DRIVERS OF AUSTRALIAN MERGER WAVES: INDUSTRY SHOCKS, MIS-VALUATION AND CAPITAL LIQUIDITY

by

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TABLE OF CONTENTS

Attestation of authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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Abstract

The purpose of this thesis is to test the extended industry shock hypothesis, which accounts for a macro-economic capital liquidity element, in determining the drivers of merger waves. Various theories have been extended by the literature and these are broadly classified under the neo-classical theory of merger waves and the behavioural theory of merger waves. Behavioural theories have explained merger waves by taking into account the psychology of stock markets and the occurrence of merger waves during a stock market boom. The industry shock hypothesis (a neo-classical theory) however, argues that merger waves are due to the clustering of industry shocks that affect an industry's operating environment. Along with this shock, the mis-valuation caused by a stock market boom increases asset values, thereby lowering transaction costs and hence increasing capital liquidity in the economy. This capital liquidity factor causes merger waves to cluster even if industry shocks do not.

The findings in this study show that industry level merger waves exist in Australia and they occur when there is sufficient capital liquidity in the economy. The industry shock variables are found to be insignificant; however they do improve the explanatory power of the explanatory variables used in predicting the start of a merger wave. The mis-valuation variables used in this study: market-to-book ratio, 3-year return and standard deviation of the 3-year return, are insignificant and do not have any explanatory powers in predicting the start of a merger wave.

Merger and acquisition announcements made to acquire Australian firms listed on the Australian Stock Exchange (ASX), are collected and analysed for the period from 1996 to 2007. The methodology used in this study is adopted from Harford (2005), which uses logit models to predict the start of merger waves. The explanatory variables are also adopted from Harford's (2005) study and include proxies for mis-valuation, industry shock and capital liquidity.

Overall, the results obtained for the Australian merger and acquisition data are inconclusive as to whether industry shocks cause industry merger waves as Harford (2005) documented for the US merger and acquisition data. However, industry level merger waves do exist, as

there is clustering in time of firm-level mergers within industries. Moreover, sufficient capital liquidity must be present to accommodate the necessary transactions.

Abbreviations

CS – Consumer Staples

CD – Consumer Discretionary

EN – Energy

FIN – Financials

HC – Health Care

IND – Industrials

IT – Information Technology

MAT – Materials

TEL – Telecommunications

UT – Utilities

Chapter 1

Introduction

1.1. Background

There has been growing evidence of mergers occurring in wave-like patterns in the US. There is a great deal of literature, which will be discussed later, that identifies the causes and the effects of these merger waves. The first such study was conducted by Nelson (1959). More recent debates on the causes of the merger waves have focused on the correlation between stock market advances and business cycles. This is because merger waves in the US have coincided with the advancements of stock markets and a general economic expansion. Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004) linked merger waves to the stock mis-valuation hypotheses, where managers time their takeover decisions to coincide with stock overvaluations. Theories which rely on neo-classical financial assumptions of market efficiencies have also been put forward in explaining merger waves. Mitchell and Muhlerin (1996) offered the industry shock hypothesis, in which firms efficiently react to an industry shock, and this shock affects their operating environment, hence a resulting merger wave. Harford (2005) argued that, for an industry shock to generate a wave, low transaction costs in the form of capital liquidity must be present simultaneously with the industry shock. Hence, this macro-economic liquidity causes industry merger waves to cluster, forming a wave.

Merger waves have also occurred outside the US. However, there is very little literature that has studied the causes of merger waves in other countries. Mueller and Gugler (2008) found evidence that merger waves occurred in the UK and Continental Europe in the late 1990's. Da Silva Rosa and Walter (2004) carried out a survey on the research already conducted in the Australian merger and acquisition market. Da Silva Rosa and Walter (2004) note that while there was much research done on the causes and effects of mergers in Australia there are hardly any studies that claim to account for the existence of merger waves. Da Silva and Walter's research also identified the need for a study on the effect of industry shocks on merger and acquisition activity and whether merger waves ever occurred in Australia. Hence,

this study seeks to fill that gap by investigating whether merger waves exist in Australia and, if they do, to identify their causes.

Recent literature has proposed a number of reasons for merger waves in the US mergers and acquisitions market. Several theories have been proposed and they have been broadly classified under either neo-classical or behavioural theories. Neo-classical theories are founded on neo-classical economic assumptions i.e., managers maximise shareholder wealth and that capital markets are efficient. Behavioural theories relax one or more of the standard neo-classical assumptions, and also take into account the psychology of stock markets and thus explain why merger waves coincide with stock market booms.

1.2. Research question and objective

This study attempts to test the existence of the characteristics for clustering of mergers within industries and, on an aggregate level, in the Australian market. These characteristics include: (i) shocks to an industry's environment initially causing firms to merge, then (ii) dispersion in valuations of firms from their true/median value leading to (iii) capital liquidity in the economy, implying that high asset values are correlated to macro-economic liquidity and subsequent capital tightness causing the merger wave to finish.

In this study, I adopt the rational approach of the neo-classical theory and apply Harford's (2005) methodology in examining the causes of merger waves in the Australian market. Harford's study of merger waves showed that firms are not, in fact, taking advantage of temporary mis-valuation in their industries, but rather they are reacting to an industry shock and the capital liquidity that a business expansion and accompanying stock market advances provide. This allows industry level merger waves to occur and cluster in time to form a merger wave. The late 1990's and the early 2000's have witnessed major deregulatory changes in Australia, technological advances around the globe and global capital market integration. As will be discussed later, these events are the cause of industry shocks and affect different industries differently. This overhaul in the Australian corporate environment was also accompanied by an economic expansion which led to periods of great capital liquidity. Hence, following Harford's (2005) theory that industry-level merger waves are caused by industry shocks and these individual merger waves cluster when there is capital liquidity in the economy, and applying it to the Australian setting is the most suitable option and therefore has been adopted in this study.

2

Data was collected for all merger bids that took place in Australia from 1996 to 2007. Industry-level merger waves were then identified and a logit test was performed to test the causes of merger waves. The set of characteristics that capture the economic consequences of an industry shock to a firm are adopted from Harford's (2005) study. However, data for two of the characteristics were unavailable and were hence omitted in this study, reducing the number of characteristics from seven as adopted in Harford's study to five, as used here. As in Harford, mis-valuation factors such as market-to-book, average one- and three-year stocks returns and the cross-sectional standard deviations of those returns are also used. The effect of an industry shock on different industries is different; hence its effect on every industry's performance is measured as the median absolute change in the economic characteristics that are studied.

The proxy used to capture capital liquidity in this study is similar to the one in Harford's. The Reserve Bank of Australia calculates the weighted average interest rate available for large business bills and this is comparable to the Commercial and Industrial Loan rate used in Harford's study. Harford used the federal funds rate to measure the spread between commercially available loans and the loans provided by the Federal Department to banks as a measure of capital liquidity in the economy. Similarly, I used the spread between the interest rate available to large business bills and the 90-day Australian Treasury bills as a measure of capital liquidity in the Australian economy.

Logit tests are then performed to predict the start of industry-level merger waves. The results show that neither the industry median market-to-book ratio nor the stock return nor standard deviations have any explanatory powers in predicting merger waves. The industry-specific economic shock measures, surprisingly are insignificant and do not predict merger waves. Only the capital liquidity rate spread is significant and sharply improves the predictive power of the model. Hence, the results in this study provide evidence that industry-level merger waves exist and these waves occur when capital liquidity is higher in the economy. The variables (EBIT, Asset-turnover, Capex, ROA and Sales Growth) used to capture the economic effects of an industry shock to an industry's operating environment in this study are partially incomplete and hence this might explain why they do not have any power in predicting industry merger waves. To identify the relation between industry merger waves

and aggregate waves, the clustering of industry merger waves was observed, although formal logit regression was not performed to test this relationship.

The remainder of the paper is structured as follows: Chapter 2 reviews the literature and establishes the framework for testing the hypothesis. Chapter 3 describes the data, identifies the waves and presents the logit tests. Chapter 4 discusses the model used, outlines the model's specific predictions and compares them to the results obtained and also discusses the implications of the results. Chapter 4 then identifies the limitations of the study and explores further research questions. Chapter 5 concludes this study.

Chapter 2

Literature Review

This chapter reviews the existing literature on merger waves. Firstly, the review discusses the history of merger activity in Australia and the characteristics of the historical merger waves in the US in order to find commonalities among them. Then, the various models, classified into (i) neo-classical and (ii) behavioural theories are summarised and discussed. Various aspects of the two theories are supportive in determining and explaining merger waves and are supported by various studies. Following this, a literary support is explored for the model tested in this study and its characteristics. Lastly, the review discusses the success and failure of mergers along with returns, measures of returns to various participants, determinants and types of mergers.

2.1. History of merger waves

Over the past decade, worldwide merger and acquisition activity has soared as the availability of cheap capital and strong corporate earnings increased. Healthy balance sheets and cheaper transaction costs are enabling strong market players to grow inorganically and both domestically and internationally through mergers and acquisitions. During this merger boom period, Australia has seen its share of growth in merger and acquisition activity. The value of takeover activities over the last few years is summarised in Figure 2.1.

Globalisation is the main cause for the surge in merger activity over the last 16 years. During this period, Australian firms have been both acquirers and targets in cross-border acquisitions. Factors such as tax considerations, the Trade Practices Act (1974) and a relatively saturated domestic market have largely contributed to Australian firms moving their head offices to foreign markets, where the returns have been higher.

Research theories that have investigated the motives of mergers and acquisitions in the Australian market have broadly found that neither hubris nor agency issues cause Australian firms to merge. Rather, they have supported the view that differentially efficient firms initiate merger and acquisition activity as documented in Da Silva Rosa and Walter (2004), when they investigated the various research conducted on the Australian merger market. Da Silva et

al. (2004) showed that the Australian bidder and target returns are in line with other countries, where they showed that the origin of the target (private vs. public), mode of payment (cash vs. stock) matters. More specifically, bidders earned strong positive returns when the target was private, as compared to a larger public target, and at announcement cash bidders outperformed stock bidders. However, returns to acquirers using both cash and equity to finance their acquisition, were positive. The non-negative market response may manifest because investors in Australia interpret share bids for private targets as a credible signal that bidders' shares are not overvalued. Da Silva et al. (2004) also showed that the pre-bid announcement abnormal return for cash bidders was 7.01% and was insignificant for equity and mixed bidders.

Historical studies have documented the existence of merger waves in the US. To investigate the drivers of the Australian merger waves, it would be a good beginning point to look at the drivers of the US merger waves.

After World War II there was an extended period of growth, which resulted in corporates becoming larger, and this resulted in the 1960's merger wave, which was an effort by these large firms to form larger conglomerates, diversifying into various industries. A merger wave in the 1980's restructured and dismantled the conglomerates formed in the earlier merger wave, and led to increased corporate focus and productivity that spurred growth in the 1990's. The 1990's merger wave saw corporate consolidations characterized by consolidation of market share and acquisition of new technologies. By closely examining the waves of the 1960's, 1980's, 1990's and the recent mid-2000's we find commonalities in the reasons for merger activity to begin, for firms to continue entering into merger transactions hence forming a wave and, for waves to end. These common features are discussed below:

2.1.1. 1960's merger wave – formation of conglomerates

In the 1960's large conglomerates formed a view to diversify (industry shock) as they witnessed continued growth and high returns over the preceding years. These firms were over-valued, and over-valued firms acquired less over-valued firms (mis-valuation). Due to an extended period of economic growth, finding capital for these "high flying" acquisitions was easy (due to capital liquidity). As the number of acquisitions increased, a growing number of bad acquisitions resulted in poor post-acquisition performance of these widely diversified conglomerates and hence a negative returns to bidder shareholders. This led to a

gradual decline in the capital availability for such transactions, causing much required capital tightening, causing the wave to end.

2.1.2. 1980's merger wave – divestiture

In the 1980's the large conglomerates formed in the 1960's had grown too big to perform efficiently and overall productivity decreased (industry shock). Due to these inefficiencies there was considerable under-valuation and financing acquisitions by cash became more attractive, as conglomerates were dismantled and partial firm acquisitions were undertaken to cause the unproductive units to be managed more efficiently and turned into profitable entities (mis-valuation). As cash was the preferred mode of payments for bidders, and for targets looking to off-load their unproductive units, a market for leveraged buyouts grew, providing access to capital for firms and management (capital liquidity). As these acquisitions increased there was a subsequent increase in debt levels, causing higher defaults, which resulted in banks and other debt markets tightening their lending criteria, thus bringing an end to the merger wave.

2.1.3. 1990's merger wave – acquiring advanced technology

The under-valuation and the divestitures witnessed in the 1980's had resulted in efficient management of firms and a subsequent period of economic growth that followed in the 1990's. Technological advances achieved during this high growth period caused saturated firms who had reached production constraints to acquire innovative firms (industry shock). This period saw the emergence of "Strategic Buyers" who sought to combine with targets who were related across business lines, and with whom high synergy value might be created. During this period, creation of companies of extraordinary size and global presence occurred based on the assumption that size matters, a belief upheld by large publicly listed firm's high stock-market valuations (mis-valuation). High stock valuations caused firms to finance their acquisitions using stock as a medium for payment (capital liquidity). After a period of high growth, the technological stocks slowed down and there was a dramatic slowdown world-wide. It resulted in the Internet stock bubble to burst and other over-valued stocks followed. The over-valuation was almost wiped out as banks tightened their lending criteria.

2.1.4. 2000's merger wave – globalisation and emergence of large private equity players

The latest wave is the period between late 2004 and mid 2007. Globalisation and privatisation form the shock to industry and to the economy in this latest wave of mergers. As more funds started coming into stock exchanges from hedge funds and retail investors looking for higher returns, there was an increased competition to acquire stock, resulting in high stock valuations (mis-valuation). During this period there was willingness among firms to pay high premiums to acquire strategic targets including record premiums paid by private equity players. This period has also witnessed continued years of low interest rates from federal governments across the globe, the rise of stock markets and sophistication in financial instruments (capital liquidity). The sub-prime resulting losses witnessed in the latter half of 2007 have prompted banks to tighten their credit criteria and subsequently ending the merger wave.

Hence, all four merger waves have experienced the same characteristics: an industry shock initiating the wave, existence of mis-valuation providing cheaper source of capital and, once the wave extended beyond fundamental reasons capital tightening causing an end to the merger wave. Previous literature has put forward various models explaining these merger waves and these models are discussed next.

2.2.   Various models proposed

There is a growing body of literature finding support for mergers occurring in clusters. Merger waves in the 1960's and the 1980's have been well researched and documented. More recently, the latter halves of the 1990's and mid 2000's have also witnessed clustering of merger activity forming waves. Each of these waves has distinct characteristics and there are specific reasons for the propagation of each wave. Empirical studies have broadly classified the reasons for mergers to occur in waves into: (1) neoclassical theory and (2) behavioural theory.

2.2.1. Neo-classical theory of merger waves

The various theories reviewed in this sub-section assume that neo-classical explanations of finance exist, such as market efficiencies and that managers always act in the best interests of shareholders. The major theories proposed under these broad assumptions are as follows:

Industry shock theory

The industry shock hypothesis predicts that, once a technological, regulatory, or economic shock to an industry's operating environment occurs, the collective reaction of various firms is to reallocate industry assets through mergers. To invest efficiently and react to this change, industry-firms use mergers and acquisitions, hence causing mergers to cluster within certain periods of high activity. Mitchell and Mulherin (1996) showed that the industries experiencing the greatest amount of takeover activity in the 1980's were those that were exposed to the greatest fundamental shocks. The takeover and restructuring activity in a particular industry tended to cluster within a narrow range during Mitchell and Mulherin's sample period. They based neoclassical explanations of rational merger waves on an economic disturbance, which leads to industry reorganization.

Restructuring theories

The neo-classical theory further suggests that merger and acquisition activity allows for a reallocation of assets from less efficient users to users that are more efficient. Supporting this explanation, Healy et al. (1992) showed that the merged firms improve the productivity of assets within industries. Jovanovic and Rousseau (2001) also showed that mergers offer a more efficient approach to restructuring assets within an economy by replacing inefficient managers with more efficient managers, discipline poor management and restructuring failed companies. Klasa and Stegemoller (2007) used long-run cumulative abnormal return (CAR), market-to-book (M/B) ratios, internal and external analyst's growth prospects to show that takeover sequences are an efficient reaction to an industry shock or technological change faced by an industry.

Growth theories

During periods of economic expansion, the demand for an efficiently run firm's product is high and there are more investment opportunity sets available. An efficient firm's manager must then decide between investing in organic growth and acquiring other firms. Both processes add to a firm's asset base and the ultimate choice to acquire will depend on fundamental factors such as market saturation, technological/supply shock, production constraints/technical knowhow, synergistic cost reductions or revenue enhancements and regulatory/deregulatory events. Gort (1969) argued that when a firm experiences increased demand for its products, external growth through takeovers is often the cheapest way to grow. Hence, mergers and acquisitions offer a cheaper and more effective way to respond to this

growth prospect, and therefore firms react to this increased investment opportunity by beginning a sequence of acquisitions. In addition, Gort added that, when the economic expansion slows down and growth opportunity closes off, an end to the sequence is caused. Maksimovic and Phillips (2001) found that, during periods of economic expansion, firms that are more efficient are likely to have a larger investment opportunity set to acquire assets from firms that are less able to exploit their assets. The authors used performance improvements at the plant level to support the neoclassical theory of merger waves.

Investment theories (Q-theory)

During a period of economic growth, firms experience a growth in return on their invested capital stock and hence their cost of capital is lower than their return on assets, motivating them to purchase more capital stock. The firm can choose from investing in either purchase of used plant and equipment or the purchase of an entire company. Jovanovic and Rousseau (2002) extended the q-theory of investment to mergers, and claimed that this extended Q-theory can account for merger waves. Dong et al. (2006) in their study of merger waves also found evidence in support of the Q-hypotheses of takeovers. Q-theory suggests that within an industry, well-run firms become acquirers and there is a transfer of assets from bad targets to good bidders, hence suggesting that an efficiently managed bidder designs a takeover to eliminate wasteful target behaviour. The Q-theory also implies that managers of inefficient bidders use takeovers to expand their domains of control, thus accommodating agency problems. Dong et al. compared mis-valuation hypotheses with the Q-hypothesis of takeovers and found that the high market valuation is due to higher growth prospects rather than mis-valuation.

Extensions of neo-classical theories

When a technological change or a regulatory change affects an industry, the improved technology or the restricted trading environment causes firms within an industry to merge. The merged firm is generally in a better position to take advantage of the change within the industry, causing the rival firms' performance within the industry to reduce. Yan (2006) modified the neo-classical theory to accommodate this competitive argument and showed that the firms choose to merge during a wave, despite the fact that their combined value will be less than that prior to merging. Yan showed that these mergers are still value maximising, as the merger wave is initiated by an industry shock and that not reacting by merging is value destroying. He also found that merger waves in highly concentrated industries destroy less

shareholder value and merger waves in Relationship industries also destroy less shareholder value. This further supports his imperfect product market competition model.

Harford (2005) in his study showed a clustering of mergers at the aggregate level is due to a combination of industry shocks for which mergers facilitate change to the new environment, and that there must be sufficient capital liquidity to accommodate the asset reallocation. He rejected the mis-valuation hypotheses that such clustering is due to market timing. Harford argued that for a shock to propagate a wave there must be an increase in capital liquidity and a reduction in financing constraints, which are correlated with high asset values. Harford's theory accommodated a value-maximising approach adopted by firms in response to an industry shock. This approach, along with the availability of capital, leads to a merger wave.

2.2.2. Behavioural theory of merger waves

Various theories have been proposed which drop the neo-classical assumptions of efficient markets and that managers are always attempting to maximise shareholder wealth. Behavioural theories of merger waves comprise all these non neo-classical explanations. The major hypotheses proposed are as follows:

The market-timing hypothesis

This is also known as the overvaluation hypothesis. It states that some firms share prices become overvalued during stock market booms, and that the degree of this market overvaluation of firms influences investment decisions. It holds that market inefficiencies have an important effect on takeover activity. Bidding firms tend to profit by buying undervalued targets at a price below fundamental value. Shleifer and Vishny (2003) showed that firms with overvalued equity might be able to make acquisitions, survive, and grow, while firms with undervalued, or relatively less overvalued, equity become takeover targets themselves. Long-run returns to bidders are likely to be negative in stock acquisitions, and positive in cash acquisitions. Despite negative long-run returns, acquisitions for stock serve the interests of long-term shareholders of the bidder, due to over-valued stock being used to purchase real assets which will generate returns in the long term.

Even when the target stocks are overvalued, the bidding managers are able to acquire targets overvalued stocks by paying with their own overvalued stocks. Hence, the market-timing hypothesis implies that target stocks will be relatively more undervalued than the bidder's

stocks. Rhodes-Kropf, Robinson and Viswanathan (2005) argued that managers react rationally to irrational financial markets. They linked overvaluation as a driver of merger waves and showed that when an acquirer makes a stock bid, the target management even though realising that the acquirer's stock is overvalued they rationally reduce their own stock overvaluation while considering the offer made by the acquirer.

The market-timing theory predicts that returns to acquirers in the long term will be negative and despite this negative return, managers have engaged in value increasing merger activity as real and productive assets replace over-valued stock.

Managerial-discretion hypothesis

Under this hypothesis, managers get personal benefit from the growth of their firm's size. This personal benefit is either in the form of monetary incentive or from the impact of managing a larger firm on one's resume or sometimes even the so-called 'psychic income'. An increase in the size of a firm is not always wealth-maximising for the firm's shareholders. Goel and Thakor (2005) proposed an 'envy' theory, where the CEO's of bidding firms are envious of the compensation of CEO's of other, larger firms and hence engage in mergers, thereby increasing firm size which in turn is correlated to CEO compensation. This 'envy' causes other CEO's to increase their compensation by also engaging in mergers, even though their own synergies do not require them to. The authors showed that the targets in the early part of a wave are smaller than the targets in the latter half. Goel and Thakor explained that the returns to bidders are higher during the early part of a wave than the return to bidders in the latter half. They also showed that the gain in CEO compensation is higher during the earlier mergers in a wave than in latter mergers.

Another assumption of the managerial-discretion theory is that merger waves occur during stock market booms because the optimism prevailing in the market allows growth-seeking managers to undertake more wealth-destroying mergers than they safely carry out under normal market conditions. Mueller and Gugler (2008) proved the existence of merger waves in the UK, the US and Continental Europe. They tested whether 'real changes' in the economy like a shock to an industry's trading environment affects these waves or whether the wave is caused by market timing/overvaluation. Mueller and Gugler argued that if there is a real change, it should affect both listed and unlisted firms similarly and both types of firms should react in the same way to the shock. They found that the peak in the stock market

coincides with the actual occurrence of the merger wave, and that, only listed firms participated in the merger waves, with strong evidence from the UK and Continental Europe and some evidence from the US. Mueller and Gugler also argued that managers took advantage of the optimism in the stock market to acquire other companies, hence finding support for the managerial-discretion hypothesis over any of the neo-classical theories or the overvaluation hypotheses.

