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STOCK MARKET VALUATIONS AND METHOD OF PAYMENT IN MERGERS AND ACQUISITIONS: GLOBAL EVIDENCE FROM 1998-2003

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Abstract
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PURPOSE OF THE STUDY

The objective of this thesis is to study whether stock market driven acquisitions –theory by Shleifer and Vishny (2003) and market valuation and merger waves –theory by Rhodes-Krofp and Viswanathan (2003) affect the acquirer's choice of method of payment in mergers and acquisitions. The empirical focus of the study is two-folded. Firstly, I study the connection between method of payment and market-to-book –ratios of the target and acquirer. Secondly, I study the effects that periods of high stock market valuation levels have on the choice over method of payment.

DATA

The data in this study comprises of global mergers and acquisitions announced between January 1, 1998 and December 31, 2003. The data concerning mergers and acquisitions is acquired from the Securites Data Corporation's (SDC) database while accounting and share price data are from Thomson Financial Worldscope database.

METHODOLOGY

I use independent sample t-tests to compare the market-to-book –ratios of stock and cash acquirers. Logistic regression model is used to estimate the effects of the variables on the method of payment.

RESULTS

Evidence from 1622 mergers and acquisitions globally provides no indication that overvaluation measured by industry adjusted market-to-book –ratio increases the likelihood of stock financing. On the contrary, the logit model indicates that periods of high stock market valuations are statistically significant at 1% level in defining the method of payment. Furthermore, a sub-sample consisting of 150 U.S. based transactions indicates with 5% statistical significance that high acquirer market-to-book –ratios are a factor in choosing stock as method of payment.

KEYWORDS

Mergers and acquisitions, method of payment, market efficiency, behavioral finance, stock market driven acquisitions

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1 INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

During the last two decades, mergers and acquisitions has been one of the most researched areas in finance literature. Event studies about the stock market reactions to merger announcements, studies about the long-term post-merger share price performance and research papers about the accounting performance of merged companies are numerous.

An interesting detail in the merger activity is the existence of merger waves. From the U.S. perspective there were five distinct merger waves during the twentieth century (Ali-Yrkkö, 2002), and a common characteristic for each of these waves was a period of economic prosperity and favorable stock market conditions. The latest wave took place in the 1990s and according to Andrade et al. (2001) most of these deals were stock financed.

The neoclassical theory of mergers and acquisitions (Mitchell and Mulherin, 1996) states that the historically evident waves of mergers and acquisitions are results of changes in industry structures – i.e. the waves are caused by industry shocks. The Q-Theory of mergers and acquisitions (Jovanovic and Rousseau 2002) argues that a firm's merger and acquisition investment rate should rise with the ratio of the firm's market value to replacement costs of its assets (Q-ratio). Jovanovic and Rousseau argue that merger waves occurring during periods of high stock market valuations are thus evidence that mergers are a channel through which capital flows to better projects and better management.

On the contrary to the traditional theories, this study concentrates on the stock market valuation levels and motives for selecting the method of payment in mergers and acquisitions. While increasing merger activity during periods of high stock market valuation can be explained by traditional theories, it is more difficult to explain why more highly valuated companies prefer to use stock rather than cash in financing their acquisitions. According to recent theories by Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2003), also the stock market valuation levels may have impact on the market for mergers and acquisitions especially when considering the choice of method of payment.

The main insight of Shleifer and Vishny (2003) is that managers of overvalued companies use the overvalued equity to purchase other companies from the market before market valuations return to reflect their fundamental values. The managers of target companies are either paid of or their investment horizons are significantly shorter which gives them incentive to accept the deals.

Especially interesting is that the theory by Shleifer and Vishny (2003) includes an assumption that the financial markets are not rational – i.e. efficient – but the managers deciding on mergers and acquisitions are. Basically, this is the opposite of the Hubris theory by Roll (1986) which assumed efficient financial markets but presented the managers as irrational destroyers of shareholder value while being 'hyped out' by their past performance.

While Shleifer and Vishny propose that managers of target companies accept the overvalued equity because of different investment horizons or due to personal gains, the theory of Rhodes-Kropf and Viswanathan (2003) is based on information asymmetries. They propose that during periods of hot stock markets it is more difficult to determine which part of overvaluation is market-wide and which part is firm-specific. Consequently the inability of the target firms to distinguish effects of market overvaluation from synergy when evaluating acquirers bid leads to increased use of stock as a medium of exchange during levels of high stock market valuations.

Overvaluation of the acquirer in stock financed mergers has been evident in several distinctive cases. Rhodes-Kropf and Viswanathan (2003) mention the infamous merger between America Online and Time Warner as an example of acquiring firm taking advantage of its inflated share price. The shareholders of Time Warner that held on to the stocks offered by AOL have suffered an enormous loss while the AOL-Time Warner stock has plummeted from pre-announcement price of $73.75 on January 7th 2000 to $16.82 on April 19th 2004. On the contrary, there seems to be a quite high possibility that the original shareholders of AOL are actually better of with the merger compared to what might have happened if it never had come true.

The Finnish-Swedish Enso Oy – STORA Ab forestry merger in 1998 is another case that fits the Shleifer and Vishny theory[1]. The ownership of the merged company was split according to share prices and Stora's share price had risen sharply during the last twelve months preceding the merger.

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[1] Kauppalehti 12.6.1998 "FIM Pankkiiriliike arvostelee Stora Enso –fuusion vaihtosuhdetta"

On the contrary, the government owned Enso had no such momentum and thus according to some critics the ownership was not split fairly when looking at the fundamentals and synergy benefits.

Moreover, mergers and acquisitions as a phenomenon are utmost interesting since they are directly linked to the socioeconomic mega-trend of our time – the globalization and integration of world-wide markets. Furthermore, during the course of my studies the collapse of stock market's so called internet bubble shifted my attention from efficient market hypothesis towards behavioral finance approach. Therefore studying a theory of mergers and acquisitions based on market inefficiency has been a very interesting task on the personal level.

1.2 RESEARCH PROBLEM AND PURPOSE

This study examines a global sample of mergers and acquisitions announced between January 1, 1998 and December 31, 2003. The main purpose of this thesis is to study whether overvaluation proxied by market-to-book –ratios have effect on the choice of method of payment in mergers and acquisitions. Research problems are highlighted below:

Research problem 1:
Does the share price valuation level proxied by market-to-book –ratio affect acquirer's choice of method of payment in mergers and acquisitions?

Research problem 2:
Does period of high overall stock market valuation create conditions under which high market-to-book firms able to better take advantage of their high valuations through stock financed acquisitions?

First research problem stems from stock market driven acquisitions theory Shleifer and Vishny (2003) and second research problem derives from combining Shleifer and Vishny predictions with the theory of Rhodes-Krofp and Viswanathan (2003), both of which will be further discussed in the theoretical part of this thesis.

As already said in the background chapter, an important aspect of this study is that it assumes inefficient financial markets. The assumption is based on the fact that both of the key theories in this thesis question market efficiency as well. The theoretical model of Shleifer and Vishny (2003) assumes zero synergies and inefficient financial markets that are affected by heuristics and psychological sentiment. The theory of Rhodes-Kropf and Viswanathan (2003) is based on correlated misinformation and on the fact that managers of acquirer and target firms have private information about the value of their companies – which implies rejection of at least strong form market efficiency.

Intuitively it does appear to be a complicated idea to use market-to-book –ratios to measure misvaluation since they are a commonly accepted proxy for growth opportunities. However, the persistence of B/M –anomalies first identified by Rosenberg et al. (1985) and recently evidenced by Chan and Lakonishok (2004) does indicate that under certain conditions market-to-book –ratio may also be used as a proxy for under- and overvaluation. Most importantly, the validity of this study does not require that market-to-book –ratio would be a better proxy for rational fundamental value than the share price nor that market-to-book would not simultaneously contain information about the firms' growth opportunities. All I am saying is that if it can be shown that differences in market-to-book –ratio cause firms to act as predicted by theories written about stock market influenced acquisitions, it would be fair to suggest that there is a relation between market-to-book –ratio and takeover behavior.

Additional objective of this study is reviewing the literature regarding two key areas of the thesis: Theories explaining motives for mergers and acquisitions and theories concerning the choice of method of payment in M&A.

1.3 MAIN RESULTS AND LIMITATIONS OF THE STUDY

The main result of this thesis is that evidence from 1622 mergers and acquisitions globally taking place between 1998-2003 does not provide any indication that acquirer overvaluation measured by industry adjusted market-to-book –ratios increase the likelihood of stock financing. Even though the market-to-book –ratios of stock acquirers are on average somewhat higher than those of cash acquirers, the results of a logit regression offer no support for the hypothesis that high market-to-book –ratios would be a factor in choosing the method of payment. Therefore, this thesis rejects the predictions of Shleifer and Vishny (2003) at least on the general level.

On the contrary, the logit model indicates that months classified as periods of high stock market valuations are statistically significant at 1% level in defining the method of payment. Consistently, months classified as periods of low stock market valuations have negative effect on the stock payment. The latter result is statistically significant at 5% level, thus supporting the theory by Rhodes-Kropf and Viswanathan.

Furthermore, a logit regression of a sub-sample consisting of 150 acquisitions with an acquirer domiciled in the U.S. indicate with 5% statistical significance that high acquirer market-to-book –ratios are a factor in choosing stock as method of payment during periods of high stock market valuations. Intuitively it can be stated that the predictions of Shleifer and Vishny do not apply to an average deal. Therefore the result of this thesis that high market-to-book –ratios are a significant factor in choosing the method of payment in M&A is supporting the Shleifer and Vishny theory.

The general applicability of the results of this thesis is subject to several constraints. Firstly, the data set is limited to six years containing the up and down movements of the stock market around the change of the millennium. In order to be able to generalize any of the results, it would be necessary to study whether they hold also during other time periods. Moreover, when considering the results of this thesis it must be stated that the method of estimating the industry averages of market-to-book –ratios is subject to selection bias. This is due to the fact that the sample for forming the industry averages consists of companies involved in takeovers between years 1998 and 2003. Moreover, since there is no academically approved measure for periods of high and low stock market valuations the results are also subject to the robustness of the methodology used for classifying overall stock market valuation levels. Finally, the results can also be disputed since the M/B –ratio has been used as a proxy for both growth opportunities and overvaluation.

1.4 STRUCTURE OF THE STUDY

After introduction, I will look into the relevant theories including market efficiency, motives for mergers and acquisitions and alternative theories for choosing method of payment in mergers and acquisitions. The third chapter includes results of past empirical research and the fourth chapter includes a description of the sample selection process and hypotheses development. In the fifth chapter I will briefly go though the research methodology. Both descriptive statistics and results of univariate tests and logistic regressions will be introduced in Chapter six. Finally, Chapter seven includes concluding discussion and summarizes the findings of the Thesis.

1.5 KEY DEFINITIONS

Acquisition – Merger – Takeover:

Academic literature uses terms mergers, acquisitions and takeovers sometimes interchangeably and sometimes to indicate distinctions in takeover characteristics. Terms acquisition and tender offer sometimes denote transactions where the bidder makes an offer directly to the shareholders of the target company, whereas term merger indicates a negotiated deal between target and acquirer management.

This thesis uses terms *deal, transaction, merger, acquisition and takeover* interchangeably to denote the process of combining two companies except for in the cases where distinction of acquisition type is relevant. Furthermore, target and acquired company as well as terms acquirer, buyer and bidder are used interchangeably in this thesis.

Behavioral Finance Theory:

Behavioral finance is a theory stating that there are important psychological and behavioral variables involved in investing in the stock market that may cause the security prices to deviate from the intrinsic value based on economic fundamentals.

Efficient Markets Theory (EMH):

A theory stating that in an efficient market the prices of securities will reflect a rational assessment of the true underlying worth of stocks; the prices will have fully and accurately discounted all available information. Since the theory assumes that news arise randomly in the future it predicts that stock prices will approximate to a Brownian motion pattern (i.e. random walk) of price movement and that technical analysis and statistical forecasting are likely to be fruitless.

Fundamental (Intrinsic) Value of a Firm:

Fundamental value is the net present value of a firm's expected future cash flows discounted by the required rate of return.

Joint-Hypothesis Problem:

Joint-hypothesis problem states that a test of market efficiency is always simultaneously a test of the market model. This causes problems for academic consensus about market efficiency, since whether research results either support or deny efficient market hypothesis, it can be always argued that the result was due to imperfections in the model used in the study. Joint-hypothesis problem is one of the key reasons for my decision to abandon the idea of long-term abnormal returns approach in favor of market-to-book approach.

Market-to-book -ratio:

Market-to-book -ratio (M/B) is the ratio of market value of assets to the book value of assets. Please note that some studies in this thesis use book-to-market (B/M) or book-to-price –ratios (B/P) which are the opposite of M/B-ratio – i.e. low B/P –ratio is high M/B-ratio.

Tobin's q (a.k.a. the q-ratio):

Tobin's q is the ratio of the market value of assets over the replacement value of assets. Perfect and Wiles (1994) show that Tobin's q and the market-to-book -ratio are highly correlated (0.96). I therefore make no distinction between Tobin's q and the market-to-book –ratio in this study.

2 THEORY REVIEW

Due to the fact that the key theories of this study are related to market efficiency, merger motives and method of payment, the range of the literature and theory review of this thesis is very comprehensive. It begins with a short review of market efficiency, continues with traditional motives of mergers and acquisitions before introducing merger theories based on market valuations. The last section of theoretical review concentrates on market-to-book –ratio and alternative theories of method of payment in mergers and acquisitions.

