ngo, & Viale, 2012; Mitchell & Mulherin, 1996). Jensen (1994) argues that macroeconomic conditions may affect capacity utilization and that excess capacity will tend to occur in recessions as demand falls, which is the stepping stone to a merger wave, as companies use the market for corporate control to eliminate excess capacity. The availability of financing may also be an important factor, because bidder management may be more inclined to pay a high premium when financing is abundant. In the recent financial crisis, the global financial- and stock markets were largely driven by market risk created by macroeconomic conditions such as the U.S. subprime crisis and the political turmoil in Europe surrounding the South European Debt Crisis. This has lead higher inter- and intra-asset-correlations (Kolanovic, Silvestrini, Lee, & Naito, 2011). We argue that this phenomenon might affect the market for corporate control, as markets might undervalue target stocks without taking into account idiosyncratic risk, which would indicate that on average deal premiums should increase.

Finally, because of current economic conditions we argue that understanding drivers of deal premiums is becoming increasingly important. The deleveraging process of the global economy will affect growth prospects of firms, as the economy is likely to continue to exhibit very low growth over the years to come. This will increase the level of uncertainty surrounding the estimation of synergies, potentially causing bidders to overpay. We therefore examine the effect of firm-related deal premium drivers on a more contemporary sample that includes the financial crisis. We also control for potential structural shifts by examining the effects of deal premiums drivers on subsamples for the Pre-crisis and Crisis period.

1.2. Problem Statement and Research Questions

This thesis investigates the main drivers of deal premiums in U.S. acquisitions from 2003-2009 and the robustness of such relationships across industry groups. The following research questions are examined to assess the problem statement.

- *Do macroeconomic factors have significantly explanatory power over the variation in deal premiums in the U.S. from 2003 to 2009?*
- *Do firm-related factors still have significant explanatory power over the variation in deal premiums from 2003 to 2009?*
- *Is the relationships examined in question 1 and 2 consistent across target industries?*

1.3. Contribution to Existing Empirics and Research

This study extends existing research on deal premium drivers in a number of areas, where existing research on drivers of deal premiums fall short or is not updated. Firstly, existing studies mostly examines target- and bidder-related characteristics and the majority of these studies use sample periods in the 1980s and 1990s. We use a contemporary sample of acquisitions, which also includes the financial crisis.

Secondly, many of the cross-sectional econometric models specified by previous scholars assume a constant underlying acquisition environment i.e. that the relationship between the explanatory variable and the dependent variable (deal premium) is constant over time. We argue this rarely holds in practice, especially not for data periods of 10 years, which is the most common analysis period length. Therefore we test this assumption on our sample to shed light on the stability of our model and consequently also previous models.

Thirdly, only one study not yet published by Madura, Ngo & Viale (2012) examines macroeconomic factors as drivers of deal premiums directly. Roy (2009) argues that it is important to understand how the economic downturn from the current financial crisis has affected deal premiums, because the acquisitions market has been affected significantly and companies will have to acquire in this new environment. Our results will help to clarify the discussion amongst practitioners on deal premiums.

Finally, most studies assume the relationship between deal premium drivers and deal premiums to be stable across industries. This is highly unlikely to hold in reality due to large differences across industries; hence we examine the validity of this assumption in our study.

1.4. Results

In order to answer our research questions we propose the following hypotheses: Hypothesis 1 states that macroeconomic factors are important drivers of deal premiums. This we test through two sub-hypotheses. Hypothesis 1a states that the general state of the economy is negatively associated with deal premiums. Hypothesis 1b states that the general state of the economy will be more negatively associated with deal premiums when targets are in Services compared to Non-Services. Hypothesis 2 proposes that firm-related factors remain important drivers of deal premiums. Hypothesis 2a tests this by proposing that bidder free cash flow is positively associated with deal premiums, while hypothesis 2b states that the degree of undermanagement is positively associated with deal premiums. We test these four sub hypotheses using multiple regression using OLS estimation on a cross-sectional sample of 255 domestic U.S. acquisitions from 2003-2009. We test all results across industry groups to examine industry heterogeneity.

In response to the hypotheses we find: Strong support for hypothesis 1b. The negative impact of the state of the economic is much greater for acquisitions where the targets operate in Services compared to Non-Services. We find moderate support for hypothesis 2a. The general state of the economy only significantly impacts deal premiums for acquisitions where targets are in Services. We also find moderate support for hypothesis 2b. Deal premiums are only positively related to target undermanagement for deals where targets are in Non-Services. Lastly, we find no support for hypothesis 2a.

1.5. Definitions

In this section we will briefly provide our definitions and a brief understanding of the terminology used in this study. First we will clarify what is meant by an acquisition. Second we will briefly define deal value and how the deal premium fits into the equation. Third, we will provide some key facts on the financial crisis and its effect on the U.S. market for corporate control.

1.5.1. Acquisition

The terminology used in literature to refer to different types of corporate control transactions such as acquisitions and mergers can be somewhat confusing, because the two terms are sometimes used interchangeably. We define acquisitions as transactions where one company procures 100% of the stock in another company, whereby the procured company ceases to exist after the acquisition completes. Because we limit our focus to acquisitions where both bidder and target are publicly traded U.S. incorporated companies, the target is delisted in its original form post-acquisition. A merger on the other hand is understood as a combination of two or more separate companies into one, with equal holding and governance rights assigned to the shareholders of each entity.

1.5.2. Deal Value and Deal Premium

We use the data provider Mergermarket's terminology to calculate deal values. The total price paid by the bidder for a target is equal to the deal value, which will entail the deal premium. When a bidder obtains 100% control of a target it procures all target shares and assumes all net debt. In these cases, deal value is equal to the enterprise value of the target based on the outstanding share capital of the target company at the announcement date. In cases where the equity stake at completion of the deal differs from the announcement date, deal value is adjusted accordingly (Mergermarket, 2011). Enterprise value is calculated as the equity value plus net debt, where net debt is calculated as short- and long-term debt plus preferred stock minus cash and cash equivalents (Gaughan, 2007). Earn-outs and future additional payments conditioned on the target achieving certain financial milestones are included in the deal value when the earn-out period is within two years of the completion of the transaction.

A bidder will need to value a target including expected synergies from the combination to arrive at a reservation price. The reservation price is understood as the maximum price a bidder would be willing to pay and would theoretically be the price that makes the net present value of the combination exactly equal to zero. In practice, bidders will try to pay a price below the reservation price to keep part of the gain (Walkling & Edmister, 1985). There are a number of different approaches available to compute the value of a company. We will not go into further detail, since this is beyond the scope of our study, but merely introduce the main methods applied, such as discounted cash flow models, multiples valuation and comparable valuation. When valuing a target based on a discounted cash flow approach, the bidder must

estimate the cash flows created by the combination (incl. estimated synergies) to arrive at the target's free cash flow, which is the cash flow available to common shareholders. The free cash flow is discounted by the Weighted Average Cost of Capital (WACC) to arrive at the enterprise value of the target company. As the bidder assumes the debt obligations of the target company, it is the equity that must be valued to arrive at a maximum offer price, so the bidder must subtract net debt from the calculated enterprise value and divide by the number of shares to be purchased. This procedure is largely simplified and is much more complicated in reality. For a more detailed introduction, we refer to Brealey, Myers & Marcus (2009). However this short introduction highlights the uncertainty surrounding the estimation of synergies. Multiples like enterprise value over earnings before interest, tax, depreciation and amortization (EV/EBITDA) or enterprise value over sales (EV/SALES) can also assist in the target valuation process. In practice the bidder can compute an interval for each multiple based on a number of comparable companies' multiples to guide the valuation. Lastly, it is also helpful to look at deal premiums paid in former similar deals, if these can be identified. If the bidder arrives at a theoretical target price that is higher than the market price, the difference will be the estimated synergies. The bidder must then determine how much of this estimated gain should be transferred to the target. This amount will be the deal premium. We calculate the deal premium as the difference between the offer price and the target share price one month before the acquisition announcement date over the target share price one month before the acquisition announcement date, which is in line with previous studies.

1.5.3. The Financial Crisis

The recent financial crisis resulted in the collapse of large financial institutions, numerous bailouts of banks by national governments and led the U.S. economy into recession. We define the crisis period from mid-2007 to December 2009, but acknowledge that the definition can be disputed, since no formal definition exists. We therefore determine this based on U.S. GDP growth, which began to decline in the third quarter of 2007 according to Bloomberg data. The crisis also affected takeover activity. Historically, the U.S. market has been the most active market for corporate control both in terms of annual aggregate deal value and volume (Mergermarket, 2009). The number of acquisitions had been growing in the years preceding the financial crisis and volumes had reached record-breaking levels in the seventh merger wave as a result of increasing world demand (Gaughan, 2007). But when the crisis hit

takeover activity declined by 24.7% and 7.6% in value from 2008-2009 alone (Mergermarket, 2009).

1.6. Limitations

This section will describe the limitations that have been necessary to make in this study in order to reach a conclusion in relation to our research questions. The main limitations are related to the data and the method applied in the study.

1.6.1. Geographical Scope

In order to ensure our sample is sufficiently uniform we limit the sample to only contain U.S. domestic acquisitions. We hereby avoid the issues surrounding different regulatory systems. Most empirical studies in the field only analyze U.S. transactions. This has also influenced our geographical focus because studying the U.S. enables us to better compare results. Lastly, the U.S. market is the largest and most active, which besides from being attractive in general also allows us to obtain a reasonably large sample.

1.6.2. Public U.S. Incorporated Firms

We limit our sample to only contain public bidders and targets. This has been necessary to facilitate the information requirements for our study and to ensure that the data is comparable across firms. We need a large amount of information from company annual reports. Public entities registered with the U.S. Securities and Exchange Commission have to adhere to the same reporting requirements under U.S. General Accepted Accounting Principles (U.S. GAAP). This implies that items from company financial statements are more easily compared. We also need to obtain figures on historical market capitalization for both bidders and targets and other financial data for bidders through Bloomberg, where no or very limited information is available for privately held companies. This procedure is in line with previous studies.

1.6.3. Method Limitations

We estimate a multiple regression model using Ordinary Least Squares estimation on a cross-sectional sample of 255 completed domestic U.S. acquisitions announced from 2003 to 2009. This method allows us to quantify the relationships between proposed deal premium drivers with high precision, and evaluate whether these associations are significant using hypothesis testing procedures. The method relies on a number of restrictive assumptions that should be

considered in relation to the results. It is simplifying by nature and does not allow us to accurately capture all details though it is very useful in pointing towards overall relationships. There are a range of other general limitations concerning the data and measurement errors, which will be commented on when testing and evaluating model robustness.

1.7. Structure of the Study

The rest of the paper is structured as follows. Section 2 presents the methodological considerations and choices made in this study. Section 3 reviews relevant theories and literature within the field. Section 4 reviews the most relevant empirical studies relating to our research questions, and presents our hypotheses. Section 5 concerns the data sample, econometric methodology and statistical measures. We describe our data sample and discuss limitations. We also present the parameter- and model specification. In section 6 we present our results and methods applied to test the robustness of the model. Section 7 discusses the findings and the implications for existing theory as well as practical implications for stakeholders. In section 8 we draw the conclusions of this thesis and outline recommendations for future research.

2. Methodology

In this section we will briefly discuss the methodological considerations underlying our research approach. The research approach is formalized by relevant literature on business research methodology, primarily using Bryman & Bell's work on Business Research Methods (2011). This approach will also serve as the underlying structure of our study as will become apparent in the section to follow.

2.1. Literature Collection

We commenced our literature search by looking into the current debate on deal premium drivers that was largely driven by the emergence of the financial crisis, which put an end to the latest merger wave. We therefore began by collecting literature on the mechanics behind target valuation and theories to establish an understanding of how deal premiums were calculated. Here we obtained most knowledge from corporate finance textbooks such as Brealey, Meyers & Allen (2009) and Gaughan (2007). We then directed our attention towards previous theoretical work and empirical studies within the field mainly in the form of academic journal articles. We performed numerous and extensive searches through databases such as EBSCO, Science Direct, Wiley, and J-Stor on the keywords "*deal premiums drivers", "bid premiums drivers", "agency problems in takeovers", "Winner's curse", "takeover premiums", "deal valuation", "drivers of company value",* and *"determinants of premiums"*. Even though relevant literature is vast on the subject our initial searches returned only a handful of articles relevant to our specific area of interest. We therefore relied extensively on the references used in these articles to continue our search and thereby managed to find a broad range of relevant and high-quality sources. We mainly rely on Gondhalekar, Sant & Ferris (2002), Jennings & Mazzeo (1993), Lang & Walkling (1989), Travlos (1987), Varaiya & Ferris (1987), Varaiya (1987, and Walkling & Edmister (1985) to conceptualize deal premiums drivers and to understand previous methods. We mainly base our work on macroeconomic deal premium drivers on a study by Madura, Ngo & Viale (2012). This study is yet to be published and is the most similar study in contemporary empirics to ours. The study was released in the latter part of our own research process and underlines the interest and attention that our subject continues to receive. We conducted three rounds of literature searches, one in the beginning of the research period, one just before the formulating our model and the last one when commencing the discussion of our results.

Our literature collection approach has built a solid understanding of the theories and empirical work on our subject from the 1980s to today. We have sorted the literature after relevance measured by 1) the relevance to the academic field e.g. how much the study has been used by other sources and 2) the relevance to our specific focus, and 3) the similarity of the methods.

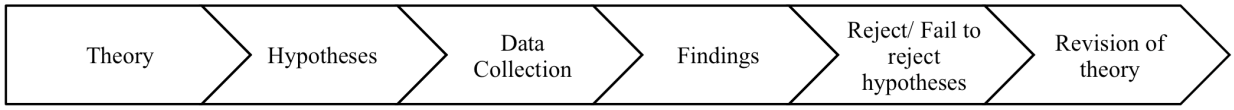
2.2. Research Methodology

Business research methodology literature emphasizes two different approaches to business research, the inductive and the deductive approach (Bryman & Bell, 2011). In order to asses which method is the most suiting for our study it has been necessary to evaluate with what precision our research questions should be answered, and secondly the established tradition in previous empirical work in the field.

The inductive researcher takes his starting point in a set of observations and attempts to identify and explain patterns through theory (Bryman & Bell, 2011). This approach is often used when little knowledge exist in terms of established research and is therefore often more qualitative in nature. The deductive researcher on the other hand bases his approach on already-established theories, which occurs most often given the inherent difficulty of applying a pure inductive approach. The deductive researcher will form hypotheses based on existing theory within a field and attempt to test such hypotheses by either accepting or rejecting these hypotheses using a representative data sample, also known as the process of falsification (Bryman & Bell, 2011). This is most often done using quantitative methods.

We have chosen a deductive approach, because the topic is already heavily discussed and relationships from theory have already been identified and tested. We want to answer the research questions with a greater precision than the inductive research approach can offer. In addition we choose to follow an established research tradition within the field to be able to compare results. Therefore, a quantitative approach is chosen to allow us to make deductions with the required precision needed to be able to measure relationships between deal premiums and deal premium drivers, and to enable us to compare results. We are primarily interested in whether the associations between deal premiums and deal premium drivers are positive or negative, before we also look at the exact impact of the identified drivers. We follow Bryman and Bell's (2011) deductive research process in our study as shown in figure 1 below.

Figure 1
The deductive research process taken from Bryman & Bell (2011)



Lastly, there has been a long tradition of analyzing the U.S. market for corporate control over the last 50 years. This is primarily because the U.S. market is the most active market both in terms of volume and deal value (Mergermarket, 2009). Following in the footsteps of previous research will allow us to compare our results to previous studies without having to deal with the complexities of more than one legal and cultural system.

2.2.1. Theory

We commence our study by establishing a theoretical framework based on previous literature within the field. We do this for the following two reasons: Firstly, we position our study in the corporate finance field and secondly, we use existing theory to deduce the deal premium drivers and their relationships to deal premiums. We utilize a solid range of sources to understand how our study fits into the corporate finance field and to establish the required intuition behind our hypotheses.

2.2.2. Hypotheses

We will put our focus on the relationships implied by existing theory and review the relevant empirical studies that test these theories. On the basis of this we will form our hypotheses. Naturally there are certain limitations to this approach in that some theories and empirical work stems from different time periods, which requires us to amend existing hypotheses to fit the current situation. However, we do have access to newer empirical works to ensure consistent and relevant hypotheses.

2.2.3. Data Collection

We primarily make use of the information provider Mergermarket to supply us with our sample of acquisitions from 2003 to 2009. This database provides extensive information on historical deals and fully sourced data on deal premiums i.e. all information retrieved is backed up by external resources such as press releases from the companies. This makes the data highly reliable. Mergermarket is owned by the Financial Times and a widely acknowledged tool used by many large firms within the merger and acquisition's sector. We

use the original SEC filings, forms 10-K, which are the official company annual report filings, to obtain data on target company financials. This data has been obtained through a long and time-consuming manual effort. Target company share prices and bidder financial data are obtained through Bloomberg. We also use Bloomberg to obtain macroeconomic data to ensure high data reliability and to limit errors. We expect the data quality to be high due to the selection of reliable and professional sources.

We analyze the period from 2003 to 2009, but also analyze the Crisis period from 2007H2-2009 and the Pre-Crisis period 2003-2007H1 in isolation to assess model stability. We have defined the crisis period from 2007H1-2009 based on the American GDP growth rate, because it began to decline in 2007H2.

2.2.4. Hypotheses Testing and Findings

We start by examining our sample of deal premiums for trends across time, industry, deal size, whether target- and bidder are from the same industry and target debt levels to investigate and indicate patterns and relationships in the data that will aid the formation of our hypotheses. We will then apply mean comparison tests to examine whether industry groups seem to affect average deal premiums in the sample. We are also going to check for indications of interaction effects between subgroups and variables in the sample. We continue by applying multiple linear regression and OLS estimation to test our hypotheses. Our results will help us to either reject or fail to reject the hypotheses. We rely on Gujarati and Porter (2009), Engle & Hendry (1993) and Hansen (2002) for our econometrics methods, and Park (2009) for the mean comparison methods. In addition we draw on a number of other sources in relation to examination of model stability (Hatice & Soerensen, 2010; Ohtani & Toyoda, 1985). We use SAS software to execute the model estimation.

2.2.5. Revision of Theory

Our hypotheses are deducted from existing theory and previous empirical findings from the deal premium driver literature. Therefore our findings should be discussed in relation to both theory and previous empirical findings. No studies analyzing a sample that contains the financial crisis have yet been published. Therefore our results should also be considered in relation to contemporary discussion amongst practitioners and scholars, and in relation to previous findings on the general relationship between economic cycles and deal premiums.

This implies that the study will be mainly empirical in nature. Lastly, our results should be critically evaluated against the limitations that apply to the chosen method.

3. Literature Review

Deal premiums in acquisitions have received a considerable amount of attention in the corporate finance literature over the last decades. The topic has been examined from a number of angles. In the early 1980s the interest in deal premium drivers experienced a surge on the back of a bull market, where a tolerant antitrust policy from the Reagan administration had given life to a fourth wave of hostile takeovers in the U.S., before deal activity declined sharply at the end of the decade (Mitchell & Mulherin, 1996). Average deal premiums rose considerably in the 1970s and 1980s compared to earlier, which also fueled the rising interest in deal premium drivers (Billett & Ryngaert, 1997; Nathan & O'keefe, 1989). In 1985 Walkling & Edmister presented the first model with significant explanatory power over the variation in deal premiums followed by many more or less successful attempts throughout the 1990s to identify additional drivers. The interest began to fade and the number of studies published in the late 1990s declined until after the IT crisis in the early part of the millennium, which marked the end of the fifth merger wave and the beginning the sixth merger wave. The sixth wave ended as the financial crisis struck in 2007 (Gaughan, 2007). In recent years the world has become more interdependent supported by the severity of the financial crisis. This has given rise to a renewed interest in deal premiums, especially focusing on the relationship between economic cycles and merger waves. However, little attention has been paid to the association between macroeconomic factors and deal premiums while the association between takeover activity and the economic cycle has been examined extensively. Furthermore, newer studies find mixed support of previous well-established firm-related deal premium drivers, which could indicate a need to investigate further.

The following section will review existing literature in the field and justify the position and approach chosen in our study. Our topic is linked to a large number of areas within the corporate finance field; hence we have chosen to focus on the key developments and only include the most relevant academic papers. We apply two inclusion criteria for journal articles. Firstly, the articles must investigate either deal premium drivers, takeover activity or/and takeover motives. Secondly, for the quantitative investigations, the articles must entail an adequate level of detail on applied methods, measures and definitions to allow us to validly evaluate and compare results across studies. Two areas will be emphasized to position our study in the corporate finance field. Firstly, we introduce corporate finance valuation theory in

acquisitions, which deals with quantifying a maximum boundary to deal premiums in order to provide an understanding of why the subject is considered relevant in the literature. We then proceed by reviewing previous literature on deal premium drivers closely linked to takeover motives. We end the section by introducing our view that macroeconomic factors and industry heterogeneity are important when examining drivers of deal premiums.

3.1. Introduction to Valuation Theory and Optimal Deal Premiums

Ideally, a bidder must determine an initial bid that is both below its own reservation price and above the price at which target shareholders are willing to accept to ensure the acquisition completes and that it also creates value for the bidder (Demsetz & Lehn, 1985; Demsetz, 1988; Flanagan & O'Shaugnessy, 2003; Jennings & Mazzeo, 1993; Müller & Panunzi, 2004). In effect the bidder should only be willing to offer a premium over market value when it estimates a gain from the combination (Gujarati & Porter, 2009; Varaiya, 1987; Walkling & Edmister, 1985). Varaiya (1987) extends and formalizes the acknowledged definition of bidder gains mathematically in order to establish an upper boundary for deal premiums in accordance with the fundamental economic value concept, the Net Present Value (NPV) rule. The estimated gain from the acquisition is given by the difference between the value the target imputes to the bidder, V^{BT}, if the deal completes, and the value the market assigns to the target, V^{T}, if the target continues to operate on a stand-alone basis (Varaiya, 1987). The NPV of the acquisition should be positive in order for the bidder to go ahead with a proposed takeover, and is calculated as follows:

$$V^{BT} = \sum_{t=1}^{\infty} \frac{D_t^{BT}}{\left(1 + k^{BT}\right)^t} > V^{T} = \sum_{t=1}^{\infty} \frac{D_t^{T}}{\left(1 + k^{T}\right)^t}$$

where D_t^{BT} and D_t^{T} is the market's estimate of the dividend streams to the target shares currently outstanding if combined with bidder or as stand-alone entity, respectively, and k_t^{BT} and k_t^{T} is the risk-adjusted equity discount rate for the target if combined with bidder or as stand-alone entity (Varaiya, 1987). Consequently, the maximum bid premium can be derived as $V^{BT} - V^{T}$, which should be the theoretical maximum absolute deal premium that the bidder should be willing to pay in order to be indifferent about whether to engage in or drop the acquisition, since the NPV is exactly zero.

Walkling & Edmister (1985) were amongst the first to explore the inherent dilemma that the bidder faces in determining the initial bid. They argue that too high a bid will lower the gain to the bidder, while a too low bid increases the probability of rejection. Walkling & Edmister further argues that the value-maximizing bidder would be expected to set premium below the reservation price, V^{BT}, because the reservation price would imply that the total gain of the combination is transferred to the target (Walkling & Edmister 1985). In practice the initial bid is often not rejected instantly but rather marks the beginning of a long negotiation process to arrive at a final offer. It has been well documented that acquisitions overall produce a combined gain for target and acquirer shareholders, while most of this gain if not all often goes to target shareholders when looking at final premiums (Hayward & Hambrick 1997). This would indicate that bidders do not end up value-maximizing when looking at the final bid, but instead determine the bid based on irrational behavior.

The importance of determining an optimal initial bid is relevant to avoid a long negotiation process. Jennings & Mazzeo (1993) highlights the effects that the initial bid can have on two important factors, namely (1) the decision by targets to resist the bid and (2) the decision by competitors to contest the bid which may both results in higher premiums. Jennings & Mazzeo (1993) apply a qualitative response regression with a logit transformation to a sample of 647 proposed acquisitions from mid-1979 to 1987 in the U.S. and find that high premium bids are less likely to meet competition and target resistance. The positive effect of a counterbid on the deal premiums paid by acquirers has been firmly supported by previous studies (Billett & Ryngaert, 1997; Flanagan & O'Shaugnessy, 2003; Hayward & Hambrick, 1997; Hsieh & Walkling, 2005; Madura & Ngo, 2008; Varaiya, 1987; Walkling & Edmister, 1985). This relationship underlines the importance of determining an optimal initial bid to reduce the risk of engaging in overbidding (Jennings & Mazzeo, 1993).

The fact that acquisitions on average have been found to have a neutral to negative effect on bidder gains indicates that overpayment does occur extensively in acquisitions and that bidders fail to arrive at optimal initial and final deal bids, but instead pay a too high premium (Bradley, Desai, & E. Han, 1988; Hayward & Hambrick, 1997). Despite this, takeover activity remains strong highlighting a continuing importance of understanding the drivers of deal premiums (Hayward & Hambrick, 1997).

3.2. Hypothesized Deal Premium Drivers and Associations in Previous Literature

Numerous theories and studies offer insight on the different factors that may cause deal premiums to vary across deals (Andrade & Stafford, 2004; Billett & Ryngaert, 1997; Bradley, Desai, & E. Han, 1988; Cavaglia, Brightman, & Aked, 2000; Comment & Schwert, 1995; Eckbo, 2009; Flanagan & O'Shaugnessy, 2003; Hayward & Hambrick, 1997; Jennings & Mazzeo, 1993; Lang & Walkling, 1989; Lang & Walkling, 1991; Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012; Varaiya, 1987; Walkling & Edmister, 1985). The most acknowledged drivers of deal premiums in the literature are based on growth and synergies. Acquisitions can be used as tool to expand capacity quickly. This can be an economically rational decision or a consequence of agency problems e.g. managers wanting to build large empires no matter the cost (Jensen, 1994). The expectations of realizing synergies from for example operational improvements or cost efficiencies may also affect the premium paid by bidders. Overall, existing theories dating back from the 1980s are based on the general relationship that factors that increase estimated synergies in an acquisition have a positive effect on deal premiums as bidders will tend to give up a larger percentage of the total gain to target shareholders when the absolute value of the residual bidder gain is high (Gaughan, 2007). Overall, the focus is put on understanding irrational takeover motives and such irrational drivers of deal premiums. These theories are largely based on agency cost theory related to either bidder- or target characteristics, and we will take our starting point here.

3.2.1. Agency Cost Based Deal Premium Theories

The majority of theories that attempt to explain the variation in deal premiums are founded in agency cost theory, which offers important insights into the relationship between firm characteristics and the size of the premiums paid in acquisitions. Agency theory deals with the inherent conflicts of interest that prevail between the management of a company and the company's owners. For large acquisitions, firms are most often publicly traded and are characterized by dispersed ownership. The shareholders delegate the everyday operational responsibility to the firm's management team, but have little power in controlling what management chooses to do with this power. It is in the shareholders' interest that management acts to maximize shareholder wealth. This is most often not the case because management will instead optimize its own utility, which might lead them to pay unnecessarily large deal

premiums or even engage in value-destroying deals (Jensen & Meckling, 1976). The existence of the overpayment problem in acquisitions has been supported by a number of empirical studies (Morck, Shleifer, & Vishny, 1990; W. G. Schwert, 1996; Varaiya & Ferris, 1987). Jensen (1988) notes that bidder shareholders on average earned 4% in hostile takeovers and zero in friendly acquisitions prior to the merger boom in the 1980s. Gaughan (2007) further summarizes a number of studies that find similar results from 1980 to today. Generally, this string of literature examines why bidder management might enter into acquisitions that destroy shareholder wealth and finds that this happens due to a conflict between shareholder interests and management's own utility maximizing behavior (Hayward & Hambrick, 1997; Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012; Varaiya & Ferris, 1987).

3.2.1.1. Agency Cost Based Deal Premium Theories and Bidder Characteristics

The main theories on bidder characteristics in relation to deal premium drivers attempt to explain the sources of excessive premiums or overpayment in acquisitions based on agency problems relating to bidder management and the CEO.

Roll (1986) was one of the first to present a theory to explain the overpayment problem observed in acquisitions through his hubris hypothesis of takeovers. Hubris is defined as overconfidence. According to this theory bidder management believes that they have superior valuation skills compared to the market, which will lead them to superimpose their own valuation causing deal premiums to increase and potentially leading them to overpay. Hayward & Hambrick (1995) and John, Liu & Taffer (2008) both find support that management hubris or CEO hubris may lead to negative bidder returns and higher deal premiums. Another related theory concerns the presence of a counterbid and the impact of competition on hubris. Competition is said to drive up deal premiums firstly due to the simple mechanics of supply and demand, since demand increases, and secondly due to a tendency of bidder management to engage in bidding wars. The latter problem is conceptualized through the Winner's Curse theory (Varaiya & Ferris, 1987). According to this theory bidders are more likely to overpay when competition is present because the winning bidder will tend to be the one that overestimates the value of the target the most. The bidder with the highest reservation price will most often be the one with the strongest hubris problems. Hayward & Hambrick (1997) find support that CEO hubris is positively associated with deal premiums,

especially in relation to overpayment, because the winning bidder will tend to be the one that overestimate the synergies it is able to extract in an acquisition the most. John, Liu & Tafffer (2008) also provide newer support for positive association between deal premiums and management overconfidence on a sample of 1888 public U.S. deals from 1993 to 2005 using multiple regression on a cross-sectional sample. Varaiya and Ferris (1987) examine a sample of 96 acquisitions completed from 1974 to 1983 and find that the winning bid did overestimate the value of the target for 58% of the deals, leading to post-acquisitions loss of approximately 14% supporting the Winner's curse theory.

Jensen (1988) was among the first to theorize on the relationship between bidder free cash flow and deal premiums as a possible managerial agency cost. According to Jensen's free cash flow theory of takeovers, managers endowed with free cash flow will be more inclined to engage in negative NPV deals instead of paying out excessive cash to shareholders, who might be able to invest the funds into other positive NPV investments. This means that as cash reserves are higher for companies with poor internal investment opportunities. Jensen (1988) therefore hypothesizes that a given bidder's takeover activity is positively associated with the amount of free cash flow that it holds. Lang & Walkling (1991) were among the first to directly investigate this hypothesis empirically. They use multiple regression and OLS estimation on a sample of 209 US tender offers from October 1968 to September 1980. Tobin's Q-ratio is used to measure investment opportunities of bidders i.e. low Q bidders are defined as firms where the market value is below book value. They find that bidder returns are significantly negatively related to cash flow of low Q bidders and opposite for high Q bidders after controlling for a range of bidder- and deal-related factors.

Very little attention has been paid to how the amount of free cash flow a bidder holds might affect deal premiums. Lang & Walkling (1991) and Gondhalekar, Sant & Ferris (2002) extend Jensen's theory and hypothesize that the amount of free cash flow a bidder holds is positively associated with deal premiums. If bidder management has large amounts of cash at its disposal this will increase agency costs if monitoring is not sufficient and encourage hubris because the bidder is able them to pay larger premiums without having to deal with monitoring from creditors. Lang & Walkling (1991) applies cross-sectional regression using OLS to a sample of 88 successful tender offers in the U.S. from 1968 to 1986 and finds no support for such a relationship. Gondhalekar, Sant & Ferris (2002) does find support for a

significant positive relationship when applying the same econometric method to a sample of 165 cash only U.S. deals from 1973-1999. Existing literature has largely neglected the impact of bidder free cash flow on deal premiums and mixed support has been found so far. In addition no updated studies have been identified.

3.2.1.2. Agency Cost Based Deal Premium Theories and Target Characteristics

Target management may also impose agency costs to shareholders in relation to acquisitions. The bidder often replaces the existing target management post-acquisition in the belief that they have superior management skills and can extract synergies from undermanagement, which could be enhanced by hubris problems. The undermanagement hypothesis states that a motive of takeovers could be synergies extracted from improving target management. The Q-theory of mergers proposes that bidder with high Tobin's Q-ratios tend to acquire low Q targets (Jovanovic & Rousseau, 2002). Tobin's Q is used as a proxy of management skills and is most often calculated as the market value of equity and debt over the book value of equity and debt (Lang & Walkling, 1989; Servaes, 1991). Poorly managed firms are said to have low Q ratios and hence be an attractive target for well-managed firms that expect to be able to extract synergies by employing their management skills to the target post-acquisition (Lang & Walkling, 1989; Madura, Ngo, & Viale, 2012). The bidder should therefore be willing to pay more for targets with low Q-ratios because estimated synergies are higher. Very few empirical efforts have been made to investigate the relationship between target undermanagement and deal premiums, the studies that do generally find support for a negative association between target Q ratio and deal premiums (Lang & Walkling, 1989; Lang & Walkling, 1991; Servaes, 1991). Varayia measures undermanagement using the difference between target Return on Equity and its primary industry mean and finds some support based on multiple regression on a cross-sectional sample of 77 completed U.S. acquisitions between 1975 and 1980. However, measures such as ROE and ROA have most often been used to measure the target's ability to generate cash flow overall and not only the part attributable to management (Flanagan & O'Shaugnessy, 2003).

The threat of replacement may cause target management to resist takeovers through the use of modern antitakeover measures such as poison pills and staggered boards. Jensen & Ruback (1983) and Jensen (1984 and 1988) find that actions taken by target management to eliminate or prevent acquisitions are the most likely to harm shareholders. Comment & Schwert (1995)

empirically investigate the effect of modern antitakeover measures on shareholder wealth and find no evidence that these deter takeovers that would else have been beneficial for shareholders. They do however note that antitakeover measures might have a positive effect on deal premiums, because the bidder would be willing to pay a higher initial bid to attempt to decrease the likelihood of management resistance – a relationship that have been investigated and supported by Jennings & Mazzeo (1993). Varaiya (1987) on the other finds mixed support for the effect of antitakeover measures in his study of 77 completed U.S. acquisitions from 1975 to 1980. The relevance of antitakeover measures might not be as relevant today, since most U.S. companies have them in their charter.

Lastly, we highlight the fact that any of the firm-related deal premium drivers presented above have been found to be declining in explanatory power over deal premiums in newer studies compared to earlier studies in the field. This highlights the importance of testing such relationships in order to determine whether this is the case or whether it could be related to e.g. measurement issues.