Another explanation of the managerial-discretion hypothesis is that it also predicts that firms managers are wary of a takeover threat and hence engage in empire building. Their behaviour differs from managers who maximize shareholder wealth with respect to mergers that are positive net present value (NPV) projects. Gory et al. (2005) proposed two scenarios, the first being a defensive scenario where managers of independent firms work on the theory that a firm of a given size cannot be acquired by a larger firm; hence by acquiring other smaller firms they reduce their firms' chance of being taken over. "The defensive motive is self-reinforcing and may generate a wave of defensive acquisitions" Gory et al. (2005). The second scenario described by the authors is an efficient scenario where firms engage in profitable acquisitions.

Another motive for the manager-discretion hypothesis is that each period of economic boom brings its own theories of why certain mergers will be value creating for example, the conglomerate mergers of the 1960's, the internet stock mergers in the 1990's, etc. The market hence begins to believe that these types of mergers will generally generate synergies and the announcement of these mergers is initially received positively by the market. Hence, managers undertake such mergers without the fear of large negative returns on announcement of deals that are self proclaiming. The negative return to such acquirers is revealed only during recessionary periods and when the perceived synergies have failed to materialise.

Acquisition-probability hypothesis

When an overseas bidder bids for a target within an industry, then the success or failure of this announcement increases the probability of other rival firms becoming targets and being taken over by other overseas bidders seeking technological or competitive advantages. Otchere and Ip (2006) found support for the acquisition probability theory by computing merger announcement returns for cross-border transactions. They argued that net abnormal return from acquisition announcement and termination is positive due to the expectation that

other international bidders may subsequently acquire rival targets. Otchere and Ip showed that rival firms exhibit significantly positive stock price reactions to news of cross-border acquisition proposals within an industry and the subsequent termination of the proposal.

Psychological and sociological theories

Duchin and Schmidt (2008) provided a link between the agency theory and merger waves. They found that in-wave mergers long-term performance is worse than the long-term performance of out-wave mergers, in-wave mergers are poorly managed and governed, and that managers are less likely to be fired following a bad merger if it was made during a wave.

Under Roll's (1986) hubris hypotheses, mergers destroy value because overconfident managers pursue what they think is the best strategy, and fail, rather than knowingly sacrificing shareholder value for personal gains.

Brewster and Kenneth (1996) defined "challengers" as those who have the structural opportunity and the individual incentive to change things and are willing to innovate. They showed that "challengers" using "innovations", as in the 1980's leverage-buyouts, are the initiators and the first ones to react to an industry shock. Well-informed business managers of large corporates quickly follow them with easy access to capital. Brewster and D. also argued that "imitators" are the last ones to react to the industry shock and are entering into transactions only to imitate the "challengers" and the "leaders". There are no fundamental reasons for them to enter into a merger and hence they suffer negative returns.

2.2.3. Model tested

The neo-classical theory of merger waves helps explain individual mergers and can also explain industry-level mergers caused by an industry shock. However, on an aggregate level, several industries would have to undergo a shock simultaneously for a merger wave to be explained by the neo-classical theory. Harford (2005) added a macro-level liquidity factor to the industry shock hypothesis and found that merger waves on the aggregate level in the US are caused by an economic motive (shock) and cheaper transaction costs which accompany an economic expansion. However, Halbheer and Gärtner (2006) used a Markov regime switching model in detecting waves in merger activity. They did not support the notion that waves in aggregate merger activity occur due to the clustering of industry-level waves. Halbeer and Gärtner's results did not find support for the existence of a merger wave in the

1980's, but they did find evidence of the existence of merger waves starting from the fourth quarter of 1995 in the US.

To test the industry-shock hypothesis and the importance of capital liquidity in the economy as used in Harford's (2005) study to explain the drivers of merger waves in Australia, the following equation is used:

P (merger wave) $_t$ = α + market-to-book$_{t-1}$ + 3 yr return $_{t-1}$ + σ (3 yr return) $_{t-1}$ + high capital liquidity $_{t-1}$ + economic shock index $_{t-1}$ + low capital liquidity $_{t-1}$

The dependent variable predicts the probability of when an industry will have a merger wave. The independent variables are at time t-1 and precede the year in which the merger wave occurred. The motives for the use of the independent variables: namely, industry shock (economic shock index); mis-valuation (market-to-book ratio, 3 year return and standard deviation of 3 year return); and capital liquidity (low and high capital liquidity) are discussed below.

Industry shock

A shock to an industry's operating environment affects the dynamics and functioning ability within the industry. The industry shock alters the value of the assets, creates over/under capacity, drives managers to be more innovative, and increases the importance of synergistic gains to maintain/grow market-share, thereby providing more incentives for transfer of assets to more productive users within an industry. Firms in some industries expand while those in other industries contract, for instance the oil industry in the mid to late 1990's saw a period of large mergers and a general consolidation within the industry.

The "economic turbulence" from industry shocks is always present, but it affects various industries and the firms within them differently. Some of the shocks that can affect industries are described below:

Deregulation: is a process by which governments eliminate, decrease, or simplify restrictions on businesses and individuals with the intention of encouraging the efficient operation of private markets. This has in the past unleashed a wave of consolidation and rationalization of firms.

15

Trade liberalisation: is the liberalisation of trade policies within countries to promote free-flowing trade among members without restrictions, this allows for more foreign direct investment (FDI). Mergers and acquisitions are the most popular form of FDI.

Geopolitical and demographic change: is a change in geographic, political or demographic factors affecting businesses. A change in government policies or governments themselves can lead to restructuring of industries. Also, a change in the make-up of the population can lead firms to either expand or consolidate.

Technological change: advances in technology prompt all technology-linked industries to restructure through mergers and acquisitions.

Innovation in financial markets: the high yield debt market which was one of the main characteristics of the 1980's merger wave is the ideal example of how growth in sophistication and efficiency in financial markets can lead to increased merger activity.

Globalization: the integration of world markets has caused increased pressure on firms to maintain a global presence to remain competitive. Globalisation provides access to new suppliers and customers for businesses and can cause economic turbulence.

Organisation innovation: conglomerates of the 1960's, leverages buyouts of the 1980's, and strategic buyers of the 1990's are some examples of how organisational inventions affect merger waves.

Changes in demand and supply: consumer demand over the last two decades has varied drastically. The advancement of technology has caused products to go out of fashion more quickly than in the past and more mid-sized firms have had to merge or to exit from the industry to sustain these changes in demand.

Changes in capital market condition: the cost and the supply of money are crucial factors in determining merger and acquisition activity.

Various studies have investigated the way industries respond to these industry shocks. Andrade and Stafford (2004) suggested that merger activity plays a dual role, 'expansionary' because of an increase in a company's capital base in response to good growth prospects and 'contraction' providing a more productive and efficient response to an industry shock. They also suggested that firms with better performance and an efficient management are in a better position to take advantage of this asset reallocation within an industry. This replaces complacent managers with productive and efficient managers, thereby increasing productivity and providing technical advances. Harford (2003) showed that a reallocation of resources happens when an industry's environment undergoes a shock (economic, deregulatory, competition, etc), and this reallocation occurs through mergers occurring in clusters. These merger waves are efficient industry activity, while mergers driven by hubris, herding, free cash flow are value destroying. Jovanovic and Rousseau (2002) put forth Q-theory in which technological change and a subsequent increased dispersion in Q-ratios lead to high Q firms taking over low Q firms. Maksimovic and Phillips (2001) showed that the timing of mergers and the pattern of efficiency gains suggests that the transactions that occur, especially through asset sales of plants and divisions, tend to improve the allocation of resources and are consistent with a simple neo-classical model of profit maximizing by firms. They also showed that some firms are more productive and produce more than other firms from any given number of plants. Firms adjust in size until the marginal benefit is equal to the marginal cost of production. As output prices increase, the more productive firms have a larger gain in value from the assets they control.

Mis-valuation

The mis-valuation hypothesis of takeovers holds that market inefficiency has important effects on takeover activity. These effects stem from the efforts of bidders to profit by buying undervalued targets for cash at a price below fundamental value, or by paying equity for targets that, even if overvalued, are less overvalued than the bidder is. Bidder and target mis-valuation provides managerial incentives, and therefore affects transaction characteristics including the means of payment (stock versus cash), the form of the offer (merger versus tender offer), bid premium, hostility of the target to the offer, success of the bid, and event-period returns. Overvaluation will be more in bidder stock than in target stock.

While testing this mis-valuation hypothesis, mixed results have been put forward by various studies. Harford (2005) found his mis-valuation proxies in predicting merger waves were

insignificant. Klasa and Stegemoller (2007) showed that technological change drives merger waves and do not support the mis-valuation proxies. Shleifer and Vishny (2003), Rhodes-Kropf, Robinson and Viswanathan (2005) used more sophisticated techniques in determining the mis-valuation and found that it had a significant motive. Ang and Cheng (2006) provided evidence that overvaluation could be a motive for most stock acquisitions, although not for all stock mergers. Gugler, Mueller and Yurtoglu (2006) replaced the shock proxies in Harford's (2005) explanation of merger waves with time dummies defined by two-year intervals. They found correlation between the spread, the average interest rate on commercial and industrial loans and the Federal Funds rate, used by Harford, as a proxy to capital liquidity, and the Standard and Poor's (S&P) price to earnings ratio (P/E), hence suggesting that this spread is not measuring the capital liquidity and is rather capturing the effect of the S&P price-to-earnings ratio (P/E). Gugler et al. (2006) included the P/E in Harford's equation and found it to be significant, hence indicating that mis-valuation is, in fact, significant and helps to explain the start of a merger wave.

However, both the papers, Shleifer and Vishny (2003) and Rhodes-Kropf, (2005), conclude that other fundamental factors could well be the drivers of merger activity, but mis-valuation affects how these shocks are propagated through the economy, suggesting that the drivers of a merger wave could be a combination of both the shock hypotheses and the mis-valuation hypotheses.

Capital liquidity

Financial constraints are the major stumbling blocks most firms face. The ability of firms to raise capital to invest in positive NPV projects or react to industry shocks is the backbone of economic expansion. If firms are unable to raise such capital relatively freely, economic growth is affected and this can have recessionary effects. Merger and acquisition activity is pro-cyclical and is greater in an economic expansion. Hence, one could argue that merger and acquisition activity is not a result of random manager behaviour, but is a result of deeper forces of change at work in an economy. To identify the drivers of merger waves leading financial indicators which affect economic cycles should be considered. One such indicator is the capital liquidity. The amount of funds that are potentially available for firms to borrow in the financial system as a whole is referred to as capital liquidity. A change in the supply of money to lenders causes a change in the capital liquidity. The monetary transmission mechanism states that an increase in the money supply increases overall capital liquidity in

the economy, which lowers interest rates; that, in turn, encourages growth and increased investments. Hence interest rate is a tool that affects aggregate demand and investment. This is because when an increase in the nominal money supply increases the real supply of money, the opportunity cost of holding money comes down. This opportunity cost is the nominal and real interest rates. Hence a measure of the capital liquidity in the economy is the interest rate.

As in Harford (2005), this study uses the capital liquidity factor to explain merger waves. Eisfeldt and Rampini (2006) found that capital liquidity is pro-cyclical, as the opportunity cost of foregone productivity during an expansionary period is higher than financial friction costs. In addition, they found that the financial friction costs are counter-cyclical hence implying capital liquidity is lower during economic recession. Further, Shleifer and Vishny (1992) linked market values of assets to capital liquidity, showing that financially unconstrained buyers are able to buy assets at their fundamental market values. Shleifer and Vishny showed that merger waves often occur during an economic expansion and are due to the increase in asset values which provides firms easy access to capital, hence relaxing any financial constraints.

This sub-chapter reviewed the various studies that have used neo-classical assumptions to explain the causes of merger waves, and other studies that have used non neo-classical assumptions, classified under behavioural theories of finance, to explain the causes of merger waves. Neo-classical theories advanced a rational approach in explaining the causes of merger waves, and an extended hypothesis provided by Harford (2005), the industry shock hypothesis is used to test the causes of merger waves in this study. The success or failure of a merger transaction is measured by the returns to the various stakeholders. The returns to various stakeholders are discussed next; as these returns show how the stock performance of an industry is affected by various shocks and what type of transactions provide greater returns.

2.3. Returns to participants

In estimating the success of a merger transaction, the first observable fact is the returns to the various stakeholders. Research has shown that on average a merger transaction often creates wealth. While the target shareholders gain the most, the bidder shareholder return on average is a zero abnormal return at announcement. Announcement period returns are generally short-term returns, only capturing the assessment of the merged firm at the time of the merger;

however, only the bidder management knows the true value of the combined firm over a longer term while making the bid.

The most conventional view of merger returns are that, for public targets, as the relative size of the target increases, the returns become more positive for cash offers, more negative for stock offers, and change little for combination offers. For both subsidiary and private targets, there is a positive relationship between the target's relative size and the acquirers' positive abnormal returns; returns to the bidder using stock are greater than if the bidder had used cash for private targets.

2.3.1. Target vs. bidder shareholders, short-term vs. long-term and cash vs. stock bids

A report by JP Morgan, as reported in *The Sydney Morning Herald* (Weekes 9 February 2005) into takeovers, mergers and spin-offs among ASX200 companies over the past 10 years found that generally cash bids are better for investors in the target company as about 80 per cent of takeovers reduce the value of the acquiring company. Cash bids signal to the market that the bidding firm has confidence in the quality of the target firm. Companies that bid with cash outperform the market by 8.6 per cent for one year following, while non-cash bidding companies underperform the market by close to 9 per cent.

The modes of payment and the public/private target are much-researched factors in determining returns to acquiring shareholders. The broad finding is that bidder returns are zero or negative when they bid for a publicly listed target and use stock as a mean of payment, while they are significantly positive when bidding for private targets and when they use cash to pay for the acquisition. Fuller, Netter and Stegemoller (2002) found that the stock returns of the bidder at the time of the announcement of the bid may tell us more about how the market is reassessing the bidder's business than it does about the value of the acquisition. They also proved that bidders have negative returns when bidding for public targets and a positive return when bidding for private or subsidiary targets. They showed that when the payment mode is cash, the returns to bidders improve significantly, while stock-financed transactions provide a negative return. Hazelkorn, Zenner and Shivdasani (2004) showed that success drivers, such as purchase of private companies in the same industry, business units/assets are transactions that have created value. Purchase of public companies in different industries has destroyed share holder value. Cash transactions returned more than stock transactions and foreign acquisitions provided better returns than local acquisitions.

These success drivers provide a key indication as to whether a transaction creates value for the acquirer.

A focus acquisition, where a firm acquires another firm within the same industry, is perceived as being able to generate high synergistic gains and these types of acquisitions are attributed with more chances of success than a diversification acquisition, where a firm acquires another firm from a different industry. The general conception of this latter strategy is that managers are ill equipped to derive the synergies and are more prone to failure due to the lack of experience of the board in the new industry. However, the diversification strategy is a useful one when the acquirer industry undergoes a shock such as losing market share, increased costs, etc, providing a useful strategy to exit a particular industry. In line with this argument, Bruner (2004) found that the market views a focus acquisition more positively, measured as the bidder's announcement period stock-return, as compared to a diversification acquisition strategy. Bruner noted that an acquisition in the same industry matters, however a diversification strategy is potentially a valuable mechanism for exit and re-entry elsewhere. Bruner also discounted for contamination events, overvalued stock consideration and industry shock, arguing they are not a product of the transaction, when judging returns. He found that target firm shareholders gain abnormal returns, while acquirer firm shareholders essentially break-even i.e., on average, earn their required rate of returns.

A market's immediate reaction to a merger announcement is significant at the time, as it reveals important information about the market's perceived value of both the stand-alone value of the acquirer and the combined value of the merged firm, thus indicating the value of the synergies or benefits derivable by the acquirer. Andrade, et al. (2001) found that the announcement period abnormal return to an acquirer's stock predicts the success/failure of a merger when post-merger performance is compared to industry benchmarks and peers. If the market perceives that the merger is driven by non-fundamental factors such as manager discretion, over/under-valuation, hubris or agency motives then it immediately shows its disapproval by discounting its share value accordingly. Moreover, the market is forced to recalculate the value of the acquirer by itself and as a combined entity. The market could find that they had previously assumed the growth prospects of the acquirer to be higher/lower and that those growth prospects are no longer available or have increased in light of this new transaction, and adjust the share price accordingly. This can cause announcement results to be positive for some acquirers and negative for others.

Hietala (2003) noted that the announcement of a takeover reveals information about the potential synergies in the combination, the stand-alone values of the bidders and targets, and the bidder overpayment. They argued that it is often impossible to isolate these effects and thus know the meaning of the market's reactions to a takeover announcement. This short-term return is an important assessment of the merger; however, it should not be used as the only measure of assessment as industry environment changes all the time and long-term abnormal returns should also be used in determining the success of a merger. Antonio, Petmezas and Zhao (2007) provided evidence from the UK market that short-run results can be driven by market mispricing and no conclusion must be drawn based solely on short-term results. Their findings imply that the stock market may initially overreact to a takeover event in the short run but prices in the long term are gradually corrected. These findings also cast doubt on the empirical view of market efficiency that short-run returns were good economic indicators of abnormal returns. The "what if" scenario is also an important aspect in measuring the returns, and a comparable benchmark should be appropriately established.

Moeller, Schlingemann and Stulz (2005) showed that firms with high valuation, announcing deals earn significantly negative abnormal returns. In addition, this high valuation is not sufficient to explain the change in returns associated with acquisition announcements, since these firms have had comparable valuations when they announced previous mergers or acquisitions that were associated with positive abnormal returns. "The magnitude of the losses is large enough and the performance of the firms after the announcement poor enough that it seems probable that the acquisitions led investors to reconsider the extremely high stand-alone valuations of the announcing firms" Moeller, et al. 2005, p. 781). This evidence suggests that the acquiring firm's strategy of growing through acquisitions is no longer sustainable and will not create as much value as they believed previously.

Another measure of computing returns is comparing operating performance of the merged entity to the pre-merger operating performance. Powell and Stark (2005) used a benchmark of expected performance that controls for industry, size and pre-performance while estimating post-acquisition performance for UK bidders. Using this method, they found that takeovers create real improvements in operating performance for acquiring firms. However, their results highlighted some methodological issues that appeared to be significant in testing

whether takeovers create real improvements in the post-takeover operating performance of acquiring firms.

2.3.2. In-waves, out-waves merger returns

The assumption that industry firms systematically react to a shock (technological, regulatory, etc), as shown by Mitchell and Mulherin (1996), Harford (2005), implies that, generally these mergers should be wealth-creating for the participants in the long term. Mergers occurring within a wave, hereafter in-wave mergers are motivated by a common factor (say an industry shock) and are hence value-maximising for their shareholders relative to the market or other firms in the same industry. Mergers and acquisitions occurring outside a wave, hereafter out-wave mergers, are prone to various motivations, which can also include value-destroying decisions. Harford (2003) in his study confirmed this argument where he tested whether there is wealth creation or destruction during merger waves and compared these returns to non-wave period mergers. Harford found that in-wave mergers create 16% abnormal return compared to the market portfolio. Out-wave merger's abnormal return is insignificantly different to that of the market portfolio.

Notwithstanding this, the firms that react first to the industry shock using innovation are the most successful, while firms that are late in reacting to the same industry shock and are thus late entrants to the wave or are using this merger wave for the manager's own benefits for e.g. envy theory, empire building, etc are the least successful. The market identifies the "winners" and the "losers" early by rewarding or punishing their stock. Harford (2003) showed that the early entrants in the wave gain the most, while the entrants in the middle period of a merger wave have insignificant returns as compared to the market.

The late-comers are usually the worst performing and pay the highest premiums as they enter when the market for mergers is "hot" and valuations are driven to the higher end. These negative returns force the merger wave to stop. More recently, Gebken, Floegel and Johanning (2005) computed the returns for 18 industry merger waves comprising 1025 bids. They found that mergers at the beginning of a wave provide acquiring shareholders a significant 1.5562% abnormal return, while mergers at the latter stages of a wave earn a significant -1.1079% abnormal return. They attributed this negative abnormal return at the later stages of a wave to the competitive advantage theory, where "the bidders are often forced to overpay for their targets" Gebken, et al. (2005, p. 6). They also found results which

indicate the hubris hypothesis, where overconfident managers over-estimate the advantages of the mergers, thereby overpaying for their targets.

Yan (2006) found that stocks of acquirers during a wave underperform stocks of acquirers outside a wave by 15% over one year and by 40% over two years. He concluded that merger waves not only destroy the firm value of merging firms, but also lead to poor performance of industry rivals. However, he did not consider the effect of an industry shock which might have initiated the merger waves, as his theory does find that, within the waves, the merging firms have significantly better results than their non-merging rival firms.

Out-wave merger returns depend on the various characteristics of the merger itself. Various studies have tried to explain these characteristics, with the most popular being the status of the target "private or public", mode of payment "cash or stock", focus or diversification merger strategy, and size of target relative to acquirer, among others. Fuller, Netter and Stegemoller (2002) found that bidders have significantly negative returns when buying public targets and significantly positive returns when buying private or subsidiary targets, acquisitions of public targets result in insignificant bidder returns for cash or combination offers but significantly negative returns to the acquirers when stock is offered. They argued that since little is known of private firms, and the subsequent election of target shareholders/management to the board of the merged entity shows the market that there will be close involvement of these experienced managers that will help improve the realisation of targeted synergies. When cash is used as the mode of payment, the market infers that the acquirer is confident of realising the synergies and the acquiring firm does not want their shareholders return to be diluted.

Gory, Matthias and Rosen (2005) provided a useful insight of the dynamics within an industry. They analysed how different industries react to a shock and how the returns are distributed among various industries. They argued that the negative return to acquiring shareholders is due to the clustering of inconsequential mergers (defensive merger theory) which may even prevent profitable mergers from happening. They also argued that the size of firms within an industry is an important factor in determining the returns to the acquirer's shareholders, an industry with similar sized firms will engage in defensive merger waves and undertake more negative NPV projects. As a result, these firms will experience the worst average abnormal return. An industry with firms of different sizes is most likely to undertake

more positive NPV projects, exhibiting merger waves where acquirer-firm shareholders experience, on average, better abnormal returns.

The literature reviewed in this Chapter has outlined the importance of identifying the causes of merger waves and has helped in identifying the similar characteristics, i.e., industry shock, mis-valuation and capital liquidity, of the past merger waves in the US. These characteristics were used together in explaining merger waves by Harford (2005). Harford's extended industry shock hypothesis is adopted in this study in identifying the merger waves in Australia and in testing the causes for these merger waves. The data collected and the methodology used to test the hypothesis is explained in the next chapter.

Chapter 3

Data and Methodology

Merger and acquisition data from 1996 to 2007 is collected from the past-announcements made by listed firms on the Australian Stock Exchange (ASX) and from Datastream International Limited. In total there are 541 bids announced during this period, for which merger transactions are identified. Out of these, 299 bids are made by publicly listed bidders and 242 bids are made by either private or overseas bidders. Each bidder and target is assigned to one of 10 industry groups, as classified under the Global Industry Classification Standard (GICS) by Standard and Poor's/Morgan Stanley Capital International. Harford (2005) split his sample into two time periods of 10-year each, following Harford's methodology and to balance the two time periods, I split the data into two six-year periods. Also as the late 1990's and mid-2000's are characterised by two distinct aggregate merger waves, I split the sample into two six-year periods, the first from 1996 to 2001 and the second period from 2002 to 2007. These time periods are subjective, however, due to limitation of the data, the hypotheses are tested based on this.