2.1 THEORETICAL FRAMEWORK – MARKET EFFICIENCY

This chapter introduces the key theoretical framework of the study – specifically the theories of efficient market hypothesis and basic concepts of behavioral finance. While is not plausible to present complete review of the efficient market literature, a brief overview of the theory will provide the necessary background information for this study.

2.1.1 Efficient Market Hypothesis

The efficient market hypothesis (EMH) originates from Kendall's (1953) finding that security prices follow a random walk and cannot be forecasted merely by looking into the historical time-series of their past returns. The concept was further developed in the 1960s and in his seminal article titled "Efficient Capital Markets" Fama (1970) defined efficient markets as markets where at any point in time security prices 'fully reflect' all available information.

Furthermore, Fama divided market efficiency according to the definition of information into three different categories: weak-form, semi-strong-form and strong-form market efficiency. By definition, the weak-form efficiency is included in the semi-strong-form efficiency concept and correspondingly the semi-strong-from is included in the strong form efficiency concept.

In the weak-form of market efficiency, 'information' refers merely to the historical record of past prices. In other words, under weak-form efficiency prices reflect all information contained in the record of past prices in such way that any trading system based on only pricing history cannot produce superior risk-adjusted returns.

In the semi-strong-form market efficiency the definition of information is broadened to all publicly available information including e.g. financial records and past news about the company in question. Put it more explicitly, the semi-strong market efficiency requires that all new information – such as earnings announcements, profit warnings and merger announcements – coming to the market should be incorporated into security prices quickly and correctly. In practice this means that the security prices should adjust to news events immediately without any post-announcement drift either in form of an upward trend or a downward reversal.

Strong-form market efficiency requires that all information, including that of insiders, is fully reflected in the security prices. In other words, the question is whether there are any investors in the market who have private information not yet reflected in the current security prices.

Since the EMH is a theoretical abstraction, some more practical definitions are useful to further enlighten the concept. Jensen (1978) defined market efficiency in an academically relaxed but economically more rational way: "security prices reflect information to the point where the marginal benefits of acting rationally on information exceed the marginal costs". Grossman and Stiglitz (1980) expanded the view of EMH in the similar way by arguing that prices can not perfectly reflect the information since obtaining information in the real world is costly.

2.1.2 Critique of the Efficient Market Hypothesis – Behavioral Finance

Contrary to the EMH, the theories of behavioral finance do not presume that the stock market is always efficient. Behavioral finance approach presumes that in addition to rational economic factors, the share prices are affected by irrational – psychological – elements, which impact human behavior in all walks of life including the science (and art) of investments.

As most economic theories, the EMH is based on several assumptions. Beyond the natural assumption of the hypothesis that investors maximize their own wealth, Shleifer (2002) summarizes key theoretical foundations of the EMH as follows:

1. Investors are rational and value securities based purely on fundamentals
2. To the extent that some investors are not rational, their trades are random and therefore cancel each other out
3. Rational arbitrageurs eliminate the influence of non-random irrationality

Shleifer (2002) further presents both theoretical arguments and empirical evidence to suggest that none of the three arguments hold in the real world.

Firstly, investor rationality is criticized by the Prospect Theory developed by Kahneman and Tversky (1979). Kahneman and Tversky found that contrary to expected utility theory, people placed different weights on gains and losses and on different ranges of probability. Firstly, they found that people put much more weight on the prospective losses compared to equivalent sized gains. Moreover, they found that people will respond differently to equivalent situations depending on the framing of the question, i.e. whether it is presented in the context of losses or gains. Furthermore, the evidence of Kahneman and Tversky (1979) shows that people do not deviate from rationality randomly but rather form their biased judgments in the similar ways.

The argument that people are more sensitive to losses than gains makes them reluctant to realize losses and hence also perhaps reluctant to hold risky equity. Supporting the previous argument Benartzi and Thaler (1995) find that the size of the equity premium over bonds is consistent with the predictions of the prospect theory.

In case the psychological factors cause market prices of some securities to deviate from their fundamental values, it creates an opportunity for arbitrage, i.e. the simultaneous purchase of undervalued securities and selling overvalued securities with essentially similar risk characteristics. However, due to the fact that there are not exact substitutes for most of the securities the opportunity for arbitrage is limited. Also the noise trader risk (see e.g. De Long et al. 1990) may present limits to arbitrage and therefore allow the security prices to deviate from fundamental values (Shleifer 2002).

2.1.3 Implications to Mergers and Acquisitions Research

As stated above, the efficient market hypothesis suggests that the market value of a company's share price reflects an unbiased estimate of all publicly available information about the firm's future cash flows and the related risk level. Therefore, according to the EMH the price impact of any merger or acquisition announcement should immediately reflect the economic rationality of the transaction.

As later discussed in the empirical evidence chapter of this study the evidence of the accuracy of price impact is mixed. An example of irrational merger activity is the wave of diversifying conglomerate mergers around 1970 that has been widely regarded as value destroying activity and at least a partial cause for the break-up merger wave in the 1980s. However, paradoxically the initial event returns to acquirers were positive in many cases suggesting that market efficiency did not hold during the conglomerate wave (Shleifer and Vishny, 1991).

However, from practical point of view perhaps the most important concept associated with the efficient market hypothesis is the joint-hypothesis problem. It states that a test of market efficiency is always simultaneously a test of the market model used in the study, as further emphasized in Fama's article "Efficient Capital Markets II" (Fama 1991). This makes it virtually impossible to make a watertight case for or against market efficiency and leads to discussion about methodological issues beyond the scope of this study (see e.g. Lyon et al. 1999).

However, both the theoretical debate and empirical findings for and against market efficiency continue to be contradicting. Therefore, it is an interesting task to test whether the Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2003) predictions stemming from market inefficiency and information asymmetry will hold. In addition, an important element for this study is that the efficient market hypothesis does not provide any indications that there should be any association between market-to-book value and method of payment in mergers and acquisitions.

2.2 MERGERS AND ACQUISITIONS IN GENERAL

As stated in the introduction, mergers and acquisitions have been widely researched topics during several decades. In addition to the uncountable number of finance studies written about the subject, M&A has been frequent subject also in studies written from perspectives of several other disciplines of social and economic sciences.

Many disciplines have also been intersecting with the finance perspective. Especially management science studies have concentrated on the implementation phase and post-implementation performance of merged companies. For example Vaara (1999), Very et al. (1997) and Weber et al. (1996) study cultural fit and post-merger performance and Chatterjee et al. (1992) write about shareholder value and cultural differences in merging companies.

In order to widen the overall picture of the disciplinary orientations covering mergers and acquisitions as a phenomenon beyond financial economics, Table 1 below includes examples of theoretical approach categorizations of mergers and acquisitions.

Table 1: Disciplinary Orientations Categorizing Mergers and Acquisitions

Weston et al. 2001	**Cording el al. 2002**	**Larsson and Finkelstein 1999**	**Haspeslagh and Jamison 1991**
Process	Process	Economics	Process
Strategy	Top management complementarity	Strategic management	Strategy
Finance	Overpayment	Finance	Capital markets
Agency problems	Agency problems	Human resource management	Organizational behavior
Hubris	CEO hubris	Organizational research	
Redistribution	Employee distress		
	Experience		
	Overpayment		

Modified from Parvainen 2003 (Table 23: M&A research streams as identified in recent overviews of the field. p. 241)

From the perspective of financial economics, however, the fundamental function of mergers and acquisitions is that new owners can put the transferred assets into better use in economic terms. After all, allocation of scarce assets in the most rational way is the main purpose of capital markets.

While the other approaches presented in the Table 1 are useful in understanding mergers and acquisitions as a phenomenon of modern society, a finance textbook approach seems most appropriate for this particular research. Therefore, to large extent Chapter 2.3 describing the traditional motives for mergers and acquisitions follows the categorization of Weston et al. (2001) used also in several preceding finance master's thesis at Helsinki School of Economics (Salokangas 2002, Nyrölä 2002).

2.2.1 Merger Waves

Many summarizing books and studies have noted the occurrence of merger waves that have been a major empirical driver in the development of both Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2003) theories. For example Weston et al. (2001) and Ali-Yrkkö (2002) discuss merger waves and their industry and macro-level causes. From the standpoint of U.S. economy there have been five distinct periods of high merger activity during the past 150 years. Table 2 below describes the waves and key drivers behind increased merger activity.

Table 2: Merger Waves of the Twentieth Century

Time	Description	Key Drivers	Results
1897-1904	Horizontal Mergers	Economic expansion, Railroad development, Electricity Network development	High industry concentration rates, monopolies
1916-1929	Vertical Mergers	Upturn in business activity, utilization of motor vehicles, new means of communication	Oligopolies, mass distribution
1965-1969	Conglomerate Mergers	Changes in regulation, New management theories, defensive diversification	Creation of large conglomerates
1981-1989	Hostile takeovers, LBOs,	Economic upturn, financial innovations, computer technology, international competition	Streamlining of conglomerates, invention of takeover defenses
1994-2000	Strategic Mergers, Wave of Mega deals	Strong economic recovery, Globalization, rapid development of ICT, deregulation	International consolidation

Sources: Ali-Yrkkö (2002), Parviainen (2003), Weston et al. (2001)

What can also be noted is that merger waves have taken place during times of economic prosperity and high stock market valuations. It also seems that top management's tendency towards empire-building escalates in good times (Stallworthy and Kharbanda 1988, 105-106).

2.2.2 Industry Clustering and Neoclassical M&A Drivers

Andrade et al. (2001) present evidence that increased merger activity concentrates on specific industries. This effect can be seen as supportive for the Mitchell & Mulherin (1996) theory since it predicts such industry clustering as a result of changes in corporate environment. However, in case efficient market hypothesis is abandoned, periods of high overvaluations within some industry sectors may lead to increased mergers and acquisitions activity also according to Shleifer and Vishny (2003) theory of market driven acquisitions. Table 3 below shows hot merger industries during three decades.

Table 3: Hot M&A Industries

1970s	1980s	1990s
Metal Mining	Oil and Gas	Metal Mining
Real Estate	Textile	Media and Telecom.
Oil and Gas	Manufacturing	Banking
Apparel	Non-Depository Credit	Real Estate
Machinery	Food	Hotels

Ranked by market values. Sources: Ali-Yrkkö (2002), Andrade et al. (2001)

Furthermore, consistently with the industry shock theory by Mitchell and Mulherin (1996), Weston et al. (2001) list seven change forces related to recent merger activity in the 1990s. Table 4 below presents these change forces.

Table 4: Neoclassical Drivers of Mergers and Acquisitions in 1990s

	The Seven Change Forces
1.	Technological change
2.	Globalization and freer trade
3.	Deregulation
4.	Economies of scale and scope, complementarity and need to catch up technologically
5.	Changes in industry organization
6.	Individual entrepreneurship
7.	Rising stock prices, low interest rates, strong economic growth

Adapted from Table 1.4 in Weston et al. (2001) p. 4

2.3 TRADITIONAL MOTIVES FOR MERGERS AND ACQUISITIONS

Finance literature presents several theories about the motives of mergers and acquisitions that are consistent with the efficient market hypothesis. The key motives can be summarized in five categories as follows:

1. Theories of value creation
2. Managerial motives
3. Hubris
4. Redistribution theories
5. Undervaluation and stock market influenced theories[2]

Berkovitch and Narayanan (1993) present an illustrative summary table representing the overall gain patterns of the first three motives. By testing correlation between different gains in U.S. tender offers between 1963 and 1988 Berkovitch and Narayanan conclude that synergy is the dominant motive for acquisitions and value-destroying acquisitions are driven by agency rather than hubris. Aggregate gain from the fourth motive – redistribution – is understandably zero.

Table 5: Summary Table of Gains in M&A

Motive	Total Gains	Gains to Target	Gains to Acquirer
Efficiency or synergy	+	+	+
Hubris	0	+	-
Agency problems, mistakes	-	+	-

Source: Berkovitch and Narayanan (1993)

[2] Undervaluation and stock market influenced theories will be discussed in Chapter 2.4

2.3.1 Theories of Value Creation

According to the neoclassical theory of the firm the ultimate purpose of the firm is to maximize firm profits or more precisely maximize firm value. Accordingly the dominant motive in the economics and finance literature for mergers and acquisitions has been economic performance improvement and thereby increased shareholder value.

Since maximizing shareholder value is a too generic motive to explain how a particular deal is assumed to lead up to value improvements, the following sub-chapters discuss the different means of achieving improvements.

2.3.1.1 Definition of Value Creation

Very often corporate takeovers are justified by the existence of synergies. Basically, the concept of synergy means that 2 plus 2 equals more than four, i.e. that the value of the merged company (V_{AB}) is greater than the sum of the values of two originally separate companies (V_A, V_B).

$$V_{AB} > (V_A + V_B) \qquad (1)$$

Rationally acting managers should engage only in takeovers where price paid for the target (P_B) is lower than the value increase for the acquirer (Brealey and Myers 1996).

$$P_B < V_{AB} - V_A \qquad (2)$$

Shelton (1988) offers following explicit definition for value creation: "When an acquisition is defined as a combination of the assets of target and bidder firms, value is created when the assets are used more efficiently by the combined firm than by target and acquirer separately."

2.3.1.2 Strategic Realignments

The major argument for mergers and acquisitions in the 1990s was strategic realignment. This means that the focal point of the acquisition is either further focusing or a shift in current corporate strategy. In practice synergies of a strategic merger may be achieved through each of the other ways described in this chapter.