3.2.1.3. Other Relevant Theories

Existing literature on deal premium drivers emphasizes a range of additional firm- and deal-level factors. The role of relative bargaining power of bidder and target in determining deal premiums has received significant attention, but can also be linked to agency-based theories such as the undermanagement hypothesis, where it can be argued that poor management of a target will lead to lower bargaining power, or contradictory to higher bargaining power because undermanagement synergies are higher (Billett & Ryngaert, 1997; Varaiya, 1987; Walkling & Edmister, 1985). Walkling & Edmister (1985) hypothesize that deal premiums depend on the relative bargaining power of bidder and target. After the bidder submits an offer, the negotiation process will determine the expected gain between target and bidder's shareholders should be split (Jensen, 1988). Many studies have been undertaken on the allocation of wealth. Walkling & Edmister (1985) and later followed by Billett & Ryngaert (1997) present evidence that the distribution of the total gain depends on the relative bargaining strength of target and bidder. This has been proxied through a large number of factors relating to relative size and metrics associated with financial performance. Interestingly, newer studies fail to find a significant influence of many of the target firm factors that have been found to be significant in most of the early studies.

Deal specific characteristics have also been hypothesized to affect deal premiums in previous literature. When a hostile bid arise, target management may often be more inclined to resist, which can lead to a higher deal premium to push the deal through (Eckbo, 2009). A number of studies examine this relation but find mixed support (Madura & Ngo, 2008; Walkling & Edmister, 1985). The method of payment is one of these characteristics. The signaling theory hypothesizes that bidder management may choose to use stock as a means of payment when they believe it is overvalued stock. Targets shareholders will then require a larger premium compared to cash bids to compensate for the expected loss as bidder stock returns to fair value (Jensen, 1994). In extension there is greater uncertainty about the actual premium when stock is included in the bid, which may also require an enhanced premium to compensate for the increased risk (Eckbo, 2009). Another contradictory theory hypothesizes that cash bids should be higher than bids including stock because target shareholders will incur an immediate loss from taxation as opposed to stock bids where the capital gain tax can be deferred to the point of sale (Jensen, 1994). Empirical studies find mixed support for this relationship even with overlapping samples, but mostly support the latter theory (Hayward & Hambrick, 1997; Lang & Walkling, 1991; Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012; Servaes, 1991; Sullivan, Jensen, & Hudson, 1994).

3.2.2. Macroeconomic Factors and Industry Heterogeneity

Another more contemporary string of literature within the field focuses on explaining takeover activity over time - merger wave theory (Andrade & Stafford, 2004; Harford, 2005; Mitchell & Mulherin, 1996; Nathan & O'keefe, 1989). Takeover activity is observed to cluster in distinct patterns over time, in so called waves. Existing theory generally identify 6 merger waves, where the last one ended just before the financial crisis (Gaughan, 2009). The neoclassical theory hypothesizes that it is economic, regulatory and technological shocks in combination with overall capital liquidity that drive merger waves (Jensen, 1994; Madura & Ngo, 2008). This is viewed as a natural effect as industries respond to changes in the competitive environment. According to this line of theory industry waves are caused by regulatory or economic shocks in combination with loose liquidity conditions, while aggregate waves are caused by multiple simultaneous industry waves, which cluster due to macroeconomic liquidity abundance. This is why periods of recessions are often followed by merger waves. These theories propose that acquisitions are a relatively cheap means of adjusting capacity and are relevant in relation to deal premium drivers because it is

hypothesized that the magnitudes of deal premiums are inversely associated with takeover activity (Jensen, 1994; Mitchell & Mulherin, 1996). Because of this, the relationship between takeover activity and macroeconomic factors are mostly examined in relation to economic shocks, though not much attention has been paid in current literature. Overall, the limited number of conducted studies find that economic, regulatory and technological shocks may be important drivers of merger waves (Harford, 2005; Mitchell & Mulherin, 1996; Toxvaerd, 2008). The second dominating string of merger wave theory is behavioral theory. This string of literature predicts that both industry- and aggregate merger waves occur due to overvaluation of bidder stock. During such periods, bidders will use their stock to finance acquisitions and takeover activity rises.

In merger wave theory takeover activity is hypothesized to be inversely associated with the economic cycle. In recessions takeover activity tends to fall due to a number of proposed reasons. According to the neoclassical merger wave theory this happens due to lack of liquidity in the system. A number of studies highlight other reasons such as enhanced uncertainty, which can lead the bidder to postpone their bid until markets become less volatile (Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012; Toxvaerd, 2008). Another plausible explanation could be the tendency of estimated synergies to fall in recessions as general growth prospects decline, which would most likely the number of acquisitions negatively. While recessions are said to affect takeover activity negatively, deal premiums tend to rise. Very little research has been undertaken on the relationship between macroeconomic factors such as the general state of economy. Madura, Ngo & Viale (2012) suggest that the market tend to underprice target stock in recessions, which could push up deal premiums. We suggest that factors such as stricter due diligence done by parties involved in granting financing to proposed deals will automatically ensure that only the deals with the highest and most certain synergies complete. The only study we have found that tests the impact of macroeconomic factors directly on deal premiums is Madura, Ngo & Viale (2012). This study is not yet published, but is currently under peer review for the journal Quarterly Review of Economics and Finance. The study became accessible in the last part of our research process. They find that deal premiums are positively associated with the amount of liquidity in the economy and to volatility in the economy measured as GDP trailing volatility on a sample of 2,479 U.S. deals from 1990-2007.

Mitchell & Mulherin (1996) were among the first to test the hypothesis that economic, regulatory shock effects should be considered on industry level and not only on aggregate level. They show that merger waves and timing of such waves vary across industries in line with the predictions of neoclassical merger wave theory. They highlight that many of the mergers in overall merger waves tend to cluster disproportionally across a narrow number of industries and find that these industries where most of the activity clusters are the ones exposed to the greatest fundamental shocks. These findings are supported by a number of newer studies (Jensen, 1994; Madura & Ngo, 2008; Toxvaerd, 2008). Harford (2004) challenges the hypothesized significance of industries. He argues that merger waves cannot occur without sufficient overall capital liquidity in the system and hereby introduces the first empirical test of the association between takeovers and the state of the economy. He finds that macroeconomic liquidity component causes merger waves in industries to cluster independent of the clustering associated with industry shocks, which could support the importance of macroeconomic factors relative to industry factors.

We believe that examining deal premiums in relation to macroeconomic factors will add to the existing literature on firm- and deal- characteristics. Our focus is especially relevant in relation to our sample period that includes the financial crisis which has not been examined before. Furthermore, we also consider industry heterogeneity by examining the effect of proposed deal premium drivers on target industry groups.

3.3. Summary

Early literature primarily examines firm- and deal-characteristics in order to explain the variation in deal premiums. Most of these theories are founded in the agency cost literature and highlights the importance of managerial agency costs in determining the magnitude of premiums paid in acquisitions.

If a bidder is characterized by management hubris overpayment is more likely to occur. The association between the amounts of free cash flow a bidder holds and hubris is generally hypothesized to be positive, which would indicate that deal premiums are also positively associated with the amount of cash a bidder holds. This relationship has received very little attention in current literature. The few studies conducted present support for a positive association between the amounts of cash a bidder holds and deal premiums as management

will be more likely to spend this cash on non-value adding acquisitions and engage in overbidding when the cash is at hand.

Drivers relating to target firm characteristics are often examined through factors that affect estimated synergies. A proposed source of synergies is the ones a bidder may extract from replacing an incumbent management at a target post-acquisition. It is hypothesized that undermanaged targets are more likely to receive higher deal premiums, because the estimated synergies that can be retrieved from improving the management post-acquisition are higher. However it is also suggested that such synergies do not exist, but merely reflects hubris problems.

The free cash flow problem and the undermanagement hypothesis have been largely neglected by current empirical research and have not been tested in newer time. We therefore believe that updating these results will add to the knowledge of deal premiums drivers in today's environment.

A second and later focus within the field has been put on explaining takeover activity in relation to economic, regulatory and industry shocks. Generally, such shocks are said to explain why mergers tend to cluster in aggregate or industry waves. Takeover activity is also examined in relation to economic cycles. Takeover activity is found to be lower during periods of economic stress like recessions, whereas deal premiums tend to increase. Because of these observed relationships, we argue previous literature lacks an examination of macroeconomic factors as drivers of deal premiums. This is notably even more relevant to investigate this area in relation to the financial crisis to gain an insight into whether such relationships can be established in this period, where no research has yet been published.

4. Empirical Review and Hypotheses

After reviewing existing theories within the field where we highlighted the theories most relevant to the focus of the study, this section will present key empirical findings in relation to these focus areas. We will deduct the hypotheses to be tested in this study based on the theoretical review and the empirical studies presented in this section. A wide range of deal premium drivers have been examined by earlier empirical studies, but the attention to our focus has been limited. We begin by reviewing the main findings concerning macroeconomic factors and deal premiums, and then we will shortly review the empirical findings on the free cash flow theory and the undermanagement hypothesis. Lastly, we review the development of methods to study deal premiums and how the relationships have been measured to understand the inherent limitations.

4.1. Studies on Macroeconomic Factors and Deal Premiums

The study of macroeconomic drivers of deal premiums in the U.S. is motivated by the increased interdependence of global capital markets. This interdependence has increased during the financial crisis and the European debt crisis. In addition cross-asset correlations have increased over the last decade (Andrade & Stafford, 2004; Harford, 2005; Kolanovic, Silvestrini, Lee, & Naito, 2011; Mitchell & Mulherin, 1996; Nathan & O'keefe, 1989). A vast amount of theoretical and empirical work has already been undertaken to explain the variation in deal premiums, specifically focusing on firm- and deal characteristics. The influence of macroeconomic factors on deal premiums has, however, largely been neglected. Despite the lack of empirical attention to the subject, it is generally acknowledged by scholars that the market for corporate takeovers is linked to economic conditions. We begin by presenting the one study by Madura, Ngo & Viale (2012) that investigates this relationship directly followed by the findings of studies that investigate merger waves and takeover activity. The latter group of studies is relevant to this study, because these investigations shed light on the indirect effect that macroeconomic shocks have on deal premiums through their effect on takeover activity.

Only one study not yet published by Madura, Ngo & Viale (2012) incorporates macroeconomic factors directly. They investigate the impact of liquidity and economic volatility on average quarterly deal premiums from 1986 to 2007. Their sample consists of 2,479 acquisitions of U.S. companies where both the bidder and target are publicly traded.

They model average quarterly premiums on eight different industry groups as a static panel. This method is chosen because they argue that considerable time-series variation exists in deal premiums in addition to cross-sectional variation. They apply a number of different estimation methods to their regression model; among those are maximum likelihood and pooled OLS. Their main findings are a positive and statistically significant impact of capital liquidity. Capital liquidity is proxied by the Senior Loan Officer Survey, which is an index based on qualitative questionnaires filled in by banks on a quarterly basis to indicate whether they have loosened or tightened credit over the last quarter. They also find a positive and statistically significant impact of economic stress on deal premiums. These results support the hypothesis that merger premiums are higher when the economy has more capital liquidity and during more volatile economic periods. Madura, Ngo & Viale (2012) underline the possible measurement errors associated with their macroeconomic proxy variables and hereby suggest future empirical studies to test alternative measures. We attempt to integrate some of their ideas that relate to our study in order to be able to compare results. This will allow a better evaluation of robustness of the effect of macroeconomic factors on deal premiums, since we test on a different time period and use cross-sectional data instead of panel data. In addition we also use different sample selection criteria.

The relative effects of industry- and macroeconomic factors on asset pricing have long been discussed in international asset pricing literature (Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012). A focus on explaining takeover activity on industry level has recently emerged, but this has not yet spilled over to the deal premium driver field. We argue that the relative impact of macroeconomic factors compared to other categories is increasing and will only continue to increase in the light of the financial crisis. We contain our focus to macroeconomic indicators of the U.S. economy because our sample is contained to domestic acquisitions, leading us to our first hypothesis.

Hypothesis 1: *Macroeconomic factors have significant explanatory power over the variation in deal premiums.*

We test the first hypothesis following a similar classification to that of Madura, Ngo & Viale (2012). The first relevant effect is growth prospects of the economy, which may affect estimated synergies in acquisitions and there through also affect deal premiums. During economic recessions growth prospects decrease which is often reflected in stock markets

along with market conditions becoming more volatile. This has been shown to reduce takeover activity significantly, mainly due to the reluctance of bidders to engage in deals, because there is a value of delaying the bid since deal premiums for acquisitions that complete tend to rise (Toxvaerd, 2008). The market tends to underprice target stock below fair value due to austerity (Nathan & O'keefe, 1989). In addition as capital liquidity is becoming increasingly important to finance acquisitions, liquidity squeezes might also affect the growth prospects of the economy and deal premiums. Madura, Ngo & Viale (2012) find that liquidity is positively related to deal premiums based on the idea that liquidity may increase expected growth prospects of firms, which can increase estimated synergies. They also point towards that easier access to capital may stimulate merger waves and hereby increase competition amongst bidders, which could drive up premiums. We highlight an opposing effect. In volatile economic periods, liquidity is scarce and stakeholders perform stricter due diligence on proposed acquisitions. Only the deals with the highest synergies obtain financing, which would imply that deal premiums would be higher on average when liquidity is low. This issue should be resolved empirically. Because of high collinearity between macroeconomic factors, we test the impact of overall economic conditions and forth the first sub-hypothesis to assess the overall hypothesis 1.

Hypothesis 1a: *The general state of the economy is negatively associated with deal premiums.*

4.1.1. Industry Heterogeneity and Macroeconomic Deal Premium Drivers

Mitchell & Mulherin (1996) were among the first to put forth the hypothesis that the effect of economic and regulatory shocks on deal premiums should be considered on industry level. Their findings are supported by a number of studies (Jensen, 1994; Madura & Ngo, 2008; Toxvaerd, 2008). No formal theory exists on industry heterogeneity and deal premium drivers; however previous studies of the relative importance of industry factors have been growing in relative importance throughout the last decades in the international asset pricing literature. One of the key empirical studies by Cavaglio, Brightman & Aked (2000) finds evidence that the importance of industry factors dominate country factors. They estimated a factor model for 21 developed equity markets using data from 21 countries (all constituents of the MSCI World Developed Markets) and found that a shift had occurred around the mid-1990s where industry factors became more important than country factors for stock price

valuations. Traditional corporate finance valuation literature also supports such differences (Brealey, Myers, & Marcus, 2009; Gaughan, 2007).

Due to the inherent differences between target industries, we test the impact of macroeconomic factors on two target industry groups, Services and Non-Services. We expect deal premiums and the impact of identified drivers to differ the most for these groups. Corporate finance literature highlights the considerable differences in e.g. accounting standards for Services and Non-Services as well as the very different nature of assets, where intangible assets are the most important for Services (Damodaran, 2009a). In addition the nature of these two industry groups emphasizes why it is plausible that the impact of the condition of the economy on deal premiums depends on the industry a target firm operates in. Revenues in Services are more volatile to demand shocks because consumers will tend to adjust their spending by cutting or adding Services before they cut spending on more stable products. Non-Services commonly entail a larger element of stable products (Gujarati & Porter, 2009). Following this line of argument, we expect the condition of the economy to affect Services more severely, which will lead to a larger underpricing of such stocks relative to Non-Services during periods of economic stress. This implies higher estimated synergies for a bidder, which will lead to higher reservation prices and hence higher deal premiums. This is so because it has been shown by a vast number of empirical studies that bidders tend to pay larger percentage premiums when synergies are high (Gaughan, 2007). This brings us to our second sub-hypothesis to assess the overall hypothesis 1:

Hypothesis 1b: *When a target firm operates in Services the general state of the economy will be more negatively associated with deal premiums compared to when a target operates in Non-Services.*

4.2. Previous Studies on Firm-Related Factors and Deal Premiums

The majority of empirical studies on deal premium drivers emphasize firm-related factors as main drivers of deal premiums (Andrade & Stafford, 2004; Gondhalekar, Sant, & Ferris, 2002; Madura, Ngo, & Viale, 2012; Nathan & O'keefe, 1989; Walkling & Edmister, 1985). Results are mixed for the factors used to test the undermanagement hypothesis and Jensen's free cash flow theory. In addition many of the newer studies find no significance of many firm-related variables. Walkling & Edmister (1985) was one of the earliest and most

influential empirical papers testing the impact of firm-related factors on deal premiums. They found that several firm-related factors such as the trend in target leverage, working capital and market-to-book value were significant drivers of deal premiums in their sample of 88 successful U.S. tender offers from 1968 to 1986. They performed multiple regression analysis on a cross-sectional sample and presented a model that explained 37.9%, which remains one of the highest explanation levels achieved. A vast number of studies confirm the importance of firm-related factors as drivers of deal premiums (Billett & Ryngaert, 1997; Bradley, Desai, & E. Han, 1988; Gondhalekar, Sant, & Ferris, 2002; Hsieh & Walkling, 2005; John, Liu, & Taffler, 2010; Lang & Walkling, 1989; Servaes, 1991; Varaiya & Ferris, 1987). We argue that company-specific factors remain important drivers of deal premiums, and therefore put forth the second overall hypothesis to be tested in this study:

Hypothesis 2: *Firm-related factors still have significant explanatory power over the variation in deal premiums.*

4.2.1. Previous Studies on the Free Cash Flow Theory of Takeovers

The deal premium paid in an acquisition is influenced by the amount of cash that bidder management can spend, as suggested by Jensen's free cash flow theory (Jensen, 1986; Jensen, 1988). The agency costs of free cash flow are proposed to increase with bidder free cash flow and so is the percentage premium a bidder is willing to pay in an acquisition. Few empirical studies test this theory. The ones that do, find mixed support for a positive association between bidder free cash flow and deal premiums (Gondhalekar, Sant, & Ferris, 2002; Harford, 2005). Gondhalekar, Sant & Ferris (2002) find support for a positive association, while Lang & Walking (1991) find no support, though they use overlapping samples from 1973 to 1999 and from 1968 to 1986, respectively. The theory is tested more indirectly in the studies examining the hubris hypothesis of takeovers. Roll (1986) was one of the first to present a theory to explain the overpayment problem observed in acquisitions through his hubris hypothesis of takeovers. He hypothesizes that bidders will tend to pay higher deal premiums when they have cash at hand. Hayward and Hambrick (1997) test the CEO hubris hypothesis on a sample of 106 publicly traded U.S. bidders and targets where the deal value was above 100 million. They test several measures of CEO hubris using multiple regression and find a strong positive association. We argue that the free cash flow theory still holds and

that there still exists a positive relationship between the amount of free cash flow held by the acquirer and the magnitude of deal premium.

Hypothesis 2a: *The amount of free cash flow that a bidder holds is positively associated with deal premiums.*

We again point towards a potential complexity in testing hypothesis 2a in relation to industry heterogeneity. It is likely that the effect of bidder free cash flow is conditioned on whether the target is in Services or Non-Services. Services are found to make greater use of equity options in incentive systems by Damodaran (2009a). This could decrease the agency costs of free cash flow relative to Non-Service targets as managers are more severely punished for undertaking value-destroying acquisitions. This would help management to focus on the acquisition with the highest positive NPV and encourage management to avoid overpayment (Jensen, 1988; Lang & Walkling, 1991; Varaiya & Ferris, 1987). We will not put forth a hypothesis on the effect of target industry, this is an issue that should be resolved empirically and we will examine the data for such difference to check consistency of results, because no relationship has been indicated from existing theory and empirical work.

4.2.2. Previous Studies on the Undermanagement Hypothesis

The degree of undermanagement of a target is related to the estimated synergies in an acquisition. The poorer the existing target management performs the more synergies the bidder expects to be able to extract from improving management post-acquisition as suggested by the Q-Theory of mergers. Grossmann & Hart (1980) state that there can be many reasons for undermanagement in a target, and underlines that a number of different measures exist to proxy management performance. One of these is the Tobin's Q ratio. Lang & Walkling (1989) suggest that firms with higher Q ratios are better managed and that this ability can be used to extract synergies in takeovers of undermanaged targets. Tobin's Q is an increasing function of the quality of a firm's current and anticipated projects under existing management. Most empirical studies use the Q-ratio to test the undermanagement hypothesis. Lang & Walkling (1989) tested this theory on 88 successful U.S. tender offers in the period of 1968 to 1986 with the use of multiple regression. They found that shareholders of a high Q bidder gain significantly more than the shareholders of low Q bidders. Their results are consistent with the view that takeovers of poorly managed targets by well-managed bidders

have higher bidder, target and total gains. Servaes (1991) also examines a sample of 384 completed U.S. takeovers from 1972 to 1987 and find support for a positive association between Tobin's Q-ratio and deal premiums. Lang, Stulz & Walkling (1991) also confirm this association on a sample of successful tender offers from 1968 to 1989 in the U.S. Both studies use cross-sectional data. We suggest that the undermanagement hypothesis still holds though not tested directly in newer studies. Gaughan (2007) highlights the lack of empirical attention given to this source of synergies. Furthermore, no evidence has been presented that indicate that the principal agent problems have been resolved in newer time. Therefore, there is reason to believe that target managers still pursue their own interests. We suggest that a bidder will look at the trend in management efficiency just before the takeover, because a static measure could give rise to coincidental results. If target management is performing consistently worse just before the offer, expected synergies should be higher. Our last sub-hypothesis to be tested to assess the overall hypothesis 2 is therefore:

Hypothesis 2b: *The degree of undermanagement of a target is positively associated with deal premiums.*

4.2.3. Previous Studies on Other Relevant Firm-Related Deal Premium Drivers

Existing literature on deal premium drivers establishes a number of firm-related deal premium drivers (Billett & Ryngaert, 1997; Eckbo, 2009; Varaiya, 1987; Walkling & Edmister, 1985).

4.2.3.1. Target Profitability

Walkling & Edmister (1985) found that most of the motives for mergers and acquisitions could be tied into target performance. Part of target performance can be measured by profitability. One of the most common variables is return on assets (ROA). ROA gives an indication of a company's ability to utilize its assets to generate net income. Some theories suggest that bidders would pay more for targets with high profitability. The majority of the simultaneous conducted studies found ROA to be positively associated with deal premiums (Eckbo, 2009; Madura, Ngo, & Viale, 2012; Walkling & Edmister, 1985). However it could also be argued that ROA should be negatively associated with deal premiums because this would indicate that the bidder could extract synergies from improving asset deployment post-acquisition.

An alternative to ROA is return on equity (ROE). This measure has however also been used as a proxy for undermanagement by Varaiya (1987) who argue that ROE measures management performance rather than overall performance as target shareholders will be aware of poor management and dispose of the stock. However it could also be argued that investors would keep the stock in the expectation of the firm being acquired. This highlights the problem of isolating the different sources of overall target performance, because most measures accumulate the aggregate effect of both undermanagement and other factors together. We argue that management only has a limited impact on ROA, because revenues and profits are often dominantly influenced by more general trends and management impact is low (Gaughan, 2007). This is however not the case for ROE because stock markets will too some extend factor in poor management in the share price, which makes this measure more volatile and general. Of course it could be that equity prices are just as dominated by general trends that management cannot influence, or that investors are not able to observe management effort. In either circumstance ROA is a more stable measure because it is based on assets. Using ROA as a measure of profitability would imply that bidders pay higher premiums for targets with greater propensity to generate profits as supported by earlier studies.

4.2.3.2. Target Leverage Trend

Walking & Edmister (1985) contended that acquires will pay less for a firm that is highly leveraged, because this indicates that management already excels at managing the assets of the target company and little synergies can be extracted from a takeover. This is important in relation to the hypothesis that most acquisitions are based upon the possible operational synergies. Flanagan & O'Shaugnessy (2003) and Gondhalekar, Sant & Ferris (2002) found a negative and significant relationship between leverage and premiums.

4.2.3.3. Relative Size

Another firm-related variable found to affect deal premiums is relative size of the target and bidder. When a target is relatively small a bidder can more easily afford to pay a higher premium, since the dollar cost of a higher premium is not prohibitive. Billett and Ryngaert (1997) on the also find that target abnormal returns are smaller when the target is larger relative to the bidder. A bidder may be more likely to pay more for smaller targets because the risk of overpayment occurring will have a low impact on the bidder's share price. Lang &

Walkling (1991) present contradictory evidence. They find that expected bidder gains should be positively associated with target relative size.

4.3. Previous Studies on Relevant Deal-Related Deal Premium Drivers

A limited number of studies directly set out to investigate the impact of deal-related factors on deal premiums. The majority of studies however acknowledge the importance of such factors and therefore control for these in their models. These studies showed that the characteristics of the takeover (hostile versus friendly and single versus multiple bidders) are important determinants of the magnitude of takeover gains and their distribution between targets and bidders (Flanagan & O'Shaugnessy, 2003; Servaes, 1991; Varaiya, 1987).

4.3.1. Competition

The majority of previous studies control for the presence of more than one bidder. As competition for the target increases bidder returns should fall based on the assumption that the successful bidder must increase its bid to win (Lang & Walkling, 1991). The bidder with the highest estimated synergies will most often have the highest reservation price and hence put forth the highest bid. The Winner's curse theory supports this relation (Varaiya, 1987; Walkling & Edmister, 1985). The majority of all studies within the field include a dummy to control for competition and find a positive association that is consistent across econometric methods and sample periods.

4.3.2. Type of Payment

The majority of studies have limited their sample to one type of payment or controlled for the type of payment used to finance acquisitions. This is due to various reasons. A popular reason is found in agency cost theory. Sullivan, Jensen & Hudson (1994) highlight that the type of payment signals asymmetric information to the market. When estimated synergies are high and the bidder is certain that these will materialize, the bid will be financed by cash. Opposite a bidder will use stock to finance takeovers when it believes its stock price is overvalued (Gaughan, 2007). Loughran & Vijh (1997) also finds that bidders on average realize negative returns on acquisitions when stock is used as the medium of payment. Another possibility could be that the use of cash signals higher synergies, which could attract competition and push up deal premiums (Gondhalekar, Sant, & Ferris, 2002). Huang and Walking (1987) find that cash offers are associated with significantly and substantially higher returns. The effects are explained by the tax hypothesis; target shareholders will demand higher premiums for

cash bids to compensate for an immediate taxation of their gains, whereas they can postpone the tax loss when receiving bidder stock to the point of asset sale. In addition tax rates in the U.S. are usually higher for cash bids, and capital gain taxes from realized gains on stocks.

4.3.3. Type of Combination

Scholars argue that the type of acquisition may affect deal premiums. The type of combination refers to whether the bidder and target operate in similar industries. Related acquisitions are combinations of firms that have the same or similar product. Hayward & Hambrick (1997) and Flanagan & O'Shaugnessy (2003) argue that synergies are higher when target and acquirer is related under the assumption that operational synergies such as economies of scale and scope are greater. Results have however been mixed (Flanagan & O'Shaugnessy, 2003; Hayward & Hambrick, 1997; John, Liu, & Taffler, 2010).

4.3.4. Deal Value

Hsieh and Walkling (2005) are among the first to formally examine the impact deal value on deal premiums. They propose that when a target is relatively small, a bidder can more easily afford to pay a higher premium, since the dollar cost of a higher premium is not prohibitive. This is in line of Walkling & Edmister (1985) who also states that the success of acquisitions is related to the deal size. Most studies control for impact of deal size by limiting their sample to large deals with a minimum value of 50-100M USD, but considerable variation still exist in the sample.

4.4. Development of Methods to Study Deal Premium Drivers

The methods used to study deal premium drivers have naturally developed over the last many decades. In the following sections we will go through developments in the econometric methodology and calculation terminology for deal premiums.

4.4.1. Econometric Methodology

All previous studies we have found are based upon a deductive research approach with a quantitative element of analysis. Many of the early hypotheses have been deducted from related areas within the corporate finance field. Of the studies conducted on deal premiums drivers the majority use cross-sectional linear regression models (Flanagan & O'Shaugnessy, 2003; Hsieh & Walkling, 2005; Jennings & Mazzeo, 1993; Nathan & O'keefe, 1989; Varaiya, 1987). This is by far the predominant way of analyzing deal premium drivers. Some of the

newer studies use static panel data linear regression models as the influence of merger wave theory underlines a need to also examine time trends in deal premiums. Hsieh & Walking (2004) found their results to be robust to the method; they arrived at the same results whether they used panel- or cross-sectional regression analysis. This indicates that the relationship between deal premium and deal premium drivers is constant and not dependent on the econometric method chosen to analyze the data with.

4.4.2. Measuring Deal Premiums and Deal Premium Drivers

There has been a shift in how to measure deal premiums as explained by Eckbo (2009). Some studies use target cumulative abnormal stock returns as a proxy for deal premiums. This is an alternative way to calculate a premium used in early studies whereby the premium is measured as the percentage return to target shareholders during a specified period over an interval from before to after offer announcement. This could introduce some problems when comparing results, because the abnormal returns might not estimate the true premium. This problem is primarily contained to early studies. After professional merger and acquisition databases became available, data on final offer prices have been easily accessible. It is not a focal issue for our study, because we largely contain the reference studies to the ones that use the same calculation method as us.

Another problem in relation to the contemporary calculation of deal premiums that we apply is the determination of the unaffected target stock price that is used to compute the premium. The premium is calculated as the percentage difference between the final offer price and target unaffected stock price X days before deal announcement. This introduces inconsistencies concerning the chosen time interval between the date of the unaffected price and deal announcement. It is important to determine an appropriate time span to avoid runup effects associated with pre-rumors of an acquisition. Investors buy target stock due to rumours of a takeover cause such runup effects. They expect benefit from appreciation of target stock as a deal is announced. Professional investors often engage in this kind of trading under the term merger arbitrage (Gaughan, 2009). If the target stock price entails runup effects the premium will appear to be smaller than it is in reality. The majority of studies determine that the unaffected target share price can be obtained by using a 1-month interval before announcement (Hayward & Hambrick, 1997; John, Liu, & Taffler, 2010; Varaiya, 1987; Walkling & Edmister, 1985). However, Gondhalekar, Sant & Ferris (2002) uses the stock

price 40 days prior to announcement while Walkling & Edmister (1985) use the stock price 14 days before announcement.

The selection and calculation of proxy variables are vital for overall model fit. Throughout the literature it can be seen that dummy variables along with static and dynamic variables are used (Gondhalekar, Sant, & Ferris, 2002; Harford, 2005; Hsieh & Walkling, 2005; Madura, Ngo, & Viale, 2012; Müller & Panunzi, 2004; Nathan & O'keefe, 1989; Servaes, 1991; Varaiya & Ferris, 1987; Walkling & Edmister, 1985). Generally, findings are more robust when looking at trends, but few studies do this probably due to the large manual effort needed to obtain data for many years. The selection of what type of variable used usually ties into with what precision the study attempts to test the hypotheses. We will comment on our rationale when specifying our model in section 5.

4.5. Summary of Previous Studies and Hypotheses

Very little empirical work has been undertaken on the association between macroeconomic factors and deal premiums. Only one study by Madura, Ngo & Viale (2012) directly tests such relationships. They find that deal premiums are positively associated with the level of stress in the economy and capital liquidity, which is in line with the predictions of the neoclassical merger wave theory. Two dominant theories on merger waves indirectly propose that deal premiums should be higher in recessions than in growth periods. According to the findings of existing studies takeover activity is inversely related to the economic cycle, and takeover activity is then inversely related to deal premiums. The latter association is based on two arguments. Firstly the market will tend to undervalue poor-performing firms during recessions, which will imply greater synergies, which will cause bidders to pay more. We propose an additional effect, namely that stakeholders such as target board of directors or the parties granting financing will conduct stricter due diligence when liquidity is low, like in recessions, which will work as a natural selection mechanism whereby the deals with the highest estimated synergies weighted by the probability of materialization will complete. In examining such relationships, we also highlight the possible differences associated with target company industry. Existing corporate finance literature highlight the inherent differences of Services and Non-Services, especially the higher cyclicality of Services compared to Non-Services, which could cause deal premiums to be more negatively associated with the state of the economy. We therefore propose that macroeconomic factors are important deal premium

drivers in our first hypothesis. This we examine by looking at the impact of economic conditions on deal premiums taking into account industry group differences in two sub-hypotheses 1a-b to assess the overall hypothesis 1.

Previous empirical studies indicate that firm-related factors are important in explaining the variation in deal premiums. We test whether this is still the case in hypothesis 2. Little focus has been put on testing Jensen's free cash flow theory and the undermanagement theory. Therefore we test these in hypotheses 2a-b to assess the overall hypothesis 2. The few studies examining Jensen's theory find mixed support for a positive association between bidder free cash flow and deal premiums. Most existing studies on the other hand finds support for the undermanagement hypothesis using Tobin's Q-ratio a measure of target management efficiency. A number of other more firmly established firm-related and deal-related deal premiums drivers such as type of combination, payment type, deal value, target profitability and performance are important to control for in future models. We examine the impact of target industry group for the firm-related variables as well. Table 1 summarizes the hypotheses to be tested in this study.

Table 1: Summary of Hypotheses

The table describes the two main hypotheses to be tested in the study and the corresponding sub-hypotheses as support the well as whether findings from previous studies the hypotheses or not.

Hypothesis		Previous Studies
1	Macroeconomic factors have significant explanatory power over the variation in deal premiums.	
1a	The general state of the economy is negatively associated with deal premiums.	Yes
1b	When a target firm operates in Services the general state of the economy will be is more negatively associated with deal premiums compared to when a target operates in Non-Services.	Not investigated
2	Firm-related factors still have significant explanatory power over the variation in deal premiums.	
2a	The amount of free cash flow that a bidder holds is positively associated with deal premiums.	Mixed
2b	The degree of undermanagement at a target firm is positively associated with deal premiums.	Yes

5. Data Collection and Methods

This section describes our data sample, econometric methodology and statistical tests used in this thesis. First, we describe our data sample and consider limitations relating to the data. Second, we identify and describe the measurement of the variables used to test our hypotheses. Third we describe the chosen econometric methodology and specify our model, and lastly we discuss limitations of the overall method.

5.1. Data Sample

The sample is obtained from the Mergermarket Deal Database. Our sample is comprised of completed acquisitions over the period 2003 to 2009. We only include completed deals because the estimated premiums cannot be compared to the premiums paid in unrealized acquisitions, which could distort the attempted inferences of this study. This implies that all our deal premiums are based on final offer prices. Data on deal characteristics on competition and deal nature is retrieved from Mergermarket while data on target and bidder financials is obtained manually from 10-K Securities and Exchange Commission (SEC) filings, and Bloomberg.