The data in Table 3.1 suggests that takeover activity tends to cluster within a two-year period in any given industry. For example, in the utility industry, 86% of the seven takeovers within the second six-year period occur within two years and 67% of the six takeovers during the first six year period in the Telecommunication industry occur within two years. Even in both six-year periods in the more active Materials industry, 50% of the takeovers occur within two-year periods. More generally, 41% of the takeover activity is concentrated within two-year periods in both groups of six-years. Mitchell and Mulherin (1996) found a similar pattern of clustering of mergers within a 24-month period. In their study of merger and acquisitions in the US from 1982 to 1989, they found that half of the mergers occur within a two-year period. Over the 12-year sample period in this study, the average number of bids any one of the 10 industries sees in a two-year non-wave period is 8.9 while the average number of bids it sees during a two-year wave period is 12.6. Therefore waves in this study will be two-year units.

3.1. [1]Number of bids, transaction value

Table 3.2 reports the number of bids made during the two six-year periods and the value of those transactions. The first six-year period witnessed slightly fewer numbers of bids in comparison to the second six-year period. However, the second six-year period comprised 62% of the total value of the announced bids, suggesting that larger deals were announced during the 2002–2007 years.

Figure 3.1 displays the number of bids announced each year. 2006 was the most active year for mergers, which witnessed 67 bids, followed by 57 bids in 2000 and 53 bids in 2001. 1998 was the quietest year for merger and acquisition activity with only 24 bids announced, followed by 2005 which witnessed 38 announced bids. The average number of bids announced each year was 45.

The total value of merger and acquisition activity in Australia annually is shown in Figure 2.1. 2006 and 2000 saw the highest value of announced transactions. The value of a transaction is measured as the bid price multiplied by the share price of the target on announcement date. The years between 1996 and 1999 witnessed 152 announced bids which amount to 28% of the total number of announced bids, but the combined value of the transactions within these three years is only $24 billion which is merely 11% of the total announced transaction value. The years 2004 and 2006 both witnessed a below average number of bids but were characterised by large individual transactions.

The merger announcements collected in this study are classified into either publicly listed bidders or private/overseas firms. Public bidders are all firms that are listed on the Australian Stock Exchange (ASX), these are either local firms or overseas firms listed on the ASX. Private firms comprise privately held firms and private equity firms, and overseas bidders are firms that are listed on overseas stock exchanges or are overseas private firms, and are bidding for targets that are listed on the ASX. Private firms and overseas firms are combined together due to the limitations of the data set and the difficulties faced in obtaining further information on firms that are not listed on the local Australian stock exchange.

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[1] An alternative way to identify merger wave within an industry is to observe when the industry shock occurred in the industry or when there is an increase in liquidity. However this paper follows Harford (2005) methodology in identifying the start of industry merger waves.

The data is further split into firms that have financed or intend to finance their acquisition through either cash or equity/mixed bid. There is a vast literature, as briefly explored in the earlier chapter, which identifies the mode of payment being an important element in determining the success or failure of a merger. Both public and private bidders have used both modes of payments extensively, hence data is further classified as cash vs. equity/mixed bids for private and public bidders seperately.

Public vs. Private/Overseas

Figure 3.2 splits the announced bids by the origin of the bidder. Public bidders are those firms that are listed on the ASX. Private/overseas bidders are the combination of privately held companies, private equity firms and overseas firms. Fifty-five per cent of the bids announced during this period are by publicly listed firms, while 45% of the bids are made by either private equity firms or overseas bidders. The year 2006 attracted the largest number of overseas and private bidders to bid for publicly listed firms, while 2000 was the least popular for these firms.

The transaction value of public and private/overseas bidders is reported in Figure 3.3. The year 2006 witnessed the highest value of announcements from overseas and private bidders, while 2002 witnessed the lowest value of transactions from private firms.

Utilities, Telecommunication, Energy and the Industrial sectors have seen the highest percentage of bids in terms of value made by either overseas/private firms. Figure 3.4 shows the percentage of public and private/overseas bidders in each industry. (The targets are allocated into one of 10 industries as classified under the Global Industry Classification Standard (GICS) by Standard and Poor's/Morgan Stanley Capital International). Domestic industries such as Information Technology, Consumer Discretionary and Health Care have seen the highest percentage of bids made by publicly listed companies.

Cash vs. equity/mixed bids

An interesting feature of the merger bids announced in Australia is the high percentage of cash bids in terms of value as compared to other larger markets in the US and among European countries. Figure 3.5 presents the percentage of cash and equity/mixed bids for each industry. The value of the cash bids during the sample period is 65% of the total value

of the announced bids, with all industry sectors but the Telecommunications, Finance and Consumer Discretionary sectors having a larger percentage of cash bids than equity bids.

Cash was the most popular mode of payment in 2000, 2006 and 2007, with huge cash deals being announced during these years, as shown in Figure 3.6 which presents the total value of cash and equity bids for the 12-year sample period. Equity/mixed bids were the most preferred mode of payment only in 2001.

3.2.   Premium offered

For the purpose of this study and under efficient market assumptions, that announcement period returns should reflect the true reaction of the market to the transaction, the announcement period 1-day return is used in determining the bid premium. Bid premium is calculated as the excess return over the closing share price of the target over the bid price on the day the bidder announces his bid. For instance, when a cash bid is made, the actual bid amount is divided by the closing share price of the target, while for an equity bid the closing share price of the bidder is divided by the closing share price of the target for a straight one-for- one share swap. For any other share swap ratio the proportionate value of the bidder's share is divided by the proportionate target's share. However, a number of recent studies have shown that there is a run-up in the share price leading to the announcement day in anticipation of the bid. Hence, it is common to look at the historic volume weighted average price (VWAP) over a given number of days, say up to 30 days, in determining the premium paid to acquire the target's shares by the bidder.

For this reason a direct comparison of the premiums determined using announcement period returns to premiums calculated in other studies is not viable. However, the high premium years determined in this study are in line with high premium years in other studies and similar results are obtained for low premium years.

Figure 3.7 shows the premium offered by bidders to acquire their targets. The average premium paid over the 12-year sample period is 14% across all bids announced. The late 1990's saw a very small premium being paid by bidders to acquire their targets, however since 2000 the bid premium has been significantly higher with an average of 22% premium paid between 2000 and 2004.

Public vs. private/overseas bidders

The general presumption is that private firms calculate the value of the benefits arising from the acquisition more conservatively and hence pay lesser premiums to acquire their targets. Moreover, as these acquisitions are financed using high leverage, thereby committing the bidding firm to fixed interest repayments, the management is even more rigid in calculating the realizable value of the transaction. Meanwhile, publicly listed firm's management is more liberal in calculating the synergies, and, as discussed earlier, the management of publicly listed firms is not always acting to increase shareholder value. Hence, it would imply that public bidders pay more premium than private bidders.

Figure 3.8 splits the announced bids by the origin of the bidder i.e., public, private/overseas. The average premium paid remained positive in all years except 1997 where it was marginally negative. Public bidders, on average, paid a premium of 17% which is higher than the premium paid by private/overseas bidders, which was 15%, to acquire their targets than private bidders. Even though the last three years have seen an increased role for private equity firms in driving the premiums upward, private and overseas firms combined still pay less for their acquisitions.

Cash vs. equity/mixed bids

Figure 3.9 splits the bid premium by the mode of payment used, cash and equity/mixed, by the bidders to purchase their targets. Bidders financing their transactions using equity paid a premium of 15%, which is more than the 13% premium paid by cash bidders for their targets. An industry-wide breakup of the bid premium is provided in Figure 3.10. The Utility industry has seen the highest premium being paid by bidders to acquire targets within this industry. There are nine transactions occurring within the utility industry and these targets have been the most expensive to acquire. Even though the material industry has the maximum number of bids during the 12-year sample period, an average premium of 23% is paid to acquire the targets within this industry – considerably higher than the average premium paid across all industries, which is 14%. Targets in the Information-Technology industry have been the cheapest to acquire with the least premium being paid in this industry.

3.3. Merger wave identification

As discussed earlier, merger waves in this study are for a two-year period and the sample is divided into two six-year periods. Thus, for each industry, the highest two-year concentration of merger bids involving firms in that industry in each six-year period is calculated. This two-year period is identified as an industry wave. As shown in Table 3.1, on average 41% of mergers cluster within a two-year period in each of the six-year periods. In total, there are 21 industry waves over the entire sample period, with 10 industry waves occurring in the first six-year period between 1996 and 2001 and 11 industry waves occurring in the second six-year period between 2002 and 2007. The industries in which the waves occur, the wave start dates and the number of mergers occurring during each industry wave is listed in Table 3.3.

Seven industry waves cluster together during 1999-2000 and similarly, seven industry waves also cluster between 2005 and 2006 and these two periods consist of 35% of the total number of mergers occurring during the entire 12-year sample period as reported in panel B of Table 3.4. Panel A of Table 3.4 shows that the mergers occurring during these two two-year periods represent 72% of the total number of mergers occurring within all the 21 industry merger waves. As 14 of the 21 industry merger waves occur during these two two-year sample periods i.e., 1999–2000 and 2005–2006, this evidence points out that there are two distinct aggregate waves in the 12-year sample period.

Within these two potentially aggregate merger waves, the first year is relatively less active than the second year as shown in Table 3.5. In total there are 76% of the mergers occurring in the second year, while only 24% of the mergers occur in the first year.

3.4. Independent variables

The characteristics used in testing that mergers occur in clusters in this study are mis-valuation, capital liquidity and economic shock variables. The methodology and the proxies used to represent each variable are presented below.

3.4.1. Mis-valuation variables

Mis-valuation is defined as the dispersion of the firm's market value from its true value. Market-to-book ratio and one-year and thee-year return and standard deviations of those returns are used[2], as in Harford (2005), to proxy[3] the mis-valuation variable.

3.4.1.1. Market-to-book ratio

Market-to-book ratio is the ratio of the current stock price to the book value per share. It measures how much a company is worth now, in comparison to the amount of capital invested by the shareholders. The purpose of this ratio is to show the value investors place on the company. The market/book ratio summarizes an investor's view on the company's performance and its future prospects. Hence, a market-to-book ratio proxies for mis-valuation and is used in this study. However, a more robust measure for mis-valuation is market to the true value of the firm. True value is the fundamental value of a firm's current value in addition to future cash flows discounted to current levels using the firm's cost of capital. The difficulty in measuring this true value is the underlying assumption of growth, which is used in calculating future cash-flows – it is hard to derive. A firm's internal management has its own assumptions compared to market analysts, which almost always differ. Hence the more straightforward market-to-book value is used as in Harford's (2005) study.

The market value of a firm's stock is calculated as the share price on the last day of the financial year multiplied by the number of shares outstanding as at that day. The book value of equity of a firm at the end of each financial year is obtained from the financial statements of the firms. Market-to-book ratio is obtained for all firms within an industry and for all the 10 industries from 1996 to 2007. Figure 3.11 presents the median market-to-book ratio of all firms classified into the 10 industries. The median market-to-book value for the entire 12-year sample period for all industries is 1.5, i.e. the market value is 1.5 times the book value of a firm. Healthcare, Information-Technology and Telecommunication industries have the highest market-to-book ratio, while the Financial industry has the lowest market-to-book ratio which is close to 1.

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[2] Tobin's Q can also be included in the list of mis-valuation variables, however, to determine Tobin's Q firm replacement value is required. Data for this replacement value is unavailable and as the market-to-book ratio is used, it can be considered similar to Tobin's Q and only the market-to-book ratio is used by Harford (2005).
[3] The results in this study might be limited, due to error-in-variable problem, as a proxy for mis-valuation is used.

The Australian stock exchange has seen tremendous growth, along with other world markets, over the past four years. This is evident by the high levels of median M/B ratios for all industries from 2004. Median market values of firms were at a record level of 2.52 times the book value of the firm's equity in 2007. This high market value is due to high growth assumptions of Australian firms by analysts during a prolonged economic boom period. The Asian crisis in 1997-1998 led to a drop in the market value of the firm's stocks in 1998 leading market analysts to re-analyse growth prospects of firms across all sectors and market-to-book ratio reached its lowest level during the sample period in 1998.

The median market-to-book ratio is presented for all firms listed on the Australian Stock Exchange in Figure 3.12. A glance through these median values can lead to an assumption that the market believes a market-to-book ratio of 1.5 to be an accurate valuation of a firm's equity, as over the 12-year sample period the median value of all market-to-book ratio's is 1.5. Hence under this assumption, stocks were undervalued when the market-to-book ratio dropped below this 1.5 level, while stocks were over-valued when the market-to-book ratio went beyond the 1.5 times level.

For the purpose of this study, change in the market-to-book ratio is more significant, and as shown in Figure 3.13, some industries witnessed more change in their valuation than others. Healthcare, Information-Technology and Telecommunication industries have seen the highest volatility in their valuations, with high changes in 2000–2001, while the Financial sector has seen more stable valuations. Information-Technology industry valuation changes during 2000–2001 were when the famous "Internet Bubble" burst and is in line with other equity markets around the globe.

3.4.1.2. Return and standard deviation

Shleifer and Vishny (2003) argued that there is a positive correlation between stock valuations and merger activity. They showed that clustering of merger activity is driven by high stock market valuations. Hence, valuation in this study is also addressed by the median prior one-year and three-year compounded returns for firms in the industry along with the cross-sectional standard deviations of those returns. Stock prices for all firms within an industry are obtained from Datastream International for the sample period. The one-year and three-year prior return is calculated for individual firms using the same formula used by Harford (2005):

Compound annual return = (Share price at the end of the investment period) / (Share price at the beginning of the investment period) ^ (1/Number of years) - 1

The median is then obtained for all the firm's returns within the industry. The median one-year and three-year compounded return for all industries is 1.30% and negative 1.70% respectively. Figure 3.14 displays the one-year compound return for all industries, and Figure 3.15 shows the three-year compound return for all industries. The worst performers are the Telecommunications and Information Technology industries both over one year and three years. While the Financial, Consumer Discretionary and the Utilities industries have had the highest return. These returns are, however, not adjusted for dividends.

The one-year and three-year compound returns, as shown in Figures 3.16 and 3.17, are significantly negative between 2000 and 2002 period, while between 2003 and 2007 the returns are generally positive.

The correlation between the three-year return and the market-to-book ratio is a high 0.57 and is evident, as the returns to the stock are high when the market-to-book ratios are high between 2003 and 2007 and the returns to the stock are low when the market-to-book ratios are low between 2000 and 2002.

Standard deviation provides a measure of dispersion of a data set from its mean i.e., it measures how widely values are dispersed from the average, where dispersion is the difference between the actual value and the average value. The larger the difference between the closing prices and the average price, the higher the standard deviation will be and the higher the volatility. The closer the closing prices are to the average price, the lower the standard deviation will be, hence volatility will be lower. Hence, it is also widely refered to as a measure of volatility.

The intra-industry standard deviation is calculated for all the industries and is presented in Figure 3.18. Materials and the Financial sectors are the most volatile stocks, while Consumer Staples and the Utilities sectors are the least volatile.

3.4.2. Industry shock variables

The factors that capture the economic shock to an industry's operating environment used in this study are: *profitability* (earnings before interest and tax scaled by operating revenue – EBIT), *asset turnover* (operating revenue divided by beginning-of-period assets), *capital expenditure* (scaled by beginning-of-period assets), *return on asset* (ROA) and *growth* (sales growth).[4] These factors are indicated in papers written by Healy, Krishna, Palepu et al. (1992), Mitchell and Mulherin (1996) and Harford (2005).

Statement of financial performance, statement of financial position and cash-flow statements are collected from Datastream for all firms within each industry for the entire sample period. The following formulae are used to calculate each of the above economic shock variables:

Profitability: EBIT margin is a key measure of the financial performance of the company's earning power and is equal to earnings before interest and taxes divided by operating revenue, expressed as a percentage.

EBIT = EBIT / operating revenue

Asset Turnover: It measures the efficient use of assets and how well they produce revenue during the corresponding period. It is calculated by dividing operating revenue by total assets

Asset Turnover = Operating revenue / total assets

Capital Expenditure: The cash flow to capital expenditures ratio measures a company's efforts to acquire long-term purchases to better equip it to do business. A high or increasing cash flow to capital expenditures ratio is usually a positive sign, indicating the company has financial flexibility to invest in it and make upgrades to its buildings, machinery, and processes. This ratio is very industry specific – industries requiring large financial investments to operate will have a significantly different result than industries requiring small financial outlays.

Capital Expenditure = Cash paid for property, plant and equipment/ operating revenue

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[4] Several macroeconomic variables are also important to capture the measurement of an economic shock, e.g., industrial production, inflation, term spread. However this study follows Harford (2005) methodology and hence does not include any new variable.

Return on Asset: ROA is a key measure of a company's profitability, equal to a fiscal year's earnings divided by its total assets. Return on assets essentially shows how much profit a company is making on the assets used in its business.

Return on Asset = Earnings before interest / (total assets less outside equity interests)

Sales Growth: Annual growth rate of revenue expressed as a percentage.

Sales Growth = (Operating revenue $_{(t)}$ – operating revenue $_{(t-1)}$)/operating revenue $_{(t-1)}$

Analysing these economic shock variables across various industries is highly problematic because each industry has its own characteristics and the variable can be high for two industries and yet imply completely different things.

The economic shock variables are highly correlated within an industry and across all industries. A correlation matrix is presented in Table 3.6 for the variables across all industries for the 12-year sample period.

Due to this high correlation, if the variables are included in regression analysis simultaneously, it will cause a multi-collinearity problem. Hence the first principal component is extracted for each of the variables. Principal component analysis (PCA) is a factor extraction method used to form uncorrelated linear combinations of the observed variables. The first component has maximum variance. Successive components explain progressively smaller portions of the variance and are all uncorrelated with each other. Principal components analysis is used to obtain the initial factor solution. It can be used when a correlation matrix is singular. [5]

3.4.3. Measuring economic factors and mis-valuation variables

A shock affects the industries trading environment and is reflected by a change in its economic characteristic. Since each shock could have different effects on different industries, I use the median absolute change in each of the variables used to capture the economic shock effect. All variables are examined in the year prior to the start of the industry merger wave.

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[5] The first component does not capture all the variance, and hence loses some information about the time-series.

Absolute Change = abs (Economic Variable $_t$ – Economic Variable $_{t-1}$)

Where,

Abs – absolute value

Economic variable – EBIT, Asset Turnover, Capex, ROA, Sales Growth

The median of this absolute change for each economic variable is then calculated for the 12-year time series. The years 1999-2000 and 2005-2006 witnessed the maximum number of industry waves; hence, the median absolute change in the economic variables should be the greatest in the years prior to 1999 and 2005. Therefore, the number presented in Table 3.7 is the cross-industry mean of the median absolute change for the year preceding these two-year periods i.e., 1999-2000 and 2005-2006.

When an industry undergoes a shock, its economic variables will be affected to the greatest degree and thereby the change in the economic variable will also be high. Therefore, the median absolute change for the economic shock observations for the 12 years are ranked into quartiles and Table 3.7 also presents the cross-industry mean rank of the shock in the pre-wave years.

The factors that represent the mis-valuation component of the hypothesis, one-year and three-year compound return, one-year and three-year standard deviation of the one-year and three-year compound return, market-to-book ratio and change in market-to-book ratio are analysed here. The intra-industry median stocks returns are calculated, and the number presented in Table 3.8 and 3.9, are the cross-industry mean of the medians for the year preceding the two-year periods which witnessed the maximum number of industry merger waves i.e., 1999–2000 and 2005–2006. None of the mis-valuation variables presented in Tables 3.8 and 3.9 lie in the first quartile apart from the three-year return prior to 2005.

The median absolute change in the market-to-book ratio for the year prior to the year 1999 lies in the third quartile, while the median absolute change in the market-to-book ratio for the year prior to the year 2000 lies in the first quartile (untabulated). Similarly, the median absolute change in the market-to-book ratio for the year prior to the year 2005 lies in the first quartile, and the median absolute change in the market-to-book ratio for the year prior to the year 2006 also lie in the first quartile (untabulated).

3.4.4. Capital liquidity

Shleifer and Vishny (1992), Eisfeldt and Rampini (2006) and Harford (2005) argued that adding a macro-economic component which proxies for capital liquidity helps explain merger waves. The spread between the weighted average interest rate available for Australian large businesses on credit outstanding (LBI) and the 90-day Australian Treasury bill is one such proxy and is used in this study. Even though this is a measure of debt, it is a robust measure of overall availability of liquidity in the economy. Hence when the spread, i.e., the difference between the rates available for LBI and Treasury Bills is low, there is a general loosening of credit criteria and when this spread is high there is tightening of credit in the economy on the whole. This rate spread when low may indicate high liquidity, and hence help start a merger wave, and when the spread is high, it may indicate low liquidity, and lead to an end to the merger wave. Hence, a decrease in the rate spread must precede a merger wave and an increase in the rate spread signals the end of the wave.

This spread is collected for the entire sample period. Although it does not directly explain merger waves, as in fact equity mergers do not even have to tap the credit markets for funds, based on Lown, Morgan and Rohatgi (2000) and Harford (2005)'s studies, this spread may be used as a proxy for capital liquidity in the economy. The movement of these two interest rates and their spread over the 12-year sample period is graphed in Figure 3.19. The spread is below its median for the 12-year sample period from 1996 to 1999 indicating high capital liquidity and is almost double its median in 2000 and 2001 indicating low capital liquidity. The spread is lower again in 2002 and 2005, while 2003 and 2004 spread levels are slightly higher than the median and then increase in 2006 and 2007.

If capital liquidity is to be a factor causing merger waves, high capital liquidity must precede industry waves. Figure 3.20 plots the median rate spread between the Corporate and Treasury interest rates to aggregate merger activity for the sample periods. The rate spread is lagged and is for the year prior to the reported merger activity. The horizontal bars in Figure 3.20 show the timing of the industry merger waves and the number of industry merger waves occurring in each year. Industry merger waves tend to cluster when the rate spread is relatively low, forming two aggregate merger waves.

High liquidity

There are two industry merger waves occurring in 1999 and five industry merger waves occur in 2000. The rate spread is below the median rate spread for the 12-year sample period in the year prior to 1999 and subsequently there are seven industry merger waves in the two-year period, 1999–2000. Similarly, there are three industry merger waves occurring in 2005 and four industry merger waves occur in 2006. The rate spread is below the median rate spread for the 12-year sample period in 2005 and subsequently there are seven industry merger waves in the two year period 2005–2006. In other years, where there is an industry merger wave, the rate spread in the year prior to the wave year has been below the median rate spread for the 12-year sample period. This suggests that high capital liquidity precedes merger waves.