2.3.1.3 Operating synergy

Synergy can be achieved in both cost side and revenue side. To achieve cost side synergies an acquirer and a target must have complementary assets and/or operations that can be more valuable combined than when used separately. In practice these gains are achieved by eliminating intersecting costs from administration, information technology or from other overlapping operations. For example in the Nordic stock exchange merger between OM AB and Hex Oyj in summer 2003, IT expenditure was expected to be a major source of synergy benefits.

The underlying theory of efficiency improvements is the existence of economies of scale. This simply means that by dividing the fixed costs by a larger number of products or services, the total costs per unit can be reduced. Since economies of scale diminish with the growth of production level, an underlying assumption here is that prior to the merger firms are operating at levels where they fall short of achieving the full potential economies of scale in their particular industry.

In addition to cost savings, *synergies can also be achieved on the revenue side.* For example a company strong on marketing and another company strong on logistics can gain competitive advantage by combining their competencies by merging. Obviously these gains can also be achieved through joint ventures or strategic alliances, but difficulties of creating comprehensive, binding and at the same time flexible contracts between two separate legal entities often make a merger look like a more feasible solution.

Furthermore, companies with different but related products can merge their activities in a way that two separate clienteles can be offered products of both companies using combined sales force, and thus higher profits can be achieved. For example the bankassurance trend (Fabozzi et al. 2002 p. 104) that begun in the 1990s has been largely based on the idea that by combining an insurance company and a bank with only partly overlapping client-bases an opportunity of cross-selling products and services is created. The merger of formerly state-owned bank Leonia and insurance company Sampo in 2000 is an illustrative example from Finland.

2.3.1.4 Managerial Efficiency Increases

Weston et al. (2001) define replacement of incompetent incumbent management – the main motive of corporate raiders in 1980s – by words "efficiency increases". The basic idea is that the value of the target can be increased replacing target management unable to use target's resources efficiently by relatively more competent management of the acquirer. Theoretically also the opposite situation is possible, i.e. an acquirer takes advantage of hiring superior management of the target through an acquisition.

2.3.1.5 Financial Synergy

The concept of financial synergy is based on the idea of combining a company with excess internal cash flows with a company with extensive growth opportunities but insufficient cash flows. The synergy gains occur for the reason that asymmetries of information and issuance costs can be avoided when financing can be arranged internally. For example Myers and Majluf (1984) discuss the issue and state that financial synergy can occur from transferring of financial slack without the equity issue discount.

Diversification of equity risk and reduction of default risk have also been argued to be sources of financial synergy (Amihud et al. 1986). However, e.g. Brealey and Myers (1996) mention these as 'dubious reasons' for mergers and acquisitions. First of all, shareholders can diversify equity risk in the stock market on their own. Secondly, possible gains from reducing the default risk of bondholders is offset by the reduction of the shareholders option to default. Marginally thinking, minor savings can be achieved from combining two separate debt issues since the fixed cost of issuing debt can be reduced significantly.

2.3.1.6 Acquiring Critical Resources or Knowledge

Engaging in mergers and acquisitions can also be seen as an alternative for increasing internal capacity. Since building new capacity would result in pressure on prices, mergers and acquisitions have been used especially in industries with high existing overall capacity and low growth prospects such as the automobile industry. On the other hand, the central motive for acquiring a supplier may be securing the availability of critical resources and thus reduction of external uncertainty (Porter 1980).

Also, especially mergers between companies that succeed each other in value chain have been motivated by the transaction cost theory created by Williamsson (1975). When the costs of contracting, communicating and information costs associated in the everyday business become substantial, vertical integration can lead to significant savings and thus to value creation.

The above reasoning is useful for instance in analyzing the merger of paper machine manufacturer Valmet Oyj and forestry machinery conglomerate Rauma Oyj that created a single company whose value chain covers each machine required from cutting a tree in a forest to producing different qualities of paper.

Furthermore, some studies have raised transfer of technology as a potential reason for M&A activity. For example Lehto and Lehtoranta (2002) argue that a merger which opens access to distribution channels and complementary expertise allow a developer of technology to exploit the sunk costs of research and development to affect the distribution of returns from the innovation.

Also utilizing the best of different sets of work routines has been hypothesized to be a source of merger gains. Morosini et al. (1998) find support for their hypothesis that relatively high level of cultural distance between companies will make it more likely that the target will provide a set of routines and repertoires that are significantly different from the acquirers. The underlying argument here is that the routines and repertoires cannot easily be replicated and thus according to the resource-based view of the firm (Barney, 1986; Barney, 1991) creates competitive advantage for the merged company.

2.3.2 Managerial Motives

2.3.2.1 Managerialism Theory and Empire-building

Managerialism theory considers mergers and acquisitions as a consequence of agency problems. Scholars have argued very early in the literature (Schumpeter, 1934) that managers' desire for "empire-building" may lead to decisions that are not entirely in-line with the interests of shareholders. An entrenched manager may see also mergers and acquisitions as a path to achieving additional perquisites or increased managerial prestige by enhanced private benefits of control. To increase their prestige, managers can use the assets they control to acquire targets that in reality do not produce any synergy benefits. An alternative managerial motive would be to make an acquisition in order to avoid being acquired by someone else.

2.3.2.2 Agency Problems

Jensen and Meckling (1976) formulated the implications of agency problems in their seminal article titled: "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." Agency problems result from separation of ownership and control in a modern corporation and are most likely in companies where managers own only a fraction of the company's equity.

Furthermore, widely dispersed ownership makes it costly for atomistic shareholders to monitor the behavior of managers. This might lead to managers making decisions that are optimal for themselves but not in the best interest of the shareholders. Negative NPV projects of extensive perquisites such as corporate jets may reflect as a decline in the stock price.

2.3.2.3 Takeovers as a Solution to Agency Problems

Acquisitions can be also seen as a solution to agency problems. If internal control mechanisms fail, the market for corporate control provides pressure for managers to keep their focus on shareholder value (Fama and Jensen 1983). Otherwise they risk losing their jobs if falling share prices create an opportunity for an eager acquirer.

Practitioners involved in hostile takeover attempts frequently used the arguments created by academics. Corporate raiders of 1980s such as T. Boone Pickens and Carl Icahn justified their actions by arguing that they were actually doing a favor for the economy by ousting the sluggish incumbent managers and replacing them by more competent people who would be able to improve company performance in the future.

In the academic world Jensen (1988, 1993) takes the view that takeovers in the 1980s were a result of failures of internal forms of corporate governance. Also Holmström and Kaplan (2001) argue that a key driver of 1980s hostile takeover activity was managers' slow response to new business environment created by deregulation and technological development.

2.3.2.4 The Free Cash Flow Hypothesis

According to Jensen's (1986) free cash flow hypothesis, payout of excess cash relates to the agency problems between managers and shareholders. Jensen defines free cash flow as cash flow excess of what is required to finance all projects that have positive net present values, and hypotheses that when managers have cash more than necessary, they use it for negative net present value projects such as undesirable acquisitions.

Hartford (1999) analyses acquisition attempts from 1977-1993 and using probit analysis finds that cash-rich firms are more likely to attempt acquisitions. Moreover, in accordance with Jensen (1986) the results show that acquisitions by firms with potential free cash flow problems are especially poor while each bid by these firms destroys market value for an amount of 7% in their excess cash reserve. Also Morck, Shleifer and Vishny (1990) find evidence supporting the argument that managerial incentives may drive acquisitions that have adverse effects on the long-run value of the firm.

2.3.3 Hubris Theory

Roll (1986) applied winner's curse to mergers and acquisitions and created so called hubris hypothesis. Put it simply, the winner's curse means that the winner of a sealed-bid auction tends to be the one who most overestimates the value of the auction object. While winner's curse concept originates from the auction theory, it has been widely applied also in corporate finance research (see e.g. Keloharju 1993 about IPOs; Giliberto and Varaiya 1989 about bank acquisitions).

According to Roll (1986), a takeover situation is comparable to an auction, since even though there may be no competing takeover bids, market capitalization represents the current highest bid for the company. Since it is commonly known that valuation estimates are subject to errors, according to standard bidding theory rational bidders are expected to take the winner's curse and possibility of valuation error into account when making their bids. However, if bidders are affected by excessive self-confidence which Roll calls *hubris*, they overpay in takeovers which then results as a value loss for the acquiring firm shareholders. (Roll 1986)

A fundamental assumption of Roll's hubris hypothesis is strong form market efficiency. Therefore, the key prediction of the hubris hypothesis is that the overall value creation from takeovers is zero, i.e. that the gains of target's shareholders are offset by equally large losses suffered by acquirer shareholders.

Latest evidence of hubris comes from Hietala et al. (2003) who study a special case of a takeover contest over Paramount Company by QVC and Viacom. By analyzing the information extracted from stock prices around the takeover contest, they find that Viacom as the eventual winner of the battle overpaid by over $1.5 billion when it agreed to purchase Paramount for $9.2 billion. Furthermore, according to Hietala et al. the market estimated that synergies would have been substantially larger between the target and the ultimate loser of the contest. Since overpayment occurred in spite of the fact that Viacom CEO owned approximately two thirds of the company, the study offers strong support for the hubris hypothesis.

2.3.4 Theories of Value Redistribution

Mergers and acquisitions can be value increasing actions for the initiating parties even in situations where there are no real synergies in the transaction. The source of value increase in these cases is redistribution from other stakeholders of the companies involved – i.e. government, labor, bondholders, competitors, suppliers and consumers.

2.3.4.1 Redistribution from Government

Avoiding taxation has also been presented as a potential motive for mergers and acquisitions. Potential tax benefits are obvious especially when a firm with high cash flows merges with a firm with negative profits and high deferred tax benefits. According to Weston et al. (2001) the tax benefits in a merger may be substantial but on the other hand evidence shows that they are not likely to be the main reason of the merger. It is obvious that financing and organizational form of every takeover is structured as such that tax benefits are maximized. Nonetheless, common business judgment says that tax benefits are merely additional advantages to the attractiveness of a particular deal rather than being the primus causa.

2.3.4.2 Increased Market Power and Excessive Industry concentration

The market power hypothesis derives from the assumption that mergers can result in increased monopoly power and therefore adversely affect consumers. This hypothesis applies especially to horizontal mergers where firm's size is increased significantly relative to its competitors.

Some studies especially on the airline industry have found evidence that horizontal mergers lead to increase in the market power (Evans and Kessides 1994; Borenstein 1989). Besides increased monopoly power of the merged entity, also increased industry consolidation may lead to oligopolistic situations that may also have negative impact on price formation/competition.

Indications of excessive consolidation can be found in Eckbo's (1983) study of horizontal mergers. The study showed that mergers have positively contributed to rival's profits as well and this has been interpreted to indicate that the merger has increased market power in the industry.

While there have been also some supporting evidence for market power hypothesis, according to Jensen and Ruback (1983) the gains created by mergers and acquisitions appeared to come solely from efficiency gains and not from creation of market power. Also, while market power may have been a motive for mergers and acquisitions in the beginning of the twentieth century, modern day competition authorities scrutinize transactions so carefully that pursuing market power hardly is among the primary motives of mergers and acquisitions (Pautler 2001).

2.3.4.3 Labor

The theory of redistribution from labor refers to a possibility to renegotiate labor contracts. Furthermore, also the cost synergies discussed earlier can in some instances come from the employees. If people are laid off and simultaneously output and wages remain constant, employees are effectively compensated less per efforts put in. Evidence about this theory is scarce and e.g. Neumark and Sharpe (1996) find likelihood of being a hostile takeover target does not have an effect on the wage structure of the industry therefore denying the distribution hypothesis.

2.3.4.4 Bondholders

The capital structure of the combined company following a merger or an acquisition may differ significantly from those of the participant companies. Therefore, bondholders may find themselves as owners of securities with different risk characteristics compared to the original securities they purchased.

Bondholders generally have covenants and a variety of contractual clauses protecting the value of debt. However, if the leverage is increased substantially for example in a leveraged buy-out (LBO), unprotected debt may be significantly affected by increased default risk.

Consistently with the above, a majority of the studies find no evidence of such redistribution effect (Kim and McConnell 1977, Asquith and Kim 1982, Dennis and McConnell 1986) but studies focusing on LBOs find negative impacts on bondholder value (McDaniel 1986, Warga and Welch 1993).

2.4 STOCK MARKET INFLUENCED MERGERS AND ACQUISITIONS

2.4.1 Undervaluation Theories

2.4.1.1 Q-Theory – Undervaluation Aspect

Q-ratio (a.k.a. Tobin's Q) measures the ratio of market value of a company to the replacement costs of company's assets. Especially for a company seeking to increase capacity, a company with a low Tobin's Q represents an opportunity to acquire needed assets through an acquisition instead of buying new assets from the asset markets. The Q-Theory of mergers and acquisitions (Jovanovic and Rousseau 2002) argues that a firm's merger and acquisition investment rate should rise with its ratio of firm's market value to replacement costs of its assets (Q-ratio). Jovanovic and Rousseau argue that mergers and acquisitions are a channel through which capital of companies with low q-ratios flows to better projects and better management. A low q-ratio was used as a key argument for justifying mergers and acquisitions especially in the 1970 (Weston et al. 2001).

2.4.1.2 Information Hypothesis

The information hypothesis stems from the fact that the target firm value experiences a positive upward revaluation even when the takeover bid is unsuccessful (Bradley 1980). There are two explanations for this value creation resulting from the mere attempt for a takeover. Bradley, Desai and Kim (1983) argue that reason for value creation is the fact that the takeover bid reveals new information about the company previously unaccounted for in the share price.