The final sample is selected based on the following criteria:

1. Deal value and deal premiums must be disclosed in Mergermarket. Deal value must be at least USD 200 million. By imposing this criterion we only look at large acquisitions and hereby limit some of the effects deal size could have on deal premiums.
2. The deal premium must not exceed 100% for the deal to be included in the final sample. This is done to limit outliers that could be caused by the inherent imperfection relating to the choice of unaffected target stock price. This is in line with Madura & Ngo (2008) and Madura, Ngo & Viale (2012).
3. The method of payment must entail a cash component. We only look at deals financed solely by cash or by a mix of cash and stock. Jensen (1986) and Travlos (1987) find evidence of acquisitions financed solely by stock are profoundly different from those financed with a cash component in terms of deal premium size and bidder returns. Exchange of stock is also most often associated with different acquisition motives and has also been shown to signal that bidder management views its stock as undervalued (Billett & Ryngaert, 1997; Gaughan, 2007; Jensen, 1988; Jensen, 1994; Loughran &

Vihj, 1997). Hsieh and Walkling (2005) also emphasize that an exclusion of mixed forms of payment such as convertible preferred, convertible notes etc. has been found not to affect the robustness of results in previous deal premium studies.

4. The acquirer must acquire 100% of target stock. This we do to avoid the complexities of mixed control rights that arise in mergers in line with Hsieh and Walkling's (2005) approach. Madura, Ngo & Viale (2012) also excludes partial acquisitions because premiums have been shown to be lower on average for such transactions. This is so because the bidder does not gain full control of the target which would decrease estimated synergies from e.g. inability to replace target management. Therefore we are only interested in looking at acquisitions where the bidder obtains full control.
5. Both the target and acquirer are U.S. incorporated publicly traded firms. By only looking at domestic acquisitions we avoid having to deal with the complexities of different corporate control legislations. Different legal systems could affect average deal premium levels and distort our data. We impose the restriction that both firms must be publicly traded to be able to retrieve uniform data for target- and bidder firm characteristics, because reporting standards for privately held companies are different.

After applying the five selection criteria we obtain an initial sample of 558 acquisitions. We drop the observations where we cannot obtain the required data on bidder- and target characteristics, which reduces the sample to 365 acquisitions. After examining the target-related metrics we decide to exclude targets that operate in the financial industry. The accounting standards and performance metrics used in this industry differ significantly from other industry groups and appear to distort the data. In addition, we find no readily available way to distinguish between the acquisitions facilitated by public entities as part of rescue plans during the financial crisis, where the deal premium might be misleading. Therefore, our final sample contains 255 acquisitions. The sample size is in line with other large-sample studies within the field. Only a few studies obtain a considerable larger sample, while the majority of studies use much smaller samples.

5.1.1. Data Quality

To ensure high data quality we rely on information providers such as Mergermarket, Bloomberg and the SEC filings database to obtain the data needed for this study. Mergermarket uses external sourcing to collect its information on each acquisition; hence

most of data is documented by press releases and original company filings. We collect all target company financials data manually from the original annual report SEC filings, forms 10-K, which are filed directly by the companies. We use Bloomberg to obtain the data on macroeconomic variables as well as bidder company information. Bloomberg is a widely acknowledged source of company financial- and market data. Due to the manual nature of the data collection process, especially on target company financials, we must consider a reasonable error rate. We try to reduce data errors by cross checking our final sample against both SEC and Bloomberg. Lastly, there could be some errors in the reported numbers from the companies, which we cannot detect or account for. To deal with those types of errors, we examine the data for outliers.

5.1.2. Assumptions and Estimations

Despite efforts to obtain all needed data from externally validated sources, some assumptions and estimations have been necessary to complete the data sample.

5.1.2.1. Staggered Fiscal Years

About 1/3 of the target companies in our sample have staggered fiscal years i.e. fiscal years not ending on December 31th. Therefore there might be some inconsistencies when calculating measures such as target leverage, ROA and Tobin's Q-ratio two years and one year prior to the announcement year across targets. We obtain bidder free cash flow, revenue and assets from Bloomberg for the year before deal announcement and disregard the inconsistency of bidders with staggered fiscal years, because the fiscal year of the bidder might differ from that of the target in a specific deal.

5.1.2.2. Missing Data

One of our sample selection criteria is that all necessary financial data for the target are obtainable, which leads to a relatively large exclusion of observations. This exclusion is not larger in relative terms compared to other empirical studies. We assume that this selection process does not suffer from self-selection bias and we drop these observations (Abdelmonem, Clark, & May, 2004; Gujarati & Porter, 2009). To support our assumption we initially calculated mean, median, min, max and standard deviation for the sample of deal premiums both prior to and after the exclusion of missing observations. When these summary statistics did not change drastically we concluded that the issue of self-selection bias was limited. We also looked at the sample distribution across industry groups and payment types

to ensure no drastic change occurred from the exclusions. This has been a time-consuming and iterative process spanning over the data collection process.

5.1.2.3. Outliers

We only exclude outliers when we are unable to identify a reasonable explanation for how the outlier fits into the data or when the outlier is most likely a result of data measurement errors in line with the practice suggested by Gujarati & Porter (2009). We examine each variable for potential outliers and if a potential outlier is identified, we first crosscheck in several databases. If measurement errors are detected, we correct for these, and hence exclusions are limited. In addition it is reasonably normal to observe extreme cases as with many other types of financial data i.e. the problem with fat tails. We exclude two outliers where deal premiums are above 100% as per the sample selection criteria and one outlier where the target Return on Equity is above 600%.

5.2. Variable Identification and Measurement

Variable identification and measurement have mainly been based on a thorough review of existing literature and empirical work for firm- and deal-related variables. For macroeconomic variables, there is very little empirical precedence to consult within the specific area, and we therefore rely on how other areas of research have measured economic conditions. We started with a large number of variables and narrowed them down according to relevance and accuracy as we progressed with the model work. Because many of the factors we wish to measure cannot be measured directly we are forced to use proxy variables. This introduces the challenge of selecting the correct and most accurate proxies.

We use the 2-digit SIC codes to classify our data into 6 broader industry groups in line with Madura, Ngo & Viale's (2012) approach: 1) Manufacturing (codes 20-39); 2) Services (codes 70-89); 3) Transportation and Communications (codes 40-48); 4) Mining (codes 10-24); 5) Retail Trade (codes 52-59); and 6) Utilities (code 49). From this categorization, we further group the data into Services (codes 70-89) and Non-Services (all remaining codes) to be able to test our hypotheses.

5.2.1. Measurement of Deal Premiums

Mergermarket provides deal premiums as the percentage difference between the final offer price and the unaffected target stock price 1-day prior and 1-month before the offer

announcement date. Sometimes rumors of a potential deal can inflate the stock price of a target just before the official offer announcement, a so-called run-up effect. The markup effect will then be the premium from announcement to completion. The sum of these two is the deal premium. Investors buy up target stock to gain from an expected conversion of the target stock price to the offer price, the so-called merger arbitrage activity. To limit effects of pre-announcement rumors, we calculate deal premiums based on an unaffected target stock price 1-month prior to the offer announcement date. We adopt a mathematical definition of deal premiums that is in line with previous methods, where a range of time intervals such as 1 day or 60 days has been used. We use the most applied definition comparing the offer to the target share price one month prior to the offer announcement date to allow us to better compare results (Flanagan & O'Shaugnessy, 2003; Hayward & Hambrick, 1997; John, Liu, & Taffler, 2010; Madura, Ngo, & Viale, 2012; Varaiya, 1987; Walkling & Edmister, 1985).

$$DP1M = \frac{S_0 - S_{1M}}{S_{1M}}$$

where $DP1M$ is deal premiums when calculated compared the target stock price 1-month before the offer announcement date for each acquisitions, S_O is the offer price for 1 target stock and S_{1M} is the unaffected target stock price 1-month before the offer announcement date for each acquisition.

5.2.2. Measurement of Independent Variables

In this section we will present the independent variables before we formally present the model used to test our hypotheses.

5.2.2.1. Macroeconomic Variables

To test hypothesis 1a-b we use the Bloomberg U.S. Financial Conditions Index. The Index is a broad indicator of the level of stress in the US financial markets. The Index creates a normalized index based on a weighted average of yield spreads and indices from U.S. money markets, equity markets, and bond markets. The index values are Z-scores, which represent the number of standard deviations that the current level deviates from historical averages based on the period January 1994 to June 2008. In general when the index is in negative territory the economy is considered to be under severe stress. The index composition can be found in table 2. We use the index as a proxy for the general state of the economy, because

the index combines both liquidity measures and stock market indices. We would have preferred to use independent measures of liquidity and economic volatility like Madura, Ngo & Viale (2012) who used the loan index of commercial and industrial loans supplied by banks published in the Fed's Senior Loan Officer Opinion Survey as an alternative proxy for liquidity, and the trailing volatility of U.S. GDP growth as a measure of economic volatility. We have obtained data to calculate these two measures, but it is not possible to include both in the regression due to severe multicollinearity issues, which would invalidate our inferences about the effect of each individual variable. Therefore we use a broader measure that should capture the combined effect of the two measures applied by Madura, Ngo and Viale (2012). Applying this measure also allows us to examine more broad influences of economic conditions, because the measure is also highly influenced by sources outside the U.S., whereas the Senior Loan Index mostly focuses on liquidity in the U.S. market. We therefore measure the state of the economy, *FINCON,* as the average of the quarterly Index values 2- and 1-quarter before the announcement quarter. We obtain quarterly Index values form Bloomberg (BFCIUS Index). This we do to account for a plausible lag effect between the index and deal premiums. The decision concerning which premium to offer is most often a long process and therefore we have chosen to look at economic conditions over a period of six months to factor this in.

Table 2
Composition of the Bloomberg U.S. Financial Conditions Index

Composites	Weights
Money Markets	33.30%
Ted Spread	*11.10%*
Commercial Paper/ T-bill Spread	*11.10%*
Libor-OIS Spread	*11.10%*
Bond Market	33.30%
Bond/Treasury Spread	6.70%
Muni/Treasury Spread	6.70%
Swaps/Treasury Spread	6.70%
High Yield/Treasury Spread	6.70%
Agency/Treasury Spred	6.70%
Equity Markets	33.30%
S&P 500 Share Prices	*16.70%*
VIX Index	*16.70%*

5.2.2.2. Firm-Related Variables

To test Jensen's free cash flow theory of takeovers we use a ratio variable, *BIDFCF,* calculated as bidder free cash flow over total assets. Bloomberg calculates free cash flow as adjusted EBITDA (Earnings before Interest, Tax, Depreciation and Amortization) less CAPX (Capital Expenditures), cash interest and cash taxes. We define cash holdings relative to the bidder's asset base because the same absolute amount of cash can have a very different impact for two bidders that differ in size. This is in line with Gondhalekar, Sant & Ferris (2002) and Lang & Walkling (1991). We also consider cash holdings over deal value as an alternative measure, because it is possible that the effect depends on how much of the deal the bidder can finance using its cash reserves, however, we find the association to be the same, so we use the first measure in line with previous studies.

To test the undermanagement hypothesis we use a dummy to identify targets where the Tobin's Q-ratio has increased between fiscal year end two- and one-year prior to the announcement year. We proxy the Q-ratio by taking the market value of equity plus book value of liabilities divided by the book value of assets. We assume book value of liabilities to be close to market value in line with previous studies (Lang & Walkling, 1991; Servaes, 1991). We use a dynamic measure to limit uncertainty relating a static measure, where the point in time chosen can affect results significantly. Walkling & Edmister (1985) also use 5-year dynamic measures and use the slope of the regression line. We however use a dummy instead of a continuous trend variable. We can only calculate the trend from two data points, and this could lead to coincidental relationships. We therefore use a dummy because it is less sensitive to the point in time chosen. We are more interested how premiums are associated with whether a target's degree of undermanagement is declining or rising just before the acquisition is announced. The trend on which the dummy is based is calculated as the difference in the Q-ratios 2-years and 1-year before the announcement year over the Q-ratio 2-years before the announcement year. If the trend is positive, it means that management is improving, and the dummy takes a value of 1 and 0 otherwise. We also compute and test an alternative measure, the Market-to-Book ratio of the target company used by Varaiya (1987).

5.2.2.3. Control Variables

We include a number of control variables, which have been found to have a significant effect on deal premiums in previous studies.

We control for target return on assets (*TGTROA)* measured as net income over total assets the year prior to the announcement year, which is included in the many models (Flanagan & O'Shaugnessy, 2003; Madura, Ngo, & Viale, 2012; Morck, Shleifer, & Vishny, 1990; Varaiya, 1987). We also calculate target return on equity (ROE) as an alternative to check consistency but choose to use the measure relative to total assets because this measure is less sensitive to stock market movements. Several empirical studies have found evidence of a significant relationship between target leverage and deal premiums that an acquirer is willing to pay for that target (Billett & Ryngaert, 1997; Varaiya, 1987; Walkling & Edmister, 1985). Leverage is most often used to measure relative bargaining power of the target and bidder based on the argument that the target will have increasing bargaining power with declining leverage and hence is able to demand higher deal premiums. Walkling and Edmister (1985) show that higher deal premiums are associated with declining amounts of leverage. We control for target leverage by introducing a dummy *(TGTLEVD)* to identify the acquisitions where the target has increased its leverage the year prior to the announcement year. We calculate target leverage as total liabilities over total assets. We control for the relative size of target and bidder calculated as target revenue over bidder revenue one year prior to the announcement year. It has been shown that deal premiums decrease with relative size of target and bidder, as bidders are more willing to pay a large premium for a small target. We also calculate relative size based on market capitalization to check for consistency but choose to use revenues because market capitalization can be more sensitive to the measurement point in time chosen. We control for type of combination, which measures relatedness of bidder and target. Earlier empirical findings suggest that larger deal premiums are paid in deals where the bidder and target operate in the same industry and are therefore considered related, though mixed support has been found so far (Flanagan & O'Shaugnessy, 2003; Hayward & Hambrick, 1997; John, Liu, & Taffler, 2010). We use a dummy to identify acquisitions where the target and bidder operate in the same industry based on 2-digit SIC codes. We further control for the method of payment by including a dummy to identify the acquisitions financed solely with cash versus a mix of cash and stock. Cash acquisitions have been shown to have higher deal premiums due to the immediate tax loss that target shareholders incur (Sullivan, Jensen, & Hudson, 1994). We control for deal value as well, because deal premiums may vary with deal size, even though we already limit our sample to deals above USD 200 million, we still have considerable variation. In line with previous studies, we calculate deal value in log.

Lastly, we would have liked to control for competition and deal nature, but this has not been possible due to insufficient number of observations. We only have 6 acquisitions where multiple bidders were present and 5 hostile takeovers in the sample.

5.3. Econometric Methodology

We perform cross-sectional analysis on individual sample deal premiums using multiple regression. We estimate the cross-sectional ANCOVA type regression model using Ordinary Least Squares with heteroskedasticity robust standard errors. This approach is in line with the majority of previous studies (Billett & Ryngaert, 1997; Eckbo, 2009; Flanagan & O'Shaugnessy, 2003; Gaughan, 2007; Gondhalekar, Sant, & Ferris, 2002; Hayward & Hambrick, 1997; Hsieh & Walkling, 2005; Lang & Walkling, 1989; Lang & Walkling, 1991; Slovin, Sushka, & Polonchek, 2005; Varaiya, 1987; Walkling & Edmister, 1985). We use the dummy alternative to the Chow test to test for industry heterogeneity. This approach is chosen because it allows us to test for both intercept and coefficient differences across groups in isolation, whereas the traditional Chow test does not identify the source of the difference. In addition, the dummy alternative is easily transformed to be heteroskedasticity robust, since robust standard errors can be used to make inferences about variables, whereas the Chow test requires homoscedasticity.

The main model on the total sample is specified as follows, model 1:

$$DP1M = \beta_0 + \beta_1 FINCON + \beta_2 BIDFCF + \beta_3 TGTTOBIND + \beta_4 SERV + \beta_5 FINCONxSERV + \beta_6 BIDFCFxSERV + \beta_7 TGTROA + \beta_8 TGTLEVD + \beta_9 RELSIZE + \beta_{10} RELAT + \beta_{11} PMT + \beta_{12} LOGDV + \varepsilon$$

where $DP1M$ is the deal premium calculated as the difference between the target unadjusted share price 1-month prior to the announcement date and the offer price over the unadjusted target share price 1-month prior to the announcement date, *FINCON* is the Bloomberg Financial Conditions Index used to measure the state of the economy, *BIDFCF* measures bidder free cash flow over assets, *TGTTOBIND* is a dummy identifying the acquisitions where the target management's performance improved based on change in its Tobin's Q-ratio, *SERV* is a dummy identifying the acquisitions where the target is in Services, and *FINCONxSERV* and *BIDFCFxSERV* are interaction terms used to test for differential slope coefficients across industry groups. The control dummies are; *RELSIZE* is the relative size of

each pair of bidder and target based on revenue, *RELATED* is a dummy measuring whether bidder and target operate in the same industry, *PMT* is a dummy identifying acquisitions financed with cash, and *LOGDV* controls for deal size, and ε is the normally distributed error term.

We suspect the interaction terms to be significant and therefore we estimate the same model for the two industry groups Services and Non-Services. Theoretically if interactions with *SERV* were included for all model variables we could derive industry group models directly from model 1. This is however almost impossible in practice when dealing with a large number of variables due to multicollinearity problems between the interaction terms. We could have centralized the interactions, but that would lead to less intuitive interpretations of the results. We focus on the six independent variables, and estimate two individual industry group regressions, which also capture possible interaction effects for the control variables that could be lacking in model 1.

We estimate the following model for Services, model 2:

$$DP1M_{SERV} = \alpha_0 + \alpha_1 FINCON + \alpha_2 BIDFCF + \alpha_3 TGTTOBIND + \alpha_4 TGTLEVD + \alpha_5 TGTROA + \alpha_6 RELSIZE + \alpha_7 RELAT + \alpha_8 PMT + \alpha_9 LOGDV + \varepsilon$$

We estimate the following model for Non-Services, model 3:

$$DP1M_{NSERV} = \alpha_0 + \alpha_1 FINCON + \alpha_2 BIDFCF + \alpha_3 TGTTOBIND + \alpha_4 TGTROA + \alpha_5 TGTLEVD + \alpha_6 RELSIZE + \alpha_7 RELAT + \alpha_8 PMT + \alpha_9 LOGDV + \varepsilon$$

where *SERV* and *NSERV* are subscripts to distinguish between the two models. We evaluate the hypotheses based on two-tailed t-tests at a 1%, 5% and 10% level of significance.

5.3.1. Applied Statistical Tests to Compare Means of Two Samples

As part of the model specification process, we examine deal premium means across categories e.g. industries and time periods to detect differences. The tested group distributions are not expected to be normally distributed. We, therefore, resolve to non-parametric one-way ANOVA and use the Wilcoxon Rank-Sum Test to compare means of two samples. For details and formal test procedures, please refer to appendix 1.

5.4. Method Limitations

There are several limitations that must be considered in relation to method chosen in this study, firstly the ones relating to the assumptions of multiple linear regressions and OLS and secondly the ones relating to the uncertainty of correct variable specification and measurement.

Multiple linear regression and OLS is a method that oversimplifies reality. The usefulness of such methods is heavily discussed by different schools of practitioners; we refer to Gujarati & Porter (2009) for a more thorough discussion. We acknowledge the limitations of using multiple regression, but highlight the method's ability to point towards relevant relationships in the real world. Naturally, other limitations of using this method relies on the set of restrictive assumptions needed to make statistically valid inferences highlighted previously in this section.

We also acknowledge the possible limitations related to the correct specification and measurement of independent variables. When using proxy variables, it can be difficult to ensure that the proxy variable in fact measures what is intended. Relying on previous empirical work is only part of a solution, since it might be that the variable has been incorrectly proxied throughout history. Therefore we also run the model on alternative proxies that are highly correlated with the original variable.

6. Results

In this section, we will present our results. The primary purpose of this study is to investigate whether a relationship exists between macroeconomic- and firm-related factors and deal premiums in U.S. acquisitions announced in the period 2003 to 2009. In relation to firm-related factors we set out to investigate whether a relationship exists between the least empirically examined bidder- and target characteristics and focus on the impact of target industry. The section is structured around our hypotheses. We begin by describing the sample distribution and the summary statistics for the variables included in the model. Closing, we will provide a description of the process and the results of the measures taken to assess model robustness.

6.1. Summary Statistics for Sample Distribution

The majority of acquisitions took place between 2005 and 2007 just before the financial crisis. 74% of the acquisitions took place in manufacturing and services based on target company industry corresponding to 56% of the total deal value of USD 686,194 million. About 35% of total deal value relates to acquisitions announced during the financial crisis (2007H2-2009) with one third of deal volume announced in that period. Overall, the total sample of 255 acquisitions is comprised of 225 deals financed solely with cash and the remaining 30 with a mix of cash and stock with only a small difference in average deal premiums across payment methods. Only 5 acquisitions were classified as hostile and for 6 acquisitions multiple bidders were present, so we cannot include these as dummies due to insufficient sample size. The typical acquisition would have had a premium of 31.03%, have been announced between 2005 and 2007H1, be financed entirely with cash, be friendly with only one bidder present, the target and bidder would operate within a similar industry, primarily Non-Services, and the bidder would have held 7% cash relative to its total assets. Deal value would have been around USD 2.7 billion and the bidder would have been larger than the target as measured on revenue or market capitalization. Summary statistics on the sample distribution is provided in appendix 5, table 1-4.

Next we examine sample characteristics based on the variables included in our model. Table 3 summarizes the statistics for the dependent and independent variables for the total sample. Most of the variables have similar means and medians, which indicates symmetric distributions. We highlight notable differences for the variables, which are not dummies. The Financial Conditions Index, *FINCON,* is -0.30 indicating that the U.S. economy is above historical stress levels on average with a standard deviation of 157%. However, when examining the median, it is 0.49, which deviates considerably. This implies that the index is much more negative during the Crisis period compared to the Pre-crisis period and the distribution is skewed. Target ROA is 3% on average with a standard deviation of 14%, while the median is 5%, which indicates a slight skew. *RELSIZE* indicates that on average the bidder is about 2/3 larger than the target in an acquisition, while the median is much smaller indicating that some acquisitions have very large targets compared to the bidder, which is pushing up the average.

Table 3
Sample Distribution for Variables for Total Sample of 255 Acquisitions

Independent variable	Mean	Median	Stdev	Min	Max
DP1M	0.31	0.28	0.20	-0.23	0.98
FINCON	-0.30	0.49	1.57	-6.70	0.87
BIDFCF	0.07	0.07	0.07	-0.38	0.30
TGTTOBIND	0.51	1.00	0.50	0.00	1.00
TGTROA	0.03	0.05	0.14	-0.68	0.59
TGTLEVD	0.43	0.00	0.50	0.00	1.00
RELSIZE	0.34	0.11	0.64	0.00	4.77
RELAT	0.57	1.00	0.50	0.00	1.00
PMT	0.88	1.00	0.32	0.00	1.00
LOGDV	7.06	7.02	1.14	5.30	10.76
SERV	0.30	0.00	0.46	0.00	1.00
FINCONxSERV	-0.08	0.00	0.72	-5.32	0.87
BIDFCFxSERV	0.03	0.00	0.05	-0.10	0.25

6.1.1. Macroeconomic Developments and Deal Premiums

Average deal premiums average 31.03% and ranged from -23% to 98% over the period 2003 to 2009. Average quarterly deal volume, measured as number of acquisitions announced, also varies from 3 to 19 over the sample period, peaking in 2007 just before the financial crisis. Figure 2 depicts average deal premiums and number of acquisitions announced in a quarter in a scatterplot. As quarterly deal volume increases deal premiums decrease, which is in line with expectations. We do not include deal volume as an independent variable in the model due to expected multicollinearity problems because its correlation with *FINCON* is 62%. Previous research also indicates that the two measure the same thing, because takeover activity is largely driven by economic conditions.

Figure 2
Average Deal Premium and Deal Volume (Total Sample)

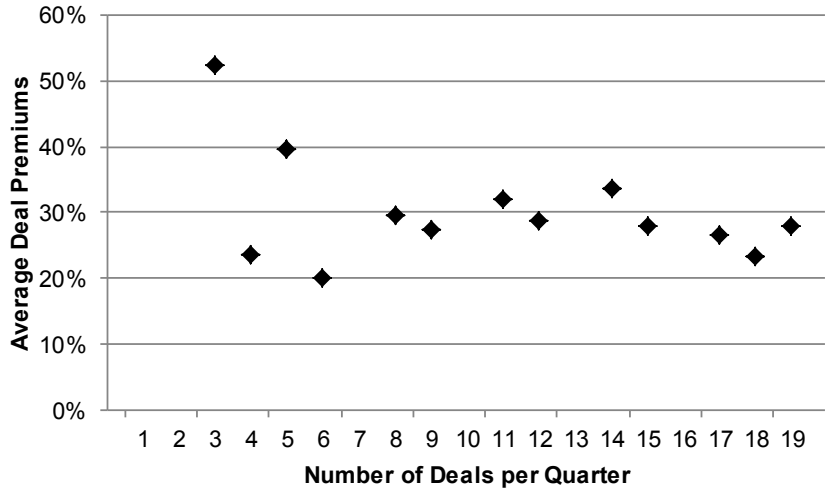
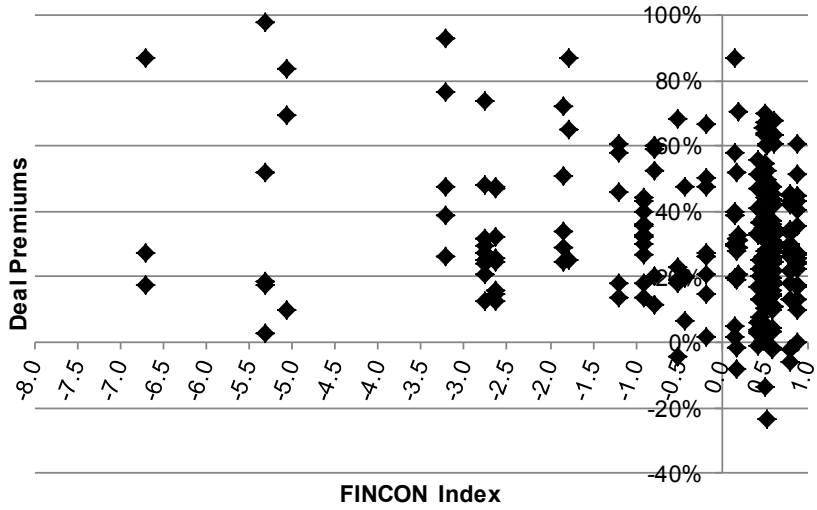


Figure 3 shows the relationship between the average *FINCON* Index over the two previous quarters prior to the announcement date and individual deal premiums. The graph indicates that deal premiums are negatively related to the *FINCON* Index, but that considerable variability in premiums exists. The correlation between deal premiums and *FINCON* is -21%. When the *FINCON* Index is negative on average over the 2 quarters before the quarter prior to deal announcement and/or the quarter before deal announcement, deal premiums are on average 7.5-8% points higher, respectively, than when *FINCON* is positive. *FINCON* is negative for about 30% of the observations in the sample.

Figure 3
Deal Premium and FINCON for Each Deal (Total Sample)



6.1.2. Industry Heterogeneity and Deal Premium Drivers

Table 4 shows the summary statistics for all model variables across industry groups. Average deal premiums for Services and Non-Services are 36.81% and 28.58% respectively with a standard deviation around 20% for both groups. This indicates that the two group means are different. We therefore examine whether average deal premiums in acquisitions where the target operates within Services are significantly higher compared to acquisitions where targets operate within Non-Service industries. We examine histograms of deal premiums for both industry groups and conclude that the distribution is skewed for Services, and hence do not look normally distributed. We therefore use the non-parametric Wilcoxon Rank-Sum Test to test for equivalence of the two means. We obtain a W-statistic of 8352 (p-value = 0.004) and we reject the null hypothesis of equal sample means. We also examine whether average deal premiums differ between manufacturing and non-manufacturing industries using the same procedure, because this distinction has been widely used within the corporate finance literature. We obtain a W-statistic of 7504 (p-value = 0.375), and we fail to reject the null hypothesis of equal means. We therefore apply the distinction Services and Non-Services. This matches the expectation a priori outlined in the literature- and empirical review. Appendix 5, table 5, shows which of the 6 main industry groups are classified as Services and Non-Services. 76 acquisitions took place in Services and the remaining 179 in Non-Services, primarily in manufacturing and transportation and communications, in the sample period.

Table 4
Sample Distribution for Variables on Industry Groups

Independent variable	Services (76 acquisitions)					Non-Service Industries (179 acquisitions)				
	Mean	Median	Stdev	Min	Max	Mean	Median	Stdev	Min	Max
DP1M	0.37	0.31	0.20	-0.08	0.93	0.29	0.27	0.20	-0.23	0.98
FINCON	-0.26	0.42	1.32	-5.32	0.87	-0.32	0.49	1.67	-6.70	0.87
BIDFCF	0.09	0.09	0.06	-0.10	0.25	0.06	0.07	0.08	-0.38	0.30
TGTTOBIND	0.49	0.00	0.50	0.00	1.00	0.52	1.00	0.50	0.00	1.00
TGTROA	0.03	0.04	0.11	-0.61	0.34	0.03	0.06	0.14	-0.68	0.59
TGTLEVD	0.43	0.00	0.50	0.00	1.00	0.42	0.00	0.50	0.00	1.00
RELSIZE	0.24	0.06	0.44	0.00	2.32	0.38	0.13	0.70	0.00	4.77
RELAT	0.50	0.50	0.50	0.00	1.00	0.60	1.00	0.49	0.00	1.00
PMT	0.91	1.00	0.29	0.00	1.00	0.87	1.00	0.34	0.00	1.00
LOGDV	6.80	6.70	1.00	5.32	9.48	7.17	7.09	1.18	5.30	10.76

Next we examine apparent differences between the continuous independent variables across the two industry groups. However, we need to examine whether the means are statistically different. It does not make much sense to compare for *FINCON* because the mean depends on the distribution of the deals across the sample period.

BIDFCF appears to differ for Services (9%) compared to Non-Services (6%) with standard deviations of 6% and 8%. Bidder free cash flow *(BIDFCF)* ranges from -38% to 30% of total assets, averaging 7% for the total sample of 255 acquisitions. We cannot test for equivalence of the two means for using the two-sample t-test because the distributions on industry groups for *BIDFCF* do not appear to be normally distributed, which is confirmed by examining histograms (see appendix 6). We therefore resort to the non-parametric Wilcoxon Rank-Sum Test (see appendix 2 for test details). We obtain a W-statistic of 8147.5 (p-value = 0.0125) and therefore reject the null hypothesis of equal means. The Wilcoxon Rank-Sum Test or a two-sample t-test cannot be used to examine whether means differ for the categorical variables. Instead Chi-squared tests should be used to assess whether the third independent variable *TGTTOBIND* differ across industry groups. However, the means are almost identifical and we expect no significant industry impact on whether a target has improved or worsened its Tobin's Q-ratio the year prior to deal announcement, so we do not go further into this.

Before we run our regression models we examine scatterplots with simple one-variable fitted regression lines to look for indication of possible interaction effects between industry groups

and the two continuous variables *FINCON* and *BIDFCF*. The last independent variable, *TGTTOBIND,* is a dummy, hence we do not plot it. Figure 4 shows individual deal premiums for different levels of *FINCON* divided into the deals where targets are in Services and Non-Services. Despite considerable variation it could appear that the slope is steeper for Services than Non-Services, which is in line with expectations.

Figure 4
Deal Premiums and FINCON on Target Industry Group (Services and Non-Services)

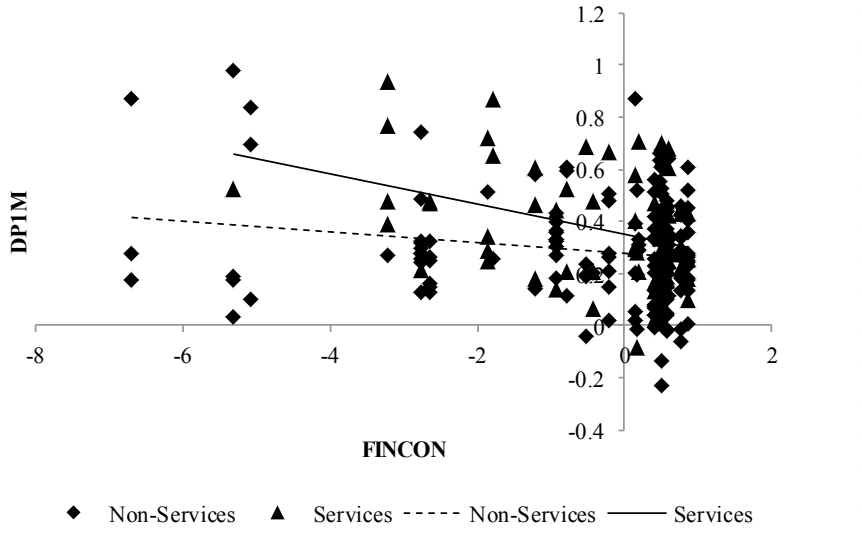
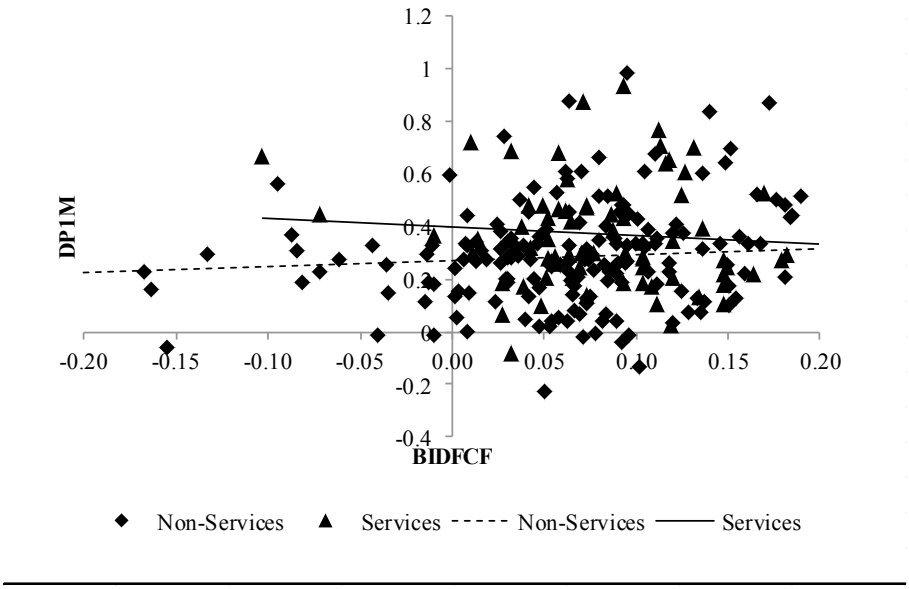


Figure 5 shows individual deal premiums for different levels of *BIDFCF* divided into the deals where target are in Services and Non-Services. Again the slopes appear to differ, it is positive for Non-Services and negative for Services, which provides mixed indications.