Low liquidity

In the two-year period, 1999–2000, the rate spread is more than twice the median rate spread for the 12-year sample period in the second year of the two-year period i.e., in 2000, hence causing the merger wave to finish due to low liquidity or tightness in the availability of capital. Similarly, in the second two-year period of 2005 to 2006, the rate spread is twice the median rate spread for the 12-year sample period in the second year of the two-year period i.e., in 2006, hence causing the merger wave to finish due to low liquidity or tightness in the availability of capital.

Capital liquidity and mis-valuation variables

The spread between the Corporate and Treasury interest rates should be correlated to the mis-valuation variables i.e., market-to-book ratio and the three-year return. A decrease in the rate spread leads to economic expansion and increases the supply of money in the overall economy. Hence, a decrease in the rate spread will increase capital liquidity in the economy which leads to increases in market-to-book ratios of firms and higher return to the firm's stockholders and similarly an increase in the rate spread will lower liquidity in the economy causing market-to-book ratios and returns to stockholders to be lower. The interest rate spread is therefore a lead indicator, as decreases in the rate spread lead to increases in the market-to-book ratio. The risk premium decreases for firms and it is easier to raise money which leads to potentially higher numbers of mergers and acquisitions. The inter-relatedness of these three variables is graphed in Figure 3.21, for the 12-year sample period. The spread is the median spread for the Corporate and Government bills from 1996–2007. Market-to-

book ratio is the median market-to-book ratio of all firms listed on the ASX for the sample period. The return is measured as the three-year compounded return for the Standard and Poor's (S&P) ASX 200 index. The return is one plus the compounded return.

Harford (2005) argued that higher asset values (mis-valuation) accommodate capital liquidity in the economy and hence bring about lower transaction costs. The mis-valuation proxy should therefore be correlated with the capital liquidity proxy i.e., market-to-book ratios should be negatively correlated with the rate spread. Stock prices are measured as the broad SandP ASX 200 index, and are strongly pro-cyclical and should be negatively correlated to the capital rate spread.

Table 3.10 shows that there is a significant negative correlation of -0.39 between lagged rate spread and the current market-to-book ratio for the 12-year sample period. There also exists a significant negative correlation of -0.39, as reported in Table 3.10, between the lagged spread and the SandP ASX 200 return. Harford (2005) noted that this lagged negative relation indicates that the market valuation of firms increases during periods of economic expansion and decreases during economic contractions. The correlation between the lagged SandP 200 return and the current rate spread is an insignificant -0.04. Therefore these correlation results raise initial doubt that the mis-valuation variables have some explanatory powers in predicting the start of merger waves.

The results thus far do not provide definite evidence that merger waves are preceded by economic shocks. However, there is firm evidence that mergers cluster in waves and that these waves cluster when there is sufficient capital liquidity in the economy to lower transaction costs for mergers to take place. The mis-valuation proxies i.e., market-to-book ratios and the return on stocks are inconclusive as to whether the mis-valuation variables have any explanatory powers or are they proxying for lower transaction costs that come with greater capital liquidity. The next section runs logit models to confirm the hypothesis. The economic shock index and capital liquidity proxies need to be significant if these are the true drivers of merger waves, while market-to-book and the return and standard deviations, if insignificant, will confirm that these two variables are only capturing the effect of lowered transaction costs.

3.5. Industry merger waves – regression analysis

Logit models are used to predict the start of a merger wave. The sample is all 10 industries for the 12-year sample period. The four equations regressed are as below:

(1)   Probability of Wave P (W) = Intercept + β (Market/Book) $_{t-1}$

(2)   Probability of Wave P (W) = Intercept + β (Market/Book) $_{t-1}$ + γ (3-year Return) $_{t-1}$

+ Δ (σ (3-year Return)) $_{t-1}$

(3)   Probability of Wave P (W) = Intercept + ε (Rate Spread) $_{t-1}$ + ζ (Economic Shock

Index) $_{t-1}$ + θ (Economic Shock Index (Tight Capital)) $_{t-1}$

(4)   Probability of Wave P (W) = Intercept + β (Market/Book) $_{t-1}$ + γ (3-year Return) $_{t-1}$

+ Δ (σ (3-year Return)) $_{t-1}$$\varepsilon$ (Rate Spread) $_{t-1}$ + ζ (Economic Shock Index) $_{t-1}$

+ θ (Economic Shock Index (Tight Capital)) $_{t-1}$

The first equation tests whether the market-to-book ratio has any explanatory power in predicting the start of merger waves. The second equation adds the other two mis-valuation variables, i.e., 3-year return and standard deviation of the 3-year return to the first equation and tests whether any of the mis-valuation variables have any explanatory power in predicting merger waves. The third equation tests whether the economic shock index when interacted with the capital liquidity rate spread predicts the start of a merger wave. The fourth equation includes all variables of mis-valuation, economic shock and capital liquidity. This equation tests whether firms react to an economic shock to their industry by merging, in the presence of higher capital liquidity.

Dependent and independent variables

In a logit model, the dependent variable may take on only two values, zero or one. One becomes the dummy variable representing the occurrence of an event and zero indicates the non-occurrence of the event. In this study, the dummy variable takes the value of one, when the year is the start of an industry merger wave and zero for all other years. There are 21 industry merger waves during the 12-year sample period.

The explanatory variables come from those analysed in Tables 3.7, 3.8 and 3.9. All explanatory variables are measured at the year preceding the start of a merger wave.

Market-to-book ratio is the industry median market-to-book ratio, 3-year return and standard deviation of 3-year return are the median industry return and the intra-industry standard deviation of that return and are included in equations 1, 2 and 4 as mentioned above.

The five economic shock variables: EBIT, asset-turnover, capital expenditure, ROA and sales growth, are highly correlated within an industry and cause multi-collinearity if simultaneously included in the regression model. Hence, the first principal component is extracted from the five economic shock variables and is included in logit equations 3 and 4, as mentioned earlier, as an economic shock index.

The rate spread between the interest rate available for large businesses for loans and the 90-day Treasury bill is used as the proxy for capital liquidity. This rate spread is included in equations 3 and 4 above. Similar to Harford's (2005) study, high liquidity years are those years in which the rate spread is below the time-series median and the industry's market-to-book ratio is simultaneously above its time-series median. All other years are years in which capital liquidity is tight. The economic shock index is interacted with a dummy variable identifying these low liquidity years and is included in equations 3 and 4 as an economic shock index (tight capital). This dummy variable takes on the value of one for a low-liquidity year, or the dummy variable is zero in all other years.

3.6. Relation between industry merger waves and aggregate merger waves

The next step is to determine whether industry merger waves cluster to form aggregate merger waves. Figure 3.21 shows the relation between aggregate merger activity and total merger activity for the 12-year sample period. The timing and fraction of bids occurring across all industries during merger waves in a given year is plotted against the total number of bids occurring across all industries in any given year. The graph clearly identifies two separate two-year periods of aggregate merger activity. These two-year periods are 1999–2000 and 2005–2006.

Regression analysis is not conducted to test whether industry merger waves cluster in time to form an aggregate merger wave as there are only 12–years in the sample period, as regression analysis conducted with only 12 variables will be a weak analysis and hence will be inconclusive.

Chapter 4

Discussion

The increasingly large amount of takeover activity worldwide and growing evidence of this activity clustering in time has driven a large number of studies to put forward various theories. As discussed in the literature review, these theories are broadly categorized under either neo-classical theory of merger waves or behavioural theories of merger waves. The literature has offered various explanations using both neo-classical and behavioural approaches such as managerial discretion, hubris, market timing, agency costs, free cash flow, Q-theory and industry shocks. Each theory adopts a different viewpoint to the rationality of markets and each one of them provides useful insights into merger and acquisition activity. One such theory, industry shock theory, is used in this study to test the causes of merger waves.

Firstly, this Chapter discusses the reasons for the choice of the model, and establishes the empirical support for the variables used in this study. Then, the specific predictions of the model and the regression results obtained are discussed. Next, it explores the implications of the results obtained. Lastly, it identifies the limitations of the study and provides questions for further research.

4.1. Industry shock theory

Here, I discuss the reasons for the choice of the model used, in exploring the plausible drivers of merger waves and then, I discuss individually the three explanatory variables used.

Industry shock is any factor, either expected or unexpected, that alters industry structure. Mitchell and Mulherin (1996) provided a connection between takeover activity and industry shock noting that "the structure of an industry, including the number and size of firms, is a function of factors such as technology, government policy, and demand and supply conditions" (Mitchell & Mulherin 1996, p. 196). Harford (2005) offered an extension to the industry shock hypothesis (ISH), by adding a macro-economic liquidity factor in explaining how firms respond to an industry shock. Harford's extended industry shock hypothesis is

adopted in this study to explore the drivers of merger waves in the Australian merger and acquisition market.

The choice of the industry shock hypothesis is justified when the common factors of the historical merger waves are reviewed. The wave of the 1960's witnessed diversifying transactions where the merger and acquisition activity was concentrated within the conglomerates and oil companies. The wave of the 1980's saw broad-based merger and acquisition activity, characterised by large and hostile takeovers. The 1990's merger wave was prompted by technological advances and there was a sector-focused approach to the merger and acquisition activity. In this sector-focused approach, industries responded to over-capacity caused by deregulation (banking), as national defence spending declined there was an industry consolidation and as the payment patterns by insurers changed health-care industries contracted (health care).

Although these waves differed in industry focus (conglomerate, strategic, financial, etc), deal sizes and industry breadth, the waves occurred during an economic expansion, low or falling interest rates and a rising stock market. When the cost of capital increased, as measured by real interest rates, merger activity within a merger wave slowed hence causing an end to the wave. This suggests that merger activity is countercyclical to bond yields, also observed by Eisfeldt and Rampini (2006). On closer examination of these historical merger waves, an industry-based pattern was observed as far as the waves of merger and acquisition activity were concerned. For example, between 1981 and 1984, oil and gas companies accounted for 25% of all merger activity in the US and between 1995 and 1998, financial services companies accounted for 22% of all merger activity.

The industry shock hypothesis was first proposed by Nelson (1959) in his classic study of merger and acquisition waves. He suggested that unanticipated changes in demand could cause a firm to acquire additional capacity or shed overcapacity by either expanding or consolidating. Acquisition was viewed as a branch of the "make or buy" decision. Gort (1969) also suggested that the "economic disturbance" induced by unanticipated industry changes would cause a wave of acquisition activity. Gort's idea was that industry shocks alter the mean and variance of investors' assessment of firm's intrinsic value, as such shocks could be derived from surprising changes in demand, advancement in technology, movement in capital markets, and more generally "entry barriers" within industries.

The ISH is appealing as it provides a rational explanation for the clustering of merger and acquisition activity. The theory rationalises merger waves (e.g., caused by large-scale shock) and industry-level merger waves (e.g., caused by focus shock). This encourages the use of tools and concepts founded on assumptions of rationality. Hence, the drivers of merger waves under an ISH are broad-based and can include drivers such as: globalisation; trade liberalisation; tax; accounting; government regulations and anti-trust policies along with macro-economic factors which include: unemployment rate; factory utilization rate; government fiscal policies; central bank monetary policies; inflation rate; interest rates; exchange rates; trade balances; consumer optimism; gross domestic product and current position in macro-economic cycle.

Firms take a rational approach in response to an industry shock. Rational managers weigh the benefits against the costs. Financially unconstrained firms are in better positions to exploit these opportunities and generally have greater access to capital. Overall capital liquidity in the economy lowers transaction costs and increases firms' access to capital. Harford (2005) proposed that, whether the industry shocks lead to a wave of mergers depends on whether there is sufficient capital liquidity. Harford further suggested that this macro-level capital liquidity component causes industry merger waves to cluster in time even if industry shocks do not.

4.1.1. Industry shock

Each industry reacts to a shock differently and it is important to measure the economic effect on the industry firms caused by these shocks. This economic effect is measured as a change in a firm's financial outlook captured by the following factors: profitability (EBIT scaled by operating revenue), asset turnover (operating revenue divided by beginning of period assets), research and development, capital expenditures (scaled by beginning of period assets), employee growth, return on assets (ROA) and sales growth. These factors are indicated by studies such as Healy et al. (1992), Mitchell and Mulherin (1996) and Harford (2005). Data for research and development and employee growth were not readily available for the Australian firms and hence these two variables have been omitted in this study as factors affecting an industry's operating environment.

The changes in these economic factors are indicators of whether the shock has affected the particular industry. Hence the mean of the median absolute change of each of these factors

for the year preceding an industry wave is crucial and should theoretically lie in the top quartile of the entire sample period. Harford (2005) found that all the economic factors used in his study of the US market were abnormally high prior to waves. However, as shown in Tables 3.7, 3.8 and 3.9 a majority of the factors were relatively low prior to waves for the 12-year sample for Australian industry firms.

4.1.2. Mis-valuation

If the mis-valuation hypothesis were true, each period of stock market advances should witness a merger wave and equity should be the mode of payment in majority of these mergers. However, as reported in Table 3.12, cash was the preferred mode of payment in both the US and Australia.

Several factors could explain the use of cash as the more preferred mode of payment for eg., companies were performing better in the 1980's and 2000's thereby increasing their cash holdings, enabling them to finance their acquisitions using cash. Some merger deals have raised their cash by issuing debt, hence companies found the issuance of debt (and the associated costs) cheaper than raising more equity, which would contradict the over-valuation hypotheses as shown by Shleifer and Vishny (2003), where firms find it cheaper to finance their acquisition using stocks.

As in Harford (2005), mis-valuation variables are included in this study to predict merger waves. Mis-valuation is proxied by market-to-book ratio, 3-year return and standard deviation of the 3-year return. The change in the above variables is of importance, and, greater the change, greater should be the merger and acquisition activity. As is the case with the economic shock variables, none of the means of median absolute change of the mis-valuation variables namely market-to-book ratio, 3-year return and standard deviation in the year prior to a merger wave-year lie in the top quartile of the 12-year sample period.

4.1.3. Capital liquidity

The two interest rates used in this study to capture the capital liquidity in the economy are interest rates available to large Australian businesses and 90-day Treasury bills. The weighted average interest rates available to large business forecasts not only business loan growth, but also overall economic activity. When credit standards tighten, large business loans contract with the fear of increased default, and consequently output falls. The spread between the

large business loans and Treasury bills rate increases at the start of an economic expansion, because investment demand begins to rise in expectation of better economic conditions, but banks remain hesitant to lend, thereby driving the premium upwards for businesses to borrow.

During an economic expansion the stock prices are rising and there is increased mis-valuation among stocks. This mis-valuation rather than becoming a direct driver for merger waves acts as a catalyst to drive down transaction costs. Once the transaction costs are lowered, the lower interest rate spread increases the overall capital liquidity in the economy. When this high liquidity coincides with industry shocks that affect an industry's operating environment, there is greater opportunity for merger and acquisition activity to occur. Harford (2005) found that this macro-level liquidity component causes industry merger waves to cluster even if industry shocks do not.

Supporting this argument, the capital liquidity proxy i.e., interest rate spread is low during the years where the maximum number of industry merger waves occur. The rate spread is 0.59 and 0.56 in the 1999–2000 period which witnessed seven industry merger waves. Similarly the rate spread is 0.59 and 0.57 in the 2005-2006 period which also witnessed seven industry merger waves. The median rate spread for the 12-year sample period is 0.77.

4.2.   Results

4.2.1. Specific predictions

The industry shock hypothesis which accommodates capital liquidity is used in determining the drivers of merger waves. The model predicts the following results:

(1)   Market-to-book ratio, 3-year return and standard deviation of the 3-year return, which proxy for mis-valuation, if significant on their own in predicting merger waves, should lose their significance when the economic shock variables and capital liquidity spread is introduced into the equation. If this is the case, market-to-book will form a catalyst for lowering transaction costs.

(2)   Economic shock index is the first principal component of the five economic shock variables namely EBIT, asset turnover, capex, ROA and sales growth. This index should be

significantly positive when included in the full equation in predicting the start of a merger wave. If significant, this shock index will confirm the view that industry firms react to a shock that affects its operating environment by merging.

(3)   Capital liquidity rate spread is the difference between the corporate interest rates and the 90-day Treasury bills. The lower this spread, the greater is the liquidity in the economy; hence there are lower financial constraints for firms to react to a shock by merging. This spread should be significantly negative when regressed with the mis-valuation and economic shock index i.e., the lower the spread, the greater is the probability of a merger wave.

(4)   Economic shock index – tight capital: The economic shock index is interacted with a dummy variable, which represents years that have low capital liquidity and is one for years when there is low capital liquidity and zero otherwise. The low capital liquidity years are years where the capital rate spread is higher than the 12-year median and when the market-to-book ratio is lower than its 12-year median. Hence, this dummy variable should be significantly negative implying that lower capital liquidity reduces the probability of a merger wave.

4.2.2. Results obtained

The results of all four equations regressed are tabulated in Table 3.11. These results are discussed below:

Equation 1: The results from equation 1 do not find evidence that market-to-book ratio on its own causes a merger wave. The co-efficient of market-to-book ratio is 0.29, with a p-value of 0.69, with a R^2 value of 0.001.

Equation 2: None of the three mis-valuation variables used in equation two to predict merger waves are significant and have no power in predicting the start of a merger wave. Hence, the mis-valuation variables on their own are not the cause of merger waves, hence rejecting the market-timing hypotheses. The co-efficient of market-to-book ratio is 0.50 with a p-value of 0.52, that of 3-year return is 2.68 with a p-value of 0.27 and that of σ of 3-year return is -0.10 with a p-value of 0.77. The R^2 of the equation is 0.013.

Equation 3: The economic shock index which comprises the five economic shock variables is found to be insignificant with a co-efficient value of 0.28 and p-value of 0.80. The capital liquidity proxy i.e., rate spread is negative with a co-efficient value of -2.42 and a p-value of 0.05 and is significant in predicting the start of a merger wave. The dummy variable interacted with the economic shock index for tight capital, which represents low liquidity years and hence predicting the end of a merger wave, is negative with a co-efficient value of -1.51 and a p-value of 0.004 and is significant. The results in equation 3, suggest that firms engage into mergers only when there is capital freely available in the economy for them to undertake such transactions. The R^2 of this equation is 0.39.

Equation 4: As in equation 3, capital liquidity rate spread and dummy variable interacted with the economic shock index for tight capital are again found significant, with co-efficient values of -2.50 and -1.40 respectively. The p-value of both these variables is 0.05 for the rate spread and 0.01 for the dummy variable interacted with the economic shock index for tight capital and the R^2 of the equation is 0.14. The results in the full model tested in the fourth equation show that the economic shock index with a co-efficient value of 0.31 and a p-value of 0.80 is insignificant. The mis-valuation variables i.e., market-to-book ratio (co-efficient 0.27 and p-value 0.78), 3-year return (co-efficient 1.73 and p-value 0.55) and σ of 3-year return (co-efficient -0.01 and p-value 0.98) are also insignificant.

4.2.3. Implications

Capital liquidity and the dummy variable for low-liquidity years are found to be significant and negative in the logit tests performed. These results were as expected and imply that the macro-economic capital liquidity is significant in predicting the start of a merger wave and also the end of the wave. Neither the market-to-book ratio nor the economic shock index is significant. These results contradict the hypothesis tested, in which industry shocks should cause firms to merge, hence starting a wave of mergers. This result is also in contrast to the results obtained in Harford's (2005) study of the 20 years of merger and acquisition activity in the US. Harford, in his study, found both the economic shock index and the capital liquidity variables to be significant. Also, the Australian takeover climate is different to that of the US and other major developed European countries. "Australia's takeover regulation is a uniquely restrictive hybrid of the American and the British system of takeovers" Huston (2002). Australia's system of corporate control law is perhaps the most preventive in the world. The Australian set of laws specifies a low triggering threshold but do not allow partial

bids. The inability for bidders in Australia to acquire greater than 20% in advance of a takeover bid means that takeover bids must be made before the bidder holds a controlling stake, making takeover bids for Australian companies riskier. In Australia, the current laws make takeovers both risky and expensive. Target shareholders in Australia are very well protected once a takeover offer is under way. The unique takeover code in Australia could also be a reason for the differences in the ways firms react to industry shock and liquidity than how firms react to the same effects in the US.

My study is the first study conducted on the causes of merger waves in Australia. The hypothesis tested and methodology used in this study follows the same hypothesis and methodology of Harford (2005), where he applies this methodology in finding the causes for US merger waves. However country differences have not been accounted for in my study, such as differences in Takeover Code in both countries, the rise and impact of overseas bidders in the Australian merger market due to the low dollar, due to lack of data availability and hence similar results are not obtained for the US and the Australian merger waves. Da Silva Rosa and Walter (2004) noted that there is a need for a study which investigates the causes of merger waves in Australia. My study is the first step towards this and the next section identifies areas where further improvements and research can be conducted.

These differences in results highlight the fact that the Australian merger waves are not necessarily reacting to industry shocks, however they do occur when capital liquidity is high in the economy. However, due to the lack of data, such as research and development and employee growth variables for the Australian firms, the findings in this study are limited. Regardless of this shortcoming in data, there are a few factors which need mentioning and are explored in the following section.

4.4. Further Research

4.4.1. Data improvements/Future Improvements

The results obtained in this study are limited by the scope and extent of the data. The missing economic shock variables, namely research and development, and employee growth are key variables and, once included, could lead the economic shock index to be significant, however at this stage this is unknown. Another limitation of the data set is the number of years in the sample. A larger sample, similar to the one used in Harford's 2005 study of 20 years, could greatly improve the results obtained. Even with these limitations, the McFadden R-Squared obtained (0.144) for the full equation (equation 4) in Table 11 is comparable to the value of the Pseudo R-Squared obtained (0.154) in Harford's study. These comparable R-Squared values validate the results obtained in this study. McFadden R-Squared is a form of pseudo R-Squared (see Appendix 1).

Ownership structure and corporate governance may play an important role in determining the merger and acquisition activity and should be controlled for. Martynova & Renneboog (2006) provide detailed and comparable information on the size and dynamics of takeover activity in 28 Continental European countries, the UK and Ireland between 1993 and 2001. They however do not test the existence of merger waves and whether there was a period of merger waves which coincides among various countries. Mueller and Gugler (2008) examine merger activity in the US, UK and Continental Europe over the period 1991-2004. They concluded that merger waves occurred in the US, UK and Continental Europe at the end of the 20th Century and in all three areas, the peaks of the merger waves coincided more or less with the peaks of stock market booms. Mueller and Gugler found few differences in the way the merger waves started and the characteristics of the deals were different in all three areas. Further studies should factor the global phenomena of merger waves and should consider the possible impact on Australian merger waves.

4.4.2. Characteristics of Australian merger and acquisition

Data collected in this study show that Australian mergers are characterised by over 45% of combined overseas and private bidders. The data-set in this study has not been segregated by overseas and private bidders, hence this 45% represents a combination of the two types of bidders. Further studies should separate these bidders and could also place controls for the

different types of bidders to analyse the drivers of merger waves. Overseas bidders[6] are different from domestic private bidders and are also different from the ones that are listed on the local stock market. These differences are briefly discussed below.