Moreover, Weston et al. (2001) describe another potential explanation for the revaluation of the target share. Even though the initial bid had been unsuccessful, the markets view that the company is now "in the play", i.e. that either it will subsequently be taken over by another bidder, or the incumbent management start implementing more efficient business strategies and operations in order to avoid being taken over and potentially losing their jobs.

2.4.2 Stock Market Driven Acquisitions Theory

Shleifer and Vishny (2003) present a framework of mergers and acquisitions that is based on stock market misvaluations. Their model explains who acquires whom, valuation consequences of mergers, merger waves and most importantly for this study, an explanation for the choice of exchange medium in mergers and acquisitions.

Shleifer and Vishny do not deny the explanatory power of neoclassical theory of mergers and acquisitions, but rather offer an additional model for explaining previously unexplained implications such as merger waves and whether cash or stock is used to finance the transaction.

By definition the model assumes that market efficiency does not hold, and an important assumption is that the managers of acquiring companies act in the best interest of the long-term shareholders. Therefore, the assumptions are exactly the opposite of Roll's (1986) hubris hypothesis, which assumed strong-form market efficiency and irrational management.

2.4.2.1 Model Arithmetic

The model is mathematically very straight-forward, and the arithmetic is discussed in the following text. The model assumes that market valuations per unit of capital (Q, Q_1), reflect investor sentiment i.e. that they deviate from the fundamental values. The model considers two firms: target (0) and bidder (1) with:

K, K_1	Capital stocks of target (0) and bidder (1)
Q, Q_1	Prices per unit of capital for target and bidder
$Q_1 > Q$	Assumption that market values bidder
S	Perceived synergy factor, market consensus price per unit of capital for the merged entity
	Furthermore,
P	The price per unit of capital paid by the acquirer
$P = Q$	Point where takeover premium is zero
$P = S$	Point where price reflects the merged short-run valuation of the combined entity
q	Long-run cost per unit of capital (for all companies)

Total market valuation of the united companies is:

$$V = S (K + K_1) \quad (3)$$

Total short-run gains from the merger are:

$$S (K + K_1) - KQ - K_1Q_1 \quad (4)$$

Furthermore, no-synergy point (S*), where short-run gains from the merger are zero, is as follows:

$$S^* (K + K_1) - KQ - K_1Q_1 = 0 \quad (5)$$

Key element of the theory is the perceived synergy factor S, which represents the short-run valuation per unit of capital affected by heuristics and market sentiment. If $S > S^*$, there exists positive perceived synergy and the combined short-run return for target and acquirer is positive. As Shleifer and Vishny put it: "S is the story that the market consensus holds about the benefits of the merger".

In order to create maximum contrast to the industry shocks based theory (Mitchell and Mulherin 1996), Shleifer and Vishny (2003) make a further assumption that there are no long-run efficiency improvements associated with mergers. In the model this means that in the long-run, all assets are worth q per unit of capital, and therefore the long-run fundamental value of merged company is:

$$q (K + K_1) \quad (6)$$

In contracts to financial markets influenced by behavioral biases, Shleifer and Vishny assume that managers are perfectly rational and perfectly informed. In model they know precisely the value of their own company and the value of potential merging partners. A further assumption is that managers maximize their own wealth given their personal investment horizons.

Short-Run Value Effects of Acquisitions

The price paid (P) reflects the negotiating power of the parties involved. Contrary to Myers and Majluf (1984), Shleifer and Vishny make a further assumption that the market learns nothing about the method of payment. Furthermore, denying the information hypothesis they also assume that the offer does not reveal anything new about fundamentals of the merging companies beyond the perceived synergy (S).

Therefore, the short-run effects to target and acquirer are as follows:

Proposition 1. **The immediate effect of the acquisition is:**

$S(K+K_1)-K_1Q_1-KQ$	On the combined market value	(7)
$(P-Q)K$	The short-run target value	(8)
$(S-P)K+(S-Q_1)K_1$	The short-run bidder value	(9)

Assuming that perceived synergy S exceeds S*, the market's perception benefits the combined entity while some of the value of the more valuable company spills over the less valuable one. Effectively this is analogous with the boot-strapping game of P/E –ratios described by Brealey and Myers (1996 p. 921-922). In practice the target shareholders gain if $P > Q$ and acquirer shareholders gain if $P < S$. Furthermore, if the perceived synergy (S) exceeds the current price of bidder capital (Q1) the bidder has an opportunity to revalue its capital upwards in the short-run by purchasing new assets.

Long-Run Value Effects of Acquisitions

Next, I will focus on the long-run effects proposed by the Shleifer and Vishny (2003) model. Hereafter acquisitions financed by stock and cash are considered separately.

Proposition 2. **The long-run effect of cash acquisition is:**

zero	on the combined value of companies	(10)
$K(P-q)$	on the target value	(11)
$K(q-P)$	on the acquirer value	(12)

According to the assumption of the model, there are no long-term effects on company values. Since cash acquisitions are a zero-sum game, bidders should proceed only if they locate a target that is undervalued in fundamental terms. Shleifer and Vishny (2003) take the view that the hostile bust-up takeovers of 1980s support their theory about cash acquisitions.

A relevant example of cash acquisition from recent Finnish business history is the hostile takeover of multi-business corporation Partek Oyj by Kone Oyj in summer 2002. By spring 2004, Kone has divested all acquired business units outside of its original core business and its share price has soared over 40% from the pre-announcement price. That is despite the fact that the short-term market reaction to announcement was a drop of nearly 20%.

The last proposition of Shleifer and Vishny concerns the long-run effects of a stock acquisition.

Proposition 3. **The long-run effect of stock acquisition is:**

zero	on the combined value of companies	(13)
$qK (P / S - 1)$	on the target value	(14)
$qK (1 - P / S)$	on the acquirer value	(15)

Bidder gains when price paid (P) is lower than perceived synergy (S). Moreover, it is again a zero-sum game where the loss of the target is the gain of the bidder and vice versa.

The key insight of Proposition 3. is that there is an important difference between the effect of acquisition on the acquirer share's intrinsic long-term value and the observed share price development. Assuming that the share was initially overpriced ($Q_1 > q$), the bidder firm's long-term value without the acquisition ($K_1(q - Q_1)$) would have been negative. Therefore, even when the long-term return of the acquirer is negative like in studies by Loughran and Vijh (1997) and Rau and Vermaelen (1998) the acquisition has been rational from the viewpoint of long-term shareholders who end up losing less if price paid (P) is less than market's assessment of synergy (S). Furthermore, this creates difference between interests of short-term and long-term shareholders. When $P < S$ but $(S - P)K + (S - Q_1)K_1 < 0$, the initial price reaction is negative but in the long-run the shareholders benefit while the fall in the share price is smaller than what it would have been without the acquisition.

2.4.2.2 What Makes the Target Agree to a Stock Merger?

In Shleifer and Vishny model, the combined long-run benefits are always zero. If $Q < P < S$, the target shareholders gain in the short-run by receiving premium over the announcement time share price but lose in the long-run if they hold on to the bidder shares they receive. Consequently the key question is that who would agree to be a target in such circumstances?

Shleifer and Vishny offer different managerial horizons (Stein 1988, 1989) as an explanation. They argue that targets in stock acquisitions are run by managers who wish to "sell out". Even though the long-run effects of a stock merger with a more overvalued acquirer are negative for original target shareholders, a manager of a less overvalued target would be rational to agree to merge if the situation offers an opportunity for a personal cash-out while the share prices are still floated. Shleifer and Vishny state that family firms selling out to conglomerates in the 1960s and entrepreneurial firms selling out to Cisco and Intel in 1990s are good examples of target companies that fit in their model.

Alternatively they suggest that target managers are paid for to agree on the merger. This can be done either directly through severance pay or indirectly by offering them high management positions in the merged company. Hartzell et al. (2003) study benefits received by target company CEOs in completed mergers and acquisitions. Consistently with the Shleifer and Vishny analysis, they find that executives obtain wealth increases with a median of $4 to $5 million and a mean of $8 to $11 million. The regression estimates of Hartzell el al. further suggest that target shareholders receive lower acquisition premia in transactions that involve extraordinary personal treatment of the CEO.

The prediction of the model that acquirers use stock as medium of exchange when their share price is overvalued relative to fundamentals is consistent with Myers and Majluf (1984), who show that firms issue stock only when it is overvalued.

2.4.2.3 Conclusion and New Predictions

In addition to the favorable share price development, the perceived synergy is the key driver in Shleifer and Vishny model. With high enough perceived synergies the best strategy for long-term shareholders is to make acquisitions, since they benefit as long as S>P. Consequently, Shleifer and Vishny also call perceived synergy (S) "the lubricant that greases the wheels of the M&A process".

According to Shleifer and Vishny, their model yields following untested predictions:

- Targets in cash acquisitions are undervalued relative to fundamentals in absolute terms
- Targets in stock acquisitions are undervalued relative to the bidders → merger pace in industries and markets with large dispersion of valuations should be high
- Bidders in stock acquisitions should exhibit signs of overvaluation relative to the fundamentals: high insider sales, manipulation of accounting accruals and negative post-formation results
- Bidders in stock acquisitions have either relatively longer horizons compared to targets horizons, or alternatively they pay off target managers to agree on stock merger.

Since I do not possess the material for estimating undervaluation in absolute terms my focus is in comparing the valuations of target and acquirer companies by using market-to-book –ratios. Empirical research process will be discussed further in chapters concerning research methodology and hypotheses development.

2.4.3 Market Valuation and Merger Waves

Besides Shleifer and Vishny (2003), also Rhodes-Kropf and Viswanathan (2003) present a model of mergers and acquisitions in which the stock market valuation is a key driver. Their article focuses more on the overall valuation level of stock market and on the merger waves.

The key insight of Rhodes-Kropf and Viswanathan model is that increased asymmetries of information between the target and the acquirer are the reason for increased use of stock as a medium of exchange during levels of high stock market valuations.

When bidders use stock as method of exchange the target has to consider the appropriateness of bidder valuation and thus encounters a valuation problem. Rhodes-Kropf and Viswanathan argue that the valuation problem associated with stock financed acquisitions is more severe during periods of high stock market valuations.

According to Rhodes-Kropf and Viswanathan, misvaluation has firm-specific and market-wide components. Furthermore, the bidder management is assumed to possess private information about the stand alone value of the bidder-company and potential synergies with the target company.

When considering the offer the target management and shareholders try to filter out market- and sector-wide misvaluation in order to make an accurate estimation about the synergies. Rhodes-Kropf and Viswanathan argue that during times of high market-wide overvaluation, the estimation error by target management is also high. Consequently, stock bids tend to be accepted more easily during bull markets. In other words, Rhodes-Kropf and Viswanathan theory is based on the inability of the target firms to distinguish synergy for effects of firm-specific and market overvaluation.

2.5 M/B –RATIO AND METHOD OF PAYMENT THEORIES

This section introduces different interpretations of market-to-book –ratio and presents alternative theories concerning method of payment in mergers and acquisitions.

2.5.1 Growth Interpretation of Market-to-Book –ratio

The conventional efficient markets approach argues that market-to-book (or Tobin's q) measures firm's growth opportunities. More precisely, Myers (1977) divides the market value of a firm into the present value of assets already in place and to the present value of future growth opportunities.

For example Lang, Stulz, and Walking (1989) define Tobin's q as "an increasing function of the quality of a firm's current and anticipated projects under existing management" and use it as proxy for firm's growth opportunities. Moreover, Servaes (1991) emphasizes Tobin's q as a measure of managerial performance.

If market-to-book can be used as a proxy for efficient use of resources, it can be stated that the fundamental economic theory supports the suggestion that high market-to-book firms buy low market-to-book firms. This is simply due to the fact that the primary function of financial markets is to allocate resources in most efficient way.

2.5.2 Misvaluation Approach of Market-to-Book -Ratio

On the other hand, high market-to-book –ratios can be thought to indicate overvaluation. Many studies have found so called book-to-market (B/M) –anomalies. Already Rosenberg et al. (1985) showed that so called value stocks (high book-to-market –ratio) outperform the market when common risk factors are taken into account. Furthermore, in their recent study Chan and Lakonishok (2004) review value vs. growth investing and their evidence suggests that value investing still generates superior returns.

Supporting efficient market hypothesis, Fama and French (1996) argue that the premium associated with high book equity to market equity might be due to the risk of distress. On the contrary, Lakonishok, Shleifer and Vishny (1994) suggest that the relation between market-to-book –ratio and stock returns is evidence of market inefficiency created by investor overreaction. Also Chan

and Lakonishok (2004) conclude their study by arguing that common measures of risk do not support the argument that higher returns of the low book-to-market (value) stocks are due to higher risk associated with the value stocks.

Hence, since low B/M (or high M/B) stocks underperform the market and there is no clear evidence about the risk factor they may present, it can be stated that in some instances market-to-book –ratio can be used also as a proxy for misvaluation.

2.5.3 Theories of Method of Payment in M&A

In addition to the misvaluation theories, there are also several theories regarding the choice over method of payment in mergers and acquisitions.

Risk sharing hypothesis is based on an article by Hansen (1987). The key insight is that if the target knows its value better than the bidder, using stock as method of payment forces the target to share any post-acquisition revaluation effects. Therefore in situations where information asymmetries are high, bidders are presumed to use stock. Hansen argues that information asymmetries and thus risk should grow with the relative size of the target compared to the bidder. Secondly, Hansen predicts that the target's investment opportunities (i.e. market-to-book) are a good proxy for information asymmetries.