These graphs are only indicative, because the linear approximations cannot be used as a substitute for formally testing for such differences using intercept and differential slope dummies in the fully-specified regression model.

Figure 5

Deal Premiums and BIDFCF on Target Industry Group (Services and Non-Services)



6.1.3. Correlations between Model Variables

As part of the model specification process we examined correlations between the proposed independent variables and the dependent variable to get an initial idea about the relationship and possible issues with multicollinearity. Table 5 shows the correlation matrix for the final model on the total sample of 255 acquisitions. *FINCON* is negatively correlated with deal premiums (-21%), which is in line with expectations. We expect deal premiums to rise when economic conditions are worsening as markets underprice target stock and stakeholders perform stricter due diligence. *BIDFCF* exhibits a positive correlation of 7% with deal premiums indicating that deal premiums and bidder free cash flow move together. *TGTTOBIND* is negatively correlated with deal premiums, which is also in line with our expectation that deal premiums should decrease if a target is improving its management, because this reduces the expected synergies from undermanagement. For correlations between all examined variables, including the ones not included in the model, please see appendix 3.

Table 5
Correlation Matrix for Dependent and Independent Variables

		1	2	3	4	5	6	7	8	9	10	11	12
1	*DP1M*												
2	*FINCON*	-0.21											
3	*BIDFCF*	0.07	-0.24										
4	*TGTTOBIND*	-0.13	0.12	-0.04									
5	*TGT ROA*	-0.24	0.07	0.06	-0.01								
6	*TGTLEVD*	0.15	-0.12	0.12	-0.01	-0.24							
7	*RELSIZE*	-0.20	0.09	-0.25	-0.03	0.07	-0.18						
8	*RELAT*	0.05	0.03	-0.04	0.05	-0.07	0.00	0.12					
9	*PMT*	0.04	0.23	0.16	0.10	-0.05	0.07	-0.12	-0.05				
10	*LOGDV*	-0.16	-0.08	-0.02	0.00	0.07	-0.03	0.12	-0.01	-0.15			
11	*SERV*	0.19	0.02	0.16	-0.03	-0.02	0.01	-0.10	-0.09	0.05	-0.15		
12	*FINCONxSERV*	-0.23	0.45	-0.11	0.10	0.01	-0.01	0.06	0.11	0.09	-0.08	-0.17	
13	*BIDFCFxSERV*	0.11	-0.04	0.41	-0.08	0.01	0.06	-0.14	0.01	0.07	-0.09	0.78	-0.24

The correlations between the independent and control variables in the model are at tolerated levels. However, a couple of the variables exhibit considerable correlation. *PMT* and *BIDFCF* exhibit high correlation with *FINCON* (0.23 and -0.24), which should be expected, because the general state of the economy affects firms' cash flow streams. Also *RELSIZE* and *BIDFCF* are -0.25 correlated. The two interaction terms are also considerably correlated, which is expected due to the nature of the way they are constructed. We keep this in mind when examining the residuals of the model to ensure we can validly make inferences about the individual parameter estimates. However, due to our large sample size, we expect issues of multicollinearity to be limited.

6.2. Regression Results

In this section we will first present the results of the performed regressions for the total sample and the two individual industry groups, Services and Non-Services. To account for minor issues with heteroskedasticity in the data, we use heteroskedasticity robust standard errors.

First we estimate the specified model 1 in section 5 on the total sample of 255 acquisitions:

$$DP1M = \beta_0 + \beta_1 FINCON + \beta_2 BIDFCF + \beta_3 TGTTOBIND + \beta_4 SERV + \beta_5 FINCONxSERV + \beta_6 BIDFCFxSERV + \beta_7 TGTROA + \beta_8 TGTLEVD + \beta_9 RELSIZE + \beta_{10} RELAT + \beta_{11} PMT + \beta_{12} LOGDV + \varepsilon$$

Table 6 reports the results of the regression of individual deal premiums on the 6 independent variables and 8 control variables. The F-Stat of 5.49 is highly significant (p-value < 0.0001) and the model explains 22.40% of the total variation in deal premiums based on R-squared. Adjusted R-squared is 18.55%. The differential slope coefficients *FINCONxSERV* and *BIDFCFxSERV* are both highly significant at the 5%- and 1%-level (p-value = 0.0190; p-value = 0.0083), which implies that the effect of *FINCON* and *BIDFCF* differ across Services and Non-Services. However, *FINCON* and *BIDFCF,* which are the conditional coefficients for acquisitions where targets are in Non-Services, are not significant. We also test whether a significant interaction exists between *TGTTOBIND* and *SERV* but this term is insignificant and we do not include it in the model. Very little consensus exists on whether a significant differential slope coefficient is adequate to infer about the main effect in a subgroup. Therefore we choose the conservative approach and examine individual regressions on industry groups to check if the main effects of *FINCON* and *BIDFCF* are significant. This also takes into account possible differences for the control variable slopes, which are not taken into account in model 1. This has not been possible due to a high degree of collinearity between many of the interaction terms, which would cause severe multicollinearity issues. If both effects had been found to be significant and we were able to include interactions for all variables, we could have estimated the two sub group regressions directly from model 1 instead using the conditional relationships.

We estimate the following model for Services:

$$DP1M_{SERV} = \alpha_0 + \alpha_1 FINCON + \alpha_2 BIDFCF + \alpha_3 TGTTOBIND + \alpha_4 TGTLEVD + \alpha_5 TGTROA + \alpha_6 RELSIZE + \alpha_7 RELAT + \alpha_8 PMT + \alpha_9 LOGDV + \varepsilon$$

We estimate the following model for Non-Services:

$$DP1M_{NSERV} = \alpha_0 + \alpha_1 FINCON + \alpha_2 BIDFCF + \alpha_3 TGTTOBIND + \alpha_4 TGTROA + \alpha_5 TGTLEVD + \alpha_6 RELSIZE + \alpha_7 RELAT + \alpha_8 PMT + \alpha_9 LOGDV + \varepsilon$$

We use the subscript *SERV* to denote the model for Services and *NSERV* to denote the model for Non-Services. Due to the detected industry heterogeneity the optimal solution would have been to run individual regressions for each of the 6 individual industry groups based on the SIC classification system outlined in section 5 (Gujarati & Porter, 2009). This has however

not been feasible because this would reduce our sample size too severely for most of the industry groups.

Table 6
OLS Regression Results

	Model 1: Total Sample				Model 2: Services				Model 3: Non-Services			
	Estimate	Robust S.E.	t-stat	P-value	Estimate	Robust S.E.	t-stat	P-value	Estimate	Robust S.E.	t-stat	P-value
Intercept	0.40	0.09	4.69***	<.0001	0.51	0.17	3.00***	0.004	0.43	0.10	4.24***	<.0001
FINCON	-0.01	0.01	-1.26	0.2077	-0.07	0.02	-4.31***	<.0001	-0.01	0.01	-1.19	0.2376
BIDFCF	0.06	0.18	0.34	0.7330	-0.88	0.34	-2.59**	0.0119	0.07	0.18	0.36	0.7190
TGTTOBIND	-0.05	0.02	-2.22**	0.0273	-0.06	0.04	-1.39	0.1682	-0.05	0.03	-1.86**	0.0646
TGT ROA	-0.27	0.09	-2.84***	0.0049	-0.18	0.26	-0.70	0.4891	-0.30	0.09	-3.34***	0.0010
TGTLEVD	0.03	0.02	1.08	0.2809	0.04	0.04	0.87	0.3897	0.02	0.03	0.68	0.4945
RELSIZE	-0.05	0.02	-2.63***	0.0090	-0.04	0.05	-0.71	0.4805	-0.05	0.02	-2.68***	0.0080
RELAT	0.05	0.02	2.07**	0.0397	0.07	0.04	1.72*	0.0910	0.03	0.03	1.22	0.2235
PMT	0.03	0.03	1.01	0.3152	0.08	0.06	1.41	0.1638	0.02	0.04	0.45	0.6540
LOGDV	-0.02	0.01	-1.92**	0.0561	-0.02	0.02	-1.06	0.2928	-0.02	0.01	-1.62	0.1062
SERV	0.13	0.04	3.50***	0.0005								
FINCONxSERV	-0.05	0.02	-2.66***	0.0083								
BIDFCFxSERV	-0.83	0.35	-2.36**	0.0190								
F-Stat	5.82***				2.70**				3.83***			
P-value	<.0001				0.0097				0.0002			
R-squared	0.2240				0.2691				0.1696			
Adj. R-squared	0.1855				0.1694				0.1253			
N	255				76				179			

Notes: Table 9 reports the estmated of OLS regression with heteroskedasticity consistent standard errors of individual deal premiums on firm-, deal, industry- and macroeconomic factors. The dependent variable DP1M is the premium paid relative to the share price of the target one month prior to the announcement date. The independent variables are measured as follows: *FINCON* is Bloomberg's Financial Condition's Index the quarter prior to the announcement quarter, *BIDFCF* is the Free Cash Flow over Total Assets of the bidder fiscal year end prior to announcement, *SERV* is a dummy for acquisitions where the targets is in Services, FINCONxSERV is an interaction dummy identifying the aquisitions where the target is in Services and the corresponding values for FINCON, and BIDFCFxSERV is an interaction dummy between bidder Free Cash Flow and Services, *TGTTOBIND* is a dummy variable for acquisitions where the target's Tobin's Q ratio increased over the year preceding the year before announcement calculated as Market Value of Equity + Book Value of Liabilities / Total Assets. The control variables are measured as follows: *TGTROA* ia the Return on Assets for the target one year prior to the announcement year calculcated as Net Income / Total Assets, *TGTLEVD* is a dummy for acquisitions where target leverage has increased over the year preceding the year before announcement calculated as Total Liabilities/ Total Assets, *RELSIZE* is the relative size of target and bidder measured on revenue the year prior to announcement, *RELAT* is a dummy for relatedness of target and bidder based on 2-digit SIC codes, *PMT* is a dummy for acquisitions that was financed solely by cash, and *LOGDV* is the log deal value. Stastistical significance is reported as: *** = 1%; ** = 5%; * = 10%.

6.3. Hypothesis Testing

In this section we describe the regression results in individual subsections for each hypothesis. We refer to the two individual regressions models on industry groups to test hypotheses 1a and 2a-b, because either the interactions or significance change across industry groups, while we look at model 1 for hypotheses 1b. We present the results according to the strength of the support found in this study.

6.3.1. Hypothesis 1: Macroeconomic Factors and Deal Premiums

We test the general impact of economic conditions on deal premiums and whether the impact differs across industry groups in hypothesis 1a and 1b to assess the overall hypothesis 1.

6.3.1.1. Hypothesis 1b: Macroeconomic Factors, Industry Heterogeneity and Deal Premiums

We test hypothesis 1b by examining the differential slope coefficient for *FINCONxSERV*. The estimate is -0.05 and significant at the 1%-level (p-value = 0.0083). We therefore find support

for hypothesis 1b that the impact of economic conditions is more negative for acquisitions where target are in Services compared to Non-Services. In addition the intercept is also found to differ between the two groups, *SERV* is significant at the 1%-level (p-value = 0.0005). These results are significant after controlling for target ROA, target leverage trend, relatedness, payment type, and deal value.

6.3.1.2. Hypothesis 1a: Economic Conditions and Deal Premiums

We use Bloomberg's U.S. Financial Conditions Index (*FINCON)* as a proxy for the general condition of the U.S. economy. The coefficient for *FINCON* is -0.07 and significant at the 1%-level (p-value < 0.0001) for Services. The coefficient is -0.01 but insignificant for Non-Services (p-value = 0.2376). This offers moderate support for hypothesis 1a since support is only found for acquisitions where targets operate in Services. This result is significant even when we control for target ROA, target leverage trend, relatedness, payment type, and deal value.

6.3.2. Hypothesis 2: Firm-Related Factors and Deal Premiums

We test the two theories in relation to firm-related deal premium drivers where previous empirical studies are scarce and findings have been mixed. Overall, we test whether such firm-related factors remain important determinants of deal premiums in hypothesis 2. We test Jensen's free cash flow hypothesis of takeovers and the undermanagement hypothesis in hypothesis 2a-b to assess the overall hypothesis.

6.3.2.1. Testing hypothesis 2b: Undermanagement and Deal Premiums

We use the target's Tobin Q-ratio to measure the degree of undermanagement. The measure is calculated by taken the market value of equity plus the book value of liabilities over total assets. We assume that the book value of liabilities is a reasonable proxy for market value of liabilities. Moreover, we also use total assets as a proxy for the sum of the book value of equity and liabilities. We use a dummy to identify acquisitions where the target's Q-ratio has increased i.e. the degree of undermanagement has declined the year prior to the announcement year. This we do to detect possible trends to minimize errors relating to using a static measure, because this is more sensitive to the chosen point in time and measurement method.

The estimated coefficient in model 1 for *TGTTOBIND* is -0.05 and significant at the 5% level (p-value = 0.0273). When targets improve their Q-ratios, average deal premiums will tend to

decrease. When checking for parameter stability across industry groups, the coefficient remains negative and in line with the overall model but become insignificant for Services (p-value = 0.1682). The coefficient remains significant for Non-Services at the 10%-level (p-value = 0.0646) indicating that this group drives the main results of model 1. We therefore also test whether interaction exists between *TGTTOBIND* and *SERV,* but no significant interaction is found, hence we exclude the term from the model. Because the estimate is not significant for Services we find moderate support for hypothesis 2b that average deal premiums are positively associated with the degree of undermanagement in acquisitions. This result is significant even when we control for target ROA, target leverage trend, relatedness, payment type, and deal value.

6.3.2.2. Testing hypothesis 2a: Bidder Cash Flow and Deal premiums

We use bidder free cash flow over total assets the fiscal year prior to announcement, *BIDFCF,* to estimate the amount of cash that a bidder holds. The differential slope coefficient for *BIDFCFxSERV* is -0.83 and significant at the 5%-level (p-value = 0.0190), which indicate that the slopes of the two industry regressions are different. We therefore examine the main effects based on model 2 and 3 on individual industry groups. *BIDFCF* is -0.88 and significant at the 5%-level for Services (p-value = 0.0119) and 0.07 and insignificant for Non-Services (p-value = 0.7190). This is opposite to our expectation that bidder free cash flow should affect deal premiums positively, since the agency cost of free cash flow implies that the amount of cash bidder management can spend is positively associated with deal premiums.

In summary, our findings provide no support for hypothesis 2a that bidder free cash flow is positively associated with deal premiums. Instead we find a significant negative association between bidder free cash flow and deal premiums for acquisitions where targets are in Services and a positive insignificant association for Non-Services.

6.3.3. Control Variables Results

We control for a number of factors that have been found to affect deal premiums. We will shortly comment on the results only referring to model 1.

A couple of interesting findings contradict expectations. *RELSIZE* is -0.05 and significant at the 1%-level (p-value = 0.009) contrary to our expectation that targets should be able to

demand higher premiums because its bargaining power increases with its relative size. *TGTLEVD* is positive (0.03) and insignificant (p-value = 0.2809) contrary to expectations.

The remaining control variables are largely in line with expectations a priori. *PMT* is found to be positive (0.03) and in line expectation that offers financed solely with cash should have higher average deal premiums to compensate target shareholders for the immediate tax loss they incur. However, *PMT* is not significant (p-value = 0.3152). *LOGDV* is negative (-0.02) and significant at the 10%-level (p-value = 0.0561). Lastly, type of combination, *RELAT,* is positive (0.05) and significant at the 5%-level (p-value = 0.0397), hence we find support that acquisitions where target and acquirer are in the same industry have higher average deal premiums. *TGTROA* is negative (-0.27) and significant at the 1%-level (p-value = 0.0049) in line with previous findings.

When examining individual regression on industry groups, there is some variation in significance, but the parameter signs are consistent. This indicates that deal premium drivers identified in previous studies differ across industries.

6.3.4. Summary of Findings

Table 7 summarizes our findings on the hypotheses. We find strong support for hypothesis 2b that the state of the economy affects deal premiums in acquisitions where targets are in Services more negatively than when targets are in Non-Services in model 1. We find moderate support for hypothesis 1a that the general state of the economy is negatively associated with deal premiums only for Services in model 2. We find moderate support for hypothesis 2b that the degree of undermanagement of a target is positively associated with deal premiums for Non-Services only. When we examine Jensen's free cash flow hypothesis, we find no support for hypothesis 2a that a positive association exist between bidder free cash flow and deal premiums. The parameter estimates for *BIDFCF* across industry groups are found to be statistically different; hence we evaluate hypothesis 2a based on model 2 and 3. We find a positive relationship when looking at acquisitions where the target is in Non-Services, but the estimate is found to be insignificant. The estimate for Services is significant but negative. Hypothesis 2a is therefore not supported.

Table 7
Summary of results on hypotheses

	Hypothesis	Coefficients used to test hypotheses	Estimated values of coefficients Model 1	Model 2: SERV	Model 3: NSERV	Support
Hypothesis 1b	When a target firm operates within Services, the general state of the economy will be is more negatively associated with deal premiums compared to when a target operates within Non-Services	β_5	-0.05**			Supported
Hypothesis 1a	The genereal state of the economy is negatively associated with deal premiums	β_3		-0.07***	-0.01	Supported for Services
Hypothesis 2b	The degree of undermanagement at a target firm is positively associated with deal premiums	$\alpha_{1SERV}, \alpha_{1NSERV}$	-0.05**			Supported for Non-Services
Hypothesis 2a	The amount of free cash flow that a bidder holds is positively associated with deal premiums	$\alpha_{2SERV}, \alpha_{2NSERV}$		-0.88**	0.07	Not Supported

Stastistical significance is reported as: *** = 1%; ** = 5%; * = 10%.

6.4. Model Robustness

In this section we will go deeper into the steps taken to test robustness of the model and results. It is always difficult to assess the fit of an empirical model to the true world. In addition to examining whether the assumptions directly relating to the applied method hold, we rely on the set of model selection criteria suggested by Gujarati & Porter (2009) whereby a model should be exhibit parameter stability and be consistent with theory regardless of the method used. In practice an empirical model will always oversimplify reality and some instability must be accepted, as long as this is considered when evaluating model results. This section assesses the first two criteria, while the discussion in section 7 will deal with the third criterion relating to existing theory. We commence by discussing how we have selected the test battery used to examine model robustness. Then we examine parameter stability aver the sample period. Third we assess whether the assumptions of multiple regression and OLS hold enabling us to exploit the statistical properties of OLS to get best linear unbiased estimators. Lastly, we look at issues in relation to model specification errors, which is the most comprehensive issue to tackle.

6.4.1. Test Power

The tests used to assess model robustness have been selected based on test power. When no superior test has been agreed upon we use the most widely applied tests. We have chosen to use a limited number of tests to remedy the increased uncertainty related to the additional layer of assumptions of the robustness tests. We mainly rely on theory and visual examination of the regression residuals to evaluate the assumptions. This we especially do in relation to model specification errors, where many competing tests exist with relatively low test power.

Test power is defined as the probability that a given test rejects the null hypothesis when it is in fact false, also referred to by Gujarati & Porter (2009) as the probability of not committing a type II error, and is formally written as $(1-\alpha)$, where alpha is the chosen level of significance. The probability of committing a type II error therefore decreases as test power increases. Test power is useful when wanting to compare different types of tests and depends on the chosen significance criterion. We evaluate the results on a 10%-, 5%- and 1%-level of significance and also report the absolute significance levels through p-values. We thereby increase test power by also looking at less conservative significance levels, but increase the likelihood of committing a type I error i.e. obtaining a significant results when the null hypothesis is in fact true. We also attempt to increase test power by using a large sample. We do not conduct formal power tests, but choose the tests that are generally known to have the highest test power based on Gujarati & Porter (2009). We mainly rely on Engle & Hendry (1993) and Hansen (2002) in relation to the methods used to assess parameter stability.

6.4.2. Endogeneity Problems

Endogeneity can arise from a range of issues relating to sample selection- and model specification errors. The endogeneity problem is well known when estimating cross-sectional regression models using methods that assume the independent variables to be exogenous. Generally, three types of exogeneity exist. *Weak exogeneity* is when the independent variables are independent from the dependent variable i.e. the dependent variable does not explain the independent variable. *Strong exogeneity* is established when current and lagged values of the dependent variable do not explain the independent variables. Lastly *super exogeneity* is when the parameters in a regression model are invariant to changes in the value of the independent variables. In general week exogeneity is enough for estimation and testing, strong exogeneity is needed for forecasting and super exogeneity is a condition for policy analysis (Gujarati & Porter, 2009; Engle, 1993). We argue the independent variables are at least weakly if not strongly exogenous. All we need is the weak exogeneity to hold for OLS estimators to be consistent, but ideally we need strong exogeneity for the results to have more practical significance for bidders to determine optimal bids. We largely rely on a thorough review of existing literature and empirical work to support the exogeneity assumption of the independent variables. It is considered less likely that a firm will take into account the potential deal premium it could receive in a hypothesized acquisition when e.g. deciding on its cash reserves or level of management efficiency. It can also not be logically argued that a

given deal premium in a specific acquisition should not affect macroeconomic variables such as stock markets or interest rates. In terms of strong exogeneity it is also not likely that lagged deal premiums will affect the independent variables.

Super exogeneity is in practice very difficult to support, since this requires complete parameter stability as the independent values change. The famous Lucas Critique proposes that relationships between economic variables may change in response to regulatory or regime shifts over time Gujarati & Porter (2009). Therefore, the problem of endogeneity is more likely to be relevant when analyzing average deal premiums over time, where it could be argued that a trend in average premiums could affect e.g. yield spreads, if demand is high to finance acquisitions financed with a large proportion of debt. Parameter stability is not only a desired property of a well specified but a necessary requirement for super exogeneity. This has most often been examined in relation to models used by policy makers for policy decisions, because the modeled relationships must be invariant to changes in policy or regime shifts over time. In relation to our topic it is therefore desirable to examine whether the relationships between the independent and the dependent variables are stable when the values of the independent variables change, specifically in relation to economic cycles, because the relationship and significance of deal premium drivers might be invariant across the sample period.

6.4.3. Model Stability over Sample Period

Engle & Hendry (1993) emphasizes the importance of parameter stability especially in relation to forecasting and policy decisions. Hansen (1991) further underlines how parameter stability is a requirement for any well-specified econometric model. In this section we examine parameter stability over the sample period, notably in relation to stability across the economic cycle. This allows us to evaluate whether cross-sectional analysis is the best approach to study deal premiums. If structural shifts do occur in the sample period, we should either shorten the period or look at other alternative methods for future use.

We are interested in determining whether the intercept or the coefficient slopes or both are stable over the sample period. To test for differential intercept for each year, we estimated a fixed effect type of regression model with individual year dummies, however none of these were significant (see appendix 14). This could be due to longer time trends that span over

years, since mergers have been found to cluster over time periods lasting more than a year. Therefore, it has been suggested in the current discussion that the financial crisis might have had a significant impact on the U.S. market for corporate control, notably that the tight credit markets have affected takeover activity and hereby also deal premiums. To examine whether the intercepts differ this we test three different crisis dummies in the preliminary model, and none of them are found to be significant. We test three alternative structural break points, 2007H2, 2008 and 2008H2. Despite these results the differential coefficient slopes might still exist, so we include interaction terms between the three independent variables and the crisis dummy. Therefore we report the results of individual regressions on the most plausible break point Crisis (2007H2-2009) and Pre-Crisis period (2003-2007H1).

We estimate the following model on the total sample, model 4:

$$DP1M = \beta_0 + \beta_1 FINCON + \beta_2 BIDFCF + \beta_3 TGTTOBIND + \beta_4 SERV + \beta_5 FINCONxSERV + \beta_6 BIDFCFxSERV + \beta_7 CRISIS1 + \beta_8 FINCONxCRISIS1 + \beta_9 BIDFCFxCRISIS1 + \beta_{10} TGTTOBINDxCRISIS1 + \beta_{11} TGTROA + \beta_{12} TGTLEVD + \beta_{13} RELSIZE + \beta_{14} RELAT + \beta_{15} PMT + \beta_{16} LOGDV + \varepsilon$$

Table 8 shows the results from estimating model 4 compared to model 1. R-squared remains in line with the overall model at 23.40%, but it appears the added terms do not add to the explanatory power of the model, since adjusted R-squared decreases to 18.25%. The F-statistic is also lower, 4.54, but remains highly significant at the 1%-level (p-value = <.0001). The differential intercept coefficient, *CRISIS1,* is positive 0.01 as expected, but not significant (p-value = 0.8505). The differential slope coefficients *FINCONxCRISIS1* and *TGTTOBINDxCRISIS1* are not significant (p-value = 0.6567; p-value = 0.9215). However, the differential slope coefficient for *BIDFCFxCRISIS1* is significant at the 10%-level (p-value = 0.0766), which would indicate that the slopes are different across the sample period. Next we examine the differential intercept dummy for *SERV* which remains positive 0.13 and highly significant at the 1%-level (p-value = 0.0004) even after controlling for the crisis. The slope coefficients for the industry group interaction dummies *FINCONxSERV* remains significant at the 1%-level (p-value = 0.0034) and *BIDFCFxSERV* at the 5%-level (p-value = 0.0111) as well indicating that the industry differences remain robust over the sample period. When analyzing *BIDFCFxSERV* in the Crisis- and Pre-Crisis period, model 5 and 6, the interaction term is only significant in the crisis (p-value = <.0001) and insignificant for the Pre-Crisis

period (p-value = 0.1784). The two composites *BIDFCF* and *CRISIS1* are not significant in any of the periods. Therefore it would have been optimal to investigate the effect of *BIDFCF* in four separate regressions for the two sub periods and industry groups, however this has not been feasible since the sample size would be too severely reduced. For targets in Services in the Crisis, the number of observations is only 18; hence sample size is too small. The findings are therefore only enough to support the stability of industry differences for *FINCON* and point toward a possible instability of *BIDFCF* over the sample period as well.

We do however estimate model 1 for the Crisis- and Pre-Crisis period to examine the stability of parameter significance for the control variables. Here it becomes apparent that the model 5 appears to be a better fit in the Crisis period compared to model 4 in the Pre-Crisis period. R-squared is 46.57% in the Crisis and 16.50% in the Pre-Crisis, which is a considerable difference. However, this could be attributed to rising correlations in periods of recession. *BIDFCF* is not significant in any of the sub-groups while and *BIDFCFxSERV* is negative but only significant in the Crisis Period (p-value <.0001). This means that all we can infer from these results are that the coefficient slopes of *BIDFCF* also differ in the Crisis period, but not in the Pre-Crisis period. From model 5 and 6 we also see some inconsistencies concerning significance of parameters for *TGTTOBIN,* which is only significant in the Pre-Crisis period (p-value = 0.0904), and *TGTLEVD, RELSIZE, PMT* and *LOGDV* also differ across the two groups.

Table 8
OLS Regression Results across Sample Period

	Model 4				Model 1		Model 5: Crisis			Model 6: Pre-Crisis		
	Estimate	Robust S.E.	t-stat	P-value	Estimate	t-stat	Estimate	t-stat	P-value	Estimate	t-stat	P-value
Intercept	0.38	0.09	4.04***	<.0001	0.40	4.69***	0.54	3.74***	0.0004	0.35	3.32***	0.0011
FINCON	-0.01	0.03	-0.41	0.6791	-0.01	-1.26	-0.02	-1.42	0.1595	0.01	0.18	0.8604
BIDFCF	0.23	0.25	0.92	0.3596	0.06	0.34	-0.18	-0.64	0.5260	0.19	0.77	0.4398
TGTTOBIND	-0.05	0.03	-1.79*	0.0748	-0.05	-2.22**	-0.05	-1.19	0.2379	-0.05	-1.70*	0.0904
TGT ROA	-0.27	0.10	-2.76***	0.0062	-0.27	-2.84***	-0.26	-1.65	0.1033	-0.28	-2.41**	0.0169
TGTLEVD	0.03	0.02	1.32	0.1893	0.03	1.08	0.08	1.79*	0.0781	0.01	0.50	0.6187
RELSIZE	-0.04	0.02	-2.53**	0.0122	-0.05	-2.63***	-0.09	-4.34***	<.0001	-0.03	-1.31	0.1934
RELAT	0.05	0.02	2.13**	0.0340	0.05	2.07**	0.01	0.38	0.7024	0.06	2.31**	0.0223
PMT	0.04	0.04	1.17	0.2428	0.03	1.01	0.01	0.12	0.9014	0.03	0.42	0.6720
LOGDV	-0.02	0.01	-1.87*	0.0624	-0.02	-1.92**	-0.04	-2.02**	0.0478	-0.02	-1.20	0.2311
SERV	0.13	0.04	3.57***	0.0004	0.13	3.50***	0.22	3.19***	0.0022	0.12	2.47**	0.0145
FINCONxSERV	-0.06	0.02	-2.96***	0.0034	-0.05	-2.66***	-0.08	-2.26**	0.0273	-0.10	-1.87*	0.0638
BIDFCFxSERV	-0.91	0.35	-2.56**	0.0111	-0.83	-2.36**	-2.40	-4.81***	<.0001	-0.52	-1.35	0.1784
CRISIS1	0.01	0.04	0.19	0.8505								
FINCONxCRISIS1	-0.01	0.03	-0.45	0.6567								
BIDFCFxCRISIS1	-0.60	0.34	-1.78**	0.0766								
TOBINDxCRISIS1	0.00	0.05	0.10	0.9215								
F-Stat	4.54***				5.49***		4.50***			2.75***		
P-value	<.0001				<.0001		<.0001			0.0020		
R-squared	0.2340				0.2427		0.4657			0.1650		
Adj. R-squared	0.1825				0.1985		0.3623			0.1051		
N	255				255		75			180		

In addition to the variables already explained in the previous regression output table, the new variables are defined as follows: *CRISIS1* is a dummy identifying the acquisitions announced between 2007H2 and 2009, *FINCONxCRISIS1*, *BIDFCFxCRISIS1* and *TGTTOBINDxCRISIS1* are interaction terms testing whether the coefficient slopes of the independent variables differ in the Crisis and Pre-Crisis period.

6.4.3.1. Parameter Stability across Sample Period for Hypothesis 1a-b

We find no signs of parameter instability of *FINCON* across the sample period. The interaction between target industry group and *FINCON* remains significant and negative -0.05. We find no support for different intercepts between the two sub periods either, because the *CRISIS1* dummy is also insignificant. No interaction effects are found between *FINCON* and *CRISIS1*. Therefore the results of hypothesis 1a and 1b do not appear to be questionable. However, it might be that some inconsistency in parameter significance exists across the Crisis and Pre-Crisis period, but this we leave for future research, because we are not able to run the necessary regressions due to sample size issues.

6.4.3.2. Parameter Stability across Sample Period for Hypothesis 2a-b

When testing for parameter stability of *BIDFCF* in the Pre- and in the Crisis period, the difference in intercept remains stable and the difference in coefficient slope is instable for *SERV* and *BIDFCFxSERV*. This means that the industry differences are relatively robust. However, the interaction term *BIDFCFxCRISIS1* is significant, which implies that the coefficient slopes are unstable across the sample period. Since we find no support for hypothesis 2a we do not expect this to affect results, but the finding should be investigated in future.

When checking for stability of *TGTTOBIND* on the Pre-Crisis and Crisis period, the parameter remains stable and is negative and significant at the 10%-level in model 4, but is not significant in the Crisis period in model 6.

6.4.4. Normality of Error Term

Normality of the error term is a necessary assumption for us to be able to exploit the statistical properties of OLS estimators required to make valid inferences about the relationships between the predicted values and the real population values (Gujarati & Porter, 2009). The issue of normality is not a large concern in large samples such as ours. The Central Limit Theorem specifies that for samples sizes above 30 the sample should be approximately normally distributed (Park, 2009). Conservatively, Gujarati & Porter (2009) defines the minimum sample size as 100. If the sample size is small then normality becomes questionable. It is always important to visually examine the data distribution to see if the normality assumption holds. Formal tests such as the Jarque-Bera Test, which is widely used, also exist (Gujarati & Porter, 2009). However, test power of such formal tests is relatively low. Because we use a large sample, the smallest sample size is 75 deals, we rely on graphical examination of histograms and normality plots to make inferences about the distribution of the error term. From the residual plots the distribution of the error terms appear to be normally distributed for model 1-6. The Jarque-Bera normality test-statistic of 3.2854 for model 1 further indicates no issues of normality. We fail to reject the null hypothesis of normality (p-value = 0.1935). Jarque-Bera test also fails to reject the null hypothesis of normality for the error terms of the regressions on industry groups (p-value Services = 0.7097, p-value Non-Services = 0.0748) at the 5%-level. Similar for model 4 and 6, the null hypotheses cannot be rejected (p-value = 0.2649; 0.9543). However, for model 5 on the Crisis period, we reject the null hypothesis of normality at the 5%-level (p-value = 0.0216), but fail to reject at the 1% -level, which could indicate some issues with that model. See residual plots in appendices 7-12.

6.4.5. Multicollinearity

The issue of multicollinearity between two or more of the independent variables in a regression is a very common issue in practice when working with empirical data. Multicollinearity makes it difficult to distinguish the effect of one independent variable from another on the dependent variable. Multicollinearity is largely a small sample size problem

and therefore not expected to be a large problem in our sample. We do however still examine our regressions for signs of multicollinearity, which often shows through insignificant parameter estimates despite a high R-squared value post-model specification. We examine the correlations between the independent and control variables included in the model a priori to model specification and conclude that the issue is limited to a few variables (mentioned in section 6.1.4.), and we keep an eye on this when examining model residuals. After we run the regressions we examine the R-squared values of each of the six regressions in relation to parameter significance. None of them seem to exhibit severe problems with multicollinearity.