Cross-border acquisitions

Overseas bidders are not always affected by the same industry shocks that affect Australian bidders. The reasons for these overseas bidders to enter into the Australian market could originate from their home country industry shocks. Some of the factors that could cause this cross-border acquisition activity are:

Global integration/international diversification: Since the 1990's well established firms in saturated economies have looked outside their domestic markets to expand, tending towards greater integration with global markets. Merger and acquisition is one such tool available for entering into overseas markets. Integration, however, brings with it economic benefits as well as costs to the local markets and institutions.

Special resources, tax and currency arbitrage: Australia's supremacy in the abundant availability of natural resources, open and competitive market and a low Australian dollar in the mid-1990's and mid-2000's, prompted many overseas firms to look at acquiring Australian firms during this period. Globalisation and deregulation and an extended period of global economic expansion also prompted many firms to engage in cross-border merger and acquisition activity to strategically place themselves in the competitive global economy.

These cross-border acquisitions can be disruptive to domestic merger and acquisition activity as they: (i) are significant; (ii) produce surprises in the form of unexpected entry by buyers, higher purchase prices of targets, expectations of further expansion into local markets by overseas buyers; and (iii) produce changes in strategic assumptions about a local market. These cross-border mergers tend to pay for their purchases in cash, as these buyers do not have their shares listed on the local stock market.

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[6] Overseas bidders are unlikely to be affected by the spread of the domestic interest rate when making their decision to acquire Australian companies which would likely result to the omitted variable problem in the analysis. Further studies should factor this in their analysis.

Private-equity deals

Private equity players raise funds by seeking investments from a range of large investors, and the funds are then invested in equity positions in firms. Private-equity players generally hunt for investments that are undervalued, as, in order to generate an acceptable return for their investors, they need to be able to purchase target companies at prices that allow them to achieve a particular hurdle rate. Some of the large private-equity deals during the 12-year sample period are listed in Table 3.13. These are large-value deals and are disruptive to other local bidders because these deals are highly leveraged and also because private-equity players are willing to pay a relatively high premium to acquire their targets.

Chapter 5

Conclusion

In an attempt to study whether industry merger waves exist in the Australian market and if so, to determine the drivers of these merger waves, this study adopted the extended industry shock hypothesis that includes a macro-economic capital liquidity component, as proposed by Harford (2005). There has been vast literature studying the causes and effects of mergers, but there is hardly any research which studies merger waves and their drivers in Australia. In particular, this study tests whether industry merger waves occur as an efficient response to industry shocks that affect their operating environment and whether the industry merger waves cluster due to capital liquidity in the economy. The results obtained do not support the industry shock hypotheses. However, the results have limitations due to the lack of data on two of the economic factors that are used in the comparable "Harford's (2005)" study of merger waves. Notwithstanding this, the importance of capital liquidity is clearly established as causing industry merger waves to cluster in time. Further, the mis-valuation factors studied do not have any power in predicting merger waves.

Overall, the results obtained are inconclusive as to whether industry shocks cause industry merger waves. However, industry-level merger waves do exist, as there is clustering in time of firm-level mergers within industries. Moreover, sufficient capital liquidity must be present to accommodate the necessary transactions. Even though there is no evidence that mis-valuation drives merger waves, individual transactions could be driven by this motive, but mis-valuation is not the cause of a merger wave.

References

 Advertiser, G. (3 January 2007). Merger activity on the up. *Geelong Advertiser*.

Andrade, G., Mitchell, M., & Stafford, E. (2001). New Evidence and perspectives on mergers. *Journal of Economic Perspectives, 15*(2), 103-120.

Andrade, G., & Stafford, E. (2004). Investigating the economic role of mergers. *Journal of Corporate Finance, 10*(1), 1-36.

Ang, J. S., & Cheng, Y. (2006). Direct Evidence on the Market-Driven Acquisition Theory *Journal of Financial Research, 29*(2), 199-216.

Antonio, A., Petmezas, D., & Zhao, H. (2007). Bidder Gains and Losses of Firms Involved in Many Acquisitions *Journal of Business Finance & Accounting, 34*(7-8), 1221-1244.

Australian, T. (19 December 2007). Strong merger activity tipped for next year *The Australian*.

Banal-Estañol, A., Heidhues, P., Nitsche, R., & Seldeslachts, J. (2006). Merger Clusters during Economic Booms Working Paper Series City University London.

Bernile, G., Lyandres, E., & Zhdanov, A. (2006). A Theory of Strategic Mergers. *EFA 2006 Zurich Meetings Paper 9th Annual Texas Finance Festival*.

Brewster, S. L., & Kenneth, A. D. (1996). Economic Behavior in Institutional Environments: The Corporate Merger Wave of the 1980's. *American Sociological Review, 61*(4), 699-718.

Bruner, R. (2004). Where M&A Pays and Where It Strays: A Survey of the Research *Journal of Applied Corporate Finance, 16*(4), 63-76.

Bruner, R. F. (2004). *Applied Mergers & Acquisitions*: John Wiley & Sons, Inc.

Chkir, I., & Co, J.-C. (2003). The Effect Of International Acquisitions on Firm Leverage *Journal of Financial Research, 26*(4), 501-515.

Da Silva Rosa, R., Limmack, R., Supriada;, & Woodliff, D. (2004). The Equity wealth effects of method of payment in takeover bids for privately held firm. *Australian Journal of Management, 29*(Special), 93-110.

Da Silva Rosa, R., & Walter, T. (2004). Australian M&A since the 1980s: What do we know and what remains to be done? *Australian Journal of Management, 29*(Special).

Dong, M., Hirshleifer, D., Richardson, S., & Teoh, S. H. (2006). Does Investor Misvaluation Drive the Takeover Market?. *The Journal of Finance, 61*(2), 725-762.

Duchin, R., & Schmidt, B. (2008). Riding the Merger Wave. Working Paper Series University of Michigan.

Eisfeldt, A. L., & Rampini, A. A. (2006). Capital reallocation and liquidity. *Journal of Monetary Economics, 53*(3).

Eun, C. S., Kolodny, R., & Scheraga, C. (1996). Cross-border acquisitions and shareholder wealth: Tests of the synergy and internalization hypotheses. *Journal of Banking & Finance, 20*(9), 1559-1582.

Fauli-Oller, R. (2000). Takeover Waves. *Journal of Economics & Management Strategy, 9*(2), 189-210.

Firth, M. (1997). Takeovers in New Zealand: Motives, stockholder returns, and executive share ownership. *Pacific-Basin Finance Journal, 5*(4), 419-440.

Focus, A. i. (2 January 2007). Australian merger, acquisition activity rises 50 pct *Asia in Focus.*

Fuller, K., Netter, J., & Stegemoller, M. (2002). What Do Returns to Acquiring Firms Tell Us? Evidence from Firms That Make Many Acquisitions *The Journal of Finance, 57*(4), 1763-1793.

Gaughan, P. A. (2007). *Mergers, Acquisitions, and Corporate Restructurings* (Fourth ed.): John Wiley & Sons, Inc.

Gebken, T., Floegel, V., & Johanning, L. (2005). The Dynamics within Merger Waves - Evidence from Industry Merger Waves of the 1990s Working Paper Series Union PanAgora Asset Management.

Goel, A. M., & Thakor, A. V. (2005). Do Envious CEOs Cause Merger Waves? Accepted Paper Series DePaul University.

Gort, M. (1969). An Economic Disturbance Theory of Mergers. *Quarterly Journal of Economics 83*(4), 624-642.

Gory, G. B., Matthias, K., & Richard.J.Rosen. (2005). Eat or Be Eaten: A Theory of Mergers and Merger Waves Yale School of Management.

Gugler, K. P., Mueller, D. C., & Yurtoglu, B. (2006). The Determinants of Merger Waves *WZB - Markets and Politics Working Paper No. SP II 2006-01*.

Halbheer, D., & Gärtner, D. (2006). Are There Waves in Merger Activity after All? Working Paper Series University of Zurich.

Harford, J. (1999). Corporate Cash Reserves and Acquisitions. *The Journal of Finance, 54*(6), 1969-1997.

Harford, J. (2003). Efficient and distortional components to industry merger waves Working Paper Series University of Washington.

Harford, J. (2005). What drives merger waves? *Journal of Financial Economics, 77*(3), 529-560.

Hazelkorn, T., Zenner, M., & Shivdasani, A. (2004). Creating Values with Mergers and Acquisitions. *Journal of Applied Corporate Finance, 16*(2-3), 81-90.

Healy, P. M., Krishna G. Palepu, & Ruback, R. S. (1992). Does Corporate Performance Improve after Mergers. *Journal of Financial Economics, 31*, 135-175.

Hietala, P., Kaplan, S. N., & Robinson, D. (2003). What is the price of hubris? Using takeover battles to infer overpayments and synergies. *Financial Management, 32*(3), 1-32.

Hodgkinson, L., & Partington, G. H. (2008). The Motivation for Takeovers in the UK *Journal of Business Finance & Accounting, 35*(1-2), 102-126.

Huston, E (2002). Australia's takeover rules: how good are they? *JASSA ISSUE, 4*, 33-37.

Jovanovic, B., & Rousseau, P. (2002). The Q-theory of mergers. *American Economic Review, 92*, 198-204.

Jovanovic, B., & Rousseau, P. L. (2001). Mergers and Technological Change: 1885-1998. *Working Paper No. 01-W16 Department of Economics*

Klasa, S., & Stegemoller, M. (2007). Takeover Activity as a Response to Time-Varying Changes in Investment Opportunity Sets: Evidence from Takeover Sequences *Financial Management, 36*(2), 19-43.

Knoop, T. A. (2008). *Modern Financial Macroeconomics: Panics, Crashes, and Crises*
 Blackwell Publishing.

Kruse, T. A., Park, H. Y., Park, K., & Suzuki, K. (2007). Long-term performance following mergers of Japanese companies: The effect of diversification and affiliation. *Pacific-Basin Finance Journal, 15*(2), 154-172.

Larry H. P. Lang, RenéM. Stulz, & Walkling, R. A. (1991). A test of the free cash flow hypothesis: The case of bidder returns. *Journal of Financial Economics, 29*(2), 315-335.

Lown, C., Morgan, D., & Rohatgi, S. (2000). Listening to loan officers: The impact of commercial credit standards on lending and output. *FRBNY Economic Policy Review*.

MacIntosh, J. (22 December 2005). 2005 biggest year for mergers since 2000 - Dealogic *Reuters Limited*

Maksimovic, V., & Phillips, G. (2001). The market for corporate assets: Who engages in mergers and asset sales and are there efficiency gains? *Journal of Finance, 56*(6), 2019-2065.

Mamdani, M., & Noah, D. (2004). Pathways to Success in M&A *Journal of Applied Corporate Finance, 16*(4), 77-81.

Martynova, M., & Renneboog, L. (2006). Mergers & Acquisitions in Europe. *ECGI - Finance Working Paper No. 114/2006, CentER Discussion Paper Series No. 2006-06.*

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behaviour, agency costs and ownership structure. *Journal of Financial Economics, 3,* 305-360.

Mitchell, M. L., & Mulherin, J. H. (1996). The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics, 41*(2), 193-229.

Moeller, S. B., Schlingemann, F. P., & Stulz, R. M. (2005). Wealth Destruction on a Massive Scale? A Study of Acquiring-Firm Returns in the Recent Merger Wave *The Journal of Finance, 60*(2), 757-782.

Morellec, E., & Zhdanov, A. (2008). Financing and takeovers. *Journal of Financial Economics, 87*(3), 556-581.

Mueller, D. C., & Gugler, K. P. (2008). The Determinants of Merger Waves: An International Perspective Working Paper Series University of Vienna.

Mueller, D. C., & Yurtoglu, B. B. (2006). Corporate Governance and the Returns to Acquiring Firms' Shareholders: An International Comparison. Working Paper Series University of Vienna.

Murray, P. G. (1994). Pre-announcement share price run-ups and abnormal trading volume in takeover target's shares: A test of the market speculation hypothesis. *Pacific-Basin Finance Journal, 2*(2-3), 319-348.

Nelson, R. L. (1959). Merger Movements in American Industry, 1895-1956. *Princeton University Press.*

Otchere, I., & Ip, E. (2006). Intra-industry effects of completed and cancelled cross border acquisitions in Australia: A test of the acquisition probability hypothesis *Pacific-Basin Finance Journal, 14*(2), 209-230.

Powell, R. G., & Stark, A. W. (2005). Does operating performance increase post-takeover for UK takeovers? A comparison of performance measures and benchmarks. *Journal of Corporate Finance, 11*(1-2), 293-317.

Pulse, A. (20 June 2005). Merger Activity Jumps 50pct in Australia H1 2005. *Asia Pulse.*

Rhodes–Kropf, M., Robinson, D. T., & Viswanathan, S. (2005). Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics, 77*(3), 561-603.

Rhodes-Kropf, M., & Viswanathan, S. (2004). Market Valuation and Merger Waves. *Journal of Finance, 59*(6), 2685-2718.

Roll, R. (1986). The hubris hypotheses of Corporate Takeover. *Journal of Business, 59*, 197-216.

Schlingemann, F. P. (2004). Financing decisions and bidder gains. *Journal of Corporate Finance, 10*(5), 683-701.

Shleifer, A., & Vishny, R. (1992). Liquidation values and debt capacity. *Journal of Finance, 32*, 337-347.

Shleifer, A., & Vishny, R. W. (2003). Stock market driven acquisitions *Journal of Financial Economics, 70*(3), 295-311.

Simmonds, & P, D. (2004). The impact of takeover offer timing on the measurement of Australian Bidder Gains 1976-1995. *Australian Journal of Management, 29*(Special).

Sirower, M. L., & O'Byrne, S. F. (1998). The Measurement of Post-Acquisition Performance: Toward A Value-Based Benchmarking Methodology. *Journal of Applied Corporate Finance, Volume 11*(Issue 2), 107-121.

Sirower, M. L., & Sahni, S. (2006). Avoiding the "Synergy Trap": Practical Guidance on M&A Decisions for CEOs and Boards *Journal of Applied Corporate Finance, Volume 18*(Issue 3), Page 83-95.

Thijssen, J. (2007). Optimal and Strategic Timing of Mergers and Acquisitions Motivated By Synergies and Risk Diversification *University of York (UK) - Department of Mathematics*.

Wang, C., & XIE, F. (2007). Corporate Governance Transfer and Synergistic Gains from Mergers and Acquisitions *Review of Financial Studies, Forthcoming*.

Weekes, P. (9 February 2005). Takeover target *The Sydney Morning Herald*.

Yan, J. (2006). Merger Waves: Theory and Evidence Working Paper Series Tykhe Capital LLC.
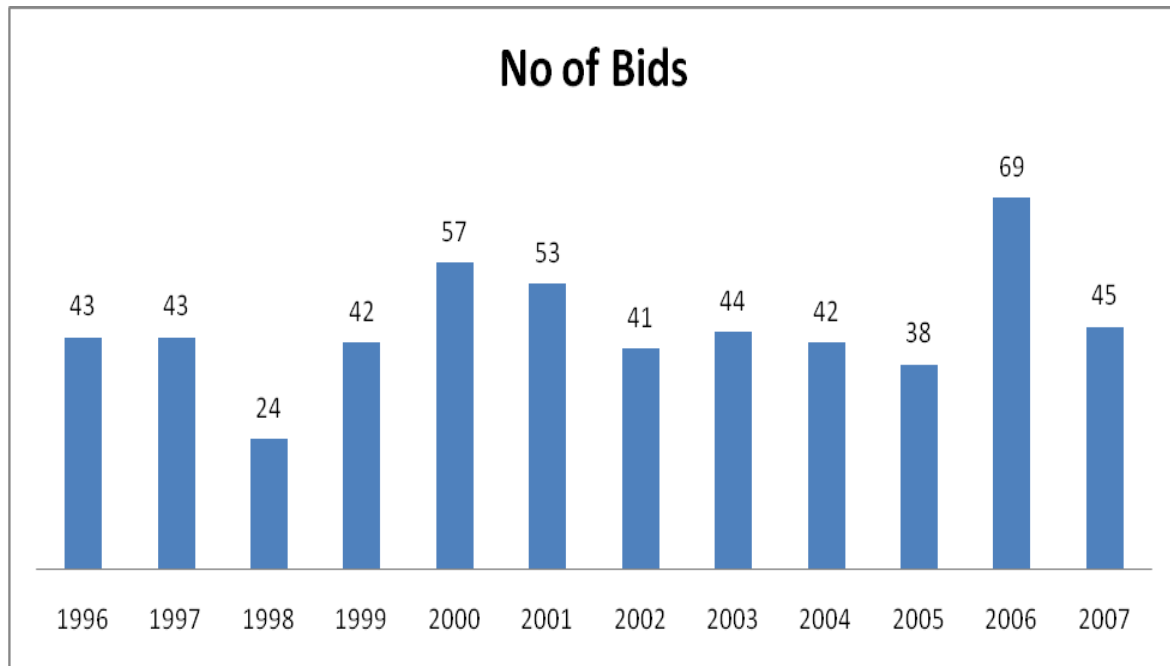
Figures

Figure 2.1   Value of merger and acquisition activity in Australia

The amounts are in billions and are in Australian dollars. Data for merger announcement, date and bid amount are collected from the announcements made by companies listed on the Australian Stock Exchange (ASX). Transaction value is calculated as the bid price multiplied by the number of shares outstanding.


Value of all Bids
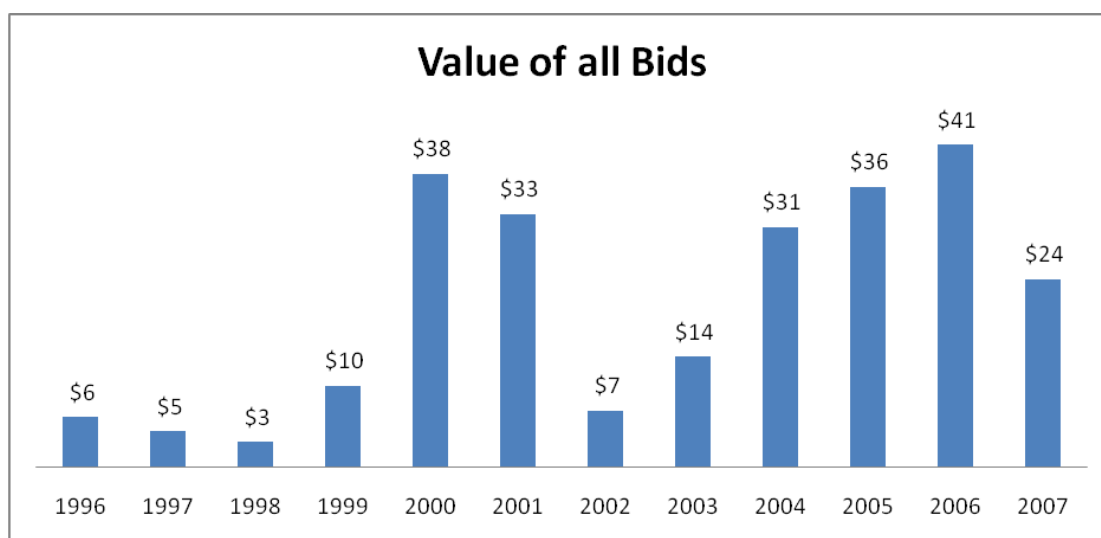
Figure 3.1   Total number of announced bids for targets listed on the Australian Stock Exchange (ASX)

The figure represents the number of bids announced per year for which data was collected. The actual number of merger and acquisition bids made during the 12-year sample period was higher than the data collected. Announced bids include withdrawn, lapsed, failed and completed bids for targets listed on the ASX.

No of Bids

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
No of Bids	43	43	24	42	57	53	41	44	42	38	69	45

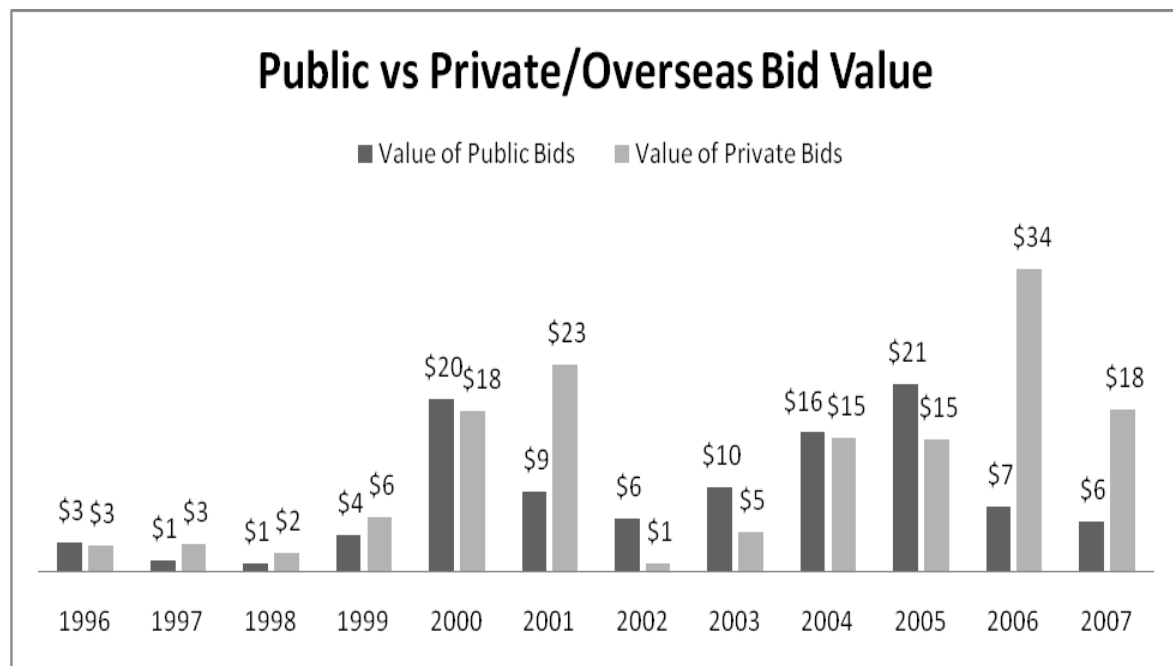**Figure 3.2   Public vs. private/overseas bidders – number of bids**

The total number of announced bids for which data is collected for the 12-year sample period is segregated by the origin of the bidder. Public bidders are those firms that are listed on the domestic Australian Stock Exchange. Private/overseas bidders are the combination of privately held companies, private equity firms and overseas firms. Bids are made for firms (targets) that are listed on the Australian Stock Exchange.
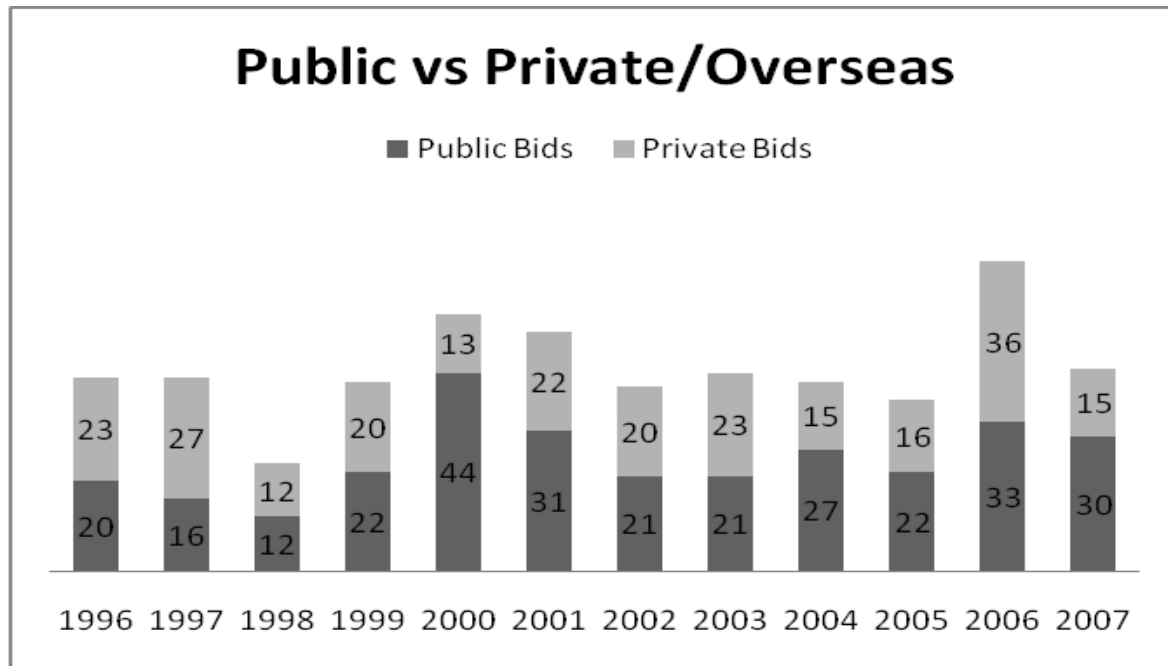
Figure 3.3   Public vs. private/overseas bidders – transaction balue

The total value of the announced bids for which data is collected for the sample period is segregated by the origin of the bidder. Public bidders are those firms that are listed on the domestic Australian Stock Exchange. Private/Overseas bidders are the combination of privately held companies, private equity firms and overseas firms. Bids are made for firms that are listed on the Australian Stock Exchange. Transaction value is calculated as the bid price multiplied by the number of shares outstanding.