The investment opportunities hypothesis stems from Myers's (1977) linking of investment opportunities with borrowing activity. According to Myers, the presence of risky debt may in some circumstances lead to underinvestment, in case exercising real investment option would result in wealth transfers from shareholders to debt holders. Consequently, firms whose value depends more on growth opportunities (high market-to-book companies) are more likely to use equity financing instead of debt financing. Myers and Majluf (1984) further argue that managers with growth opportunities prefer to raise capital through equity issues in order to maintain financial flexibility necessary to finance the growth projects in the future. Since a stock financed merger can also be considered as an equity issue (Fama 1998), it would be beneficial for a high market-to-book company to finance corporate acquisitions with issuing stock.

Cash availability hypothesis is based on Myers's (1984) pecking order of finance which says that managers primarily want to use internal cash flows for new investments. Also Jensen's (1986) free cash-flow hypothesis supports use of excess cash as medium of payment.

Furthermore, *relative size proposition* suggested by previous literature has proposed that the bigger the size of the target firm relative to the acquirer will lead to the acquirer more likely to use share financing (see e.g. Grullon et al., 1997).

It can be also speculated that *cross-border acquisitions* are more likely to be financed with cash than stock. Rationale behind the assumption is that for several reasons shareholders might prefer cash instead of holding an unfamiliar foreign share.

Firstly, the tax treatment of foreign and domestic shares may be different. For example the avoir fiscal taxation system currently under adjustment in Finland makes the dividend taxation of domestic holdings favorable compared to foreign holdings. Another argument is convenience: domestic shares can be always traded through domestic brokers but foreign shares may have to be traded through selected brokers and thus resulting possibly in higher trading and administration costs.

Also home bias in investments documented by Coval and Moskowitz (1999) and Grinblatt and Keloharju (2001) may be a factor in choosing the method of payment. Furthermore, according to Baker et al. (2002) visibility proxied by analyst coverage is also associated with a decrease in the cost of equity capital. In addition, information asymmetries are also likely to be higher in foreign holdings due to different accounting and financial reporting standards in different countries. Also shareholder clienteles may be limited compared to domestic equity. For example some U.S. institutional investors have restricted ownership of shares that are not listed in the U.S.

Management control hypothesis by Harris and Raviv (1988) and Stulz (1988) states that managers are reluctant to use stock if doing so dilutes their ownership and affect their controlling of the company. However, due to data restrictions, this hypothesis can not be tested in this thesis.

2.5.4 Summary of Method of Payment Implications to M/B -ratio

As said before, market-to-book –ratio has been associated with several financial phenomena such as intangible assets, growth opportunities, management quality, misvaluation, distress risk. However, from perspective of this study, the misvaluation interpretation of market-to-book is the only one that has clear implications to the choice over method of payment in mergers and acquisitions. If it can be shown that relatively high market-to-book –companies choose stock as method of payment, combining the Shleifer and Vishny (2003) theory to the fact that high market-to-book –companies underperform the market, the result would indicate that market inefficiency has impact on the market for corporate control.

Table 6 below presents the implications that different theories concerning the choice over method of payment have to this thesis. An underlying assumption here is that market efficiency does not hold and market-to-book –ratio can be used to proxy market misvaluation under certain circumstances.

Table 6: Implications of Method of Payment Theories

Theory	Key Author(s)	Implications to this Thesis
Risk sharing hypothesis	Hansen (1987)	High information asymmetries = High target M/B → Stock deals
Investment opportunities hypothesis	Myers and Majluf (1984)	High investment opportunities = high acquirer M/B → Stock deals.
Cash availability hypothesis	Myers (1984) and Jensen (1986)	Low acquirer leverage → Cash deals.
Relative size hypothesis	Grullon et al. (1997)	The larger the target compared to acquirer → Stock deals
Cross-border hypothesis	Indirectly Coval and Moskowitz (1999) & Grinblatt and Keloharju (2001)	Cross-border transaction → Cash deals
Management control hypothesis (*not tested)	Harris and Raviv (1988) and Stulz (1988)	Large acquirer management shareholdings → Cash deals
Misvaluation hypothesis	Shleifer and Vishny (2003)	High acquirer M/B → Stock deals, Low Target M/B → Cash deals

3 EMPIRICAL EVIDENCE IN THE LITERATURE

The performance of mergers and acquisitions is a thoroughly researched area. Countless number of studies have examined the event returns of merger announcements, effects on post-merger accounting performance and the long-term share price development after the transaction. This chapter will present a summary of the relevant empirical findings by previous research. As stated also in the introduction of the Shleifer and Vishny article (2003), the past empirical evidence is widely consistent with the predictions of the stock market driven acquisitions theory.

3.1 ANNOUNCEMENT RETURNS IN M&A

Consistently with the Shleifer and Vishny (2003) theory, acquiring firm's stock typically experiences a negative price reaction in stock-financed acquisitions. While this evidence is not completely unambiguous, majority of the research studying announcement period abnormal returns indicate that in stock acquisition the returns are either negative or do not significantly deviate from zero.

Travlos (1987) studies annual data from 1972 to 1981 by using event study methodology. He finds that the stock price reactions of bidding firms to the announcement of a takeover are related to the method of payment. The reaction is more negative for mergers paid with stock, and Travlos argues this is supportive for the hypothesis that a stock offer signals negative information about the value of bidding firms assets. Furthermore, analyzing 704 merger and tender offer bids between 1972 and 1987 Servaes (1991) reports that both acquirer and total returns are lower in stock bids compared to cash bids.

Bradley, Desai and Kim (1988) study 921 successful U.S. tender offers between 1958 and 1984. They find that cumulative abnormal return (CAR) was positive for the target and bidder combined for all subperiods and for the total period. They also find that acquirer CAR was positive for all other periods except for 1981-1984, which they argued was a consequence of new target defences, legislative changes (Williams Act) and increased competition.

Andrade et al. (2001) study a sample of 3.688 completed mergers place between 1973 and 1998. The average abnormal return for targets using a 3-day window [-1, +1] is 16%, and using a longer window beginning 20 days before the announcement and ending at the close of the merger [-20, Close] target's gain is on average 23.8%. Results are statistically significant at 1% level. Abnormal returns to acquirers are -0.7% and -3.8% respectively, but neither is statistically significant. Results for target and acquirer combined are 1.8% using 3-day window and 1.9% using the longer window, with the former being statistically significant at 5% confidence level.

More interestingly, Andrade et al. (2001) find that method of payment has impact on the announcement period returns. As the following summary table illustrates, acquirer 3-day abnormal return is statistically significantly 1.5% negative, while in transactions financed completely without stock return is 0.4% positive.

Table 7: Announcement Period Abnormal Returns for Sub-Samples, 1973-1998

	Stock	No Stock	Large Targets
Combined			
[-1, +1]	0.6%	3.6%	3.0% [a]
[-20, Close]	-0.6%	5.3%	6.3%
Target			
[-1, +1]	13.0%[a]	20.1%	13.5% [a]
[-20, Close]	20.8%[a]	27.8%	21.6% [a]
Acquirer			
[-1, +1]	-1.5% [a]	0.4%	-1.5%
[-20, Close]	-6.3%	-0.2%	-3.2%
Number of observations	2,194	1,494	511
Note: Statistical significance at 5 percent level is denoted by [a]			

Source: Andrade et al. (2001) Table 4. p. 112.

Fuller, Netter and Stegemoller (2002) study firms that make five or more acquisitions using a sample of 3.135 acquisitions between 1990 and 2000. The underlying idea of the study is that since acquirer characteristics are controlled for, identical, any variation in the method of payment or in the returns must be due to characteristics of the target and the bid. Fuller et al. find that when bidders acquire public targets using stock as method of payment, the abnormal return using 5-day window around the announcement date is -1.86% at 5% confidence level, thus supporting the overvaluation hypothesis of Shleifer and Vishny (2003). Moreover, Fuller et al. argue that positive abnormal returns from acquiring a private firm or a subsidiary reflects liquidity discount.

Recently, Yook (2003) studies the role of method of payment in acquisition returns using Standard and Poor's debt rating reviews. From a sample between 1985 and 1996, he also finds that cash acquirer returns are more favorable compared to returns of stock acquirers. However, Yook states stock and cash acquisitions have different sources of value creation. Benefit of debt seems to be the main source in cash acquisitions while synergy effects are the key in stock acquisitions. Yook further argues that while his results indicate that stock is used in most unsuccessful acquisitions, there is no convincing evidence that cash is used in all good acquisitions.

3.2 POST-MERGER PERFORMANCE

Post-merger performance studies have been conducted from both share price and accounting data. The evidence from post-merger accounting studies is mixed, while clear majority of post-merger share price studies indicates negatively abnormal performance especially in stock financed mergers. This is also consistent with the Shleifer and Vishny theory.

3.2.1 Accounting Studies

Ravenscraft and Scherer (1987) study the post-merger accounting performance of nearly 6.000 corporate mergers between 1950 and 1977 using Federal Trade Commission line of business data. They find that the operating performance of the average merger is followed by deteriorating profit performance. Also Herman and Lowenstein (1988) arrive at the conclusion that there are no improvements in operating performance after takeovers.

On the contrary, Healy, Palepu and Ruback (1992) examine post-acquisition performance from an accounting perspective. Using a sample of 50 largest mergers in United States between 1979 and mid-1984, they find that compared to an industry benchmark the merged firms show significant improvement in asset productivity. Improvements in post-merger cash flows provide support for the synergy theories of mergers and acquisitions. Furthermore, they find evidence supporting stock market efficiency theory. In their study the abnormal event returns at merger announcement correlates positively with the increases in cash flows following mergers.

3.2.2 Share Price Studies

Agrawal et al. (1992) study post-merger share price performance using a sample of 937 mergers and 227 tender offers consisting of NYSE acquirers and NYSE/AMEX targets between years 1955 and 1987. They find that stockholders of acquiring firms suffer a statistically significant loss of about 10% over the five-year post-merger period. More importantly, Agrawal et al. note that in both tender offers and mergers, post-acquisitions underperformance is more severe for stock financed acquisitions compared to cash-financed deals.

Studying 399 U.S. takeovers between 1975 and 1984 Franks, Harris and Titman (1991) find that post-merger share price performance is sensitive to the benchmark employed. They argue that previous findings of poor performance are likely due to benchmark errors rather than mispricing.

Loughran and Vijh (1997) use a sample consisting of 947 acquisitions between 1970 and 1989. They find that during a five-year period following the acquisition, the firms that complete mergers financed with stock issue earn statistically significant abnormal returns. On average the abnormal return is –25.0 percent for stock financed mergers whereas cash tender offers earn positive excess returns of 61.7 percent during the same period of time. This evidence supports the propositions by Shleifer and Vishny (2003) that share prices of stock bidders are overvalued. For mergers and tender offers combined, cash transactions earn positive average abnormal return of 18.5% during the five-year post-acquisition period, while all stock financed transactions underperform by -24.2%.

The result of Loughran and Vijh (1997) is criticized by Fama (1998). Fama argues that since negative abnormal returns are associated with stock mergers, the phenomenon is actually an equity offering anomaly in disguise. Fama further criticizes studies of equity offerings anomalies on methodological grounds, and concludes by stating that anomalies are chance results and therefore they support the efficient market hypothesis.

Also Rau and Vermaelen (1998) study three-year post-merger performance of a sample of 2823 mergers and 316 tender offers announced between 1980 and 1991 using book-to-market and size corrections recommended in the literature (Fama and French 1993). In their sample, mergers underperform equally weighted control portfolio by statistically significant 4.04% during a 36-month window, while tender offers outperform control portfolios by statistically significant 8.85%. Interestingly, the average merger in their sample is over 50% financed by stock, while on average only 7% of tender offer value is paid by stock. Rau and Vermaelen also show that much of the underperformance by acquiring firms is caused by high market-to-book firms. They suggest that this is caused by the market's overextrapolation of "glamour" firms past earnings in assessing the desirability of the acquisition. This overextrapolation can be interpreted as the market's assessment of synergies, i.e. the (S) in Shleifer and Vishny Model.

3.3 DIRECT EVIDENCE OF STOCK MARKET EFFECTS

Due to the fact that the theories by Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2003) are very recently published, only a limited number of empirical studies have directly tested their hypotheses.

Rhodes-Kropf, Robinson and Viswanathan (2003) test the theory of Rhodes-Kropf and Viswananthan (2003) by decomposing market-to-book –ratios into firm-specific, sector-wide and long-term components. They find that especially stock financed merger intensity increases during times of high stock market valuations. Furthermore, to the extent that their firm-specific and sector-wide components of market-to-book –ratio capture misvaluation, they find strong support for the theories by Rhodes-Kropf and Viswanathan (2003) and Shleifer and Vishny (2003) stating that deviation from fundamental values can be a driver of mergers and acquisitions.

A recent working paper by Dong, Hirshleifer, Richardson and Teoh (Dong et al. 2003) tests the hypothesis by Shleifer and Vishny (2003) that market misvaluation affects firms' takeover behavior. Dong et al. (2003) use pre-takeover book-to-price ratios as well as pre-takeover ratios of residual income model value to price as contemporaneous proxies for market misvaluation. They use a sample of 2922 successful and 810 unsuccessful acquisition bids taking place between years 1978 and 2000 by firms listed in NYSE, AMEX or NASDAQ exchanges.