6.4.6. Heteroskedasticity

An important assumption of OLS is homoscedastic variance of the error term, which can lead to the OLS estimators no longer being Best Linear Unbiased Estimators. When the homoscedasticity assumption is violated, applying OLS may lead to inaccurate t- and F-statistics that cannot be used to make valid inferences (Gujarati & Porter, 2009). The problem of heteroskedasticity is one of the most common problems in cross-sectional data, but is less likely to be an issue when working with cross-sectional data that spans over relative short time periods. Our sample spans over 6 years, which is a relative short period. We check for heteroskedasticity through graphical examination of scatter plots of our regressions. The residuals exhibit a vague pattern of increasing residuals for extreme values of the dependent variable for all six models, which indicates some minor issues with heteroskedasticity. We correct for this by using heteroskedasticity robust standard errors in all six regressions. See appendices 7 to 12 for residual plots.

6.4.7. Spatial Autocorrelation

Spatial autocorrelation is the term used when there is correlation between the error terms in cross-sectional regressions. If autocorrelation is present this might lead to an underestimation of parameter variances that can potentially result in an inflated R-squared. The t- and F-tests are also invalidated because the OLS estimators may no longer the Best Linear Unbiased Estimators (Gujarati & Porter, 2009). Autocorrelation mostly arise in relation to time series or panel regression models i.e. serial correlation. We examine the residuals of all six models and find no prevalent signs of autocorrelation in the error terms (see appendix 7-12 for residual plots). We use the Durbin-Watson Test to perform a formal test for first-order autocorrelation of the error terms of our regressions; because this test is generally considered

to have reasonable test power for cross-sectional regressions (Gujarati & Porter, 2009). The Durbin-Watson statistic for model 1 is 1.9570 and indicates that there are no problems with positive or negative first-order autocorrelation. For model 2 the DW-statistic is equal to 2.2997 and for Non-Services it is 2.0346. We therefore conclude that there are no signs of positive or negative autocorrelation for Non-Services, but for Services, the test is inconclusive. For model 4 the test shows 1.9573 again indicating no problems with positive or negative autocorrelation. For model 5 and 6, the DW-stats are 2.0826 for the Crisis and 1.8073 for the Pre-Crisis Period, which indicates that we again are inconclusive. We therefore examine the residuals for any distinct patterns that could indicate omitted variable bias or wrong functional form, but find no apparent problems. A potential solution would be to increase sample size to shrink the interval of inconclusiveness for the Crisis to be able to investigate further, but this is beyond the scope of this study.

6.4.8. Model Specification Errors

According to Gujarati & Porter (2009) there are largely three types of model specification errors, namely incorrect functional form, omission of relevant variables or inclusion of unnecessary variables, and errors of measurement. In addition a model may suffer from misspecification errors relating to the assumption of normal-distributed error terms, which has already been discussed.

6.4.8.1. Incorrect Functional Form

In general, we rely on a thorough investigation of previous literature and empirical work to specify our model to attempt to avoid model specification errors and to use the correct functional form. Based on this analysis, we find the relationships to be linear in line with a large amount of existing studies (Eckbo, 2009; Flanagan & O'Shaugnessy, 2003; Gondhalekar, Sant, & Ferris, 2002; Hayward & Hambrick, 1997; Hsieh & Walkling, 2005; Huang & Walkling, 1987; Lang & Walkling, 1989; Lang & Walkling, 1991; Madura, Ngo, & Viale, 2012; W. G. Schwert, 1996; Servaes, 1991; Sullivan, Jensen, & Hudson, 1994; Travlos, 1987; Varaiya & Ferris, 1987; Varaiya, 1987; Walkling & Edmister, 1985). Besides one study that use non-linear regression and weighted least squares estimation by Billett & Ryngaert (1997) the vast majority of studies use linear regression and ordinary least squares estimation and cross-sectional data, which support the functional form chosen in our study. We do examine the relationship between variables using scatterplots and find no signs of non-linear

relationships, we also examine log-linearity by running a Log-Log type of model, but arrive at similar results and the model does not appear to be a better fit when conducting robustness checks. We therefore estimate a linear model for all variables, except deal value, which is calculated in log. Post-specification we examine a number of broad indicators of model fit such as R-squared, adjusted R-squared, whether the signs of the estimated coefficients match our expectations, and whether there are any signs of correlation in the residuals that might indicate problems. We did not find any apparent problems as outlined in the individual sections.

6.4.8.2. Underfitting or Overfitting the Model

We examine the residuals of our regression for distinct patterns that could indicate omission of variables and look at the Durbin-Watson statistic, which can also be used in this case, because autocorrelation can stem from misspecification issues. However, as noted earlier, we do not find any issues for the total sample regression, but the test is inconclusive for the industry group and sub period regressions. The residuals for all four regressions do not exhibit any distinct patterns that could indicate problems with the model specification. However as highlighted in section 5 we are not able to control for competition and deal nature, because of insufficient number of observations, which could be a source of omitted variable bias. This is however a well-known problem when working with empirical data. In relation to inclusion of unnecessary variables, we mainly base our evaluation on previous empirical work.

6.4.8.3. Measurement Errors

No solid practical solutions have been suggested to solve issues of measurement errors in data. For the dependent variable we mainly rely on the primary data provider, Mergermarket, to ensure the measurement is accurate; however we do check deal premiums against Bloomberg. We expect measurement errors to be very limited in this case. Measurement errors in relation to the dependent variable is also not a big issue in relation to OLS, since it will merely lead to larger variance estimates (Gujarati & Porter, 2009). The focal issue is potential measurement errors in the independent variables that may result in inconsistent parameter estimates. We have carried out several cross checks on the data set across different databases, Bloomberg and Mergermarket, and matched the financial target company data to original annual reports filed at SEC in order to limit measurement errors.

We only formally examine for measurement errors for model 1 by using alternative proxy variables that are highly correlated with an original independent variable. Appendix 15 contains the regression output with all alternative proxy variables and correlations can be found in appendix 2. We use the trailing volatility of GDP over the last four quarters the quarter before deal announcement to proxy *FINCON*. The two measures are about 50% correlated. We highlight the fact that *GDPVOL* is a more narrow measure. The index is interpreted opposite to *FINCON* so the parameter estimate should be positive. We use bidder free cash flow over deal value as an alternative measure to *BIDFCF*. We use the market-to-book ratio of a target to substitute *TGTTOBIND*. We create a dummy, *TGTMBD* using the same method as the original variable. These two are 80% correlated. The results are consistent, except *GDPVOL*. The correlation however already highlighted that this was not a good alternative to *FINCON*. R-squared is reduced by roughly 6-8% for model 1-3 and all three F-statistics are highly significant. This means that overall explanatory power is robust to the chosen proxies.

We also examine sensitivity of results to the definition of the dependent variable, deal premiums (see appendix 14). When running the model 1-3 using 1-day prior to deal announcement as the unaffected target stock price, R-squared decreases significantly and the F-statistic is only statistically significant for model 1. The alternative calculation of deal premiums is likely to underestimate deal premiums because runup effects are included.

Overall, measurement errors do not seem to influence our results significantly and model specification errors also appear to be limited.

6.4.9. Summary of Model Robustness

We examine a number of assumptions that must be fulfilled to have a well-specified econometric model. We begin by assessing model stability and then the standard assumptions relating to the data, model specification and residuals that must be supported in order to make valid inferences. We then examine issues in relation to model specification errors.

Fitting a model to empirical data is bound to lead to some parameter instability, which must be critically evaluated. When performing cross-sectional analyses the period of analysis needs to be expanded enough to obtain a reasonably large sample size, but this also implies that the impact of the independent variables may differ across the sample period. We make an effort

to provide the reader with a fair representation of model robustness in relation to the standard assumptions of multiple regression using OLS, parameter constancy and statistical significance as well as a detailed description of the methods used allowing others to undertake successful replication of results for validation purposes.

The hypothesis testing section already highlighted some parameter instability across industry groups, but this was taken into account when concluding on the hypotheses by examining individual regressions for the two industry groups. We also examine parameter stability over the sample period in the robustness section. We find no support that the intercept or the coefficient slopes differ in the Crisis- compared to Pre-Crisis period for *FINCON* and *TGTTOBIND*, but there might be differences in whether the variables are significant, but we are unable to investigate further due to insufficient sample size. We find that the slope coefficient of *BIDFCF* is unstable across the two time periods. However, there is a high degree of uncertainty associated with the chosen break point; hence we merely point towards significance inconsistencies. We do not go deeper into this issue as it is beyond the scope of this paper and our sample is too small. In addition we would need to examine whether this suggested instability is generalizable to other periods and economic crises, which is a study in itself. We establish that the findings for *FINCON* and *TGTTOBIND* exhibit high parameter stability, while *BIDFCF* does not. We also consistently find a slope difference between Services and Non-Services for *FINCON*.

Because we establish that industry heterogeneity is also stable across time it is mostly relevant to assess model fit of the individual industry group regressions (model 2 and 3) where sample sizes are smaller. Models 1-3 do not exhibit any problems with multicollinearity, autocorrelation or abnormality of the error term. In addition we do not find any indications of problems with wrong functional form or omission of variables by examining the residuals. The Durbin-Watson test is however inconclusive for Services (model 2), but the test is very sensitive to sample size. Therefore we mainly rely on graphical examination of the residuals, which do not reveal issues. Model 4 and 6 do not exhibit problems either. Model 5 shows minor problems in terms of normality of the error term and autocorrelation, this could indicate that there are differences in what drives deal premiums in the Pre-Crisis and Crisis period, but this is beyond the scope of this study. We also find some minor issues with heteroskedasticity

for all models, which we correct for by using robust standard errors for all the estimated models.

Overall, model robustness is reasonably high, but there is some more work to be done to understand deal premium drivers on industry level and across the economic cycle.

7. Discussion and Implications

In this section we interpret and discuss the implications of the results presented in section 6. The inferences are restricted to our sample limitations, and we implicitly assume that the findings are only valid for the U.S. market and the type of transactions included in the sample throughout this section. There might be some merit supporting further generalizations of results, but this we leave to the reader to decide upon and for future research. The section is structured into two main subsections. In the first section we will interpret the results for each of the four sub-hypotheses, 1a-b and 2a-b. Based on the results and discussion we evaluate whether the two overall hypotheses 1 and 2 are supported. We also discuss surprising findings in relation to the control variables highlighted in section 6. Result interpretation and evaluation is mainly based on the suggested relationships presented in our theoretical and empirical review but also on our own insights. We will present supportive- and contradictive arguments for the hypotheses in individual subsections to facilitate an easier overview. We conclude on the hypotheses based on the results from model 1-3, but point towards issues in relation to parameter stability across the sample period based on model 4-5. We also discuss implications of our findings for existing theory and stakeholders, notably potential bidder shareholders. In the second subsection we discuss the highlighted challenges in connection with model robustness, alternatives to the chosen approach, and the implications of methods used to study deal premiums going forward.

7.1. Findings and Interpretations

The following section is structured as follows. First we will interpret the results of our main models 1-3 and discuss how our findings fit with a priori expectations for the four sub-hypotheses used to test the two overall hypotheses 1 and 2. Based on the findings, we will conclude whether the overall hypotheses are supported.

7.1.1. Hypotheses 1b: Supported

The negative effect of *FINCON* is much greater for acquisitions where the target operates in Services compared to Non-Services. Our results therefore strongly support hypothesis 1b. In fact deal premiums are estimated to decrease by 0.05 more in Services compared to Non-Services for a 1-unit increase in *FINCON*. Our results also indicate that this difference is robust for both the Crisis period (2007H2-2009) and the Pre-Crisis period (2003-2007H1).

7.1.1.1. Hypotheses 1b: Supporting Arguments

Our results provide strong support for hypothesis 1b that the impact of economic conditions on deal premiums is more negative for acquisitions where targets are in Services. Several explanations support why the state of the economy might affect deal premiums in Services more negatively relative to Non-Services. Service industries are more volatile and have higher betas on average making these more cyclical than for instance manufacturing and other non-services industries (Damodaran, 2009b). Andrade & Stafford (2004) argues that the impact of economic shocks on demand and capacity utilization is industry dependent. Less demand for Services than Non-Services would lead to more excess capacity in Services. Such excess capacity would lead to inefficiency and a massive undervaluation of Service firms. Targets in Services would then be more undervalued than targets in more stable industries and hence offer larger synergies to bidders. This would imply that during economic recessions average deal premiums would be higher for Services. Madura & Ngo (2008) also find that synergies tend to cluster on industries. According to their findings current deal premiums are driven by the aggregate estimated synergies in previous periods for that same industry. According to their findings bidders should rely on the synergies estimated in earlier deals in their industry as an indicator of future expected synergies. The increase in synergies should push up premiums e.g. for Services during recessions. However they use deal premiums as a proxy for expected synergies, which can be distorting measure because the premium might entail agency costs not related to synergies. This is supported by the fact that overpayment often occurs. This implies that if previous synergies are high for the industry, then agency costs might be as well, which would be positively associated with deal premiums.

Another plausible reason for the results for hypothesis 1b could the difference in the type of assets that firms in Services and Non-Services tend to hold. In Services there is typically a lack of tangible assets. During economic recessions, tangible assets can be used to obtain secured financing e.g. for deals. This option is not there in Services to the same extend, which will imply that the due diligence would be even stricter in Services. The selection mechanism is therefore tighter than for Non-Services, and the Services deals that do go through have higher estimated synergies on average causing deal premiums to become higher.

7.1.1.2. Hypotheses 1b: Contradictory Arguments

We do not see very many arguments for why Services would be less affected by macroeconomic conditions or why industries would be affected exactly the same by economic conditions. It could be the case that the SIC industry group classification is not accurate and hence the differences are not attributable to industry, but perhaps a coincidence. Flanagan & O'Shaugnessy (2004) present some critique concerning errors in the SIC system. We do not expect such classification errors to affect the results drastically, but alternatively for future research the data could be classified using more than one terminology to test for robustness. Another explanation could be that markets are driven by macroeconomic factors during recessions and will ignore idiosyncratic- or industry-specific risk to such an extent that deal premiums would not differ significant across industries. However, our results indicate that macroeconomic factors have a larger impact on deal premiums during recessions, but also that firm-related factors remain important drivers in the financial crisis. Madura, Ngo & Viale (2012) also find that industry factors dominate macroeconomic factors, but they do not include the financial crisis in their sample. Therefore, the issue concerning relative importance of macro-, industry- and firm-related factors is yet to be investigated.

7.1.2. Hypotheses 1a: Supported for Services Only

Our results from hypothesis 1a show that there is a negative association between deal premiums and the state of the U.S. economy between 2003 and 2009. Our parameter estimate indicates that deal premiums will decline by 0.07 for a 1-unit change in the FINCON Index for Services and by 0.01 for Non-Services. Madura, Ngo & Viale (2012) find a positive relation between GDP volatility and average deal premiums of 0.12 for comparison. It therefore appears that macroeconomic factors are significant drivers of deal premiums, but only for Services, which is not completely in line with our expectations, and we only find moderate support for hypothesis 1a.

7.1.2.1. Hypothesis 1a: Supporting Arguments

We see several reasons for why economic conditions should affect deal premiums. In general, several scholars suggest that economic conditions affect deal premiums (Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012; Nathan & O'keefe, 1989; Toxvaerd, 2008). Traditionally we would expect economic conditions and deal premiums to be negatively related, which would imply that deal premiums are higher in recessions. Nathan & O'Keefe (1989) argues

that due to capital market imperfections undervaluation occurs on a higher level during crises periods compared to more stable periods. This argument relies on two key assumptions. Firstly, markets are inefficient and sometimes undervalue companies. Secondly, estimated synergies fall less than the equity value of the target. The first assumption is plausible and supported by international pricing literature. We also see several arguments for why the latter assumption should hold. It has been proposed and supported by numerous studies that bidders on average are managed better than targets (Gaughan, 2007). If the association between management inefficiency and the risk of bankruptcy is positive, then the market might punish badly managed companies disproportionally to well-managed companies in crises period, while the decrease in estimated synergies from a deal might be less affected. This relationship would be interesting to investigate in future, especially because it might be very sensitive to the type of synergies in a proposed deal. If the synergies are mainly based on growth arguments, then synergies might fall significantly during recessions, but if synergies come from e.g. cost savings, they might not. In addition during periods of recession target shareholders might be aware of the undervaluation and believe they know the 'true' value of the stock, and will as a consequence require larger premiums to accept an offer. This relates to the hypothesis put forth by Walkling & Edmister (1985), and tested subsequently by Varaiya (1987), that premiums largely depend on the relative bargaining power of the bidder and target. Bidders' bargaining power will increase if the target is unaware of an undervaluation, or estimates the value to be lower than the bidder. Existing empirical research give some support for this, because bidders are shown to attempt to buy undervalued targets across the economic cycle. This also implies that if a target has information on the size of the synergies estimated by a bidder, bargaining power will increase, because the bidder is unable to signal that estimated synergies are lower than the real expectation, and thereby set an artificial limit on the deal premium while ensuring that they keep part of the gain. Previous research, however finds that bidder gains are zero on average for acquisitions, which could indicate that targets generally have information on the true estimated synergies or that bidders simply set synergies too high. The latter point has also been supported as part of the overpayment problem, whereby bidders tend to overestimate synergies primarily due to agency problems of hubris.

We propose an additional driver of the negative relationship between deal premiums and the condition of the economy. It could be that due diligence increases with economic uncertainty,

because such periods are often characterized and followed by periods of low growth. Roy (2009) also supports this argument. We especially argue that stakeholders such as bidders' board of directors and the parties granting financing of acquisitions will require higher estimated and probable synergies in crises periods in order to approve a proposed acquisition. This they do to insure against the increased uncertainty. Traditional corporate finance would state that lenders would merely require a higher interest rate to compensate for the increased uncertainty and the risks of an acquisition in recessions, but we argue that this only holds when enough financing is available. In periods, like the financial crisis, where credit markets freeze, lending will be capacity constrained. This constraint would work as a natural selection mechanism and ensure that only the deals with the highest estimated synergies complete causing deal premiums to increase. Toxvaerd (2008) finds support for this argument in his work on bidding strategies and deal premiums. He proposes that bidders may choose to delay a bid to less uncertain periods due to an increasing value of the option of delaying the bid or choose to pay a smaller premium in recessions. If the bidder delays the bid it will however increase the likelihood of another bidder entering the market, which will push up premiums. This would be disadvantageous for the original bidder, because competition tends to drive up premiums. We argue that bidders will not delay bids for deals where synergies are especially high, because this will be where competition is more likely to arise. This only holds of course, if the synergies are not completely unique to the original bidder. Deal premiums would then be higher because bidders will engage in high synergy deals and postpone the more questionable deals. This is supported by existing empirical studies that show that questionable deals are more likely to create value for the bidder when growth prospects in the economy are good.

Our results indicate that the condition of the economy only have a significant effect on deal premiums in acquisitions where the target is in Services, which indicates that the above arguments do not hold to the same extend for Non-Services. We propose two reasons for these results. The chosen lag of the financial conditions index could be correct for Services, but not for Non-Services. It could be plausible that acquisitions within the service industry have a shorter lag because consumers adjust demand for Services more quickly and for products from other industries, because very few Services are considered stable products (Damodaran, 2009a). This means that perhaps the lag should be larger for Non-Services, which would be interesting to investigate further in the future. It might also be that markets

undervalue poor performing targets in Services even more than Non-Services, because the low-growth environment affects their future cash flows more severely. This would also imply that due diligence would be especially strict for Services.

7.1.2.2. Hypotheses 1a: Contradictory Arguments

We also highlight reasons why macroeconomic conditions could be positively associated with deal premiums. When the economy is in a low growth period, estimated synergies from growth are reduced, which would imply that premiums should decline. Toxvaerd (2008) found that during volatile economic conditions, bidders were likely to reduce their reservation prices and the premiums they were willing to pay due to the decreasing market value of targets, which is in line with the findings of Andrade & Stafford (2004) and Lang & Walkling (1989). Andrade & Stafford (2004) find that industry capacity utilization has significant and opposite effects on merger and acquisition investments compared to other investments. Their findings showed a non-significant and negative relationship with economic factors in the 1970s and 1980s, but a positive and significant association in the 1990s. Their findings led to the conclusion that economic factors did not influence merger and acquisition activity and deal premiums directly, but instead economic factors affected industry-specific drivers such as growth that drove differences in deal premiums. Madura, Ngo & Viale (2012) however found macroeconomic conditions to positively influence deal premiums even after controlling for industry-specific factors such as growth prospects. Another argument lies within credit market liquidity. Madura, Ngo & Viale (2012) find evidence that deal premiums were positively associated with the amount of liquidity in capital markets, which would be greater during periods of growth. This would imply that during recessions, where liquidity is often scarcer or more expensive to obtain, deal premiums would be lower, ceteris paribus. However, we argue that this effect is dominated by the stricter due diligence and undervaluation mechanism.

7.1.2.3. Hypothesis 1a-b: Measurement Accuracy

An explanation for the instability of the significance of results across the sample period could be found in the variable *FINCON* used to proxy economic conditions. FINCON is a weighted index based upon 9 composites. The index varies very little despite fluctuations in deal premiums in the Pre-Crisis period. The lack of variation could be an expression of sluggishness in the variable or that the market is inefficient. The boom preceding the financial

crisis was therefore not fully captured in the index. Another possible explanation would be that deal premiums react to large movements in the economy e.g. from growth to recession. We break down the sample just as the index collapses and becomes negative, hereby severely reducing the variance. The chosen lag between the index and deal premiums could also be wrong. This depends on the length of period where bidder determines the bid and how long the index must be positive or negative to establish a trend in the economy towards e.g. recession. Andrade & Stafford (2004) had similar difficulties in deciding on how big of a lagged effect to include in their model. We were unable to test whether hypothesis 2b results were stable across the sample period due to the reduction of sample size, but it could be that the lag is different across industry groups. More volatile industries would often be the ones where demand decreases most rapid, which would mean that the lag for Services should be smaller than that of Non-Services. However, this is beyond the scope of our study. Another issue is related the SIC-code system, which has been criticized due to inconsistencies and entry flaws. Flanagan & O'Shaugnessy (2004) proposes that up to 30% of the fillings have wrong SIC codes attached to them. This is problematic because our findings on industry heterogeneity rely on this system being correct. However, most of the inconsistency in classifications was found across databases, and we rely on the SEC, which would be considered reliable.

7.1.3. Hypothesis 1: Conclusion and Implications

From the results and discussion of hypothesis 1a-b, we conclude that macroeconomic variables are important drivers of deal premiums, more specifically economic conditions, but that these effects must be examined and considered on industry level. These findings have important implications for the parties of a potential acquisition, especially in relation to relative bargaining power, as highlighted by Walkling & Edmister (1985). If a bidder makes an offer to target shareholders during periods of economic stress, this could signal that the bidder expects synergies to be high. If target shareholders know this, they gain bargaining power and could demand higher deal premiums. This is so because the bidder would not be able to complete acquisition unless the expected outcome would be highly advantageous due to the increased due diligence. Existing theory also proposes that bidders will be more likely to transfer a larger part of the total estimated gain to target shareholders, when this gain is high, which provides additional support (Bradley, Desai, & E. Han, 1988; Gaughan, 2007; Stulz, Walkling, & Song, 1990). On the other hand, if the bidder anticipates the resulting

target behavior, it could lower its initial offer to avoid such effects, though this would increase the risk of competition. Therefore, bidders should be aware of the signaling value that is attached to the timing of an offer when determining the optimal bid and its reservation price.

In terms of timing, a value-maximizing bidder should weigh the risks of delaying a bid versus making an immediate offer. This is especially relevant in recessions, where the bidder have an option to postpone a bid to better economic periods and hereby avoiding the possible signaling effect discussed above. This tradeoff will most likely depend on the type of synergies (Toxvaerd, 2008). If synergies are unique to the combination the bidder could possibly delay the bid in a recession and avoid the large premium. If synergies cannot be considered unique the risk of other bidders entering the field would be higher and delaying the bid might not be a wise option, because of the increased risk of competition. This would then increase the likelihood of higher premiums.

It has also been suggested that capital strong companies should expand capacity during recessions where other players might be weakened and market shares can be more easily captured (Eckbo, 2009; Gaughan, 2007). This could indicate that part of the expected synergies could depend on the condition of the economy, which would also support not delaying a bid. However our findings indicate that only targets in Services are affected by economic conditions, so the bidder should consider the industry that the potential target is operating in. If the target is in Non-Services, the impact the economy has on synergies might not be significant. Our results support that this is the case on average, but only if deal premiums can be considered a proxy for estimated synergies. Theory and empirical results suggest that deal premiums are the closest proxy for expected synergies, because bidders on average do not gain from transactions and all gains go to target shareholders. However factors such as overpayment and uncertainty of methods to calculate deal premiums might result in inaccurate proxies.

In summary, the importance of macroeconomic conditions in determining deal premiums has important implications for both targets and bidders when considering an acquisition, notably when the target is in Services.

7.1.4. Hypothesis 2b: Supported for Non-Services Only

Our results give moderate support for hypothesis 2b that deal premiums are positively associated with the degree of target undermanagement. We only find support for this relationship for acquisitions where targets are in Non-Services. Deal premiums decrease by 0.03 for targets in Non-Services when the Tobin's Q-ratio has increased during the year prior to deal announcement. This provides some support that synergies from undermanagement exist. Our results are instable over the sample period, and only remain significant in the Pre-Crisis period.

7.1.4.1. Hypotheses 2b: Supporting Arguments

The expected synergies from undermanagement usually only constitute part of the total estimated synergies from an acquisition. Other types of synergies can be understood as the estimated gains that are attributable to other factors but target management performance. Gaughan (2007) defines other synergies as e.g. coming from economies of scale through combined distribution, marketing and production, whereas management related synergies are attributed to inefficiency in the current asset deployment. A bidder taking over a target that is performing well is unlikely to be able extract a lot of value from the latter type of synergies stemming from undermanagement, hence the total gain is smaller, and deal premiums would be lower. This corresponds with the findings of Servaes (1991) who found that returns are larger when poor performing targets are taken over by well-performing bidders.

As highlighted in the literature- and empirical review undermanagement can stem from two main sources. Either management does not possess the necessary skills to manage a firm, or it chooses not to put in the amount of effort necessary to maximize shareholder wealth. Jensen (1976 and 1994) explains the latter through his theory on managerial agency costs. He proposes that the threat of being overtaken should help to mitigate managerial agency costs stemming from the classical principal-agent problem whereby management will not maximize its effort to maximize shareholder wealth, but instead pursue its own preferences. Being overtaken is considered a threat by target management because the existing target management will often be replaced post-acquisition. Our findings suggest that the threat of being overtaken by another firm is not sufficient to mitigate the agency costs relating to lacking management effort, because undermanagement appears to prevail.

We propose a rationale for why we only find the degree of undermanagement to be significant for Non-Services. Tobin's Q-ratio is traditionally a Non-Services metric and is based on total assets of the target company. As previously noted service companies have a different asset base composition and mainly utilize intangible assets. Accounting standards on intangible assets differ from tangible assets; hence the asset base could be too low for targets in Services, which could lead to too high ratios. In addition they are no uniform reporting standards for intangible assets yet which could lead to issues with comparing assets across service firms. Another differentiator between Services and Non-Services is that Services generally hold less debt and use equity options in their compensation schemes more often (Damodaran, 2009b). This could imply that agency problems related to management effort might not be as severe in Services. If this is the case low Q-ratios are driven by factors not directly attributable to management effort and skills. If the market and bidders are aware of this, we will not find the expected relationship. We will discuss this further in section 7.1.2.3., which deals with the measurement accuracy of the Tobin's Q-ratio.

We also find that synergies from target undermanagement do not appear to be a significant driver of deal premiums in the financial crisis. This is very interesting. We see one reason for this result. During periods of economic stress markets are largely driven by macroeconomic factors and the Q-ratio might not be a good measure of target undermanagement. Low Q-ratios would probably be the result of market austerity and market risk rather than idiosyncratic factors such as management effort.

7.1.4.2. Hypotheses 2b: Contradictory Arguments

We see fewer reasons why the trend in management efficiency would be negatively associated with deal premiums. However, Walkling & Edmister (1985) propose that bidders want to take over well-performing targets because this is an indication of profitability potential. It could be argued that management effort can be positively related to profitability of a target, and this could be reflected in the Q-ratio. However, not much support has been found. Our contradictory arguments primarily rely on the uncertainty related to measuring undermanagement, which will be discussed in the next section.

7.1.4.3. Hypotheses 2b: Measurement Accuracy

The lack of significance of *TGTTOBIND* in Services could be explained by the inaccuracy of the measure. Management effort cannot be observed directly because management has hidden

information about its maximum level of effort. Gaughan (2007) highlights the difficulty of isolating the effect of management effort on firm performance from total performance as one of the main reasons why the undermanagement hypothesis has received so little empirical attention. The Q-ratio might reflect other synergies not related to management. This implies that it is difficult to estimate how much the market valuation of target equity is directly attributable to management, and hence we might be measuring overall target performance. A possible solution could be to adjust for general market performance in stock prices to get a market value cleaned for random market effects, but this would still leave some uncertainty. Another important assumption needed to validate the use of the Q-ratio to proxy target performance is efficient stock markets. As previously argued markets may over- or undervalue firms, which can make the Q-ratio an imperfect measure. Markets should be able to detect poor managers and this should be reflected in the stock price.

7.1.5. Hypotheses 2a: Not Supported

The results support a significant interaction between target industry group and bidder free cash flow, *BIDFCF*. The interaction is however only significant in the Crisis period. The results show that for a 1-unit increase *BIDFCF* deal premium will decrease by 0.89 for Services, which is opposite to expectations. We also find no support when looking at Non-Services where the estimate is positive (0.13) and insignificant.

7.1.5.1. Hypotheses 2a: Supporting Arguments

According to Jensen's free cash flow theory bidders' takeover activity is positively associated with the amount of bidder free cash flow since managers will engage in negative NPV deals instead of paying out the cash to shareholders. Competition for targets will set the price paid for a target. Large amounts of free cash flow will enable a bidder to win when engaging in a bidding war for a target, also offering support for the Winner's Curse theory. Earlier empirical findings support this relationship (Gondhalekar, Sant, & Ferris, 2002; Lang & Walkling, 1991; Varaiya & Ferris, 1987). Gondhalekar, Sant & Ferris (2002) and Lang & Walkling (1991) all find strong support for a positive relationship, but fail to control for industry differences. Moreover both studies are conducted on samples in the 1980s and 1990s.

7.1.5.2. Hypotheses 2a: Contradictory Arguments

A possible explanation for why the free cash flow hypothesis is not supported could be that bidder management simply does not have access to the excess free cash flow. The problems

associated with excess cash have been described throughout the last 40 years of agency cost literature. It is possible that stakeholders have managed to actively limited managers' access in order to avoid the cash being spent on non-value adding deals e.g. through stricter approval processes or performance-based compensation schemes.

We see several arguments for why the bidder free cash flow theory might not hold for Services. With inconsistencies in the accounting standards, especially in relation to intangible assets, the level of free cash flow would be high for Services. In addition depreciation and capital expenditures are added back to net income as part of the free cash flow calculation. These items might be very large for Non-Services compared to Services. It could also be that managers for Services do not have access to cash reserves. Lastly, we do find a significant positive association in our study. This could be explained by Walkling & Edmister's (1985) notion of relative bargaining power. Perhaps the level of cash of bidders, that buy targets in Services is not used for non-value adding investments, but is instead restricted cash is held as reserves because the industry group is more cyclical. In this case, cash reserves could indicate uncertainty about future earnings, making managers less likely to pay large premiums. However, no support has been found for such a relationship.

7.1.5.3. Hypotheses 2a: Measurement Accuracy

Lang & Walking (1991) found considerable instability of results when testing the free cash flow hypothesis in relation to both target- and bidder returns. They tested 10 different measures of free cash flow and found that the measure derived from financial statements were very sensitive to accounting practices and to adjustments for nonrecurring items. Lang & Walking (1991) hereby establishes that the measurement of free cash flow can be very difficult to estimate correctly. However, they also state that due to new accounting rules the reported cash flow might become less noisy with time. The vital problem to address is whether there are issues with measuring cash flow in Services that do not prevail in Non-Services. Our results indicate that there might be, since we find no explanations for an opposite and significant association than the one proposed by Jensen's theory.

7.1.6. Hypotheses 2: Conclusion and Implications

Our results provide support for the undermanagement hypothesis. This has important implications for both bidders and targets. Firstly, it appears that markets are able to identify

management inefficiencies even when managers have hidden information about their effort. Target managers should realize that the takeover threat might be more real and increase their effort. Alternatively the results could also indicate that bidder management hubris drives higher premiums. Undermanagement synergies might not be as large; instead it is bidder management that overestimates their own ability. If this is the case, bidder shareholders should be aware of this problem because this would lead to more non-value adding deals.

According to our results bidders do not tend to pay larger premiums if they hold large amounts of cash, which contradicts Jensen's free cash flow theory of takeovers. Our results further indicate that the association is sensitive to whether targets are in Services or Non-Services. We therefore find no support for hypothesis 2a or Jensen's free cash flow hypothesis of takeovers. Instead we find that bidder free cash flow is negatively associated with deal premiums in acquisitions where the target is in Services. Interestingly the industry difference is only significant in the financial crisis. This implies that the impact of bidder free cash flow is sensitive to the economic cycle. We find no empirical or theoretical established explanation for the latter findings for an opposite relationship, and we leave this for future research. However, the non-significance of the positive association for Non-Services could be explained. The free cash flow theory makes the simplifying assumption that managers actually have abundant cash at their sole disposal. Our results indicate that this might not be the case. This has an important implication for existing theory. Perhaps the focus on the problem in the 1980s and 1990s has led to more strict controls on cash spending and more thorough approval processes in firms when entering into deals. Gaughan (2007) highlights such an increase. This would imply that stakeholders do not have to worry about the free cash flow problem to the same extend as earlier. However, the uncertainty and instability of the variable in our model highlights a need to investigate this relationship further in newer time to reach a more robust conclusion.

Closing, we find some support for hypothesis 2 that firm-related characteristics are still important drivers of deal premiums. The recent decline in explanatory power and significance of such measures are most likely attributed to the high uncertainty of accounting-based measured, which are also industry sensitive.

7.2. Model Robustness

In the following section we will discuss and evaluate the issues with reliability and validity of our results based on the robustness test results outlined in section 6. We also discuss the overall fit of model 1-3 in relation to the challenges we see from the model robustness analysis. Lastly, we discuss implications of our findings on model robustness for future methods.