Figure 3.4   Public vs. private/overseas bid percentage

The targets are allocated into 1 of 10 industries as classified under the Global Industry Classification Standard (GICS) by Standard and Poor's/Morgan Stanley Capital International. The percentage of the total value of bids made within each industry is presented for public and private/overseas bidders. Some industries have seen more bids by private/overseas bidders than public bidders and other industries have seen the opposite. Public bidders are those firms that are listed on the domestic Australian Stock Exchange. Private/overseas bidders are the combination of privately held companies, private-equity firms and overseas firms. Bids are made for firms that are listed on the Australian Stock Exchange. Transaction value is calculated as the bid price multiplied by the number of shares outstanding.
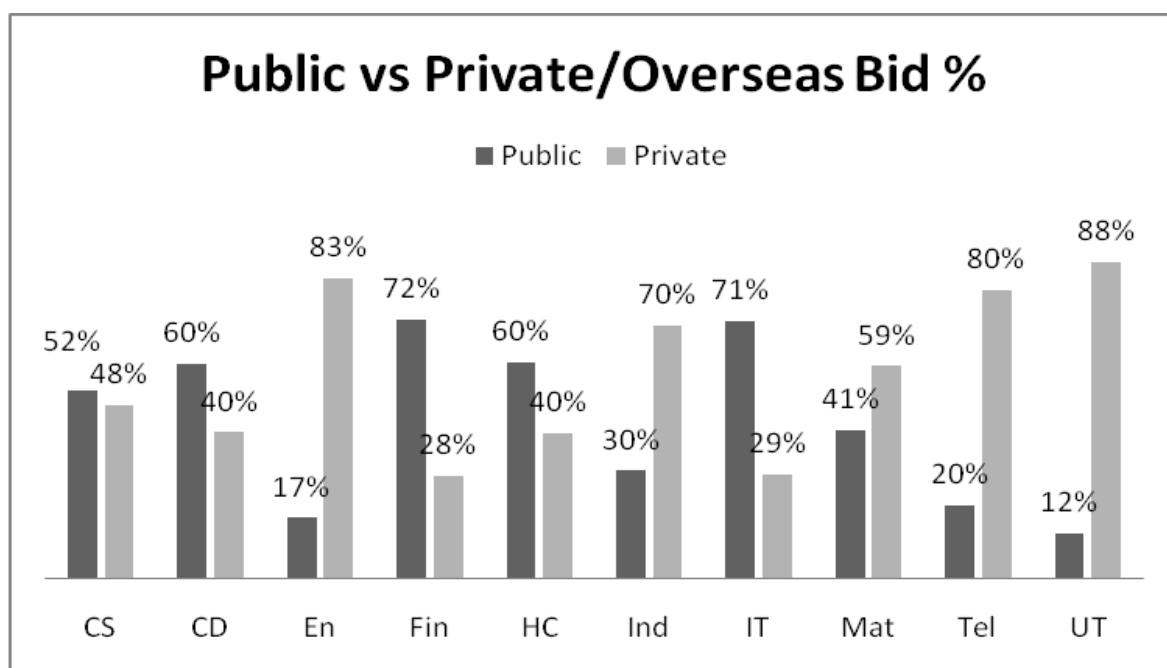
Figure 3.5   Mode of payment – cash vs. equity: no. of bids

The figure below presents the percentage of the mode of payment used to finance acquisitions in each industry. The percentages are for the total value of the transactions. Cash bids are straight-forward as cash is used by bidders to purchase their targets. Equity bids are a combination of straight equity bids and mixed bids. Straight equity bids are straight-forward swaps of target's stock with the bidder's stock in a ratio pre-determined by the bidder. Mixed bids are a combination of stock swap and cash. The value of the stock swap is determined by the announcement day share price of targets and bidders.
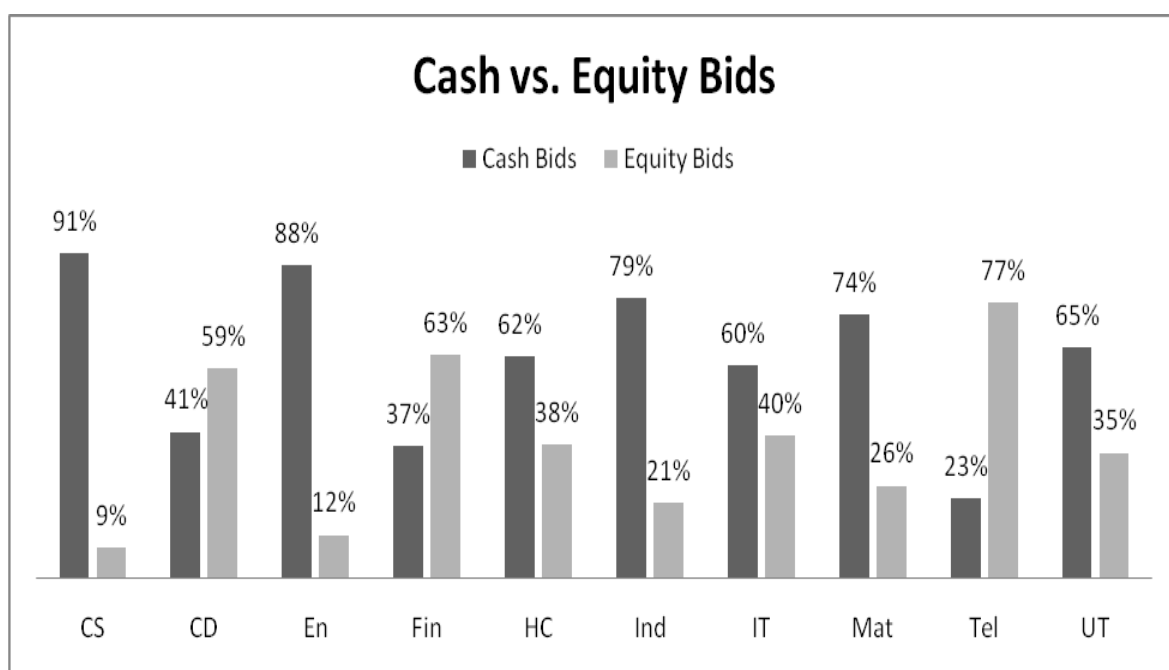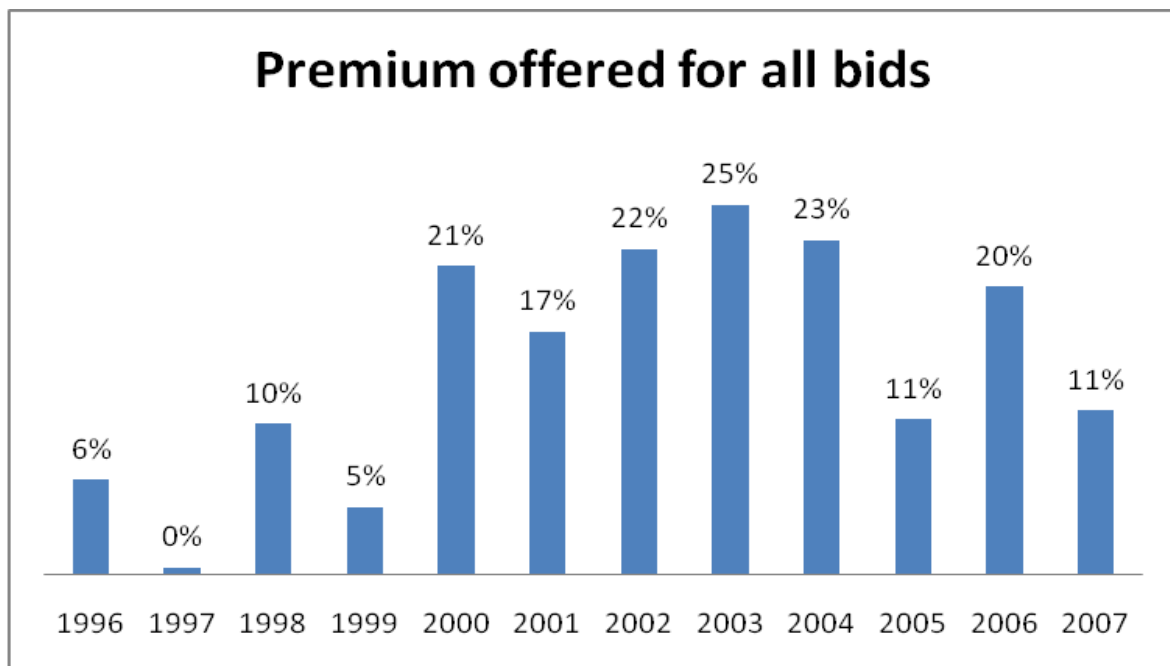
Figure 3.6   Mode of payment – cash vs. equity: transaction value

The figure below presents the total value of the mode of payment used to finance acquisitions in each industry. Cash bids are straight-forward as cash is used by bidders to purchase their targets. Equity bids are a combination of straight equity bids and mixed bids. Straight equity bids are straight-forward swaps of target's stock with the bidder's stock in a ratio pre-determined by the bidder. Mixed bids are a combination of stock swap and cash. The value of the stock swap is determined by the announcement day share price of targets and bidders.
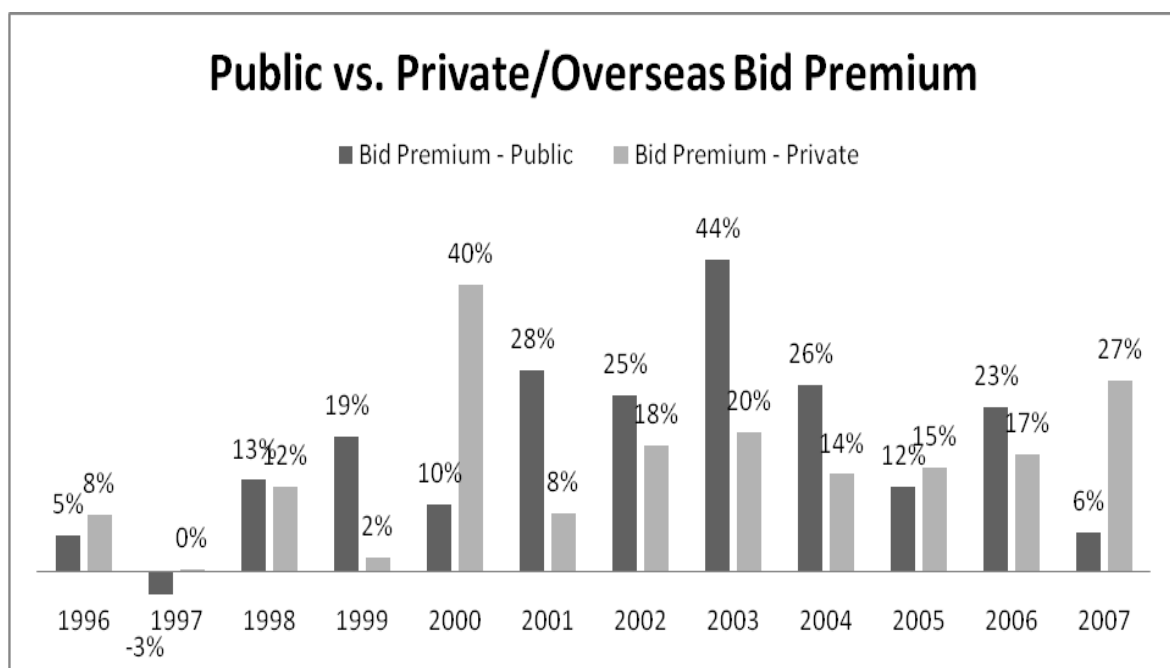

Cash vs. Equity Bids
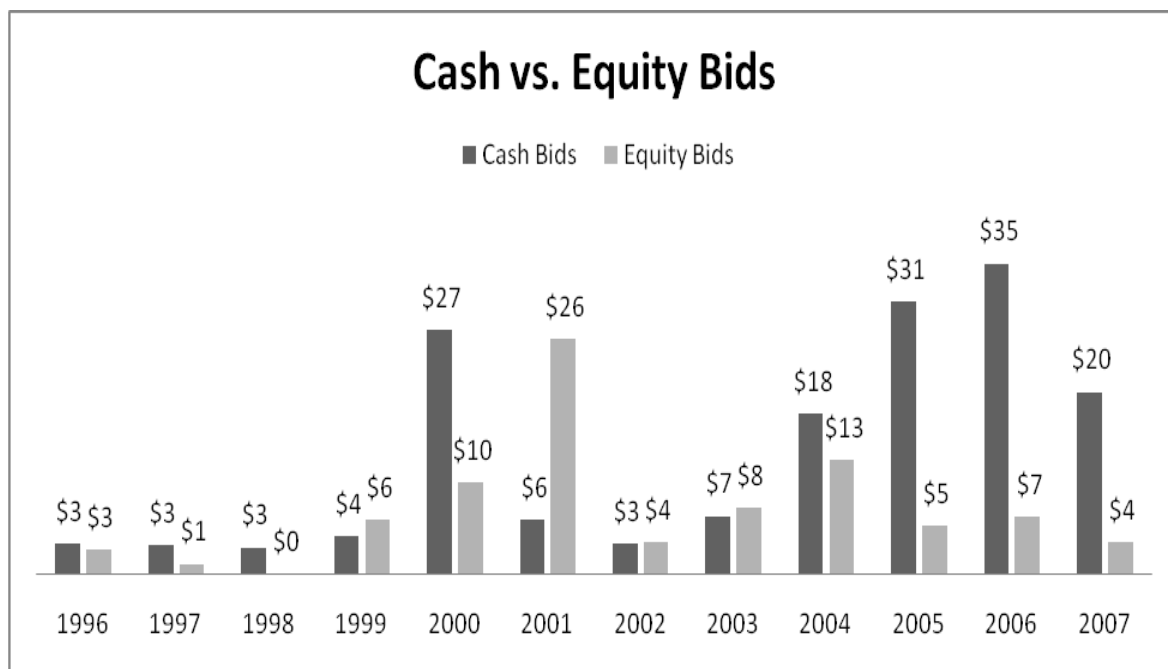
Figure 3.7   Premium offered for all bids

The figure below presents the premium offered by bidders to acquire their targets. Bidders include all public, private and overseas bidders. Both cash and equity transactions are also included. Bid premium is calculated as the announcement period return i.e., the excess return over the closing share price of the target over the bid price on the day the bidder announces his bid.

Premium offered for all bids

| Year	Premium
1996	6%
1997	0%
1998	10%
1999	5%
2000	21%
2001	17%
2002	22%
2003	25%
2004	23%
2005	11%
2006	20%
2007	11%

Figure 3.8   Premium offered – public vs. private/overseas bidders

The figure below presents the bid premium offered separated by the origin of the bidder. The percentage is for the total value of all transactions for the 12-year sample period. Public bidders are those firms that are listed on the domestic Australian Stock Exchange. Private/overseas bidders are the combination of privately held companies, private-equity firms and overseas firms. Bid premium is calculated as the announcement period return i.e., the excess return over the closing share price of the target over the bid price on the day the bidder announces his bid.

Public vs. Private/Overseas Bid Premium

Figure 3.9   Premium offered – cash vs. equity bids

The figure below presents the bid premium offered separated by the mode of payment used by the bidder to purchase their targets. The percentage is for the total value of all transactions for the 12-year sample period. Cash bids are straight-forward as cash is used by bidders to purchase their targets. Equity bids are a combination of straight equity bids and mixed bids. Straight equity bids are straight-forward swap of targets stock with the bidders stock in a ratio pre-determined by the bidder. Mixed bids are a combination of stock swap and cash. Bid premium is calculated as the announcement period return i.e., the excess return over the closing share price of the target over the bid price on the day the bidder announces his bid.
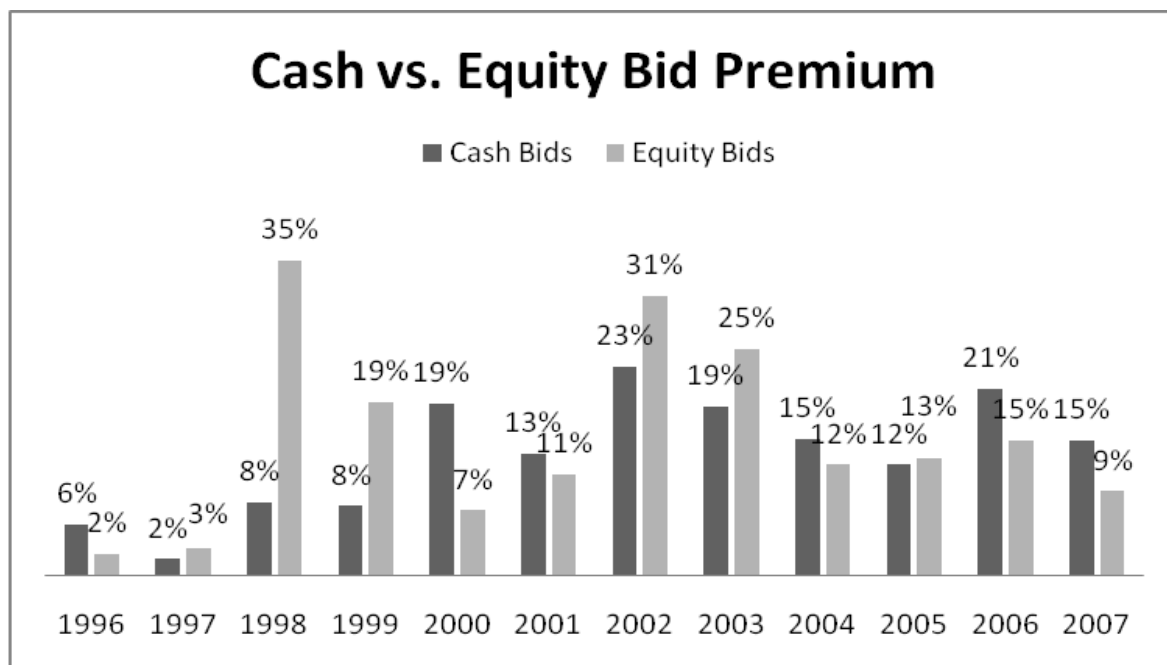
**Figure 3.10   Bid premium – industry breakup**

The figure below presents the bid premium offered separated by the 10 industries as classified under the Global Industry Classification Standard (GICS) by Standard and Poor's/Morgan Stanley Capital International. The percentage is for the total value of all transactions. Bid premium is calculated as the announcement period return i.e., the excess return over the closing share price of the target over the bid price on the day the bidder announces his bid.