In line with the predictions of Shleifer and Vishny (2003), Dong et al. (2003) find that acquirer book-to-price –ratios (B/P) are higher than target ratios in both stock and cash acquisitions with evident statistical significance. Furthermore, targets in cash acquisitions have higher B/P –ratios compared to targets in stock acquisitions. Also acquirers have higher B/P –ratios in cash acquisitions thus indicating correlation with lower valuation levels and cash payment. Dong et al. find similar results also by using residual income model. B/P findings of Dong et al. (2003) are presented in Table 8 on the next page.

Table 8: Mean Acquirer and Target B/P Ratios by Method of Payment 1978-2000

Method of Payment	Acquirer B/P	Target B/P	Acquirer B/P – Target B/P	t-stat	N
Cash	0.659	0.771	-0.112	-4.05	766
Stock	0.412	0.552	-0.140	-12.14	1246
Mixed	0.745	0.774	-0.028	-0.42	904
All	0.580	0.678	-0.098	-4.35	2916
Mean Difference of B/P Ratios					
Cash - Stock	0.247	0.219			
t-stat	11.75	8.10			

Source: Dong et al. (2003) Table 2.

In order to avoid any time-variance, Dong et al. rank sample firms monthly to quintiles according to their B/P –ratios. The comparisons of the most highly valued quintile (1) and least highly valued quintile indicate that high B/P values of both target and acquirer are associated with cash payment whereas low B/P values are connected to stock payments thus further supporting the proposals of Shleifer and Vishny (2003). Table 9 below presents the quintile results of Dong et al.

Table 9: Acquirers and Targets Sorted Monthly by B/P Ratios

B/P Rank	N	Target B/P	Probability of Cash Payment (%)	Probability of Stock Payment (%)	N	Acquirer B/P	Probability of Cash Payment (%)	Probability of Stock Payment (%)
1	518	0.148	18.3	53.9	575	0.140	19.3	54.1
2	680	0.400	24.4	48.5	734	0.348	23.8	46.2
3	691	0.608	28.7	40.8	729	0.524	25.4	44.4
4	678	0.862	27.6	37.2	736	0.725	27.6	39.9
5	670	1.388	30.7	31.2	628	1.302	33.4	28.2
Difference 1-5		**-1.24*** **	**-12.4*** **	**22.6*** **		**-1.162*** **	**-14.1*** **	**25.9*** **

Source: Dong et al. (2003) Table 3, Panels A and C. *** denotes statistical significance at 1% level.

To test the robustness of their univariate findings, Dong et al. perform logistic regressions relating bidder and target misvaluation to method of payment. They rank bidder and target B/P each month among all CRSP stocks and assign them a value between 1 and 100 and use industry control dummies defined by Moskowitz and Grinblatt (1999). Dong et al. find support for the hypotheses that target overvaluation is associated with stock payment as well as target undervaluation is associated with cash payment. Furthermore, also high bidder valuations are associated with stock payment as predicted by Shleifer and Vishny (2003). Findings of Dong et al. are presented in the Table 10 below.

Table 10: Logistic Regressions Explaining Method of Payment

	Cash	**Stock**
Target B/P	0.009	-0.020
p-value	*0.011*	*0.000*
Acquirer B/P	0.025	-0.028
p-value	*0.000*	*0.000*
Diversifying	0.361	-0.461
p-value	*0.030*	*0.002*
Log of Relative Size	0.417	-0.220
p-value	*0.000*	*0.000*
Log of Target Size	0.062	-0.173
p-value	*0.302*	*0.001*
Leverage	-0.691	-0.894
p-value	*0.222*	*0.058*
Sample Size	1513	1513
Pseudo R^2	0.1790	0.2232

Source: Dong et al. (2003) Table 4.

To summarize, Dong et al. find that the misvaluation of bidders and targets has an effect on the method of payment chosen, the premia paid, and bidder and target announcement period stock returns. Dong et al. conclude by stating that their evidence is strongly supportive for the misvaluation hypothesis by Shleifer and Vishny (2003).

A working paper by Ang and Cheng (2002) tests merger related misvaluations on a sample of over 9.000 mergers between 1984 and 2001 using three different methodological approaches. Firstly, Ang and Cheng use a traditional P/B method by comparing the market-to-book of each merging company to the median market-to-book of corresponding industry. Other two methods are based on residual income models (RIM), first by using ex-ante analysts' consensus estimations from I/B/E/S and secondly using ex-post results for three years following the mergers.

Using relative P/B method Ang et al. (2003) find that acquirers in cash acquisitions are -20.20% undervalued and bidders in stock acquisitions are 36.21% overvalued. Using RIM model based on earnings forecasts, the effect of target undervaluation disappears and overvaluation effect of stock bidders diminishes. According to their results, Ang et al. (2003) suggest that after taking pre-merger overvaluation into account, the original acquirer's shareholders do not lose. However, the long-term target shareholder that hold on to the shares of the original acquirer end up losing value.

Furthermore, a working paper by Pshisva and Suarez (2004) evaluates the earnings manipulation associated with bidders in stock acquisitions during the 1990s. Using data on 271 mergers in the 1990s, Pshisva and Suarez find evidence that the accruals of stock acquirers are abnormally high during time prior to mergers while cash acquirers do not appear to manipulate accruals before acquisition announcements. Hence their findings support the predictions of Shleifer and Vishny (2003).

3.4 EMPIRICAL EVIDENCE OF METHOD OF PAYMENT EFFECTS

A study by Andrade et al. (2001) shows that acquirer Q-value exceeds target Q-value in 66% of mergers in their sample of 4.256 mergers and acquisition between 1973 and 1998. This is consistent with the reallocative function of financial markets assuming that growth opportunity interpretation of Q-value (or M/B-ratio) holds.

The most detailed study about the motives underlying the choice over method of payment has been done by Martin (1996), who studies a sample covering 846 US acquisitions for the period from 1979 to 1988 by applying the traditional market model to calculate the mean values of data variables which are grouped by the three payment methods. His study includes several alternative hypotheses for choosing stock as the method of payment presented in the theoretical part of this study.

Martin's empirical findings support the notion that the higher the acquirer's market-to-book –ratio (Tobin's q), the more likely the acquirer is to use stock to finance an acquisition. In his study Martin controls for the following deal characteristics: buyer institutional ownership, cash holdings, leverage and profits divided by deal value, a tender offer indicator and several business cycle variables. Furthermore, Martin finds that the likelihood of stock financing increases with higher preacquisition market and acquiring firm stock returns.

In order to illustrate the risk-sharing hypothesis Martin matches 86 targets and acquirers between 1978 and 1988. Table 11 on the next page shows that 68% of high-acquirer-q/high-target-q acquisitions are financed by stock, while only 16% of those are financed by cash. While the table supports the risk sharing hypothesis by Hansen (1987), the results fit also the predictions of the Shleifer and Vishny (2003) theory since they predict that in overvalued markets bidders acquire less overvalued targets using stock as method of payment.

Table 11: Q-ratios of Acquiring and Target Companies 1978-1988

Acquiring Firm Q-ratio	Financing type	Target firm Q-ratio		
		Low	High	Total
Low	Stock	26%	45%	34%
	Cash	42%	36%	40%
	Mixed	32%	18%	26%
	N	31	22	53
High	Stock	21%	68%	48%
	Cash	43%	16%	27%
	Mixed	36%	16%	24%
	N	14	19	33
Total	Stock	24%	56%	40%
	Cash	42%	27%	35%
	Mixed	33%	17%	26%
	N	45	41	86

* Source: Martin (1996) Table III p. 1242

A study by Jovanovic and Rousseau (2002) compares mergers and acquisitions to direct investments in new capital. Jovanovic and Rousseau find that a firm's merger and acquisition investment rate responds to its Q more - by a factor of 2.6 - than its direct investment does and therefore find support for the reallocative function of capital markets. They also find support for the free-cash flow hypothesis by Jensen (1986), but state that it explains only a small fraction of merger activity. However, while the Q-theory appears to be is clearly applicable to mergers and acquisitions, it does not explain the choice of method of payment.

Previous studies on the impact of the relative size of target to bidder on payment methods are not consistently confirmed. It is viewed by some researchers that the bigger the size of the target firm will lead to the acquirer more likely to use share financing in M&A deals. However in some other studies, this hypothesis has been rejected. Grullon et al. (1997) find support for the size hypothesis in their study of U.S. bank mergers, but in their more extensive studies Martin (1996) and Ghosh and Ruland (1998) do not find significant relation between target size and method of payment.

Amihud, Lev and Travlos (1990) study a sample of 209 U.S. acquisitions between the years 1981 and 1983 to investigate whether there is a relationship between insider ownership and method of payment. They find that in cash financed transactions the top five managers of the firm hold about 11% of the company's shares, while for in stock financed deals less than 7% of shares are held by top management. The result indicates that managers with relatively higher share holdings prefer to finance acquisitions with cash instead of stocks. To explain this phenomenon, Amihud et al. point out that the reason for the use of cash rather than stock is that the managers do not want to increase the risk of losing control after the acquisitions.

Ghosh and Ruland (1998) and Faccio and Masulis (2004) find that corporate governance issues affect the choice over method of payment as predicted by control hypothesis – i.e..they find that the large management equity holdings increase probability of cash payment.

Also interestingly, Lang, Stulz and Walkling (1989) find that total stock market gains are highest when bidder has high Tobin's q and target has a low Tobin's q. However, Lang et al. do not control for method of payment and therefore it could be interpreted that both Shleifer and Vishny theory and capital market's reallocation theory could hold in their sample.

4 DATA AND HYPOTHESES

4.1 CONSTRUCTION OF THE FINAL SAMPLE

The sample of mergers and acquisitions was collected from Securities Data Corporation's (SDC) Mergers and Acquisitions -database. Due to potential selection and survivorship bias problems specified later in this chapter, the sample is limited to acquisitions between years 1.1.1998 – 31.12.2003. Furthermore, only transactions exceeding 10 million dollars in value between listed companies were included in the sample. Finally, data for market-to-book ratio for either target or acquiring company was required to be available from Thomson Financial Worldscope –database. Table 12 below enlightens construction of the final sample stage by stage.

Table 12: Description of the Sample Selection

Number of deals	Description of Criteria
213 275	Date announced: 1.1.1998 to 31.12.2003
39388	Target is a publicly listed company
23730	Acquirer is a publicly listed company
12984	Deal value must exceed 10 million USD
4550	Percent of shares owned after transaction over 50%
3717	Percent of shares acquired at least 50%
3242	Non-negative Market-to-book ratio available for either target or acquirer[3]
3242	**Sample used in Descriptive Statistics**
1622	All variable data available from Worldscope Database
1622	**Sample used in the Logistic Regression Analysis**

[3] Market-to-book –ratio's can be extremely high in case the book value of equity is minimal due to e.g. holding company structure or some other reason. Therefore, I have chosen to cut the outlier of market-to-book –ratios of over fifty (50). Furthermore, due to data inconsistencies or other peculiarities market-to-book –ratios for some companies were negative in the initial sample. Since negative values of market-to-book do not make any economic sense, I have removed them from the sample.

4.1.1 Matching Between Databases

The SDC provides market-to-book ratios for target companies, but this data for bidding companies had to be acquired from Thomson Financial Worldscope -database. Acquiring companies were matched to accounting and share price data using trading code -tickers provided by SDC database. However, the quote symbols provided by SDC are not complete in sense that they do not include the corresponding stock exchange codes required by Thomson Financial to return data from each specific company from international sample. Therefore, I was compelled to manually double check 46% of the pre-Worldscope matched sample.

4.1.2 Trading Ticker Incomplete

A typical example of ticker problem is trading code PFE, which returns the data of U.S. based pharmaceutical company Pfizer Ltd. On the other hand, Portuguese company Papelaria Fernandes SA's quote symbol is PFE-LB, of which SDC provides only the first part (PFE). When there exists multiple quote symbols with identical company component, Thomson Financial either returns the data of U.S. based company or the text "#N/A".

4.1.3 Companies Change Names

Another challenge to the sample quality is caused by the facts that companies often change names and/or quote symbols after merger or an acquisition. An illustrative Finnish example of name change roulette is manufacturing company Wärtsilä Oyj. In the aftermath corporate restructuring process caused by financial distress of its maritime unit, Wärtsilä Oy changed its name to Metra Oy in 1990. After only a decade under new brand and again following business-reorganizing process, Metra Oyj changed its name back to Wärtsilä Oyj in the fall of year 2000. During these changes, the stock quote symbol was changed each time with the corporate name change.

4.1.4 Companies Change Trading Codes

Sometimes companies change trading codes for some other reason than corporate name change. For example Finnish insurance company Pohjola Oyj that previously had multiple classed of shares changed over to one share series in May 2003. As a result, Pohjola's main trading code changed from POHVD-HE to POH1V-HE.

4.1.5 Manual Double-Checking

In order to secure that each company would receive correct data from the database, I manually double-checked the sample and added missing stock exchange codes to corresponding company quote symbols. To search the names of corporations I used Internet searches[4] and a specific Internet page that includes corporate name and structure changes associated with mergers and acquisitions[5]. Also the informative business descriptions of each company in Thomson Financial were useful while they often provide information about corporate name changes.

I also made some important observations while manually going through the data. First notice was that holding company structures might cause some noise to the data while financial data in the Worldscope may be under different code than what is provided by SDC. More importantly, it appeared that distinctively large number of Nasdaq -listed acquirers during late nineties had ceased to exist or they had been further acquired and thus in many cases there were no share price nor accounting data available for there companies. This creates a potential difficulty for this particular study while intuitively especially Nasdaq -listed technology companies potentially had extremely high valuations during the hot stock market period.