7.2.1. Deal Premium Distribution

Average quarterly deal premium fluctuated from -23% to 98% over the sample period from 2003-2009. 11 of the 255 acquisitions have negative deal premiums. If we eliminate those, deal premiums range from 0.8% to 98%. Compared to earlier studies average deal premiums is lower for our sample. This is most likely attributable to the difference in sample where deal premiums have been shown to fluctuate over time and several studies point towards structural shifts time (Eckbo, 2009; Gondhalekar, Sant, & Ferris, 2002; Jensen, 1994; Madura, Ngo, & Viale, 2012; Nathan & O'keefe, 1989; Walkling & Edmister, 1985). In addition different calculation methodology and definitions of the unadjusted target stock price could also be of influence. Madura, Ngo & Viale (2012) have a sample period that overlaps with ours (1986-2007). We examine average deal premiums for their sample from 2003 to 2007, which is 31%. For our sub sample from 2003 to 2007, the average premium is also 31%. The annual average deal premiums are also in line as well as the standard deviations. Madura, Ngo & Viale (2012) however impose the restriction that deal premiums must be above 0 to be included in their sample. The majority of studies do this without stating the sample restriction explicitly. We have included 11 observations with negative premiums because some of the effects we are testing should have a negative impact on deal premiums. Officer (2007) argues that it is an economically rational boundary that premiums cannot be negative. We challenge this argument in our study. For example in deals involving distressed targets, target shareholders could be willing to accept a bid below current market value, if the stock is illiquid and cannot be sold at the prevalent price. Several examples occurred in the financial crisis, but mostly in financial services as a result of government intervention. Whether or not to include negative deal premiums in studies is an interesting issue to look into, but it is beyond the scope of this thesis. We restrict deal premiums to 100% because of two extreme outliers in the data. This only leads to an exclusion of 2 deals in manufacturing in the financial crisis period of 245% and 274%, which distorted the data.

7.2.2. Model Goodness of Fit

In this section we will discuss the challenging findings in relation to the overall goodness of fit for models 1-6. We start by discussing R-squared in relation to previous empirical models because it is high compared to newer studies.

7.2.2.1. Explanatory Power

Model 1 has a F-statistic of 5.82 (p-value = <.0001) which indicates that the combined explanatory power of all the independent and control variables are high. Collectively the independent and control variables explain 22.40% of the total variation in the dependent variable in our sample based on R-squared (adjusted R-squared = 18.55%). For the industry group regressions, model 2 and 3, R-squared is 26.91% (adjusted R-squared = 16.94%) for Services and 16.96% (adjusted R-squared = 12.53%) for Non-Services. R-squared can be used as an indicator of how well the regression line approximates the data points. We do acknowledge that this metric is not sufficient as a standalone indicator of the quality of an econometric model, because it will increase with the number of variables added to a model; however, it is a useful complimentary measure which should be considered along with the adjusted R-squared. R-squared for our model 1 is high compared to earlier studies that apply the same method to calculate the dependent variable, deal premiums, and use either cross-sectional or panel data regression models to examine deal premiums. Even when looking at model 2 and 3 R-squared is high, but it appears the model explains more of the variation in Deal Premiums for Services compared to Non-Services.

R-squared is between 10-15% for newer studies from 1995 to today (Flanagan & O'Shaugnessy, 2003; Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012). There are however also studies that obtain a much higher R-squared between 25-40%, but generally such studies examine older time periods in the 1970s and 1980s. Walkling & Edmister (1985) present a model with a high R-squared of about 38%, but they calculate deal premiums based on a target unaffected share price 14 days prior to the announcement, which is slightly different from us. Other studies are in line with ours (Gondhalekar, Sant, & Ferris, 2002). Not all studies, especially not earlier works, report the adjusted R-squared in their model outputs. For those who do, the picture is similar to the one outlined above. Adjusted R-squared in newer studies are generally low, but these models have a larger relative number of explanatory variables compared to earlier ones, which probably drives this phenomenon.

It is vital to consider why the R-squared value is relatively high for our model compared to more recent studies in the field. Some of the studies use panel data models and hence different econometric methodologies. We should expect panel data models to have a higher R-squared if time trends have significant explanatory power over the variation in deal premiums. For such data cross-sectional models will have the lowest explanatory power and time series models like dynamic lag models will have the highest, while panel data models should lie in between.

Because a deal only occurs one time, we cannot follow the development of the dependent variable on deal-level but instead average deal premiums can be examined in panel models in line with Madura, Ngo & Viale (2012). If current average deal premiums were highly dependent on average deal premiums in the preceding periods, we would expect panel data models to dominate cross-sectional models. Perhaps this is not the case, hence the low explanatory power of such models compared to our cross-sectional model. Instead panel data models have had far more success when explaining takeover activity (Madura & Ngo, 2008; Mitchell & Mulherin, 1996; Toxvaerd, 2008). Perhaps the reason why this prevails is that the individual variation in deal premiums attributed to static firm-related factors continues to be large, while for takeover activity this is largely driven by momentum in markets. It is difficult to assess because this would require us to estimate the same model using different econometric methods and compare model results post-specification. Another potential explanation could be that a well-fitted model should include both firm-related and macroeconomic factors.

7.2.2.2. Parameter Stability over Sample Period

The difference in impact of *FINCON* on Services and Non-Services is stable across the sample period. This makes the findings of hypothesis 1b highly stable. Whether the significance of the main effect is stable for the two individual industry groups during recessions and periods of growth is beyond the scope of this study, but results indicate that this might be the case. Our results are limited by an insufficient number of observations for the subset Crisis and Services, which does not allow us to explore this issue any further without expanding sample size, which has not been feasible.

Our results indicate that the impact of *BIDFCF* on deal premiums is statistically different for the Crisis and Pre-Crisis period. However, the interaction variable *BIDFCFxCRISIS1* is only

significant at the 10% level in model 4. When looking at separate regressions on the two periods, model 5 and 6, *BIDFCFxSERV* is not significant for the Pre-Crisis Period but highly significant for the Crisis period. This could be because variables tend to move together during periods of economic stress, where uncertainty of austerity might dominate investors, as suggested by international cross-asset pricing literature. Parameter stability is generally low for the *BIDFCF* variable. The variable is sensitive to the measurement method and builds on a number of assumptions that might not be upheld in reality e.g. that management can solely dispose over the cash reserves of the firm. Since we only look at very large acquisitions this assumption could be questioned. In addition the variable correlates considerably with *FINCON,* which could indicate multicollinearity problems. However, the parameter estimates do not change when estimating regressions excluding *FINCON.* This indicates that there is a difference in what drives deal premiums in the Pre-Crisis and Crisis period. Whether this difference is stable in recessions and growth periods in general would be interesting to investigate.

TGTTOBIND also exhibits some parameter instability over the sample period. It is only significant for the Pre-Crisis period. Again this could be due to issues of increased correlation that could cause macroeconomic factors to dominate firm-related factors in crises periods. This is another very interesting subject to explore. Our results indicate that this is the case.

7.2.2.3. Heteroskedasticity

The residuals of all of the 6 performed regressions exhibit signs of small amounts of heteroskedasticity. This would indicate that there is more noise in the market now than what has previously existed. The presence of heteroskedasticity could also imply that there are additional interaction effects that we have not accounted for or that two sub populations differ. Lastly, it could stem from model misspecification errors. Because our models only show very small indications of heteroskedasticity, we do not go deeper into the issue. This problem is also very common for this type of data, and the limited amount we find is an indication of that the model is reasonably robust.

7.2.3. Implications of Model Robustness Results

In the following section we will discuss the implications of the model robustness results. First we discuss implications related to the econometric methodology followed the considerations on target industry heterogeneity.

7.2.3.1. Econometric Methodology

Our findings imply that cross-sectional models are useful to examine deal premium drivers for samples that span over relatively short time periods such as ours. However, we do find some small issues with heteroskedasticity in the residuals, which is common when working with financial- and economic data. Though the heteroskedasticity issue is easily solved by using robust standard errors, the existence of heteroskedasticity underlines the importance of examining where it stems from. The issue could come from measurement problems. The amount of independent variables used by previous research as potential deal premium drivers is vast and some of the same variables are used to proxy different things. Therefore, Principle Components Analysis could be a tool to reduce the number of variables. This type of analysis is often used when a researcher has a large number of relevant variables and wants to reduce these into a smaller set of variables each composed of some linear combination of the original variables. This would allow a better clarification of the relative importance of firm-, deal-, industry and macroeconomic deal premium drivers. We leave this for future research. Another implication of our findings could be that other types of models, for example panel data models should be used to describe deal premiums to better account for the suggested differences in deal premium drivers across economic cycles, assuming that our results can be somewhat generalized to other time periods.

7.2.3.2. Industry Separation

Our findings indicate that parameter stability is low across industry groups, while industry heterogeneity is found to be robust across time. Therefore, the association between deal premiums and deal premium drivers should also be examined on industry level. This has already been done in contemporary studies (Madura & Ngo, 2008; Madura, Ngo, & Viale, 2012; Mitchell & Mulherin, 1996). A problem with separating industries within single country studies such as ours is the reduction in the population from which the sample is drawn. The samples that can be obtained are therefore often severely reduced. This introduces small-sample issues in quantitative research methods and makes it more difficult to validly test the statistical significance of parameters used to evaluate hypotheses. It is therefore necessary to expand the number of observations. Cavaglio et al (2000) expand their sample to global deals and focus on industries instead of countries. However this is extremely broad and the potential heterogeneity of industries and corporate control markets across countries should be evaluated. Another option is to use wider industry groups in line with our approach. This

will make apparent some of the industry differences while keeping the number of observations reasonably high. However, results will be sensitive to the industry group classification criteria used. A third way to study industries would be to expand the sample period. This on the other hand opens up the possibility of time trends in the data, and cross-sectional methods become less applicable. No matter the alternative chosen, we expect industries to play an important role in future research on deal premium drivers. Lastly, it might be that there are also interaction effects between the type of combination and deal premium drivers, since we only focus on target industries and not bidder industries. We only control for intercept differences and not for slope differences in our models. This would have been interesting to do, but it is beyond the scope of this study, and might be the next step when examining industry heterogeneity.

7.3. Summary of Discussion and Implications

From the results and discussion of hypothesis 1a-b, we conclude that hypothesis 1 is supported. Macroeconomic variables should be considered important drivers of deal premiums, more specifically economic conditions, but these factors must be examined and considered on industry level. Our findings have important implications for the parties to a potential acquisition, especially in relation to relative bargaining power. If only the acquisitions with the highest estimated synergies complete during periods of economic stress such as recessions, a bid will contain a signaling value about the magnitude of the synergies the bidder expects to extract from a given deal. If target shareholders are aware of this, they will require higher premiums during recessions compared to more stable periods. The bidder might expect this and be able to incorporate that into its optimal bid- and reservation price calculations. Because the target will never know the exact magnitude of the synergies the bidder expects, the bidder holds asymmetric information and can attempt to set the initial premium at a low level to hide the magnitude of the estimated synergies from the target. However, if bidder management is not maximizing shareholder wealth they might ignore this and pay higher premiums as indicated by principal agent theory. The bidder may benefit from our results when planning the timing of an offer. If deal premiums are generally higher for targets in Services during recessions, a bidder might want to delay a bid, when synergies are unique to the combination and the risk competition is low. However it might be that synergies are high in recessions because the uncertain environment offers expansion opportunities to strong bidders buying poorly managed targets. Either way, we find macroeconomic

conditions to be an important factor to take into account when wanting to understand the variation in deal premiums.

From the results and discussion of hypothesis 2a-b, we conclude that hypothesis 2 is partly supported. We find moderate support for hypothesis 2b that the degree of undermanagement of a target is positively associated with deal premiums because this result is only significant for Non-Services. We find no support for hypothesis 2a that bidder free cash flow should be positively related to deal premiums. This implies that synergies from undermanagement are important drivers of deal premiums in Non-Service deals. Target management might want to factor these results in when deciding on its level of effort, because our findings indicate that the takeover threat discussed in agency cost literature does materialize in reality. These results fit into the existing body of studies. We highlight that the declining significance of firm-related factors in newer studies might stem from measurement errors and failure to take into account industry heterogeneity.

8. Conclusion and Recommendations

This study examines the factors that affect the premiums paid by bidders in U.S. acquisitions from 2003 to 2009. The motivation is primarily driven by a renewed interest in the subject arising from the recent financial crisis where takeover activity declined sharply. Existing literature and empirical findings show that bidders on average do not gain from acquisitions, but instead tend to overpay, while targets get most of the estimated gains through deal premiums. Despite a vast number of studies providing evidence of overpayment problems takeover activity continuous to be strong. This highlights the continuing importance of understanding the drivers of deal premiums. We believe an increased understanding of such drives can aid bidder management to determine a more optimal bid, and bidder shareholders to be more aware of agency problems that might cause bidder management to engage in value-destroying acquisitions, and enable them to mitigate such problems.

The overall problem statement of this study is therefore to investigate the drivers of deal premiums in U.S. acquisitions from 2003 to 2009 and the impact of industry heterogeneity on such relationships. We examine the problem statement through three research questions: *Do macroeconomic factors have significantly explanatory power over the variation in deal premiums in the U.S. from 2003 to 2009? Do firm-related factors in previous literature still have significant explanatory power over the variation in deal premiums from 2003 to 2009? Is the relationships examined in question 1 and 2 consistent across industries and in the financial crisis?*

Our study contributes to existing research on deal premium drivers in several ways. Previous studies primarily examine firm- and deal-related factors. We argue that macroeconomic factors are also important drivers of deal premiums. We further examine whether the impacts of deal premium drivers are different across target industries, which has also been largely ignored by previous studies. Lastly, we focus on two firm-related deal premium theories that have been neglected by previous studies, namely Jensen's free cash flow hypothesis and the undermanagement hypothesis.

We approach our research questions based on a deductive research methodology because we require a certain degree of precision to quantify the impact of the identified deal premium drivers. This approach is also chosen in line with an established research tradition to be able

to compare results. Therefore we deduct a set of hypotheses based on existing theory and empirical findings.

In the literature review we position our study in the corporate finance literature. We find that existing literature primarily emphasizes deal premium drivers stemming from firm-related characteristics. The majority of these theories are founded in agency cost theory. Jensen (1988) proposes that bidder free cash flow may be positively associated with takeover activity because managers endowed with free cash flow would be more inclined to engage in negative NPV projects instead of paying out cash to shareholders. Lang & Walkling (1991) and Gondhalekar, Sant, & Ferris (2002) extend this theory by proposing that the amount of free cash flow a bidder holds also is positively associated with deal premiums. They argue that bidder management can more easily finance large premiums when cash is at hand. This theory has however been neglected by empirical studies.

We also identify another empirically neglected deal premium driver theory that remains relevant today. The undermanagement hypothesis states that synergies from improving target management could affect deal premiums positively. Most studies do highlight that historically well-performing firms tend to acquire poorly managed firms. We find evidence that deal premiums will be higher when a target is underperforming. Lastly, we introduce our primary focus that macroeconomic factors also should be considered drivers of deal premiums. We identify a more contemporary string of literature within our field that focuses on explaining takeover activity over time, the so-called neoclassical and behavioral merger wave theories. Both theories attempt to explain the observed phenomenon that acquisition activity tends to cluster in waves on both industry and aggregate level due to economic shocks or stock market inefficiencies. This string of theory indirectly implies while takeover activity is positively associated with economic conditions, deal premiums are negatively associated. Deal premiums are higher because the market tends to undervalue target stock during recessions, and because stakeholders granting approval to bidders will require higher and more certain synergies when growth prospects are low, like in recessions.

In the empirical review we find additional support for the two firm-related theories and the macroeconomic perspective presented in the literature review. Only one study by Madura, Ngo & Viale (2012) investigates the impact of liquidity and economic volatility on average quarterly deal premiums. They find a positive and statistically significant impact of economic

stress on deal premiums. We highlight the importance of examining the impact of deal premium drivers taken into account industries. Mitchell & Mulherin (1996) were the first to put forth the hypothesis that the effect of economic and regulatory shocks should be considered on industry level, and this has been adapted in both international asset pricing- and valuation literature. We therefore consider possible industry differences for Services and Non-Services, because Services are generally considered more cyclical than Non-Services. We find mixed support for the free cash flow theory and the undermanagement hypothesis in previous studies, though not many studies exist. Lastly, we identify a number of factors that have been found to be significant by previous studies such as target return on equity, target leverage trend, relative size of target and bidder, type of combination, payment type, and deal size.

We construct 2 main hypotheses and 4 sub-hypotheses based on the theoretical and empirical review. Hypothesis 1 proposes that macroeconomic factors are important drivers of deal premiums. This we test using two sub-hypotheses. Hypothesis 1a proposes that the general state of the economy is negatively associated with deal premiums. Hypothesis 1b proposes that the general state of the economy will be more negatively associated with deal premiums when targets are in Services compared to Non-Services. Hypothesis 2 proposes that firm-related factors remain important drivers of deal premiums. Hypothesis 2a tests this by proposing that bidder free cash flow is positively associated with deal premiums, while hypothesis 2b states that the degree of undermanagement is positively associated with deal premiums. We test the four sub-hypotheses using multiple regression using OLS estimation on a cross-sectional sample of 255 domestic U.S. acquisitions from 2003-2009.

We examine results based on individual industry group regressions to examine industry heterogeneity. In response to the hypotheses we find strong support for this hypothesis 1b. The negative impact of the state of the economic is much greater for acquisitions where the targets operate in Services compared to Non-Services. We find moderate support for hypothesis 1a. The general state of the economy only significantly impacts deal premiums for acquisitions where targets are in Services. We also find moderate support for hypothesis 2b. Deal premiums are only positively related to target undermanagement for deals where targets are in Non-Services. Lastly, we find no support for hypothesis 2a. We find an insignificant positive association between bidder free cash flow for targets in Non-Services and a negative and significant association for Services, which is contrary to expectations. These results are

supported even after controlling for target return on equity, target leverage trend, relative size of target and bidder, type of combination, payment type, and deal size.

Our results have important implications for both bidders and targets. If deal premiums are higher on average during recessions, a bid will contain a signaling value about the magnitude of the synergies a bidder expects to extract from a deal. In response target shareholders demand higher premiums. A bidder should also consider the timing of an offer. If deal premiums are generally higher for targets in Services during recessions, a bidder might want to delay a bid, when synergies are unique, since competition in this case would be lower. If synergies are instead dependent on the deal completing during a recession, a bidder should not delay. This might be the case if synergies are retrieved from capturing market shares of weakened competitors during recessions. In summary we find overall support for hypothesis 1 that macroeconomic factors are important drivers of deal premiums. This implies that stakeholders should consider this. Our finding implies that synergies from undermanagement are important drivers of deal premiums in acquisitions where targets are in Non-Services. Target management should take these findings into consideration when deciding on its level of effort, since takeover threats discussed in agency cost theory appear to materialize. The failure to find support for hypothesis 2b could imply that the free cash flow problem is no longer a driver of overpayment in acquisitions. Bidder shareholders and other stakeholders should be aware of this when putting into control systems to ensure that bidder management does not undertake value-destroying acquisitions. Our findings further indicates that the declining significance of firm-related factors in newer studies most likely stem from measurement errors and the failure to not take industry heterogeneity into account. This implies that earlier results on deal premium drivers that do not take into account industry heterogeneity should be reassessed.

8.1. Suggestions for Future Research

This thesis is by no means exhaustive in dealing with all of the different sources of deal premiums. As a consequence of our findings and the general process of investigation several new areas have come to attention. In the following section we will outline some of the topics that could be interesting to focus on in future research.

8.1.1. Industry Heterogeneity

Our results provides evidence that the general assumption that the impacts of various deal premium drivers are stable across target industries used in the majority of previous studies is questionable. However, most previous studies examine much earlier time periods. We therefore recommend future research to examine such difference in more detail on both earlier periods to examine robustness of previous results and in future. We only look at two overall target industry groups, Services and Non-Services. It would be preferable to examine more narrow groups as well and other industry groups but our classification. We also highlight the need to base such classifications on other systems than SIC to limit errors associated with using only one system. Newer research should also focus on the best way to expand sample size to avoid problems with insufficient observations that we have faced.

8.1.2. Macroeconomic Factors

We present findings that macroeconomic factors are important drivers of deal premiums in line with Madura, Ngo & Viale (2012). This group of drivers is new in the field and we only scratch the surface in our study. We therefore suggest that future research devote more attention to this group especially in relation to examining the separate effects of different macroeconomic factors rather than one broad measure like we did. This will however require a solution to the multicollinearity issues that tend to arise due to the high collinearity of macroeconomic factors, especially during periods of economic stress.

8.1.3. Deal Premium Drivers and Economic Cycles

We present findings that the explanatory power and the tested deal premium drivers change depending on whether acquisitions are announced before or during the financial crisis. We do not go further into this, because this would require us to support the assumption that results can be generalized to economic cycles and not just our sample period. We therefore recommend future research to examine deal premium drivers across the economic cycle for other time periods as well to get a more thorough understanding of whether patterns persist across economic cycles. We can merely make inferences about such relationships based on our sample period.

8.1.4. Measuring Deal Premiums

We find that the explanatory power of our model is sensitive to the definition of deal premiums, especially when examining target industry groups. We therefore suggest future

research to study such influences to be able to increase model stability, and to evaluate how to best arrive at the unaffected target stock price.

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10. Appendices

Appendix 1: Overview of Previous Findings

Variable	Definition	Dependent variable	Method	Sample period	Sample size	Restrictions	Relevant sources	Association with DP	Significance
ROA	Ratio TGT net income/ assets						Frieder & Petty (1991) used in Flanagan & O'Shaugnessy	+	Yes
	Ratio TGT net income/ assets	DP1M	Multiple regression, cross-section	1986-1995	285	Non-conglomerate completed deals in manufacturing	Flanagan & O'Shaugnessy	+	No
	Ratio TGT net income/ assets						Palia (1993) used in Flanagan & O'Shaugnessy	+	Yes
Hostile	Dummy	Target returns 11 days prior to announcement until delisted	Multiple regression, panel data	1972-1987	384	Completed takeovers	Servaes (1991)	-	Yes
	Dummy	DP1M	Multiple regression, cross-section	1972-1977	158 (2/3 estimation sample)	Tender offers filed with SEC	Walkling & Edmister (1985)	+	Yes
TGT Leverage	Ratio: Debt/Equity	40 days prior to announcement	Multiple regression, cross-section	1973-1999	165	Cash only, NASDAQ targets ny NYSE and AMEX bidders	Gondhalekar et al (2002)	-	No
	Continous: Debt/ Assets, 5Y regression line, average trend	DP14D	Multiple regression, cross-section	1972-1977	158 (2/3 estimation sample)	Tender offers filed with SEC	Walkling & Edmister (1985)	+	Yes
Relatedness	Dummies, 4 different degrees of relatedness	DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambrick (1997)	+	No
	Dummy 2-digit SIC in common	DP1M	Multiple regression, cross-section	1993-2005	1888	Public U.S. firms	John, Liu & Taffer (2008)	+	Yes
	Dummy: 2- and 4-digit SIC codes		Multiple regression, cross-section	1986-1995	285	Only manufacturing. Tender offers	Flanagan & O'Shaugnessy (2001)	+	Yes
	Dummy: 2- and 4-digit SIC codes	DP1M	Multiple regression, cross-section	1986-1995	285	Non-conglomerate completed deals in manufacturing	Frieder & Petty (1991) used in Flanagan & Shaugnessy (2003)	+	Yes
Multiple Bidders	Dummy	Target returns 11 days prior to announcement until delisted	Multiple regression, panel data	1972-1987	384	Completed takeovers	Servaes (1991)	+	Yes
	Dummy	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, cross-section	1968-1989	88	Successful tender offers	Lang & Walkling (1991)	-	No
	Dummy	DP14D	Multiple regression, cross-section	1972-1977	158 (2/3 estimation sample)	Tender offers filed with SEC	Walking & Edmister (1985)	+	Yes
	Dummy	Target abnormal returns	Weighted Least Squares, Cross-sectional data	1980-1988	66	U.S. public, Terminated bids	Sullivan, Jensen & Hudson (1994)	+	No
	Dummy	DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambrick (1997)	+	No
	Dummy	40 days prior to announcement	Multiple regression, cross-section	1973-1999	165	Cash only, NASDAQ targets ny NYSE and AMEX bidders	Gondhalekar et al (2002)	+	Yes
	Dummy		Multiple regression, cross-section	1980-1989	145	Cash only	Billet et al. (1997)	-	Yes
	Dummy	DP1M	Multiple regression, cross-section	1975-1980	77	Completed, 100% acquisitions, cash for stock or stock for stock	Varaiya (1987)	+	Yes
Deal Value	Log(DV)	DP1M	Multiple regression, cross-section	1992-1999	608	Pure cash or stock	Hseih & Walkling (2004)		
Tobin's Q	Large Q TGT	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, panel data	1972-1987	384	Completed takeovers	Servaes (1991)	-	Yes
	Ratio: MV Equity + BV Liabilities / (Equity BV + Liabilities BV), high q bidder/ low q target dummy	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, cross-section	1968-1989	87	Successful tender offers	Lang, Stulz & Walkling (1989)	-	Yes
	Ratio	DP1M	Panel regression	1987-2007	2479	U.S. public	Madura, Viale & Ngo (2012)	+	No
	3-year average	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, cross-section	1968-1989	88	Successful tender offers	Lang & Walkling (1991)	-	Yes

Variable	Definition	Dependent variable	Method	Sample period	Sample size	Restrictions	Relevant sources	Association with DP	Significance
Market-to-Book	Ratio or % difference, measures underpricing	DP1M	Multiple regression, cross-section	1975-1980	77	Completed, 100% acquisitions, cash for stock or stock for stock	Varaiya (1987)	-	Yes
	5Y trend MV/BV target	DP14D	Multiple regression, cross-section	1972-1977	158 (2/3 estimation sample)	Tender offers filed with SEC	Walkling & Edmister (1985)	-	Yes
Antitakeover Amendments	Dummy, staggered boards and supermajority	DP1M	Multiple regression, cross-section	1975-1980	77	Completed, 100% acquisitions, cash for stock or stock for stock	Varaiya (1987)	+	Yes
	Poison pill dummy	DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambrick (1997)	-	Yes
	Poison pill dummy	DP1M	Multiple regression, cross-section	1986-1995	285	Non-conglomerate completed deals in manufacturing	Flanagan & Shaugnessy (2003)	+	No
	Dummies	Cumulative abnormal return	OLS regression, cross-section with year dummies	1975-1991	1164	U.S. public	Comment & Schwert (1995)	+	No
Hubris	CEO hubris	DP1M	Multiple regression, cross-section	1993-2005	1888	Public U.S. firms	John, Liu & Taffer (2008)		
		DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambrick (1997)	+	Yes
Relative Size	Log(MV TGT common stock/ MV BID common stock)	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, panel data	1972-1987	384	Completed takeovers	Servaes (1991)	-	Yes
	Log(MV TGT common stock/ MV BID common stock)	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, cross-section	1968-1986	88	Successful US tender offers	Lang & Walkling (1991)	+	Yes
	MV TGT common stock/ MV BID common stock	40 days prior to announcement	Multiple regression, cross-section	1973-1999	165	Cash only, NASDAQ targets ny NYSE and AMEX bidders	Gondhalekar et al (2002)	-	Yes
	Control: Relative TGT and bidder revenue	DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambrick (1997)	+	No
	MV TGT common stock/ MV BID common stock	TGT abnormal returns	Weighted Least Squares, Cross-sectional data,	1980-1988	66	U.S. public, Terminated bids	Sullivan, Jensen & Hudson (1994)	+	Yes
	Relative TGT to Bidder assets	DP1M	Multiple regression, cross-section	1980-1989	145	Only cash	Billet et al.(1997)	+	Yes
	Dummy	DP1M	Multiple regression, cross-section	1993-2005	1888	Public U.S. firms	John, Liu & Taffer (2008)	-	No
PMT	Dummy	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, panel data	1972-1987	384	Completed takeovers	Servaes (1991)	+	Yes
	Dummy for part noncash payments	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, cross-section	1968-1986	88	Successful US tender offers	Lang & Walkling (1991)	-	No
	Dummy	DP1M	Multiple regression, cross-section with year-fixed effects	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambrick (1997)	+	Yes
	Dummy	TGT abnormal returns	Weighted Least Squares, Cross-sectional data,	1980-1988	66	U.S. public, Terminated bids	Sullivan, Jensen & Hudson (1994)		
	Control: Current Ratio to measure financial slack	DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambrick (1997)	+	No
Bidder Cash	FCF/Total Assets	40 days prior to announcement	Multiple regression, cross-section	1973-1999	165	Cash only, NASDAQ targets ny NYSE and AMEX bidders	Gondhalekar et al (2002)	+	Yes
	FCF Bidder	DP1M	Panel regression	1987-2007	2479	U.S. public	Madura, Viale & Ngo (2012)	+	No
	FCF Bidder	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multiple regression, cross-section	1968-1986	88	Successful US tender offers	Lang & Walkling (19	+	Yes

Variable	Definition	Dependent variable	Method	Sample period	Sample size	Restrictions	Relevant sources	Association with DP	Significance
EPS	Relative TGT to E	40 days prior to announcement	Multiple regression, cross-section	1973-1999	165	Cash only, NASDAQ targets ny NYSE and AMEX bidders	Gondhalekar et al (2(	+	No
Year	Year Dummies	DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambric	-	Yes
TGT rel profitability	Control: Relative profitability ROE one 1 prior to deal relative to 4-digit SIC industry mean	DP1M	Multiple regression, cross-section	1989-1992	106	Only public bidders and targets, deal value > 100M	Hayward & Hambric	+	No
Synergies	Sum of chg in TGT and BID shareholder wealth (covers all synergies, also undermanagement hypothesis)	TGT returns, 5 days prior to announcement to 5 days after the last revision of terms for succesful bidder	Multivariate regression	1969-1984	236	Tender offer contests	Bradley, Desai & Ki	+	Yes
TGT ROE	Independent variablet to measure underperformance		Multiple regression, cross-section	1975-1980	77	Completed, 100% acquisitions, cash for stock or stock for stock	Varaiya (1987)	+	Yes
Volatility of GDP	GDP Volatility		Panel regression	1987-2007	2479	U.S. public	Madura, Viale & Ng(	+	Yes
Volatility of Stocks	S&P Index		Multiple regression, cross-section	1980-1986	87	Sufficient Data	Nathan & O'Keefe (1	-	Yes
	Beta		Panel regression	1987-2007	2479	U.S. public	Madura, Viale & Ng(	+	Yes

Appendix 2: Description of Applied Statistical Tests

Wilcoxon Rank-Sum Test

The Wilcoxon Rank-Sum Test is a non-parametric test that can be used to compare two independent samples that are also unpaired. The test is based on the Wilcoxon Rank-Sum statistics W, which is the sum of the ranks of one of the samples. The Wilcoxon test can replace the two-sample t-test (Gujarati & Porter, 2009). It is used when the population cannot be assumed to be normally distributed.

Test Procedure

Firstly rank the observations. Arranging them in order from the smallest to largest does this. The rank of each observation is its position in this ordered list, starting with rank 1 for the smallest observation. There are N observations in all where $N=n_1+n_2$. The sum W of the ranks for the first sample is the Wilcoxon Rank-Sum statistics. If the two populations have the same continuous distribution, then W has the mean $\mu_w = \sqrt{\frac{n_1(N+1)}{2}}$ and the standard deviation $\sigma_w = \sqrt{\frac{n_1 n_2(N+1)}{12}}$.

The Wilcoxon Rank-Sum Test rejects the hypothesis that the two populations have identical distributions when the rank sum W is far from its mean. In order to find the P-value statistical tables must be consulted (Moore et al., 2012)

Durbin-Watson Statistic

The Durbin-Watson statistic is a test statistic used to detect the presence of autocorrelation in the residuals from regression analysis.

Test Procedure

If e_t is the residual associated with the observation at time t, then the test statistic is

$$d = \frac{\sum_{t=2}^{T}(e_t - e_{t-1})^2}{\sum_{t=1}^{T} e_t^2},$$

where T is the number of observations. Since d is approximately equal to $2(1 - r)$, where r is the sample autocorrelation of the residuals, $d = 2$ indicates no autocorrelation. The value of d always lies between 0 and 4. If the Durbin–Watson statistic is substantially less than 2, there is evidence of positive serial correlation. As a rough rule of thumb, if Durbin–Watson is less than 1.0, there may be cause for alarm. Small values of d indicate successive error terms are, on average, close

in value to one another, or positively correlated. If $d > 2$ successive error terms are, on average, much different in value to one another, i.e., negatively correlated. In regressions, this can imply an underestimation of the level of statistical significance (Moore et al., 2012).

Jacque-Bera Test

The Jacque Bera test is a goodness-of-fit test of whether sample data have the skewness and kurtosis matching a normal distribution.

Test Procedure

The test statistic *JB* is defined as $JB = \frac{n}{6}\left(S^2 + \frac{1}{4}(K-3)^2\right)$

where n is the number of observations (or degrees of freedom in general); S is the sample skewness, and K is the sample kurtosis:

$$S = \frac{\hat{\mu}_3}{\hat{\sigma}^3} = \frac{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^3}{\left(\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2\right)^{3/2}}$$

$$K = \frac{\hat{\mu}_4}{\hat{\sigma}^4} = \frac{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^4}{\left(\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2\right)^2},$$

where $\hat{\mu}_3$ and $\hat{\mu}_4$ are the estimates of third and fourth central moments, respectively, $\bar{x}$ is the sample mean, and $\hat{\sigma}^2$ is the estimate of the second central moment, the variance (Gujarati & Porter, 2009).

If the data come from a normal distribution, the *JB* statistic asymptotically has a chi-squared distribution with two degrees of freedom, so the statistic can be used to test the hypothesis that the data are from a normal distribution. The null hypothesis is a joint hypothesis of the skewness being zero and the excess kurtosis being zero. Samples from a normal distribution have an expected skewness of 0 and an expected excess kurtosis of 0 (which is the same as a kurtosis of 3). As the definition of *JB* shows, any deviation from this increases the JB statistic.

For small samples the chi-squared approximation is overly sensitive, often rejecting the null hypothesis when it is in fact true. Furthermore, the distribution of p-values departs from a uniform distribution and becomes a right-skewed uni-modal distribution, especially for small p-values (Gujarati & Porter, 2009; Moore et al., 2012).

Two-Sided T-Test

The t-test is any statistical hypothesis test in which the test statistic follows a Student's t distribution if the null hypothesis is supported (Park 2009).