Bid Premium – Industry Breakup
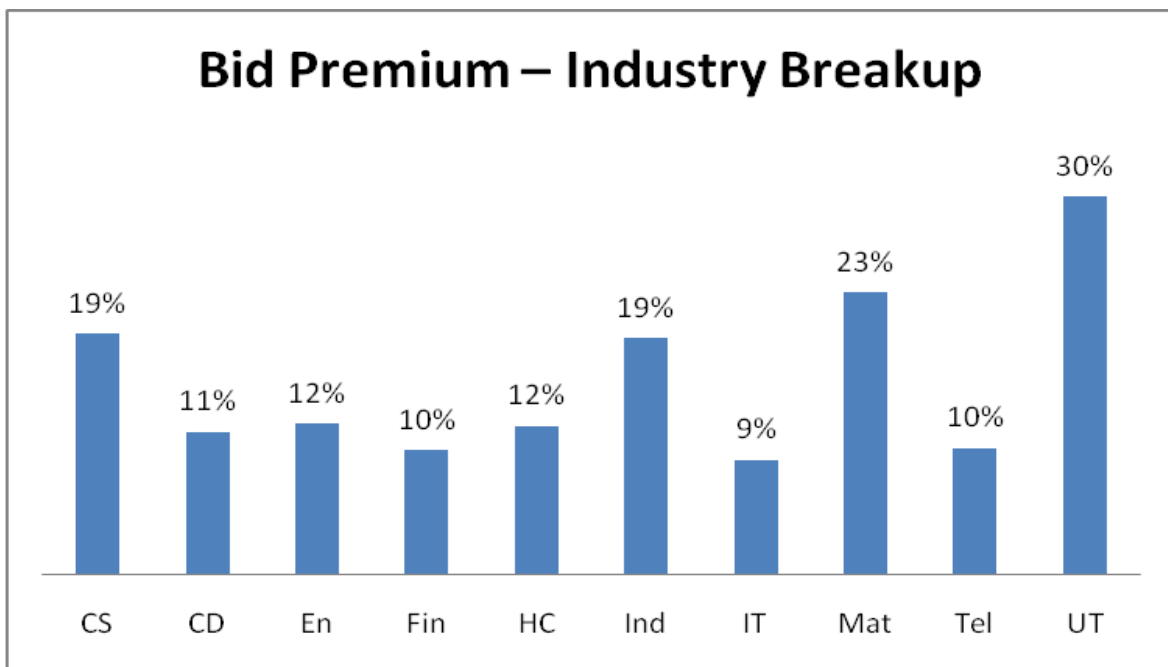
Figure 3.11   Market-to-book ratio – industry breakup

The figure below presents the median market-to-book ratio of firms classified into the 10 industries. The market value of a firm's stock is calculated as the share price on the last day of the financial year multiplied by the number of shares outstanding as at that day. The book value of equity of a firm at the end of each financial year is obtained from the financial statements of a firm.
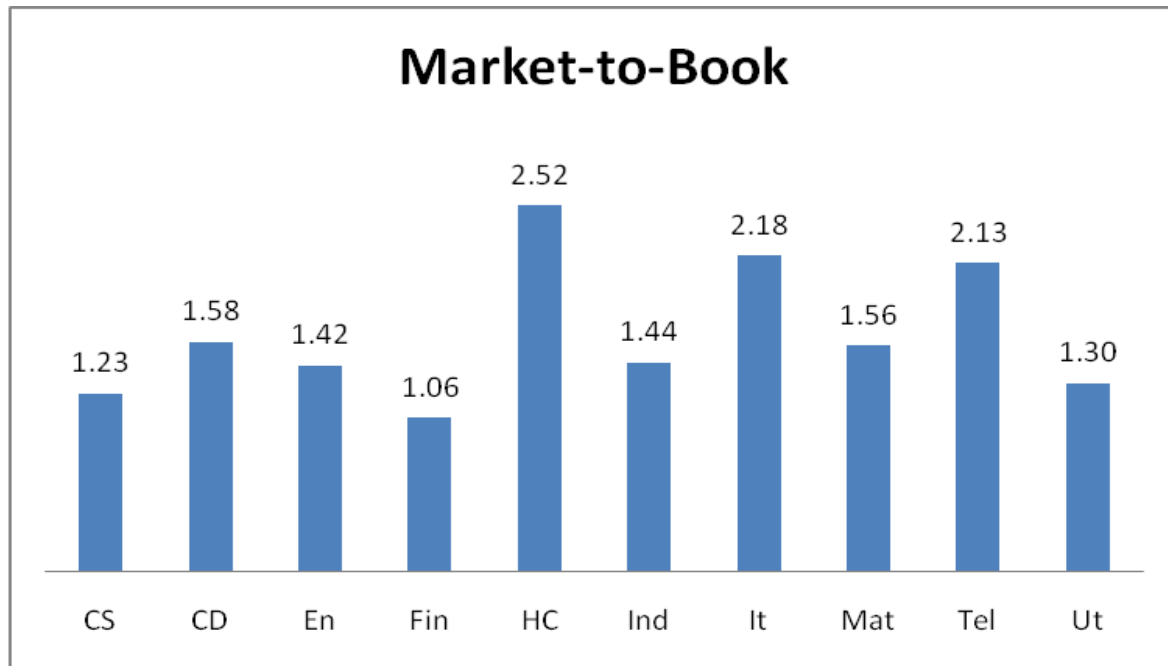
Figure 3.12   Market-to-book ratio – all firms

The figure below presents the median market-to-book ratio of all firms listed on the Australian Stock Exchange for the 12-year sample period. The market value of a firm's stock is calculated as the share price on the last day of the financial year multiplied by the number of shares outstanding as at that day. The book value of equity of a firm at the end of each financial year is obtained from the financial statements of a firm.
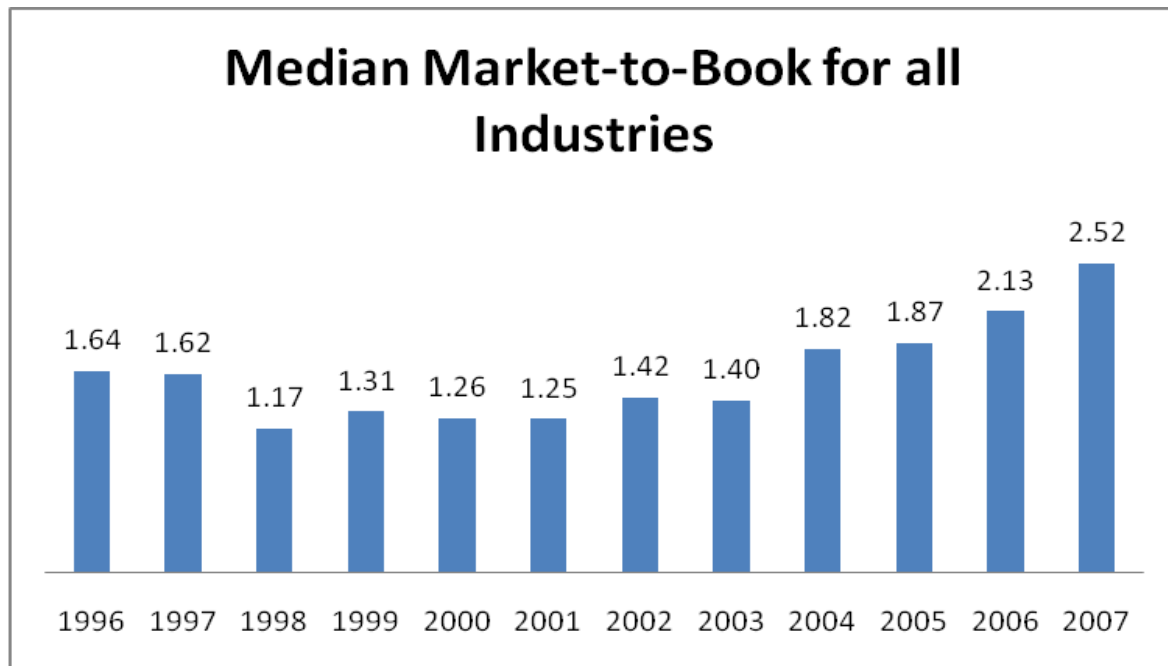
Figure 3.13   Median absolute change market-to-book ratios

The figure presents the median absolute change in the market-to-book ratio from one year to the next. Data is collected for all firms for the 12-year sample period and broken down into 10 industries as defined earlier. The market value of a firm's stock is calculated as the share price on the last day of the financial year multiplied by the number of shares outstanding as at that day. The book value of equity of a firm at the end of each financial year is obtained from the financial statements of a firm. Change is calculated using the following formula:

Median absolute change = Median [abs (Market-to-book $_t$ – Market-to-book $_{t-1}$)]

Where,

Abs = absolute value
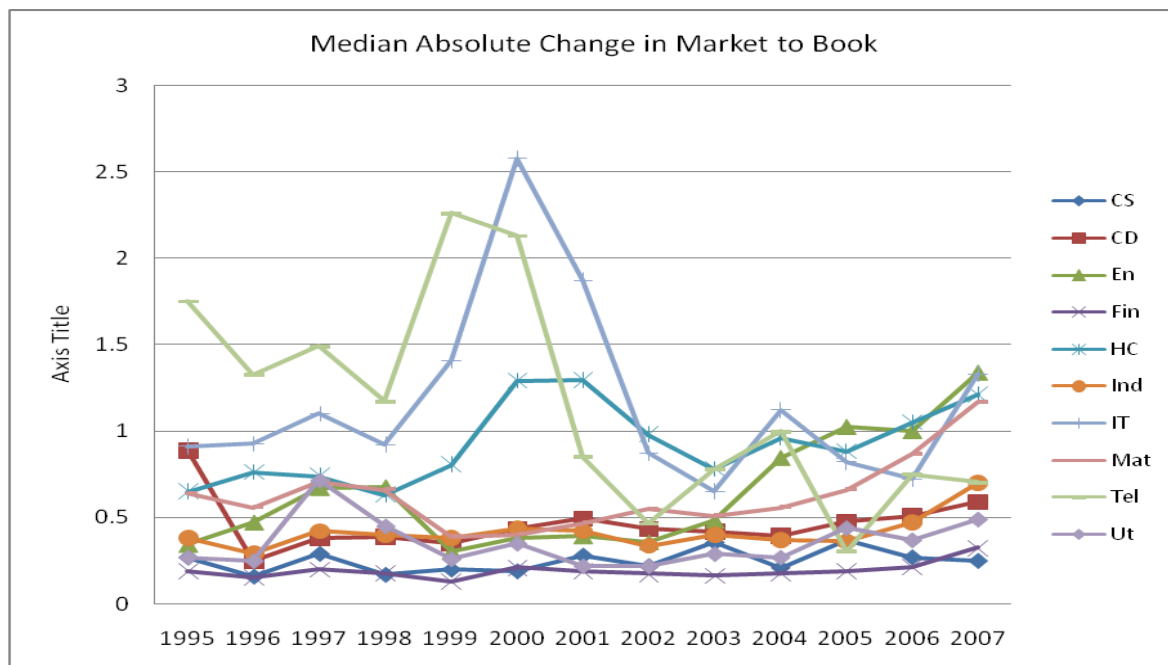
Figure 3.14   One-year returns – industry breakup

The one-year prior return is calculated for individual firms using the following formula:

Compound annual return = (Share price at the end of the investment period) / (Share price at the beginning of the investment period) ^ (1/Number of years) – 1

The median is then obtained for all the firms' returns within the industry and is presented in the figure below.

Figure 3.15   Three-year returns – industry breakup

The three-year prior return is calculated for individual firms using the following formula:

Compound annual return = (Share price at the end of the investment period) / (Share price at the beginning of the investment period) ^ (1/Number of years) – 1

The median is then obtained for all the firms' returns within the industry and is presented in the figure below.
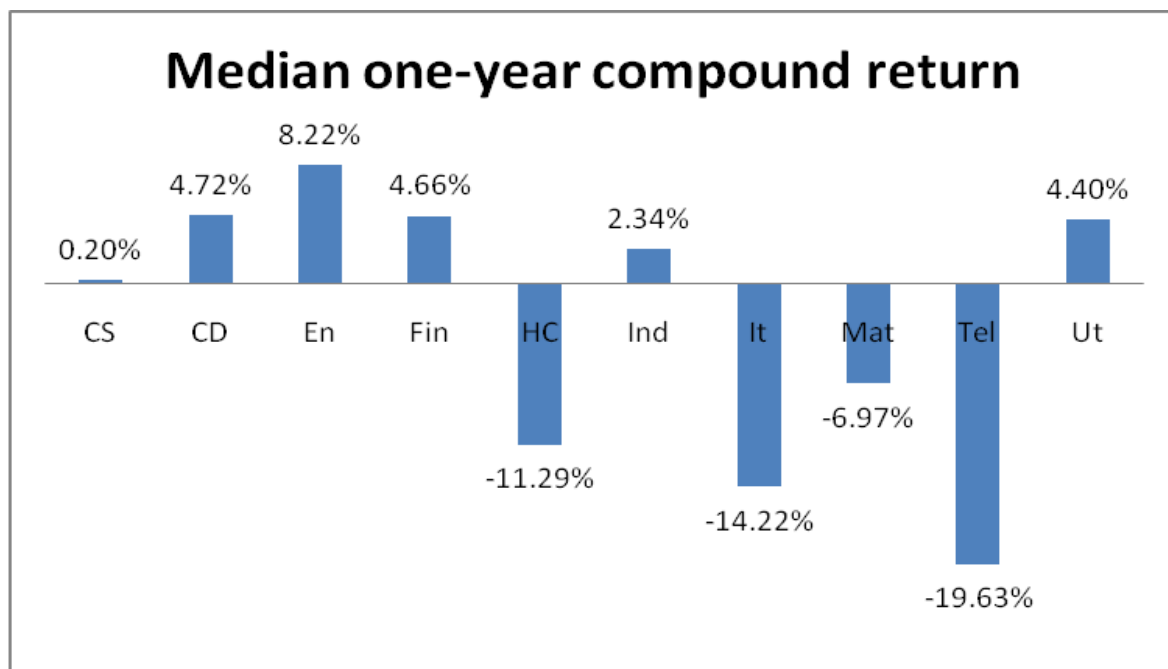
Figure 3.16   One-year returns – yearly breakup

The one-year prior return is calculated for individual firms using the following formula:

Compound annual return = (Share price at the end of the investment period) / (Share price at the beginning of the investment period) ^ (1/Number of years) – 1

The median is then obtained for all the firms' returns for each year for the 12-year sample period and is presented in the figure below.
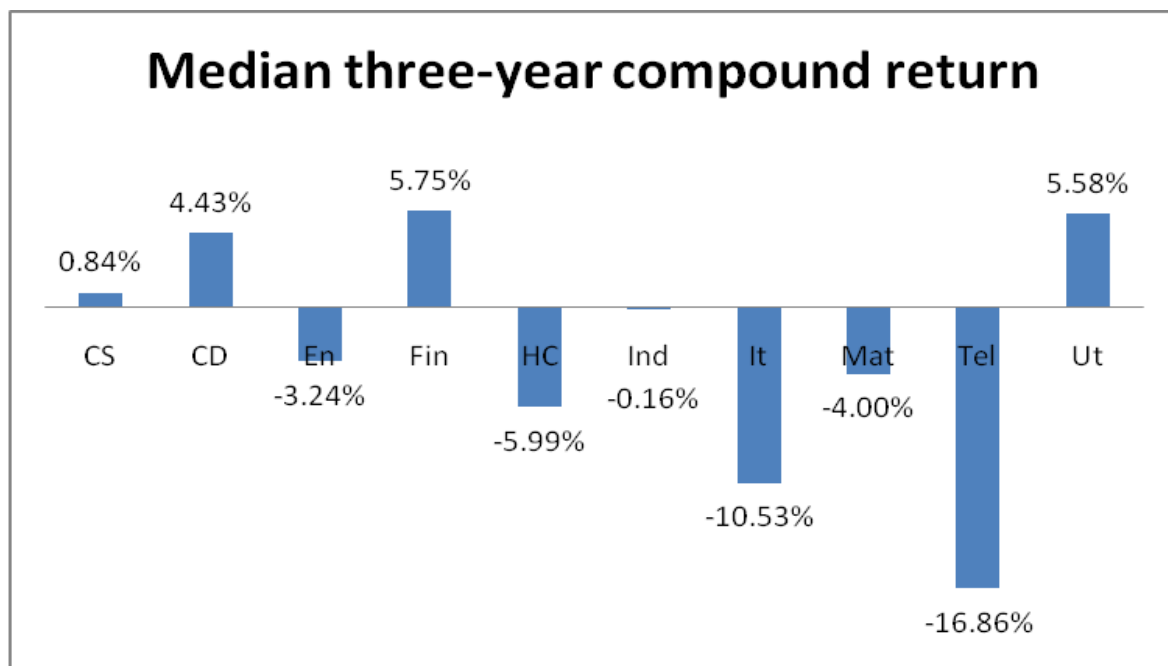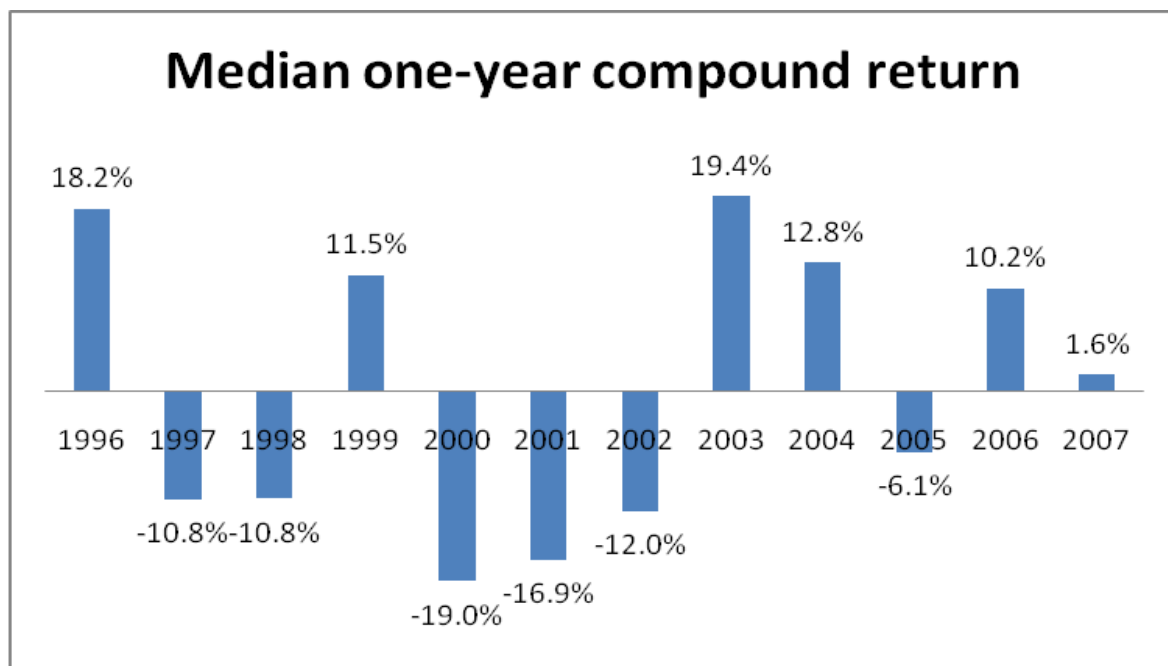
Figure 3.17   Three-year returns – yearly breakup

The three-year prior return is calculated for individual firms using the following formula:

Compound annual return = (Share price at the end of the investment period) / (Share price at the beginning of the investment period) ^ (1/Number of years) - 1

The median is then obtained for all the firms' returns for each year for the 12-year sample period and is presented in the figure below.
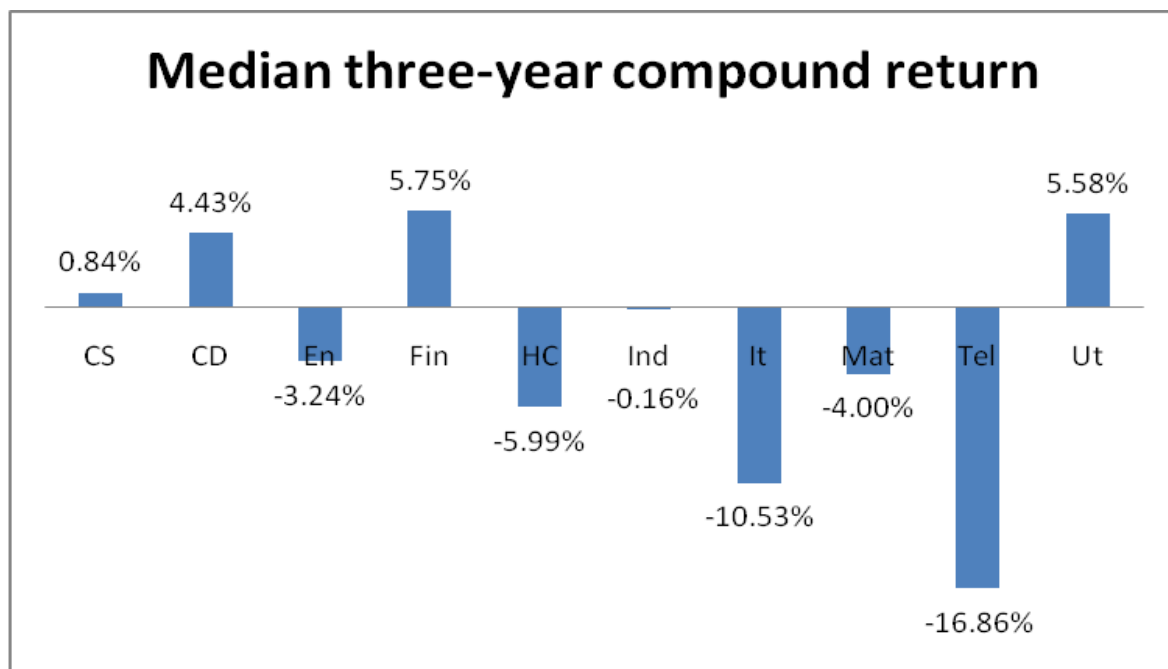
Figure 3.18   Standard deviation of 3-year return

The cross-sectional industry σ for the 3-year return is represented in the table below. The formula used to calculate the standard deviation is as follows:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \bar{x})^2},$$

Where

N = number of years,

i = 1, 2… N

x_i = random variable

$\bar{x}$ = Mean
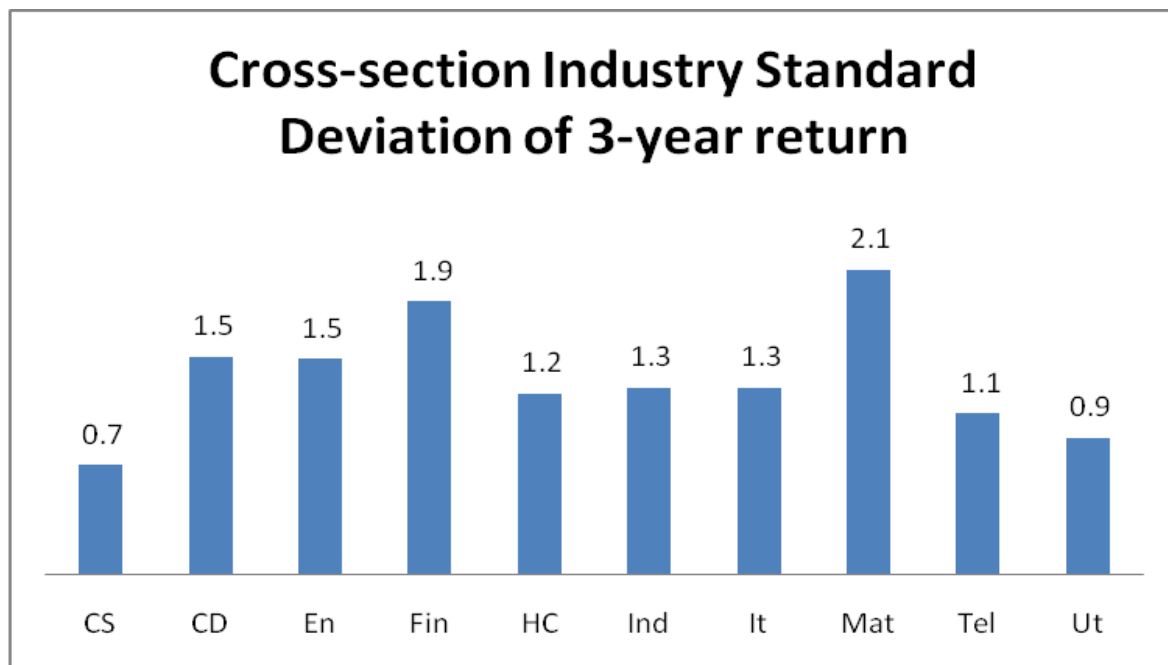
Figure 3.19   Capital liquidity spread