4.1.6 Tradeoff between Data Quality and Scope

SDC includes international transactions starting from year 1984. By using a longer time period the results would be more robust since the sample size would be larger. However, the problems with matching data between SDC and Worldscope appeared to be directly related to the time that has passed since the announcement of the acquisition, which might cause survivorship bias to the sample. Therefore, the data set is limited to contain the up and down swing of the stock market around the change of the millennium.

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[4] http://www.google.com

[5] http://www.corporateaffiliations.com

4.2 HYPOTHESES

The objective of this thesis is to find out whether stock market valuation levels[6] affect acquirer's choice of method of payment in acquisitions. Valuation levels for individual firms are proxied by market-to-book -ratios and periods of high overall stock market valuations are proxied by combining 'The Fed Model' and a model utilizing aggregate P/E -ratios of Standard & Poor's 500 Composite Stock Price Index[7]. The research questions presented in introduction are repeated below:

Research question 1: Does the share price valuation level proxied by M/B –ratio affect acquirer's choice over method of payment in mergers and acquisitions?

Research question 2: Does period of high overall stock market valuation create conditions under which high M/B firms are able to better take advantage of their high valuations through stock financed acquisitions?

As stated earlier in the introduction, the research questions and accordingly also the hypotheses of this study are primarily based on the theoretical work of Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2003). Shleifer and Vishny predict that managers of overvalued companies seek to capitalize on their highly valued acquisition currency before the market recognizes misvaluation and their share price plunges.

Moreover, since B/M –anomalies have persisted in the finance research, it may be presumed that the relation of a firms market value to its book value contain some information and therefore used to proxy possible misvaluation. Hence, in all hypotheses regarding misevaluation, it is proxied by industry adjusted market-to-book -ratio of the particular company.

Furthermore, use of overvalued stock as acquisition currency may be more common during periods of high stock market valuations since it may be more difficult to determine misvaluation during those times, as predicted by Rhodes-Kropf and Viswanathan.

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[6] Dong et al. (2003) use term 'stock market misvaluation' instead of valuation levels

[7] Defining of periods of high stock market valuations will be discussed in more detail in Chapter 5.3

4.2.1 Hypotheses about Firm-Specific Market-to-Book -Ratios

First hypothesis stems from idea that market for corporate control functions by reallocating capital towards higher growth expectations. Intuitively it would be rational that firms with high growth opportunities purchase firms with low growth opportunities. Since market-to-book –ratio is often used as a proxy for growth opportunities, it is predictable that acquirers experience higher market-to-book –ratios compared to targets. This is also in-line with the predictions of Q-Theory (Jovanovic and Rousseau 2002) stating that a firm's merger and acquisition investment rate should rise with q-ratio.

Hypothesis 1: **Both stock and cash bidders are on average higher valued than targets.**

Furthermore, building on the underinvestment theory by Myers's (1977), Myers and Majluf (1984) argue that companies with growth opportunities prefer to raise capital through equity issues in order to maintain financial flexibility. Since choice over method of payment in mergers and acquisitions can also been seen as a choice between issuing debt and equity, high market-to-book companies are more likely to use stock as method of payment.

More importantly for this thesis, Shleifer and Vishny (2003) prediction about bidders is that in stock acquisitions they should exhibit signs of overvaluation. Therefore, the key hypothesis of this formulated as follows:

Hypothesis 2: **Acquirers with high equity valuations measured by industry adjusted market-to-book –ratios choose stock as the method of payment in mergers and acquisitions.**

4.2.2 Hypotheses about the General Stock Market Effects

According to the theory by Rhodes-Kropf and Viswanathan (2003) mergers and acquisitions activity should increase during periods of high stock market valuations. Furthermore, during times of high valuations, there should be relatively more stock financed acquisitions. Consequently, following hypotheses are tested:

Hypothesis 3: **Favorable general Stock market valuation level increases the possibility for a stock bid.**

Hypothesis 4: **Acquirers with high market-to-book –ratio choose stock as medium of payment more often during periods of favorable overall stock market valuation levels.**

4.2.3 Control Hypotheses

Previous research has found several indications about the determinants of method of payment in mergers and acquisitions[8]. Even though most of them are out of the scope of this study, I will include some interesting hypotheses testable in the logit regression analysis.

As stated already in the theory review, home bias is sometimes a factor in financial decision making. Therefore, it can be speculated that cross-border acquisitions are more likely to be financed with cash than stock. Rationale behind the assumption is that shareholders might prefer cash instead of holding an unfamiliar foreign share.

Hypothesis 5: **Cross-border acquirers prefer cash as method of payment.**

Moreover, since equity financing is the relative size hypothesis by Grullon et al. (1997) is also tested:

Hypothesis 6: **Large targets are acquired rather by stock compared to cash.**

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[8] See Chapter 2.5 and Table 6 for alternative hypotheses about the choice over method of payment

Furthermore, the cash availability hypothesis by Myers (1984) and Jensen (1986) calls for testing the following hypothesis:

Hypothesis 7: Low acquirer leverage is associated with cash financing.

Also several other hypotheses could be developed from both theories concerning misvaluation and theories regarding other motives for choosing particular method of financing in mergers and acquisitions. However, due to the limitations in data items in the current sample, I limit this study to testing of the seven hypotheses summarized in Table 13 below. Table 13 also enlightens the testable implications of the hypotheses.

Table 13: Summary Table of the Hypotheses and their Testable Implications

#	Hypotheses	Testable t-Test Implications	Implications to Logit Regression Model
H1	Both stock and cash bidders are on average higher valued than targets	Acquirer M/B > Target M/B	-
H2	Acquirers with high equity valuations measured by industry adjusted market-to-book –ratios choose stock as the method of payment in mergers and acquisitions	Stock Acquirer M/B > Cash Acquirer M/B	**Positive** correlation between acquirer M/B and stock payment
H3	Favorable general stock market valuation levels increase possibility for a stock bid	-	**Positive** correlation between overall stock market valuation and stock payment
H4	Acquirers with high market-to-book – ratio choose stock as medium of payment more often during periods of favorable overall stock market valuation levels	-	Correlation between acquirer M/B and stock payment **increases** during periods of high stock market valuations
H5	Cross-border acquirers prefer cash as method of payment	-	**Negative** correlation between cross-border deals and stock payment
H6	Large targets are acquired rather by stock than cash	-	**Positive** correlation between target size and stock payment
H7	Low acquirer leverage is associated with cash financing	-	**Positive** correlation between acquirer leverage and stock payment

4.3 DESCRIPTION OF VARIABLES

This section will present the variables that are used in the logistic regression analysis. Variable definitions and data sources are summarized on Table 16 at the end of this section.

4.3.1 Dependent Variable

The dependent variable used in logit regressions is a binary variable indicating whether a merger transactions is financed entirely with stock or not. Hence, the dependent variable used in the logit regressions is as follows:

ALL STOCK: A binary variable indicating a pure stock deal. Data concerning method of payment in sample transactions is acquired from the SDC Database.

y_i (Stock100) = (1) if payment is 100% stock; if payment is less, zero (0)

4.3.2 Explanatory Variables

Independent variables are presented in the following text. The first group of independent variables consists of acquirer and target characteristics.

It has been shown in many studies that the abnormal returns associated with an acquisition may start several weeks prior to the event. Therefore I use one month 'buffer' in order to avoid any pre-announcement share price drifts resulting from news leakages before the official disclosure moment. Consequently the market-to-book –ratios for targets and acquirers are calculated from the share price one month prior to announcement and latest available full year financials.

Moreover, weighted average industry market-to-book –ratio required for generating following two variables is calculated from the sample companies in the following way[9].

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[9] Since the industry averages are calculated from a sample of companies involved in mergers and acquisitions, the values are obviously subject to a selection bias and therefore should not be used in other occasions. However, a sample of 4956 companies provides for a reasonably solid benchmark of industry estimates for the purpose if this study.

- 1773 observations of acquirer pre-acquisition five year average market-to-book –ratios are weighted with corresponding acquirer enterprise values.
- The remaining observations of acquirer market-to-book ratios one month preceding the acquisition (781) that do not have data for calculation of a five-year average, are weighted with corresponding acquirer enterprise values.
- 2402 observations of target market-to-book ratios one month preceding the acquisition are weighted with corresponding target enterprise values.

Table 14 below presents the sample used for estimating the weighted average market-to-book –ratios for each industry defined by 1-digit SIC Codes[10].

Table 14: Sample used for Estimating the Industry Average Market-to-Book -ratios

Acquirer five year pre-acquisition average M/B	1773
Acquirer M/B one month before announcement	781
Target M/B one month before announcement	2402
Total	4956

Five-year averages of acquirer M/B are used in order to mitigate some of the problematic time-variance and supplemented by using target and acquirer M/B ratios with the intention of achieving as wide sample as possible with the limited data available. This rather peculiar technique of estimating industry averages yields following results presented in Table 15 below.

Table 15: Enterprise Value Weighted Average Market-to-Book -ratios in Different Industries

	SIC1	SIC2	SIC3	SIC4	SIC5	SIC6	SIC7	SIC8	SIC9
Weighted average M/B	3,19	7,25	8,30	7,69	4,42	2,35	12,81	6,82	5,06
Unweighted average M/B	2,35	3,93	3,92	4,12	2,94	2,06	6,23	5,23	3,90
Difference in averages	0,84	3,33	4,38	3,57	1,48	0,29	6,58	1,59	1,16
Observations	382	636	1009	403	313	1320	765	138	2

[10] Detailed information about the industries by one- and two-digit SIC Codes is presented in Appendix 2

In each industry weighted averages appear to be higher than unweighted averages, which indicate that larger companies have higher M/B ratios compared to small companies. After explaining the weighting average procedure, we have the main explanatory variables:

ACQUIRER M/B LESS AVERAGE INDUSTRY M/B: Acquirer's market-to-book value one month prior to announcement less corresponding average industry market-to-book value. This is a continuous variable.

Rationality of the previous variable stems from the Shleifer and Vishny (2003) prediction that managers use stock as method of payment when it is overvalued. If the tests show that stock financing is correlated with acquirer market-to-book –ratios that exceed industry averages, it implies that managers consider the valuation level of their share when deciding about method of payment.

TARGET M/B LESS AVERAGE INDUSTRY M/B: Target's market-to-book value one month prior to announcement less corresponding average industry market-to-book value. This is also a continuous variable.

Next I introduce variables necessary for testing the implications of the Rhodes-Kropf – Viswanathan Theory:

PERIOD OF HIGH STOCK MARKET VALUATION: A calendar month is defined as period of high stock market valuations using a method based on two separate models further explained in Chapter 5.3. This variable is binary.

x_i (BullMkt) = (1) if month of deal announcement is defined as period of high stock market valuations; if not value is zero (0)

PERIOD OF LOW STOCK MARKET VALUATION: A calendar month is defined as period of low stock market valuations using a similar method as above. This is also a binary variable:

x_i (BearMkt) = (1) if month of deal announcement is defined as period of low stock market valuations; if not value is zero (0)

Furthermore, in order to be able to test the control hypotheses, three variables regarding cross-border transactions, target size and acquirer leverage are introduced:

CROSS-BORDER transaction is an acquisition in which the acquirer and target company are domiciled in different countries. The variable is binary and it is defined as follows:

x_i (CrossBor) = one (1) if the deal is a cross-border transaction; if not then value is zero (0)

ACQUIRER LEVERAGE RATIO: This ratio is the total debt percentage of total assets, and it is a continuous variable.

LOG OF TARGET SIZE: This continuous variable is the natural logarithm of the target's enterprise value in USD as reported by the SDC Database.

Moreover, I use three different groups of control variables to control for the industry effects influencing the choice of method of payment in mergers and acquisitions.

CROSS-INDUSTRY deals are transactions in which the acquirer and target company have different 1-digit SIC Codes. This is a dummy variable and it is defined as follows:

x_i (CrossInd) = one (1) if the deal is a cross-industry transaction; if not then value is zero (0)

ACQUIRER INDUSTRY DUMMIES are nine identical dummy variables indicating the 1-digit SIC code of the acquiring company. Further industry definitions are presented in the Appedix. An example of an industry indicating 1-digit SIC Code value 1 is presented below:

x_i (AcqSIC1) = one (1) if the acquirer's 1-digit SIC Code is 1; if not then value is zero (0)

One of the key elements in this study is the definition of periods of high stock market valuation levels. Due to the fact that the classifications are based on methods relating only to U.S. stock market data, it is necessary to include a variable categorizing whether bidder is domiciled in the United States or not.

ACQUIRER DOMICILE is a dummy variable indicating whether the acquiring company is domiciled in the United States:

x_i (Usdeal) = one (1) if the acquirer is a U.S. based company; if not then value is zero (0)

Finally, a summary table about the variables used in the thesis is presented on the next two pages.