Assumptions

- Each of the two populations being compared should follow a normal distribution. This can be tested using a normality test, such as the Shapiro-Wilk or Kolmogorov–Smirnov test, or it can be assessed graphically using a normal quantile plot.
- If using Student's original definition of the *t*-test, the two populations being compared should have the same variance
- The data used to carry out the test should be sampled independently from the two populations being compared. This is in general not testable from the data, but if the data are known to be dependently sampled (i.e. if they were sampled in clusters), then the classical *t*-tests discussed here may give misleading results.

Test Procedure

In order to conduct the test the following equation is used:

$$T^2 = \frac{n_1 n_2}{n_1 + n_2}(\overline{\mathbf{x}}_1 - \overline{\mathbf{x}}_2)'\mathbf{S}_{\text{pooled}}{}^{-1}(\overline{\mathbf{x}}_1 - \overline{\mathbf{x}}_2).$$

In this formula, *n* = number of participants, where $\overline{x}$ is the sample mean 1 = group one, 2 = group two (Park 2009).

Appendix 3: Correlation Matrix for All Tested Variables

Table 1
Correlation Matrix for all examined variables

	Mean	Stdev	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	29
1 *DP1M*	0.31	0.20																												
2 *DP1D*	0.25	0.18	0.69																											
3 *FINCON*	-0.30	1.57	-0.21	-0.15																										
4 *SENLOAN*	1.83	24.03	0.19	0.15	-0.89																									
5 *GDPVOL*	0.01	0.01	0.13	0.14	-0.48	0.68																								
6 *BID FCF*	0.07	0.07	0.07	0.00	-0.24	0.13	-0.02																							
7 *BID FCF DV*	2.04	7.34	0.03	-0.04	-0.12	0.08	0.02	0.17																						
8 *SERV*	0.30	0.46	0.19	0.13	0.02	-0.03	0.00	0.16	0.09																					
9 *MANUF*	0.44	0.50	-0.07	-0.06	-0.12	0.11	-0.01	0.13	0.07	-0.58																				
10 *TGTTOBIN*	2.40	1.89	0.01	-0.01	0.01	-0.08	-0.14	0.10	0.02	-0.11	0.21																			
11 *TGTTOBIND*	0.51	0.50	-0.13	-0.04	0.12	-0.15	-0.07	-0.04	-0.01	-0.03	-0.04	0.11																		
12 *TGT MB*	3.99	15.03	-0.02	-0.06	-0.04	0.02	-0.08	0.08	0.01	-0.05	0.06	0.28	0.09																	
13 *TGT MBD*	0.52	0.50	-0.11	0.02	0.11	-0.13	-0.06	0.04	0.01	-0.04	-0.06	0.10	0.80	0.09																
14 *TGTLEV*	0.46	0.31	0.00	0.03	-0.10	0.05	-0.05	-0.18	-0.16	-0.16	-0.07	0.10	-0.04	0.05	-0.02															
15 *TGTLEVD*	0.43	0.50	0.15	0.01	-0.12	0.11	0.10	0.12	0.12	0.01	0.00	0.03	-0.01	0.03	0.10	-0.01														
16 *TGTROA*	0.03	0.14	-0.24	-0.12	0.07	-0.01	0.02	0.06	0.01	-0.02	-0.06	0.00	-0.01	-0.14	0.05	-0.12	-0.24													
17 *TGTROAD*	0.42	0.49	-0.07	-0.12	0.16	-0.16	-0.07	0.01	0.03	0.08	-0.02	0.10	0.05	-0.03	0.07	-0.10	0.11	0.08												
18 *TGTROE*	0.01	0.17	-0.03	0.04	0.06	-0.05	-0.04	0.06	0.01	0.00	0.04	0.05	0.09	0.00	0.10	-0.04	-0.14	0.44	0.09											
19 *TGTROED*	0.38	0.49	0.05	-0.03	0.02	-0.01	-0.02	0.01	-0.07	0.07	0.03	-0.01	-0.31	-0.07	-0.24	-0.07	0.05	0.09	0.64	0.05										
20 *RELSIZE*	0.34	0.64	-0.20	-0.09	0.09	-0.12	-0.11	-0.25	-0.15	-0.10	-0.08	-0.07	-0.03	-0.02	-0.08	0.17	-0.18	0.07	0.02	0.05	-0.04									
21 *RELSIZE_MCAP*	0.31	0.71	-0.16	-0.06	0.05	-0.06	-0.04	-0.13	-0.12	-0.09	0.03	0.17	0.03	0.05	0.02	0.11	-0.14	0.10	0.10	0.06	-0.02	0.55								
22 *PMT*	0.88	0.32	0.04	0.02	0.23	-0.26	-0.16	0.16	0.09	0.05	0.08	0.10	0.10	0.03	0.09	-0.03	0.07	-0.05	0.09	-0.04	-0.01	-0.12	-0.11							
23 *CRISIS1*	0.29	0.46	0.06	0.07	-0.65	0.73	0.39	0.06	0.04	-0.08	0.10	-0.02	-0.14	-0.05	-0.12	0.03	0.10	0.08	-0.13	0.02	0.02	-0.01	0.05	-0.41						
24 *CRISIS2*	0.15	0.36	0.16	0.14	-0.75	0.84	0.72	0.10	0.13	-0.09	0.08	-0.09	-0.13	-0.07	-0.09	0.07	0.16	0.00	-0.14	-0.05	-0.02	-0.11	-0.07	-0.18	0.66					
25 *CRISIS 3*	0.20	0.40	0.15	0.11	-0.83	0.85	0.57	0.15	0.09	-0.03	0.04	-0.06	-0.13	-0.06	-0.10	0.04	0.13	0.05	-0.13	-0.01	0.00	-0.09	-0.06	-0.33	0.78	0.84				
26 *RELAT*	0.57	0.50	0.05	0.04	0.03	-0.06	-0.09	-0.04	-0.11	-0.09	-0.02	-0.01	0.05	0.03	0.00	0.09	0.00	-0.07	-0.08	-0.07	-0.04	0.12	0.12	-0.05	-0.05	-0.03	-0.05			
27 *RELAT_4SIC*	0.26	0.44	0.01	0.03	-0.01	-0.01	-0.10	0.01	-0.08	-0.08	0.04	-0.05	0.05	0.07	0.01	0.11	-0.01	-0.08	-0.11	-0.13	-0.05	0.00	-0.06	-0.11	-0.03	-0.11	-0.06	0.52		
28 *LOGDV*	7.06	1.14	-0.16	-0.08	-0.08	0.04	0.01	-0.02	-0.17	-0.15	-0.02	0.16	0.00	0.06	0.01	0.19	-0.03	0.07	-0.01	-0.04	-0.01	0.12	0.16	-0.15	0.11	0.04	0.08	-0.01	-0.05	
29 *DV*	2691	5820	-0.07	-0.05	-0.12	0.08	0.04	-0.03	-0.09	-0.12	-0.05	0.20	-0.10	0.04	-0.05	0.15	-0.04	0.01	-0.01	-0.05	0.00	0.06	0.16	-0.22	0.06	0.09	0.09	0.02	-0.03	0.73

Table 1 shows correlations between a range of possible proxies considered in the study. DP1M and DP1D are the dependent variable deal premiums measured against an unaffected stock price either 1-month or 1-day before announcement, respectively. FINCON, SENLOAN and GDPVOL are macroeconomic variables related to the state of the economy, BIDFCF and BIFCFDV are bidder free cash over total assets or deal value, TGTTOBIN/D is the Tobin's Q of the target either 1 year prior to announcement or measured as a trend using a dummy, the same for TGTMB but with market-to-book instead. TGTROA and TGTROA are two alternative measures for target company profitability, RELSIZE is relative size of the target and bidder based on revenue or market cap. PMT is a dummy identifying the deals paid with cash only, Crisis1, 2 and 3 are three different break points for the financial criris (2007H2, 2008 and 2008H2), RELAT is a dummy identifying the deal where target and bidder share the same 2-digit or 4-digit SIC code and LOGDV and DV are calculated as either ln(deal value) or deal value in USD.

Appendix 4: Correlation Matrix for Interaction Terms

Table 1
Correlaton Matrix for Interaction Terms

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 *FINCONxSERV*																	
2 *BIDFCFxSERV*	-0.24																
3 *TGTTOBINDxSERV*	0.03	0.41															
4 *TGT ROAxSERV*	-0.02	0.21	0.14														
5 *TGTLEVDxSERV*	-0.11	0.54	0.37	-0.02													
6 *RELSIZExSERV*	0.03	0.17	0.37	0.16	0.10												
7 *RELATxSERV*	0.02	0.62	0.48	0.22	0.40	0.47											
8 *PMTxSERV*	-0.09	0.75	0.63	0.13	0.58	0.38	0.61										
9 *LOGDVxSERV*	-0.20	0.78	0.63	0.22	0.57	0.43	0.62	0.92									
10 *FINCONxCRISIS1*	0.37	-0.02	0.09	-0.02	0.01	0.06	0.08	0.08	0.03								
11 *BIDFCFxCRISIS1*	-0.36	0.11	-0.05	0.01	0.06	-0.05	0.01	-0.01	0.02	-0.67							
12 *TOBINDxCRISIS1*	-0.13	-0.05	0.06	-0.10	0.00	-0.06	-0.05	-0.09	-0.08	-0.33	0.41						
13 *TGT ROAxCRISIS1*	-0.09	-0.04	-0.12	0.27	-0.14	0.00	-0.01	-0.12	-0.05	-0.01	0.11	0.22					
14 *TGTLEVDxCRISIS1*	-0.21	0.01	-0.05	-0.13	0.13	-0.08	-0.05	-0.03	-0.06	-0.45	0.56	0.33	-0.02				
15 *RELSIZExCRISIS1*	-0.04	-0.09	-0.09	0.01	-0.08	-0.02	-0.06	-0.14	-0.10	-0.11	0.13	0.26	0.14	0.12			
16 *RELATxCRISIS1*	-0.12	-0.03	-0.09	0.02	-0.04	-0.05	0.03	-0.14	-0.11	-0.41	0.42	0.38	0.21	0.43	0.31		
17 *PMTxCRISIS1*	-0.30	0.03	-0.07	-0.06	0.07	-0.09	-0.07	0.00	-0.01	-0.52	0.69	0.49	0.20	0.62	0.18	0.43	
18 *LOGDVxCRISIS1*	-0.34	-0.04	-0.13	0.00	-0.04	-0.08	-0.11	-0.12	-0.06	-0.61	0.63	0.53	0.31	0.62	0.44	0.66	0.73

Appendix 5: Summary Statistics on Sample Distribution

Table 1
Sample Distribution and Deal Premium by Quarter

Period	N	Percent (N)	Average DP	Stdev DP	Min DP	Max DP	Min DP	Average DP
2003-Q1	3	1.18%	59.24%	31.26%	25.38%	87.02%	25.38%	59.24%
2003-Q2	5	1.96%	39.27%	22.12%	13.64%	60.61%	13.64%	39.27%
2003-Q3	5	1.96%	40.68%	23.15%	11.25%	60.38%	11.25%	40.68%
2003-Q4	4	1.57%	23.67%	17.28%	6.67%	47.78%	6.67%	23.67%
2004-Q1	8	3.14%	31.89%	21.27%	1.74%	66.53%	1.74%	31.89%
2004-Q2	9	3.53%	34.39%	26.39%	1.82%	86.94%	1.82%	34.39%
2004-Q3	6	2.35%	20.11%	22.21%	-8.28%	51.81%	-8.28%	20.11%
2004-Q4	5	1.96%	36.86%	19.46%	20.61%	70.63%	20.61%	36.86%
2005-Q1	12	4.71%	24.33%	21.32%	-0.93%	55.54%	-0.93%	24.33%
2005-Q2	14	5.49%	32.20%	24.38%	-13.82%	70.04%	-13.82%	32.20%
2005-Q3	12	4.71%	29.58%	16.98%	10.20%	63.27%	10.20%	29.58%
2005-Q4	9	3.53%	31.14%	20.51%	0.83%	65.81%	0.83%	31.14%
2006-Q1	9	3.53%	16.92%	10.18%	6.77%	36.90%	6.77%	16.92%
2006-Q2	15	5.88%	27.97%	12.65%	3.40%	47.67%	3.40%	27.97%
2006-Q3	14	5.49%	36.33%	16.64%	11.19%	67.76%	11.19%	36.33%
2006-Q4	14	5.49%	32.48%	21.84%	-23.32%	60.51%	-23.32%	32.48%
2007-Q1	17	6.67%	26.59%	14.82%	-6.10%	45.43%	-6.10%	26.59%
2007-Q2	19	7.45%	27.83%	15.05%	0.00%	60.71%	0.00%	27.83%
2007-Q3	18	7.06%	23.35%	14.76%	-2.07%	47.67%	-2.07%	23.35%
2007-Q4	5	1.96%	24.97%	26.67%	-4.37%	68.60%	-4.37%	24.97%
2008-Q1	5	1.96%	42.12%	19.55%	24.36%	72.03%	24.36%	42.12%
2008-Q2	8	3.14%	27.53%	13.91%	12.36%	47.63%	12.36%	27.53%
2008-Q3	11	4.31%	31.93%	16.34%	12.44%	73.75%	12.44%	31.93%
2008-Q4	3	1.18%	54.20%	39.19%	9.67%	83.43%	9.67%	54.20%
2009-Q1	3	1.18%	43.80%	37.48%	17.52%	86.72%	17.52%	43.80%
2009-Q2	5	1.96%	37.73%	38.15%	2.79%	97.82%	2.79%	37.73%
2009-Q3	5	1.96%	56.48%	27.59%	26.52%	93.24%	26.52%	56.48%
2009-Q4	12	4.71%	32.11%	9.19%	13.64%	44.41%	13.64%	32.11%
Total	255	100%	31.03%	20.10%	-23.32%	97.82%	-23.32%	31.03%

Table 2
Sample Distribution by Payment Type

Payment type	N	Percent (N)	Average DP	Stdev DP	Min DP	Max DP
Cash	225	88.24%	31.34%	20.27%	-23.32%	93.24%
Cash and Stock	30	11.76%	28.71%	18.87%	4.44%	97.82%
Total	255	100.00%	31.03%	20.10%	-23.32%	97.82%

Table 3
Sample Distribution on Whether Deal is Friendly or Hostile

Deal nature	N	Percent (N)	Average DP	Stdev DP	Min DP	Max DP
Friendly	250	98.04%	30.99%	20.13%	-23.32%	97.82%
Hostile	5	1.96%	33.02%	20.59%	10.96%	60.61%
Total	255	100.00%	31.03%	20.10%	-23.32%	97.82%

Table 4
Sample Distribution by Whether There is One or Multiple Bidders

Competition	N	Percent (N)	Average DP	Stdev DP	Min DP	Max DP
One bidder	249	97.65%	31.41%	20.10%	-23.32%	97.82%
Multiple bidders	6	2.35%	15.59%	13.33%	0.83%	33.16%
Total	255	100.00%	31.03%	20.10%	-23.32%	97.82%

Table 5
Sample Distribution by Target Industry Group

Target Industry	Industry group	N	Percent	Average DP	Stdev DP	Min DP	Max DP
Manufacturing	Non-Services	113	44.31%	29.51%	19.82%	-23.32%	86.72%
Mining	Non-Services	18	7.06%	21.32%	12.18%	-6.10%	37.68%
Other	Non-Services	7	2.75%	25.33%	12.49%	12.27%	45.00%
Retail Trade	Non-Services	13	5.10%	33.62%	25.16%	-2.07%	86.94%
Services	Services	76	29.80%	36.81%	20.38%	-8.28%	93.24%
Transportation and Communications	Non-Services	22	8.63%	30.41%	21.06%	0.00%	97.82%
Utilities	Non-Services	6	2.35%	18.86%	16.48%	-1.94%	36.90%
Total		255	100.00%	31.03%	20.10%	-23.32%	97.82%

Appendix 6: Distribution Analyses Graphs for DP1M and BIDFCF

Distribution analysis of: DP1M

The UNIVARIATE Procedure

Variable: DP1M

SERV=0

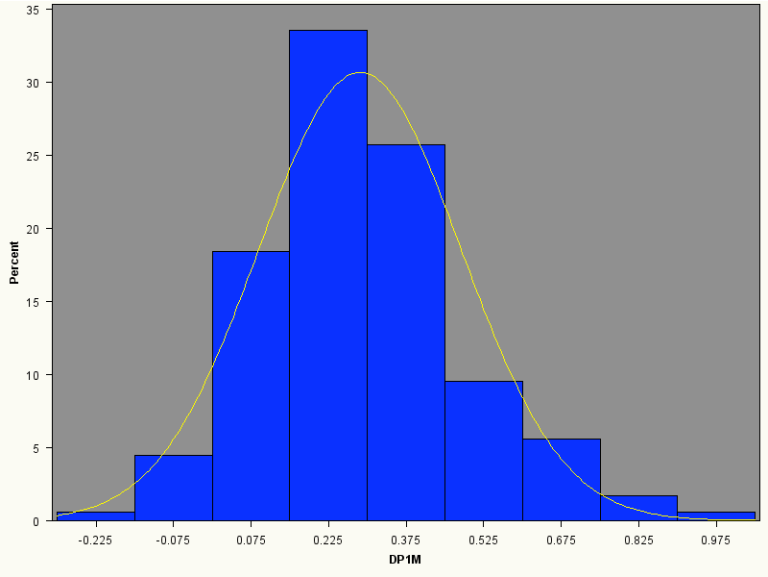
Basic Confidence Limits Assuming Normality			
Parameter	**Estimate**	**90% Confidence Limits**	
Mean	0.28579	0.26167	0.30991
Std Deviation	0.19517	0.17963	0.21394
Variance	0.03809	0.03227	0.04577

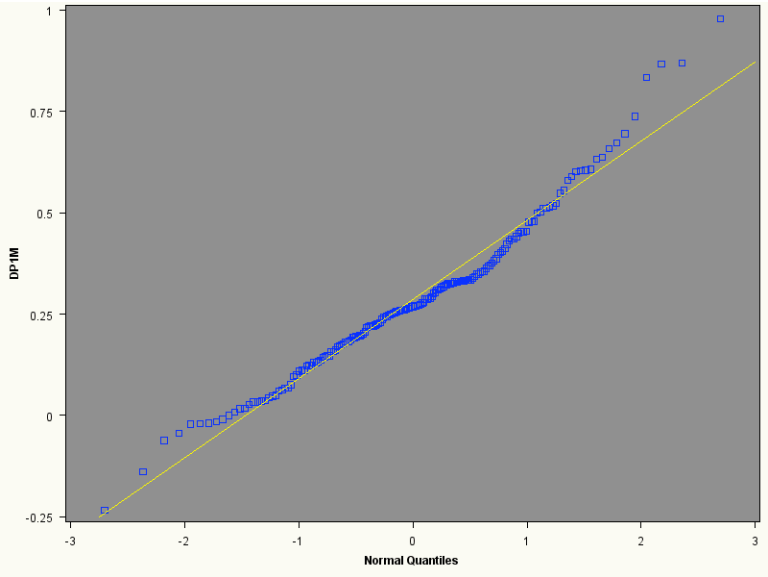
Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	W	0.971302	Pr < W	0.0009
Kolmogorov-Smirnov	D	0.098452	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.2515	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	1.430182	Pr > A-Sq	<0.0050

Distribution analysis of: DP1M

The UNIVARIATE Procedure

SERV=0

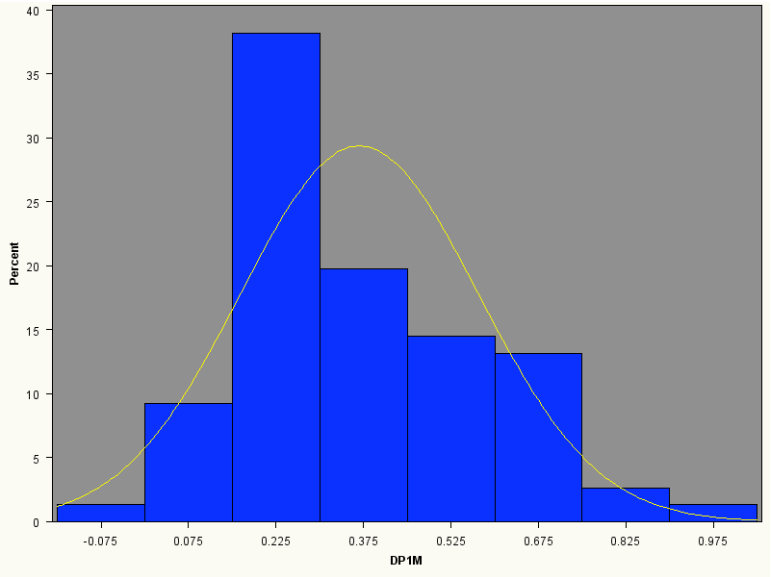


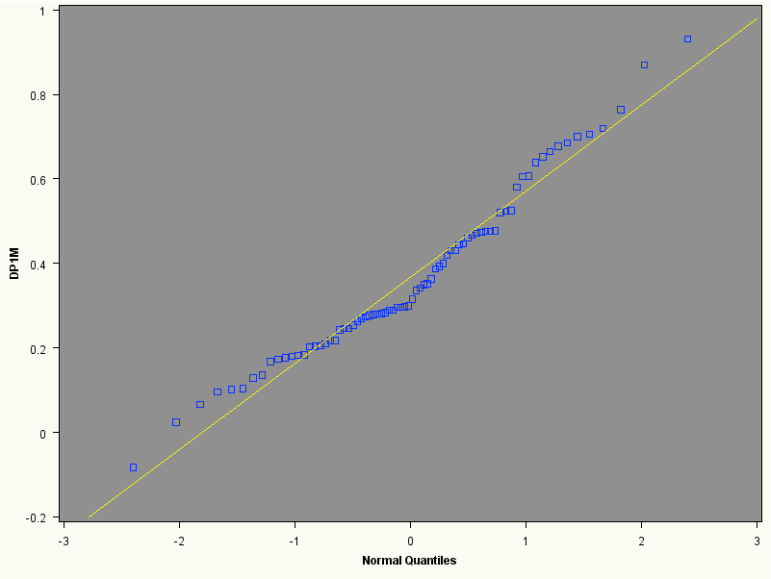


Distribution analysis of: DP1M

The UNIVARIATE Procedure

SERV=1





Distribution analysis of: FCF_Bidder

The UNIVARIATE Procedure

Variable: FCF_Bidder

SERV=0

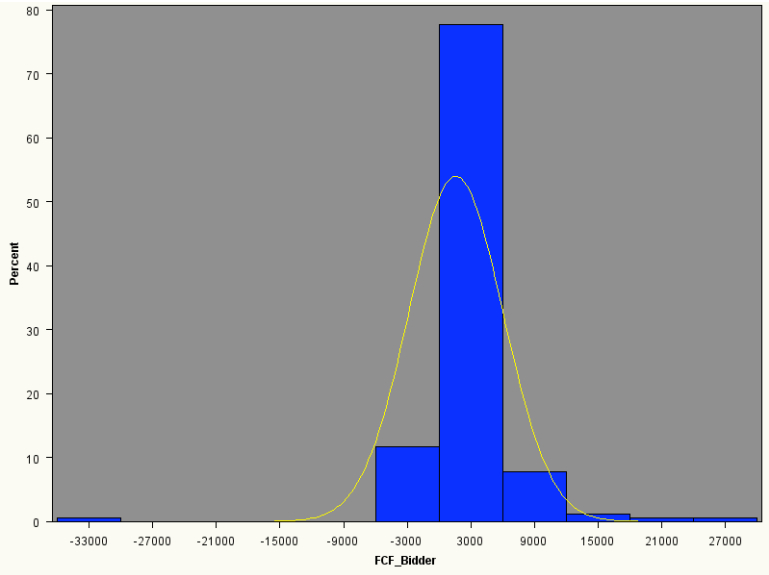
Basic Confidence Limits Assuming Normality			
Parameter	**Estimate**	**90% Confidence Limits**	
Mean	1594	1046	2141
Std Deviation	4432	4079	4858
Variance	19641755	16638441	23600410

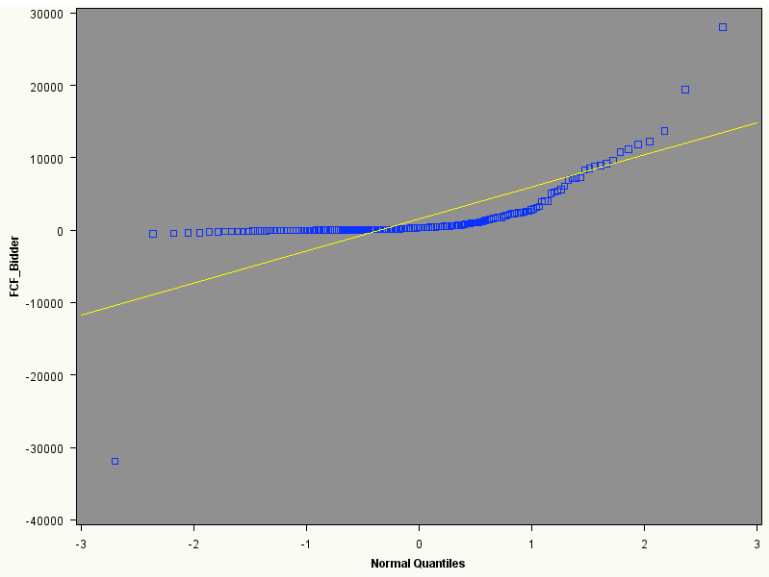
Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	W	0.525879	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.315021	Pr > D	<0.0100
Cramer-von Mises	W-Sq	5.627909	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	27.74253	Pr > A-Sq	<0.0050

Distribution analysis of: FCF_Bidder

The UNIVARIATE Procedure

SERV=0

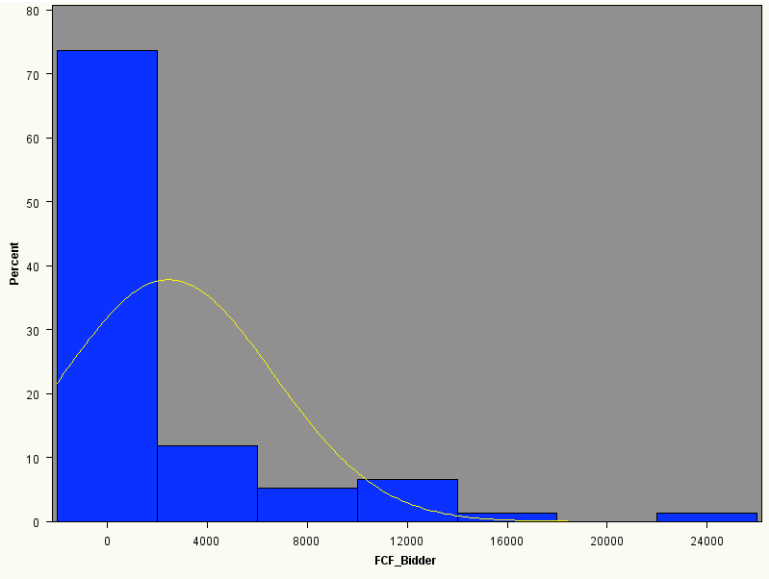


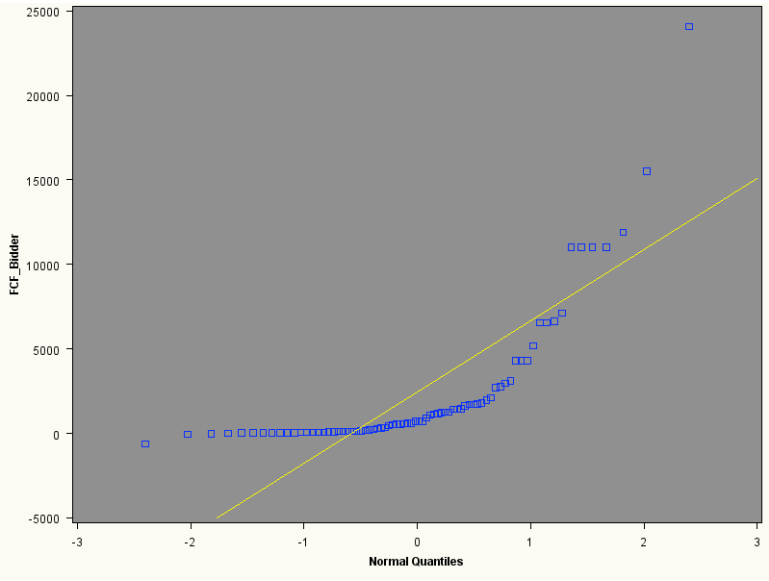


Distribution analysis of: FCF_Bidder

The UNIVARIATE Procedure

SERV=1





Appendix 7: Regression Output OLS and Residual Plots for Model 1

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

Number of Observations Read	256
Number of Observations Used	255
Number of Observations with Missing Values	1

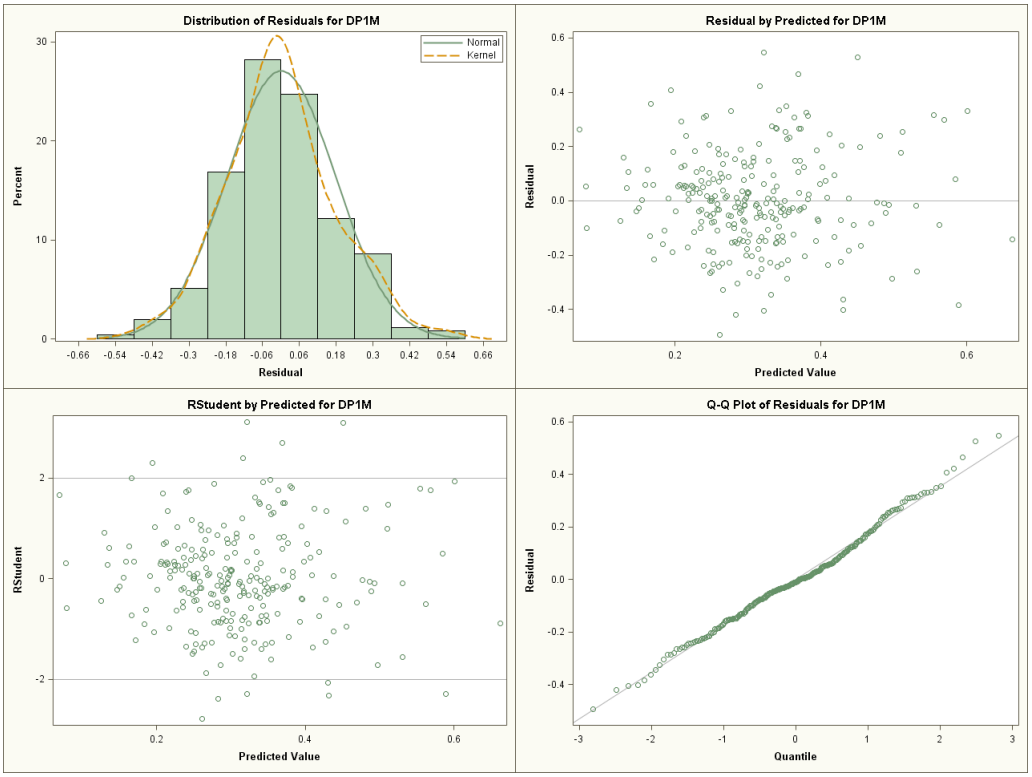
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	2.29806	0.19151	5.82	<.0001
Error	242	7.95995	0.03289		
Corrected Total	254	10.25801			

Root MSE	0.18136	R-Square	0.2240
Dependent Mean	0.31033	Adj R-Sq	0.1855
Coeff Var	58.44172		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.40480	0.08810	4.59	<.0001	0.08629	4.69	<.0001
FINCON	1	-0.01494	0.00886	-1.69	0.0932	0.01183	-1.26	0.2077
BIDFCF	1	0.06198	0.18930	0.33	0.7436	0.18147	0.34	0.7330
TGTTOBIND	1	-0.04837	0.02316	-2.09	0.0378	0.02179	-2.22	0.0273
TGT ROA	1	-0.26908	0.08808	-3.05	0.0025	0.09466	-2.84	0.0049
TGTLEVD	1	0.02538	0.02427	1.05	0.2968	0.02348	1.08	0.2809
RELSIZE	1	-0.04701	0.01905	-2.47	0.0143	0.01784	-2.63	0.0090
RELAT	1	0.04617	0.02384	1.94	0.0539	0.02233	2.07	0.0397
PMT	1	0.03262	0.03800	0.86	0.3915	0.03241	1.01	0.3152
LOGDV	1	-0.01988	0.01031	-1.93	0.0550	0.01036	-1.92	0.0561
SERV	1	0.12961	0.04240	3.06	0.0025	0.03700	3.50	0.0005
FINCONxSERV	1	-0.05151	0.01846	-2.79	0.0057	0.01934	-2.66	0.0083
BIDFCFxSERV	1	-0.82873	0.39598	-2.09	0.0374	0.35094	-2.36	0.0190


Distribution of Residuals for DP1M
Normal
Kernel
Percent
Residual
Residual by Predicted for DP1M
Residual
Predicted Value
RStudent by Predicted for DP1M
RStudent
Predicted Value
Q-Q Plot of Residuals for DP1M
Residual
Quantile

Appendix 8: Regression Output OLS and Residual Plots for Model 2

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

SERV=1

Number of Observations Read	76
Number of Observations Used	76

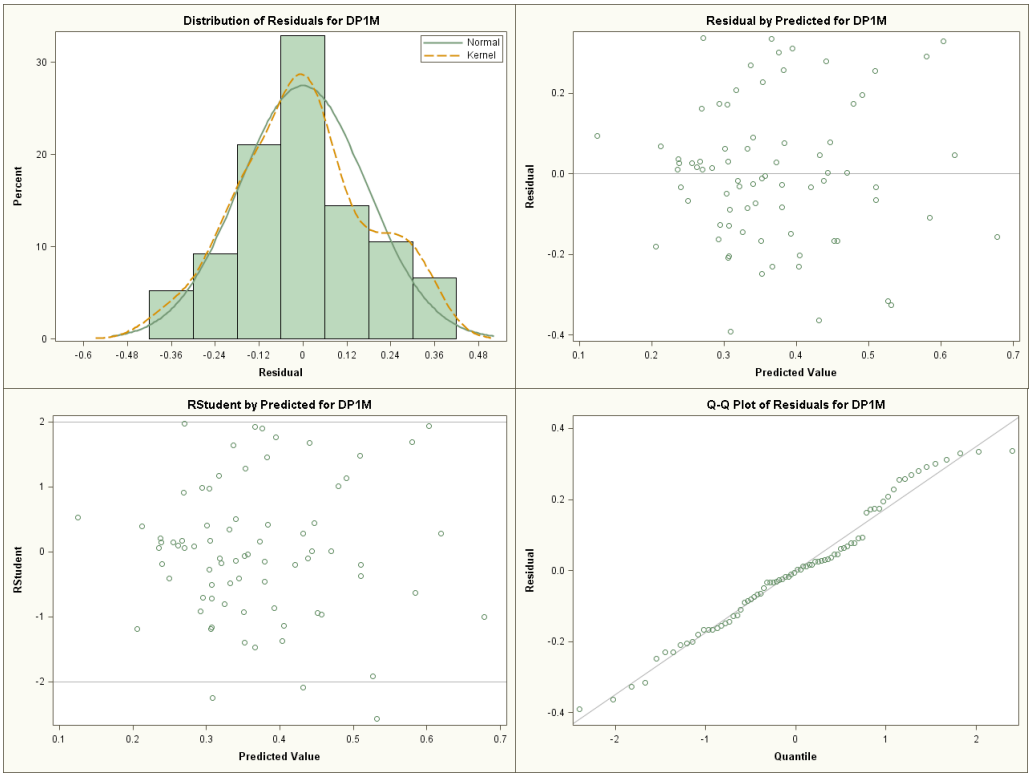
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	0.83829	0.09314	2.70	0.0097
Error	66	2.27743	0.03451		
Corrected Total	75	3.11572			