The spread between the weighted average interest rate available for large businesses on credit outstanding (LBI) and short-term 90-day Treasury bills is calculated from data available from the Reserve Bank of Australia website. The graph below presents the movement of the two interest rates and the spread.
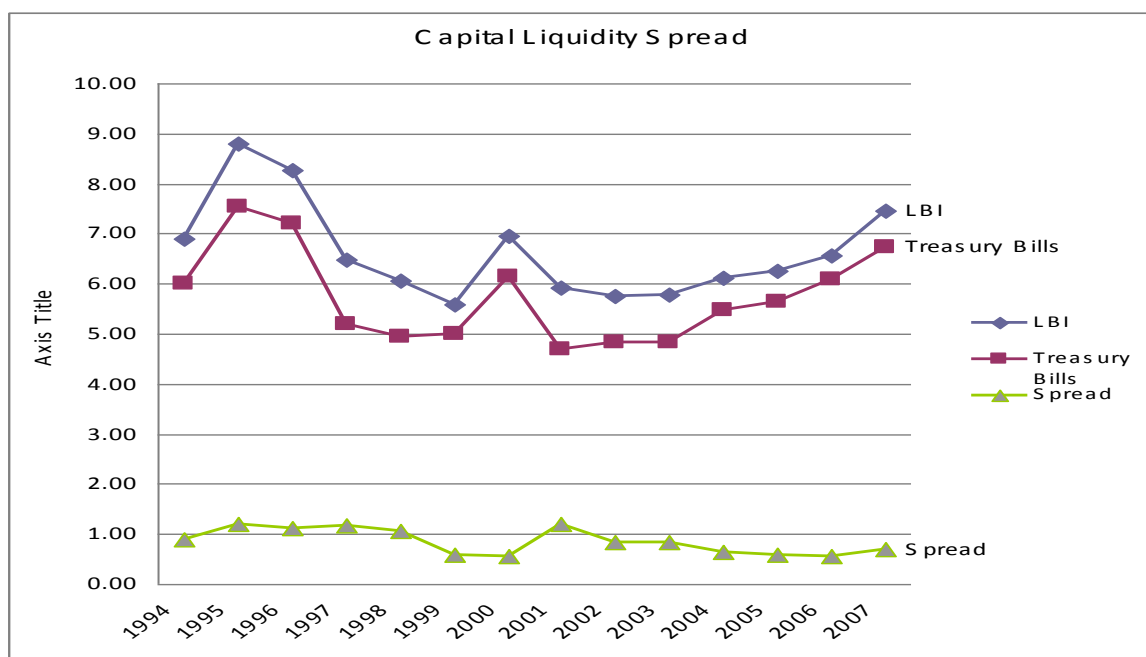
Figure 3.20 Capital liquidity, industry merger waves and aggregate merger activity

The line is the spread between the average interest rate charged for large business bills and the 90-day Treasury bill rate, reported on the website of Reserve Bank of Australia. This spread is measured in percentage points and proxies for capital liquidity. It has been scaled to use the left axis (e.g. 60 represents a rate spread of 1.2% * 50 = 60). The horizontal bars mark the timing of the industry merger wave periods and the number of industry merger waves in any one year (for example the top-most bar represents 5 industry level merger waves that occurred in 2000). The vertical bar represents the total number of merger bids announced in each year and the values are represented by the left axis.
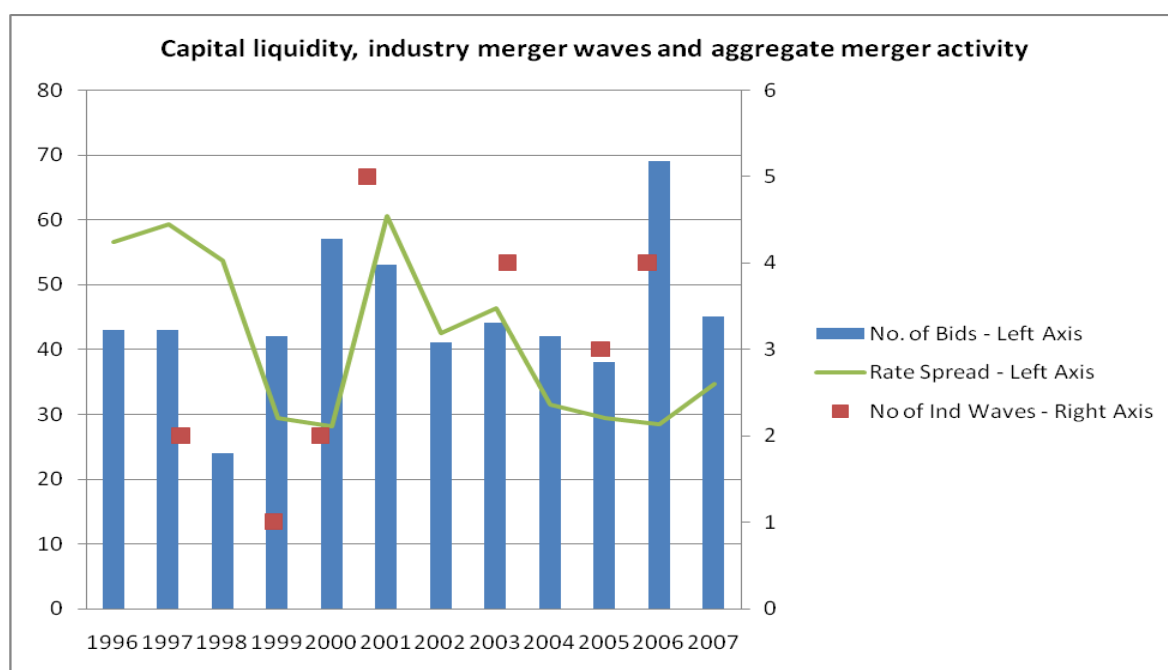
Figure 3.21   Market-to-book ratios, rate spread and 3-year SandP ASX 200 return

The graph below presents the time-series relation between the rates spread variable and variables commonly used in mis-valuation explanations of merger waves. The rate spread is the spread between the weighted average rate available for large business and the 90-day Treasury Bill rate, as collected from the Reserve Bank of Australia's website. This spread is measured in percentage points and proxies for low capital liquidity. The M/B time series is the median market-to-book ratio of all firms listed on the ASX. Finally, 3-yr SandP ASX 200 return is one plus the compounded prior three-year return on the SandP ASX 200 index.
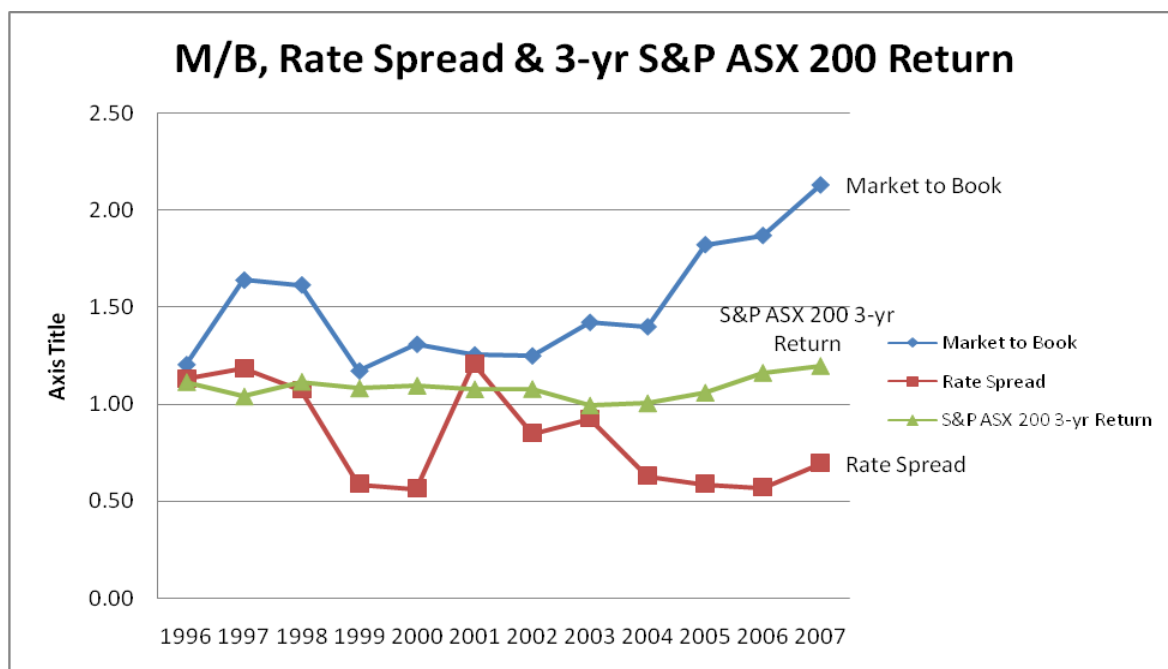
Figure 3.22   Relation between industry merger waves and aggregate merger activity

The height of each bar represents the number of bids, shown on the left axis across all industries in that year. The line indicates the percentage of all bids, shown on the right axis, in each year that involved one of the industries undergoing a merger wave in that year.
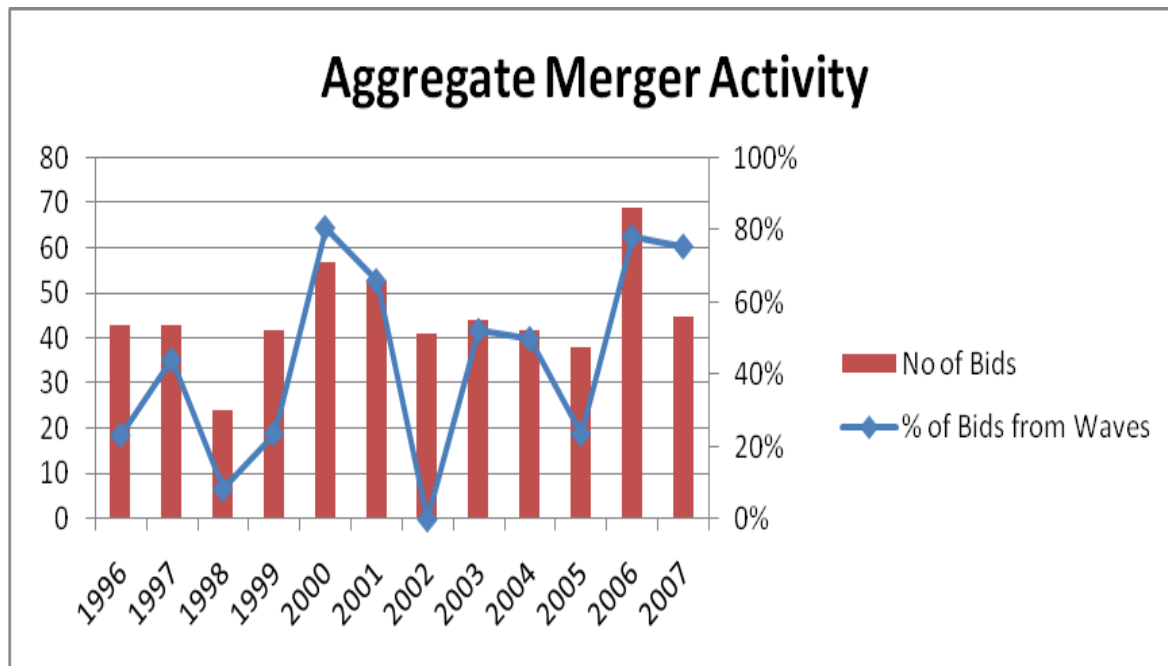
Tables

Table 3.1   Takeover activity by year

This table reports the number of takeovers annually for each industry in the data collected for the 12-year sample period. A takeover is assigned to the year in which the initial announcement of the event occurs. Maximum cluster percentage in two years is the greatest fraction of takeovers occurring in an industry in an adjacent two-year period.

Panel A

	Number of Takeovers per Year						Total	Maximum Cluster % in 2 years
	1996	1997	1998	1999	2000	2001	Merger Activity	
Telecomm	0	0	1	1	2	2	6	67%
Health Care	0	0	1	1	1	2	5	60%
Materials	10	7	6	9	17	16	65	51%
Energy	5	3	2	4	6	0	20	50%
Info Tech	3	6	1	1	3	4	18	50%
Utilities	0	0	1	0	0	1	2	50%
Financials	6	6	2	6	9	7	36	44%
Cons Disc	5	6	3	6	9	5	34	44%
Industrials	7	13	4	10	8	8	50	40%
Cons Staples	7	2	3	4	2	8	26	38%
Average cluster % in 2 years								42%
Total takeovers	43	43	24	42	57	53	262	
% of all takeovers	16%	16%	9%	16%	22%	20%		

Panel B

| | Number of Takeovers per Year | | | | | | Total | Maximum |
	2002	2003	2004	2005	2006	2007	Merger Activity	Cluster % in 2 years
Utilities	0	0	1	2	4	0	7	86%
Energy	5	2	1	1	8	5	22	59%
Health Care	1	2	6	1	6	0	16	50%
Materials	8	7	9	11	17	18	70	50%
Info Tech	6	2	2	6	3	1	20	45%
Financials	4	10	5	2	6	8	35	43%
Telecomm	1	1	1	1	2	1	7	43%
Cons Disc	8	9	7	5	12	6	47	38%
Industrials	5	7	6	5	8	5	36	36%
Cons Staples	3	4	4	4	3	1	19	42%
Average cluster % in 2 years								41%
Total takeovers	41	44	42	38	69	45	279	
% of all takeovers	15%	16%	15%	14%	25%	16%		

Table 3.2   Takeover activity during 1996-2007

This table lists the total announced bids during the two six-year periods studied in this paper.

The number of bids made and the value of those transactions are also listed below.

Bid Period	No. of Bids	% of Bids	Bid Value	% of Value
1996-2001	262	48.43%	$94,797,591,311	38.14%
2002-2007	279	51.57%	$153,734,918,404	61.86%

Table 3.3   Industries with merger waves

The industries and the years in which the industry merger waves started along with the number of mergers in each wave are listed in the table below.

Industry	Year Wave Started	No.of Mergers
Industrials	1996	20
Information Technology	1996	9
Utilities	1998	1
Consumer Discretionary	1999	15
Energy	1999	10
Consumer Staples	2000	10
Financials	2000	16
Health Care	2000	3
Materials	2000	33
Telecommunications	2000	4
Total Mergers in Waves during 1996-2001		121
Consumer Staples	2003	8
Financials	2003	15
Health Care	2003	8
Industrials	2003	13
Information Technology	2005	9
Telecommunications	2005	3
Utilities	2005	6
Consumer Discretionery	2006	18
Energy	2006	13
Industrials	2006	13
Materials	2006	35
Total Mergers in Waves during 2002-2007		141

Table 3.4   Potential aggregate merger waves

The table below presents the two potentially aggregate waves in the two six-year periods and their percentage of all merger and acquisition occurring in all industry waves and in the 12-year sample period.

Panel A

2 Year Period	No. of Industry Waves	Total Mergers in waves during the 2 years	Total Mergers in all industry merger waves in each 6 year period	% of waves in the 2 years to the industry waves
1999-2000	7	94	124	76%
2005-2006	7	97	141	69%
Total Mergers in both 2 year periods	14	191	265	72%

Panel B

2 Year Period	No. of Industry Waves	Total Mergers in waves during the 2 years	Total Mergers in each 6-year period	% of waves occurring in the 2 years to total waves
1999-2000	7	94	262	36%
2005-2006	7	97	279	35%
Total Mergers in both 2 year periods	14	191	541	35%

Table 3.5   Number of mergers within the two potentially aggregate merger waves

The table below presents the number of announced bids and their percentage relative to the total number of mergers occurring in the two years during each year within the two potentially aggregate merger wave periods of 1999-2000 and 2005-2006.

	No. of Mergers 1999-2001	% of mergers in each year	No. of Mergers 2005-2006	% of mergers in each year	Total no. of mergers in both 2 year periods	% of mergers in each year
1st Year	25	27%	18	19%	43	23%
2nd Year	66	73%	79	81%	145	77%
Total	91		97		188	

Table 3.6   Economic shock correlation matrix

The correlation matrix of the five variables used to measure the economic shock is presented in the table below. The correlation is for the variables across all industries and the full 12-year sample period.

Economic Shock Correlation Matrix

	EBIT	ASTTURN	CAPEX	ROA	GROWTH
EBIT	1.00	-0.27	0.69	0.67	0.79
ASTTURN	-0.27	1.00	- 0.51	0.29	-0.26
CAPEX	0.69	-0.51	1.00	0.32	0.63
ROA	0.67	0.29	0.32	1.00	0.60
GROWTH	0.79	- 0.26	0.63	0.60	1.00

Table 3.7   Measures of economic shock

The state of the industry in the year before a merger wave is summarized. Several variables are used to measure economic shocks to the industry: EBIT, asset turnover, capital expenditures, ROA and sales growth. The median absolute change in each of the above variables is computed for each industry year. For all variables, the number presented in the table is the mean, across all industries, of this industry-specific median in the year immediately preceding the start of the merger wave. For each industry, the 12-year time series of shock observations is ranked into quartiles and the cross-industry rank of the shock in the pre-wave year is presented.

Measures of economic shocks

Economic Shocks	Mean 1999	Rank	Mean 2005	Rank
EBIT/Sales	0.13	3	0.43	2
Asset Turnover	0.12	3	0.15	1
Capital Expenditure	0.08	4	0.11	3
ROA	0.05	3	0.07	2
Sales Growth	0.35	4	0.40	3

Table 3.8   Measures of stock valuation

The state of the industry in the year before a merger wave is summarized. Stock valuation is addressed by the median prior one- and three-year compounded return for firms in the industry along with the intra-industry dispersion of that return. For all variables, the number presented in the table is the mean, across all industries, of this industry-specific median in the year immediately preceding the start of the merger wave. For each industry, the 12-year time series of shock observations is ranked into quartiles and the cross-industry rank of the shock in the pre-wave year is presented.

Measures of stock valuation

Stock Valuation	Mean 1999	Rank	Mean 2005	Rank
3 yr - Return	-0.04	3	0.03	2
σ (3yr - Return)	1.00	4	1.89	2
1 yr - Return	-0.14	3	0.11	2
σ (1yr - Return)	0.65	4	0.69	3

Table 3.9   Measures of mis-valuation

The state of the industry in the year before a merger wave is summarized. The median absolute change in market-to-book ratio is computed for each industry-year. The number presented in the table is the mean, across all industries, of this industry-specific median in the year immediately preceding the start of the merger wave. For each industry, the 12-year time series of shock observations is ranked into quartiles and the cross-industry rank of the shock in the pre-wave year is presented.

Measures of mis-valuation

Market-to-Book Variables	Mean 1999	Rank	Mean 2005	Rank
Market-to-Book	1.47	3	1.83	2
Change in Market-to-Book	0.56	3	0.59	3

Table 3.10   Correlation between capital liquidity rate spread, median absolute change in market-to-book ratio and 3-year compounded stock return

The table below presents the correlation for the rate spread, change in market-to-book ratio and 3-year stock return. Correlation is also computed for lagged variables and current variables to determine the lead-lag relationship among the 3 variables.

Correlation		1996-2007
Current Spread and Current M/B	-	0.35
Current Spread and Current Return	-	0.33
Lagged Spread and Current M/B	-	0.39
Lagged M/B and Current Spread	-	0.47
Lagged Spread and Current Return	-	0.39
Lagged Return and Current Spread	-	0.04

Table 3.11   Predicting merger waves

Logit models are used to predict when an industry will have a merger wave. The sample is 10 industries, each over 12 years (1996–2007). The dependent variable in the four columns is equal to one if the industry-year is the beginning of a merger wave in that industry. The explanatory variables are measured at the end of year $t-1$. Market-to-book ratio is the industry median absolute change market-to-book ratio, 3-year return and σ (3-year return) are the median return in the industry for the three years ending at the end of year $t-1$ and the intra-industry standard deviation of that return, and the weighted average rate available for large business on bills (LBI) loan rate spread (spread above the 90-day Treasury Bill rate) proxies for low capital liquidity. The economic shock index is the first principal component of the five economic shock variables in the first column of Tables 3.7, 3.8 and 3.9. The economic shock index is also interacted with dummy variable selecting years when market-to-book ratios are below their industry-specific time-series median or the LBI rate spread is above its time-series median representing years of low capital liquidity. This dummy variable takes the value of one when there is low capital liquidity and zero otherwise.

	(1)	(2)	(3)	(4)
Intercept	-1.71	-1.69	1.42	1.27
(p-value)	0.00	0.01	0.17	0.28
Market/Book $_{(t-1)}$	0.29	0.50		0.27
(p-value)	0.69	0.52		0.78
3-year Return $_{(t-1)}$		-0.10		1.73
(p-value)		0.27		0.55
σ (3-year Return) $_{(t-1)}$		-0.10		-0.01
(p-value)		0.77		0.98
LBI Rate Spread $_{(t-1)}$			-2.42	-2.50
(p-value)			0.05	0.05
Economic Shock Index $_{(t-1)}$			0.29	0.31
(p-value)			0.80	0.80
Economic Shock Index $_{(t-1)}$ (Tight Capital)			-1.51	-1.40
(p-value)			0.00	0.01
McFadden R-squared	0.001372	0.013024	0.139639	0.144167

Table 3.12   Preferred mode of payment in US and Australian mergers

The table below lists the percentage of cash used by bidders to purchase their targets in the US and the Australian markets.

Panel A

US Mergers	Cash	Equity	Mixed	Debt
Average 1980-1989	43.8%	29.5%	25.9%	0.8%
Average 1990-1999	33.8%	35.1%	30.6%	0.5%
Average 2000-2005	53.3%	22.7%	22.8%	1.2%

Source: Mergerstat Review 2006

Panel B

Australian Mergers	Cash	Equity
Average 1996-2007	65%	35%

Table 3.13 Large private-equity deals in Australia

The table presents some of the large private-equity deals over the last six years in Australia.

Target	Bidder
Just Jeans	Catalyst
Ausdoc	ABN Amro
Flight Centre	Pacific Equity Partners
Rebel Sport	Archer
Myer	Newbridge Capital Group LLC and Texas Pacific Group
BIS Cleanway	Transpacific Industries Group
Coles	Kohlberg Kravis Roberts and Co
APN News and Media	Independent News and media, Providence Equity Partners and the Cayle Group
Qantas Airlines	Airline Partners Australia Consortium

Appendix 1:

R-squared

When analysing data with a logistic regression, an equivalent statistic to R-squared does not exist. The model estimates from a logistic regression are maximum likelihood estimates arrived at through an iterative process. They are not calculated to minimize variance, so the OLS approach to goodness-of-fit does not apply. However, to evaluate the goodness-of-fit of logistic models, several "pseudo" R-squareds have been developed. These are *pseudo* R-squareds because they look like R-squared in the sense that they are on a similar scale, ranging from 0 to 1 (though some pseudo R-squared never achieve 0 or 1) with higher values indicating better model fit, but they cannot be interpreted as one would interpret an OLS R-squared and different pseudo R-squared can arrive at very different values.

McFadden's R- squared

The log likelihood of the intercept model is treated as a total sum of squares, and the log likelihood of the full model is treated as the sum of squared errors. The ratio of the likelihoods suggests the level of improvement over the intercept model offered by the full model.

A likelihood falls between 0 and 1, so the log of a likelihood is less than or equal to zero. If a model has a very low likelihood, then the log of the likelihood will have a larger magnitude than the log of a more likely model. Thus, a small ratio of log likelihoods indicates that the full model is a far better fit than the intercept model. If comparing two models on the same data, McFadden's would be higher for the model with the greater likelihood.

$$R^2 = 1 - \frac{\ln \hat{L}(M_{Full})}{\ln \hat{L}(M_{Intercept})}$$

M_{full} = Model with predictors

$M_{intercept}$ = Model without predictors

$\hat{L}$ = Estimated likelihood