Root MSE	0.18576	R-Square	0.2691
Dependent Mean	0.36814	Adj R-Sq	0.1694
Coeff Var	50.45881		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.51072	0.16653	3.07	0.0031	0.17032	3.00	0.0038
FINCON	1	-0.07210	0.01794	-4.02	0.0002	0.01671	-4.31	<.0001
BIDFCF	1	-0.88441	0.40860	-2.16	0.0341	0.34193	-2.59	0.0119
TGTTOBIND	1	-0.05599	0.04478	-1.25	0.2156	0.04018	-1.39	0.1682
TGT ROA	1	-0.18357	0.20059	-0.92	0.3634	0.26389	-0.70	0.4891
TGTLEVD	1	0.03709	0.04526	0.82	0.4155	0.04283	0.87	0.3897
RELSIZE	1	-0.03835	0.05610	-0.68	0.4967	0.05405	-0.71	0.4805
RELAT	1	0.07480	0.04958	1.51	0.1362	0.04361	1.72	0.0910
PMT	1	0.08142	0.07843	1.04	0.3030	0.05782	1.41	0.1638
LOGDV	1	-0.02450	0.02291	-1.07	0.2886	0.02311	-1.06	0.2928


Distribution of Residuals for DP1M
Normal
Kernel
Percent
Residual
Residual by Predicted for DP1M
Residual
Predicted Value
RStudent by Predicted for DP1M
RStudent
Predicted Value
Q-Q Plot of Residuals for DP1M
Residual
Quantile

Appendix 9: Regression Output OLS and Residual Plots for Model 3

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

SERV=0

Number of Observations Read	179
Number of Observations Used	179

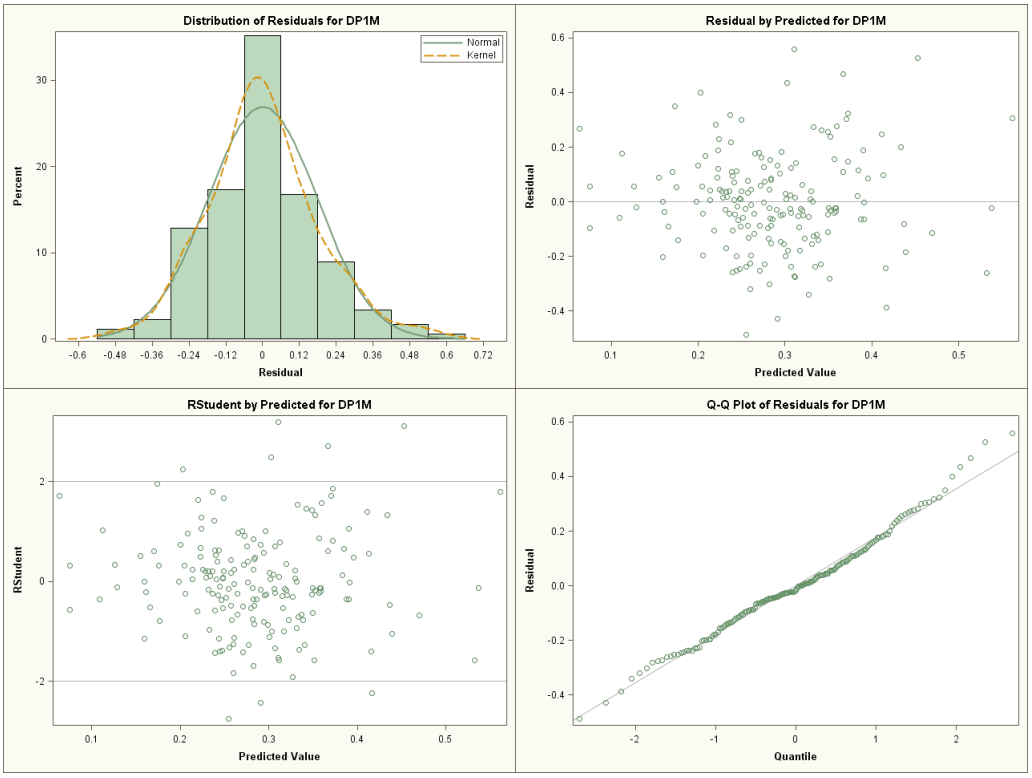
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	1.14967	0.12774	3.83	0.0002
Error	169	5.63079	0.03332		
Corrected Total	178	6.78046			

Root MSE	0.18253	R-Square	0.1696
Dependent Mean	0.28579	Adj R-Sq	0.1253
Coeff Var	63.87059		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.42760	0.10345	4.13	<.0001	0.10096	4.24	<.0001
FINCON	1	-0.01415	0.00906	-1.56	0.1202	0.01194	-1.19	0.2376
BIDFCF	1	0.06622	0.19281	0.34	0.7317	0.18374	0.36	0.7190
TGTTOBIND	1	-0.04860	0.02768	-1.76	0.0809	0.02613	-1.86	0.0646
TGT ROA	1	-0.29802	0.10057	-2.96	0.0035	0.08925	-3.34	0.0010
TGTLEVD	1	0.01915	0.02940	0.65	0.5157	0.02796	0.68	0.4945
RELSIZE	1	-0.05059	0.02064	-2.45	0.0153	0.01886	-2.68	0.0080
RELAT	1	0.03207	0.02839	1.13	0.2603	0.02625	1.22	0.2235
PMT	1	0.01789	0.04454	0.40	0.6885	0.03984	0.45	0.6540
LOGDV	1	-0.01938	0.01185	-1.64	0.1038	0.01193	-1.62	0.1062


Distribution of Residuals for DP1M
Normal
Kernel
Percent
Residual
Residual by Predicted for DP1M
Residual
Predicted Value
RStudent by Predicted for DP1M
RStudent
Predicted Value
Q-Q Plot of Residuals for DP1M
Residual
Quantile

Appendix 10: Regression Output OLS and Residual Plots for Model 4

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

Number of Observations Read	256
Number of Observations Used	255
Number of Observations with Missing Values	1

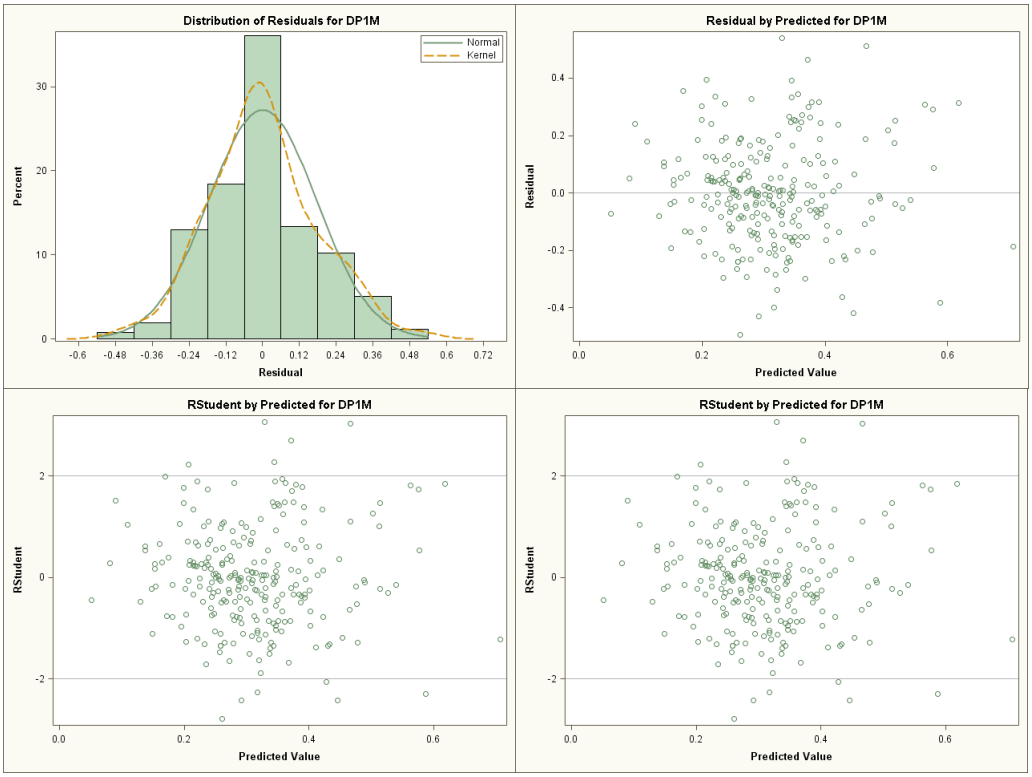
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	16	2.40060	0.15004	4.54	<.0001
Error	238	7.85741	0.03301		
Corrected Total	254	10.25801			

Root MSE	0.18170	R-Square	0.2340
Dependent Mean	0.31033	Adj R-Sq	0.1825
Coeff Var	58.54999		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.38292	0.09389	4.08	<.0001	0.09489	4.04	<.0001
FINCON	1	-0.01249	0.02812	-0.44	0.6574	0.03015	-0.41	0.6791
BIDFCF	1	0.23012	0.22202	1.04	0.3010	0.25072	0.92	0.3596
TGTTOBIND	1	-0.04838	0.02776	-1.74	0.0827	0.02704	-1.79	0.0748
TGT ROA	1	-0.26539	0.08994	-2.95	0.0035	0.09619	-2.76	0.0062
TGTLEVD	1	0.03103	0.02465	1.26	0.2093	0.02357	1.32	0.1893
RELSIZE	1	-0.04341	0.01925	-2.25	0.0251	0.01718	-2.53	0.0122
RELAT	1	0.04735	0.02397	1.98	0.0493	0.02221	2.13	0.0340
PMT	1	0.04181	0.04224	0.99	0.3232	0.03571	1.17	0.2428
LOGDV	1	-0.01970	0.01041	-1.89	0.0597	0.01052	-1.87	0.0624
SERV	1	0.13426	0.04299	3.12	0.0020	0.03764	3.57	0.0004
FINCONxSERV	1	-0.05780	0.01920	-3.01	0.0029	0.01953	-2.96	0.0034
BIDFCFxSERV	1	-0.90574	0.40073	-2.26	0.0247	0.35399	-2.56	0.0111
CRISIS1	1	0.00773	0.04936	0.16	0.8758	0.04094	0.19	0.8505
FINCONxCRISIS1	1	-0.01435	0.02985	-0.48	0.6312	0.03224	-0.45	0.6567
BIDFCFxCRISIS1	1	-0.59849	0.38009	-1.57	0.1167	0.33655	-1.78	0.0766
TOBINDxCRISIS1	1	0.00475	0.05190	0.09	0.9272	0.04810	0.10	0.9215


Distribution of Residuals for DP1M
Normal
Kernel
Percent
Residual
Residual by Predicted for DP1M
Residual
Predicted Value
RStudent by Predicted for DP1M
RStudent
Predicted Value
RStudent by Predicted for DP1M
RStudent
Predicted Value

Appendix 11: Regression Output OLS and Residual Plots for Model 5

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

CRISIS1=1

Number of Observations Read	75
Number of Observations Used	75

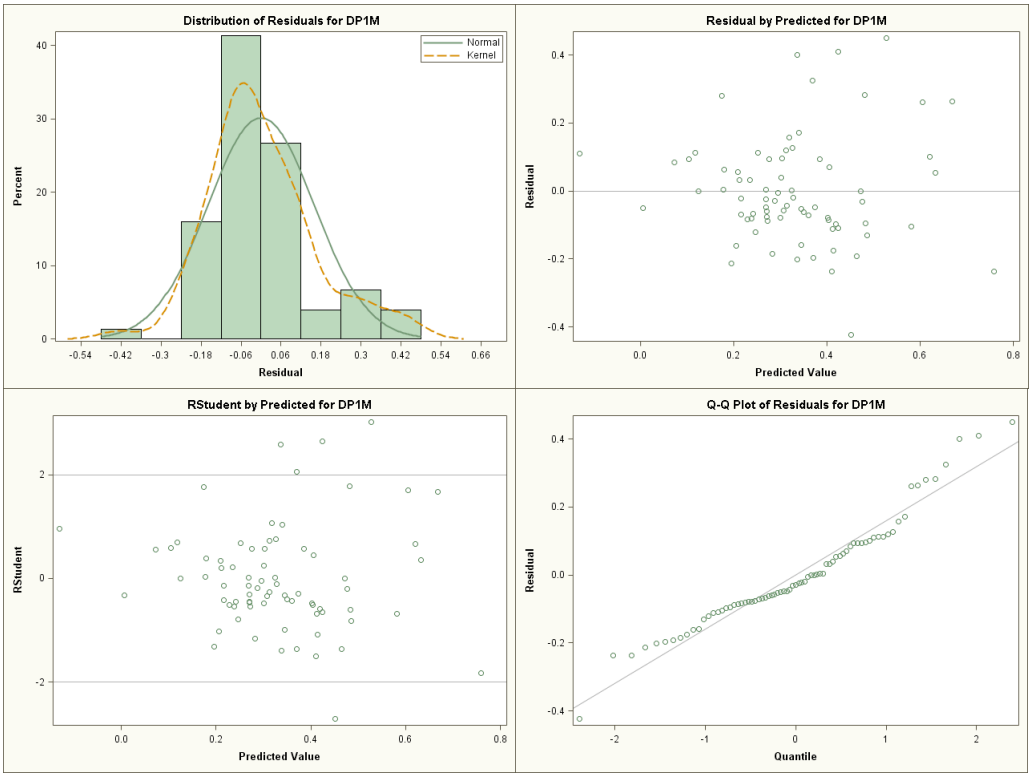
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1.63111	0.13593	4.50	<.0001
Error	62	1.87150	0.03019		
Corrected Total	74	3.50260			

Root MSE	0.17374	R-Square	0.4657
Dependent Mean	0.33035	Adj R-Sq	0.3623
Coeff Var	52.59330		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.54146	0.15300	3.54	0.0008	0.14491	3.74	0.0004
FINCON	1	-0.02146	0.01279	-1.68	0.0985	0.01507	-1.42	0.1595
BIDFCF	1	-0.17813	0.34557	-0.52	0.6081	0.27935	-0.64	0.5260
TGTTOBIND	1	-0.04574	0.04231	-1.08	0.2839	0.03838	-1.19	0.2379
TGT ROA	1	-0.25552	0.17098	-1.49	0.1401	0.15452	-1.65	0.1033
TGTLEVD	1	0.07840	0.04519	1.73	0.0877	0.04377	1.79	0.0781
RELSIZE	1	-0.09441	0.03657	-2.58	0.0122	0.02178	-4.34	<.0001
RELAT	1	0.01433	0.04336	0.33	0.7421	0.03733	0.38	0.7024
PMT	1	0.00586	0.05107	0.11	0.9090	0.04713	0.12	0.9014
LOGDV	1	-0.03535	0.01833	-1.93	0.0584	0.01751	-2.02	0.0478
SERV	1	0.22050	0.09315	2.37	0.0211	0.06915	3.19	0.0022
FINCONxSERV	1	-0.07700	0.03321	-2.32	0.0237	0.03405	-2.26	0.0273
BIDFCFxSERV	1	-2.39642	0.85833	-2.79	0.0070	0.49849	-4.81	<.0001


Distribution of Residuals for DP1M
Normal
Kernel
Percent
Residual
Residual by Predicted for DP1M
Residual
Predicted Value
RStudent by Predicted for DP1M
RStudent
Predicted Value
Q-Q Plot of Residuals for DP1M
Residual
Quantile

Appendix 12: Regression Output OLS and Residual Plots for Model 6

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

CRISIS1=0

Number of Observations Read	180
Number of Observations Used	180

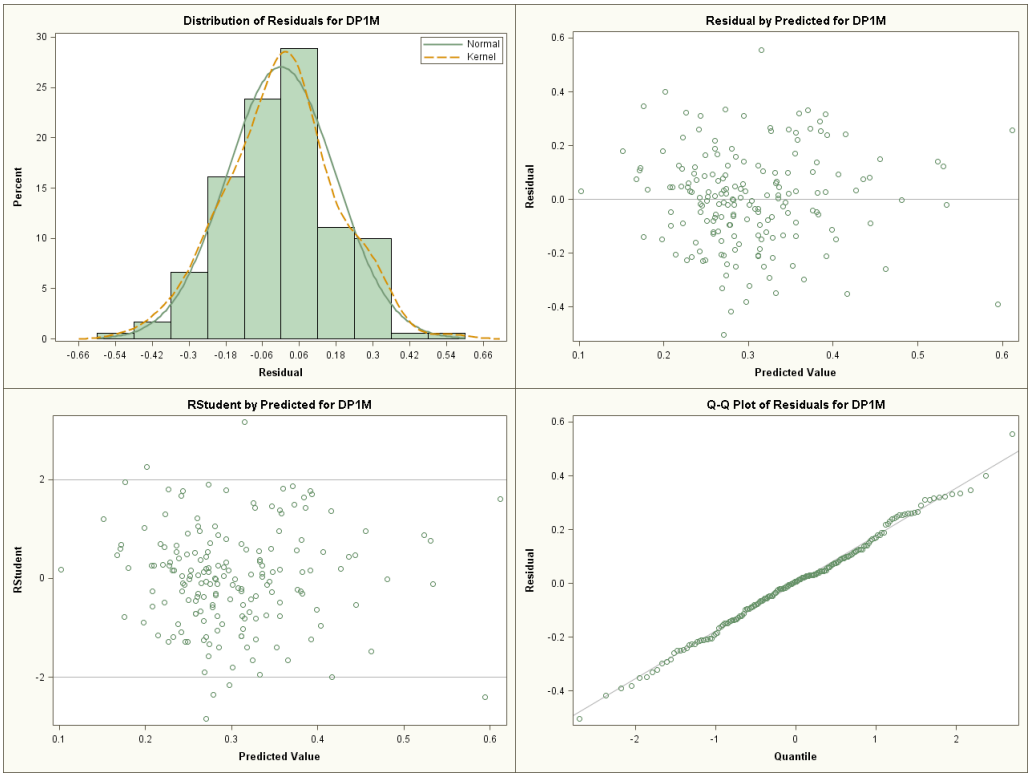
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1.10794	0.09233	2.75	0.0020
Error	167	5.60491	0.03356		
Corrected Total	179	6.71284			

Root MSE	0.18320	R-Square	0.1650
Dependent Mean	0.30199	Adj R-Sq	0.1051
Coeff Var	60.66414		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.34861	0.12232	2.85	0.0049	0.10514	3.32	0.0011
FINCON	1	0.00683	0.03871	0.18	0.8601	0.03878	0.18	0.8604
BIDFCF	1	0.19233	0.23202	0.83	0.4083	0.24836	0.77	0.4398
TGTTOBIND	1	-0.04604	0.02813	-1.64	0.1036	0.02703	-1.70	0.0904
TGT ROA	1	-0.27638	0.10634	-2.60	0.0102	0.11457	-2.41	0.0169
TGTLEVD	1	0.01369	0.02941	0.47	0.6421	0.02746	0.50	0.6187
RELSIZE	1	-0.02708	0.02275	-1.19	0.2357	0.02073	-1.31	0.1934
RELAT	1	0.06255	0.02887	2.17	0.0317	0.02711	2.31	0.0223
PMT	1	0.02629	0.07662	0.34	0.7319	0.06199	0.42	0.6720
LOGDV	1	-0.01505	0.01265	-1.19	0.2359	0.01252	-1.20	0.2311
SERV	1	0.12272	0.05282	2.32	0.0214	0.04965	2.47	0.0145
FINCONxSERV	1	-0.10001	0.05408	-1.85	0.0662	0.05360	-1.87	0.0638
BIDFCFxSERV	1	-0.52232	0.45856	-1.14	0.2563	0.38650	-1.35	0.1784


Distribution of Residuals for DP1M
Normal
Kernel
Percent
Residual
Residual by Predicted for DP1M
Residual
Predicted Value
RStudent by Predicted for DP1M
RStudent
Predicted Value
Q-Q Plot of Residuals for DP1M
Residual
Quantile

Appendix 13: Regression Output OLS for Model 1 with Industry Dummies

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

Number of Observations Read	256
Number of Observations Used	255
Number of Observations with Missing Values	1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	15	2.13536	0.14236	4.19	<.0001
Error	239	8.12265	0.03399		
Corrected Total	254	10.25801			

Root MSE	0.18435	R-Square	0.2082
Dependent Mean	0.31033	Adj R-Sq	0.1585
Coeff Var	59.40536		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent		
						Standard Error	t Value	Pr > |t|
Intercept	1	0.41051	0.08906	4.61	<.0001	0.08656	4.74	<.0001
FINCON	1	-0.02713	0.00813	-3.33	0.0010	0.01041	-2.61	0.0097
BIDFCF	1	-0.12796	0.17869	-0.72	0.4746	0.15842	-0.81	0.4201
TGTTOBIND	1	-0.05192	0.02376	-2.18	0.0299	0.02233	-2.33	0.0209
TGT ROA	1	-0.28869	0.09070	-3.18	0.0017	0.09615	-3.00	0.0030
TGTLEVD	1	0.01114	0.02495	0.45	0.6556	0.02402	0.46	0.6432
RELSIZE	1	-0.04987	0.01992	-2.50	0.0130	0.01805	-2.76	0.0062
RELAT	1	0.03173	0.02430	1.31	0.1929	0.02345	1.35	0.1773
PMT	1	0.03987	0.03959	1.01	0.3149	0.03243	1.23	0.2202
LOGDV	1	-0.01862	0.01065	-1.75	0.0817	0.01073	-1.73	0.0840
MINING	1	-0.01079	0.05072	-0.21	0.8317	0.03563	-0.30	0.7623
RETAIL	1	0.08210	0.05611	1.46	0.1447	0.06227	1.32	0.1887
SERV	1	0.07707	0.02764	2.79	0.0057	0.02706	2.85	0.0048
UTILITIES	1	-0.10968	0.07841	-1.40	0.1632	0.07424	-1.48	0.1409
TRANSPORT	1	0.02843	0.04524	0.63	0.5303	0.04557	0.62	0.5332
OTHER	1	0.02583	0.07437	0.35	0.7287	0.05932	0.44	0.6637

Appendix 14: Regression Output OLS for Model 1 with Year and Crises Dummies

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

Number of Observations Read	256
Number of Observations Used	255
Number of Observations with Missing Values	1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	15	2.33186	0.15546	4.69	<.0001
Error	239	7.92615	0.03316		
Corrected Total	254	10.25801			

Root MSE	0.18211	R-Square	0.2273
Dependent Mean	0.31033	Adj R-Sq	0.1788
Coeff Var	58.68239		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.41826	0.09166	4.56	<.0001	0.09326	4.49	<.0001
FINCON	1	-0.01493	0.01446	-1.03	0.3030	0.01782	-0.84	0.4029
BIDFCF	1	0.07173	0.19317	0.37	0.7107	0.18606	0.39	0.7002
TGTTOBIND	1	-0.04871	0.02333	-2.09	0.0379	0.02192	-2.22	0.0272
TGT ROA	1	-0.26073	0.09083	-2.87	0.0045	0.09636	-2.71	0.0073
TGTLEVD	1	0.02633	0.02471	1.07	0.2877	0.02371	1.11	0.2680
RELSIZE	1	-0.04557	0.01923	-2.37	0.0186	0.01734	-2.63	0.0092
RELAT	1	0.04542	0.02397	1.89	0.0593	0.02223	2.04	0.0421
PMT	1	0.01949	0.04127	0.47	0.6372	0.03626	0.54	0.5914
LOGDV	1	-0.01952	0.01037	-1.88	0.0609	0.01034	-1.89	0.0603
SERV	1	0.13099	0.04307	3.04	0.0026	0.03786	3.46	0.0006
FINCONxSERV	1	-0.05390	0.01888	-2.86	0.0047	0.01949	-2.77	0.0061
BIDFCFxSERV	1	-0.85267	0.40059	-2.13	0.0343	0.35258	-2.42	0.0163
CRISIS1	1	-0.03662	0.04226	-0.87	0.3870	0.03273	-1.12	0.2643
CRISIS2	1	0.03374	0.06211	0.54	0.5875	0.04273	0.79	0.4305
CRISIS3	1	0.00019213	0.07529	0.00	0.9980	0.05976	0.00	0.9974

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

Number of Observations Read	256
Number of Observations Used	255
Number of Observations with Missing Values	1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	18	2.31484	0.12860	3.82	<.0001
Error	236	7.94317	0.03366		
Corrected Total	254	10.25801			

Root MSE	0.18346	R-Square	0.2257
Dependent Mean	0.31033	Adj R-Sq	0.1666
Coeff Var	59.11757		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.40026	0.10019	3.99	<.0001	0.09116	4.39	<.0001
FINCON	1	-0.01823	0.01587	-1.15	0.2517	0.02031	-0.90	0.3705
BIDFCF	1	0.04266	0.19464	0.22	0.8267	0.18048	0.24	0.8134
TGTTOBIND	1	-0.05042	0.02396	-2.10	0.0364	0.02159	-2.34	0.0204
TGT ROA	1	-0.26600	0.09256	-2.87	0.0044	0.09349	-2.85	0.0048
TGTLEVD	1	0.02494	0.02501	1.00	0.3197	0.02377	1.05	0.2951
RELSIZE	1	-0.04803	0.01942	-2.47	0.0141	0.01769	-2.72	0.0071
RELAT	1	0.04595	0.02418	1.90	0.0586	0.02230	2.06	0.0404
PMT	1	0.02851	0.04007	0.71	0.4774	0.03406	0.84	0.4033
LOGDV	1	-0.02038	0.01062	-1.92	0.0561	0.01078	-1.89	0.0601
SERV	1	0.12955	0.04359	2.97	0.0033	0.03779	3.43	0.0007
FINCONxSERV	1	-0.05307	0.01920	-2.76	0.0062	0.01894	-2.80	0.0055
BIDFCFxSERV	1	-0.81403	0.40602	-2.00	0.0461	0.35824	-2.27	0.0240
Y2008	1	0.00372	0.05191	0.07	0.9429	0.05135	0.07	0.9423
Y2007	1	0.00686	0.07369	0.09	0.9259	0.05652	0.12	0.9035
Y2005	1	0.02296	0.07460	0.31	0.7585	0.05999	0.38	0.7023
Y2004	1	0.02150	0.07258	0.30	0.7674	0.06118	0.35	0.7256
Y2003	1	-0.00427	0.06772	-0.06	0.9497	0.06409	-0.07	0.9469
Y2006	1	0.02414	0.07440	0.32	0.7459	0.05772	0.42	0.6761

Appendix 15: Regression Output OLS for Model 1 with DP1D as Dependent Variable

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1D

Number of Observations Read	256
Number of Observations Used	255
Number of Observations with Missing Values	1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	0.74990	0.06249	1.99	0.0254
Error	242	7.58181	0.03133		
Corrected Total	254	8.33170			

Root MSE	0.17700	R-Square	0.0900
Dependent Mean	0.25066	Adj R-Sq	0.0449
Coeff Var	70.61351		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.29498	0.08598	3.43	0.0007	0.08310	3.55	0.0005
FINCON	1	-0.01068	0.00865	-1.23	0.2183	0.01010	-1.06	0.2913
BIDFCF	1	-0.10716	0.18475	-0.58	0.5624	0.14519	-0.74	0.4612
TGTTOBIND	1	-0.00967	0.02260	-0.43	0.6692	0.02088	-0.46	0.6437
TGT ROA	1	-0.12539	0.08597	-1.46	0.1460	0.09371	-1.34	0.1821
TGTLEVD	1	-0.01091	0.02369	-0.46	0.6455	0.02239	-0.49	0.6264
RELSIZE	1	-0.02242	0.01859	-1.21	0.2290	0.01711	-1.31	0.1915
RELAT	1	0.02817	0.02327	1.21	0.2272	0.02134	1.32	0.1881
PMT	1	0.02487	0.03708	0.67	0.5031	0.03010	0.83	0.4096
LOGDV	1	-0.01011	0.01006	-1.00	0.3160	0.00982	-1.03	0.3043
SERV	1	0.06829	0.04138	1.65	0.1002	0.04332	1.58	0.1163
FINCONxSERV	1	-0.04186	0.01802	-2.32	0.0210	0.02089	-2.00	0.0462
BIDFCFxSERV	1	-0.32235	0.38646	-0.83	0.4050	0.41809	-0.77	0.4415

SERV=1

Number of Observations Read	76
Number of Observations Used	76

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	0.49202	0.05467	1.46	0.1814
Error	66	2.47064	0.03743		
Corrected Total	75	2.96266			

Root MSE	0.19348	R-Square	0.1661
Dependent Mean	0.28745	Adj R-Sq	0.0524
Coeff Var	67.30891		

Parameter Estimates

						Heteroscedasticity Consistent		
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standard Error	t Value	Pr > |t|
Intercept	1	0.32796	0.17345	1.89	0.0630	0.19642	1.67	0.0997
FINCON	1	-0.05618	0.01868	-3.01	0.0037	0.01922	-2.92	0.0047
BIDFCF	1	-0.54081	0.42558	-1.27	0.2083	0.43888	-1.23	0.2222
TGTTOBIND	1	-0.02294	0.04664	-0.49	0.6244	0.03953	-0.58	0.5636
TGT ROA	1	-0.27948	0.20893	-1.34	0.1856	0.25033	-1.12	0.2683
TGTLEVD	1	-0.01048	0.04714	-0.22	0.8248	0.04395	-0.24	0.8124
RELSIZE	1	-0.02340	0.05843	-0.40	0.6902	0.05387	-0.43	0.6655
RELAT	1	0.07474	0.05164	1.45	0.1526	0.04091	1.83	0.0723
PMT	1	0.04902	0.08169	0.60	0.5505	0.05767	0.85	0.3983
LOGDV	1	-0.00864	0.02386	-0.36	0.7183	0.02722	-0.32	0.7518

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1D

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1D

SERV=0

Number of Observations Read	179
Number of Observations Used	179

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	0.18766	0.02085	0.70	0.7084
Error	169	5.03488	0.02979		
Corrected Total	178	5.22254			

Root MSE	0.17260	R-Square	0.0359
Dependent Mean	0.23505	Adj R-Sq	-0.0154
Coeff Var	73.43446		

Parameter Estimates

						Heteroscedasticity Consistent		
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standard Error	t Value	Pr > |t|
Intercept	1	0.31149	0.09782	3.18	0.0017	0.08822	3.53	0.0005
FINCON	1	-0.01056	0.00857	-1.23	0.2195	0.01005	-1.05	0.2949
BIDFCF	1	-0.11777	0.18232	-0.65	0.5192	0.14954	-0.79	0.4320
TGTTOBIND	1	-0.00656	0.02617	-0.25	0.8023	0.02473	-0.27	0.7910
TGT ROA	1	-0.09441	0.09510	-0.99	0.3223	0.10478	-0.90	0.3689
TGTLEVD	1	-0.01150	0.02780	-0.41	0.6795	0.02680	-0.43	0.6683
RELSIZE	1	-0.02495	0.01951	-1.28	0.2027	0.01778	-1.40	0.1624
RELAT	1	0.01302	0.02685	0.49	0.6282	0.02484	0.52	0.6008
PMT	1	0.01369	0.04211	0.33	0.7456	0.03427	0.40	0.6901
LOGDV	1	-0.00989	0.01121	-0.88	0.3789	0.00998	-0.99	0.3232

Appendix 16: Regression Output OLS for Model 1 with Alternative Proxy Variables

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: DP1M

Number of Observations Read	256
Number of Observations Used	255
Number of Observations with Missing Values	1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1.91726	0.15977	4.64	<.0001
Error	242	8.34075	0.03447		
Corrected Total	254	10.25801			

Root MSE	0.18565	R-Square	0.1869
Dependent Mean	0.31033	Adj R-Sq	0.1466
Coeff Var	59.82333		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent Standard Error	Heteroscedasticity Consistent t Value	Heteroscedasticity Consistent Pr > |t|
Intercept	1	0.41885	0.09701	4.32	<.0001	0.09381	4.46	<.0001
GDPVOL	1	1.91840	2.73335	0.70	0.4834	3.10319	0.62	0.5370
BIDFCFDV	1	0.00123	0.00183	0.67	0.5035	0.00199	0.62	0.5373
TGTMBD	1	-0.04603	0.02375	-1.94	0.0537	0.02213	-2.08	0.0386
TGT ROA	1	-0.28626	0.08974	-3.19	0.0016	0.09193	-3.11	0.0021
TGTLEVD	1	0.02646	0.02503	1.06	0.2917	0.02381	1.11	0.2675
RELSIZE	1	-0.05234	0.01927	-2.72	0.0071	0.01777	-2.95	0.0035
RELAT	1	0.02636	0.02409	1.09	0.2749	0.02387	1.10	0.2706
PMT	1	0.01168	0.03763	0.31	0.7564	0.03229	0.36	0.7178
LOGDV	1	-0.01875	0.01063	-1.76	0.0789	0.01019	-1.84	0.0668
SERV	1	0.04592	0.04685	0.98	0.3280	0.05033	0.91	0.3625
GDPVOLxSERV	1	5.63172	4.38860	1.28	0.2006	5.02720	1.12	0.2637
BIDFCFDVxSERV	1	-0.00940	0.00393	-2.39	0.0174	0.00302	-3.11	0.0021