Table 16: Variables Used in the Thesis

Variable	SPSS Code	Observations	Data source	Definition of variable
Dependent variable				
All Stock	STOCK100	1081	SDC	Method of payment is 100% in stock (1), if less (0). Binary variable.
Acquirer and Target Characteristics				
Acquirer market-to-book -ratio (M/B)	AcqMB	2554	Worldscope	Acquirer's market value to book value ratio calculated from share price one month prior to announcement and latest available full year financials, continuous variable.
Acquirer M/B less acquirer five year average M/B	Ambvsavg	1773	SDC and Worldscope	Acquirer's market-to-book value one month prior to announcement less acquirer's five year average market-to-book value calculated from monthly data. Continuous variable.
Acquirer M/B less industry average M/B	AcqVsInd	2554	SDC and Worldscope	Acquirer's market-to-book value one month prior to announcement less corresponding average industry market-to-book value. Continuous variable.
Target M/B	TargetMB	2402	SDC	Target's market value to book value ratio calculated from share price 4 week prior to annnouncement and last twelve month (LTM) financials, continuous variable.
Target M/B less industry average	TarVsInd	2402	SDC and Worldscope	Target's market-to-book value one month prior to announcement less corresponding average industry market-to-book value. Continuous variable.
Acquirer leverage ratio	AcqLever	2535	Worldscope	Total debt percentage of total assets, continuous variable.
Log of Target enterprise value	TarsizIn	2381	SDC	Natural logarithm Target's enterprise value: year end market capitalization + total long-term debt + debt due in one year + preferred stock and convertible + preferred stock liquidating value - cash, continuos variable

Table 16: Variables Used in the Thesis (Continued)

Variable	SPSS Code	Observations	Data source	Definition of variable
Stock Market Conditions				
Period of high stock market valuation	BullMkt	881	Web-pages of Robert J. Shiller and the Federal Reserve	Month defined as period of high overall stock market valuations (1), otherwise (0). Binary variable. See Chapter 5.3 for data sources and classification methodology.
Period of low stock market valuation	BearMkt	425	Web-pages of Robert J. Shiller and the Federal Reserve	Month defined as period of low overall stock market valuations (1), otherwise (0). Binary variable. See Chapter 5.3 for data sources and classification methodology.
Deal Characteristic and Industry Dummies				
Cross-border deal	CrossBor	644	SDC	A classification of cross-border acquisitions (1) and domestic acquisitions (0), binary variable.
Cross-industry deal	CrossInd	568	SDC	A classification according to one-digit SIC codes; Cross-industry transaction (1), non-cross-industry (0), binary variable.
Acquirer 1-dig SIC Codes	AcqSIC1	251	SDC	Acquirer industry variables, 9 categories according to one-digit SIC codes, dummy variables.
	AcqSIC2	409	SDC	
	AcqSIC3	627	SDC	
	AcqSIC4	312	SDC	
	AcqSIC5	197	SDC	
	AcqSIC6	890	SDC	
	AcqSIC7	472	SDC	
	AcqSIC8	82	SDC	
	AcqSIC9	2	SDC	
Acquirer domicile	Usdeal	1819	SDC	Acquirer domicile either U.S. (1) of other (0), binary variable
Log of Transaction value	TrValLn	3242	SDC	Natural logarithm of the total transaction value reported by SDC, continuous variable.

5 METHODOLOGY

This chapter briefly introduces the statistical methodology and a procedure of defining periods of high and low stock market valuations. The statistical methods used in the thesis include logit regression model and independent sample t-tests.

5.1 INDEPENDENT SAMPLE T-TESTS

I use common two tailed t-test to compare the means of market-to-book ratios of stock financed mergers and cash financed mergers. The tests are performed as described in Lehtonen's book (1998, pp. 68-75).

5.2 LOGIT REGRESSION ANALYSIS

Logit regression is used to explain the binary choice of method of payment. This section is mostly based on Chapter 11 in Dougherty's (2002) book titled *Introduction to Econometrics*.

The key question in this thesis is whether market-to-book -ratio and its pre-merger development affect bidder's choice of method of payment in mergers and acquisitions. Since the dependent variable – method of payment – is defined as either cash or stock, the question comes down to binary choice between those two and the potential factors that contribute to the choice.

When applied to binary choice, commonly used linear probability models have some serious defects concerning disturbance term and nonsense probability estimates. Since the distribution of the disturbance term is neither continuous nor normal, the model can cause heteroscedasticity. Furthermore, when used for estimation of binary choice the linear regression can in some occasions also violate meaningful boundaries of probability, i.e. the probabilities can be over one or below zero (Dougherty 2002). Therefore, I use logistic regression to estimate the probability of occurrence of stock payment.

The assumptions of logistic regression are explained in the following text. The model assumes k independent observations $y_1, y_2, \ldots, y_k$ and that the i-th observation can be treated as a realization of a random dependent variable Y_i which has a binomial distribution:

$$Y_i = \text{Bin}\ (n_i, p_i) \tag{16}$$

where the denominator n_i is binomial and the probability is p_i. Furthermore, it is supposed that in logistic regression the logit of the underlying probability (p_i) is a linear function of the predictors:

$$\text{logit}\ (p_i) = \beta_1 + \beta_2 X_i \tag{17}$$

Furthermore, the relationship between the logit (p_i) and the odds ratio produced by a logistic function is written as follows:

$$\text{logit}\ (p_i) = \log\left(\frac{p_i}{p_i - 1}\right) = \log(odds) \tag{18}$$

In logit estimation the probability of the occurrence on an event is determined by the following function:

$$p_i = F(Z_i) = \frac{1}{1 + e^{-Z_i}} \tag{19}$$

where Z_i is a linear function of explanatory variables:

$$Z_i = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \ldots + \beta_j X_i \tag{20}$$

As Z tends to infinity, e^{-Z} tends to 0 and p_i has upper bound of 1, and as Z tends to minus infinity e^{-Z} tends to infinity resulting in p_i having a lower bound of zero. Moreover, it should be noted that contrary to the linear regression model, in logistic framework the predictions have effects both on the mean and the variance of observations. The mean and variance for Y_i are presented as follows:

$$E(Y_i) = \mu_i = n_i p_i \tag{21}$$

and

$$\text{var}(Y_i) = \sigma_i^2 = n_i p_i (1 - p_i) \tag{22}$$

In logistic regression, the preferred method for estimation is so called maximum likelihood estimation. The log-likelihood function used in the estimation is written as follows:

$$\log L(\beta) = \sum_i \{y_i \log(p_i) + (n_i - Y_i)\log(1 - p_i)\} \qquad (23)$$

where p_i depends on covariates X_i and a vector of parameters β_i through the logit transformation of the equation 17. The distribution of a logistic function is similar to the normal distribution except for fatter tails and a lower top.

5.3 CLASSIFICATION OF STOCK MARKET VALUATION LEVELS

In a finance thesis, it is extremely risky to include a proxy periods of high market valuations in the testable model. This is simply because there is no consensus about academically approved definition for 'bull markets' i.e. periods of high market valuations. However, testing of hypotheses based on the theory by Rhodes-Kropf and Viswanathan (2003) calls for such a classification.

5.3.1 Approaches in Relevant Literature

While there is no agreement about a feasible proxy for market valuation levels, the recent literature includes several ways of classifying stock market conditions. Testing the R&V model, Rhodes-Kropf, Viswanathan and Robinson (2003) break M/B –ratio into firm-specific, sector-wide and market-wide components, and therefore obtain periods of high valuations within specific industries and whole market from their model.

However, since this thesis is not built on decomposition of M/B –ratios, the definition of high overall stock market valuations has to be based on other arguments. One solution is to use so called 'Fed Model' often quoted in the financial media[11]. It states that the market is fairly valued when the rate of long-term treasury notes equals aggregate stock market earnings yield. The model stems from the fact that there appears to be strong empirical regularity between the yields. For example, there appears to be strong positive correlation in the earnings yield of Dow Jones Industrial Average and 10 Year Treasury Note rate, as noted by Ritter (2002, p. 164, Figure II).

The relationship between common stock and bond valuations was set forth already by Benjamin Graham and David Dodd in their famous book *Security Analysis* published in 1934 (Graham and Dodd 1951). Lander and Orphanides (1997) formalize Graham and Dodd's observation by testing a trading rule that alternates between S&P 500 and cash. They build a model for one-month-ahead forecasts of S&P 500 returns, and using a sample period of 1984-1996 they find support that their trading rule provides higher returns that are statistically significantly and also significantly lower variance. Also Shen (2003) finds support for the claim that market timing strategies based on the

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[11] The Fed Model is not officially endorsed by the Federal Reserve. It was dubbed 'the Fed Model' by Prudential Securities strategist Ed Yardeni after Fed's Humphrey-Hawkins Report to Congress in July 22, 1997 suggested the bank was following it: http://www.federalreserve.gov/boarddocs/hh/1997/july/ReportSection2.htm.

difference of E/P ratio of the S&P 500 and interest rates yield on ten-year Treasury notes beat the market index in terms of higher mean returns and lower variances – even after transaction costs.

Nonetheless, the theoretical grounds of the 'Fed Model' are not sound. Ritter (2002) points out that if most of the variation in nominal interest rates comes from changes in expected inflation rather than change in real rates, theoretically in an efficient market the correlation should be negative.

Another approach in defining levels of market valuation is to focus exclusively on the periods of high and low aggregate price-earnings ratio. In the first chapter of his book *Irrational Exuberance*, Shiller (2000) emphasizes the significance of the relationship of inflation-corrected S&P 500 Composite Stock Price Index and inflation-corrected moving average of the preceding ten years S&P Composite earnings in determining whether the stock market is overvalued or not.

Another alternative of high, low and neutral classifications of S&P 500 is presented in a recent working paper by Bouwma, Fuller and Nain (2003). They divide each month as high (low) – valuation when it lies in the top (bottom) half of months with P/E ratios above (below) the past five-year average P/E.

5.3.2 Model for Classifying Stock Market Valuation Levels

I define the periods of high stock market valuations by using a combination of 'the Fed Model' and a simple estimation of aggregate P/E –ratio calculated as in Robert J. Shiller's book *Irrational Exuberance* (Shiller 2000).

The data for inflation-corrected aggregate P/E ratios of S&P 500 Composite Stock Price Index is obtained from Shiller's website[12] and the monthly yields on actively traded issues of 10-year U.S. treasury notes adjusted to constant maturities are acquired from the Federal Reserve Statistical Release website[13].

In his data set, Shiller smoothens quarterly reported earnings into monthly earnings as follows. March, June, September and December earnings are simply one third of the corresponding reporting quarter earnings. The remaining monthly earnings are calculated by weighting the closest of

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[12] http://www.econ.yale.edu/~shiller/data/ie_data.htm

[13] http://www.federalreserve.gov/releases/h15/data.htm#fn12

previous months by 2 and second closest by 1 and dividing their sum by three. For example January earnings calculated as follows:

$$E(Jan) = \frac{2 \times E(Dec) + E(Mar)}{3} \tag{24}$$

Furthermore, Shiller uses monthly Consumer Price Index (CPI) to make inflation corrections to both S&P Composite Index and monthly earnings[14]. Monthly inflation-corrected price-earnings ratio (P/E10) is calculated by the corresponding S&P 500 index value by ten years lagging average monthly earnings.

A calendar month is defined as period of normal stock market valuation unless both of the following criteria support either period of high valuation or period of low valuation. The full data table used to calculate the valuation levels is presented in Appendix 1.

1. 'The Fed Model'

This model is based on the difference between S&P 500 aggregate earnings yield[15] and 10-year Treasury Note rate. Firstly, I calculate monthly mean difference and standard deviation of the mean difference between the S&P earnings yield and 10-year Treasury note rate using the sample period of 1998-2003. On average treasury notes yield 1.96% more than S&P500 and the standard deviation on the difference is 1.48%.

To allow for reasonable fluctuations, I define market conditions as normal in case the monthly difference between the yields is within one standard deviation away from the mean difference. Therefore, I define overall stock market levels as follows:

(10-year Tr. note rate) – (S&P 500 yearnings yield) > 3.44% → High stock market valuations
(10-year Tr. note rate) – (S&P 500 yearnings yield) > 0.48% → Low stock market valuations

This approach yields 15 high valuation, 17 low valuation and 40 normal valuation months.

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[14] In the data used in this thesis, the base date is 1/2000

[15] S&P 500 aggregate earnings yield = 1 / (P/E10)

2. Direct P/E Approach

The second model follows the approach of *Irrational* Exuberance (Shiller 2000). In the first chapter of the book Shiller discussed periods of stock market valuation levels in the twentieth century by comparing ten-year lagging aggregate price-earnings ratios (P/E10) of S&P 500 Index. Accordingly, I also calculate the mean and standard deviation of P/E10 using monthly data between 1998 and 2003. The average price-earnings ratio (P/E10) is 33.64 and the standard deviation 7.39.

As in the 'Fed Model' I allow for fluctuations of one standard deviation from the average P/E10. Consequently, overall stock market levels in direct P/E model are defined as follows:

Monthly P/E10 > 41.04 → High stock market valuations
Monthly P/E10 > 26.25 → Low stock market valuations

Direct P/E approach yields 18 high valuation, 17 low valuation and 37 normal valuation months.

By combining the 'Fed Model' and Direct P/E Approaches, the sample comprises of 14 months defined as periods of high overall stock market valuation, 17 months of low overall stock market valuation as presented in the Table 17 below[16].

Table 17: Months Defined as High and Low Stock Market Valuation (1998-2003, N=72)

Overall Stock Market Valuation Levels			
High		Low	
Jun1999	Jan2000	Jul2002	Jan2003
Jul1999	Feb2000	Aug2002	Feb2003
Aug1999	Mar2000	Sep2002	Mar2003
Sep1999	Apr2000	Oct 2002	Apr2003
Nov1999	May2000	Nov2002	May2003
Dec1999	Jun2000	Dec2002	Jun2003
	Jul2000		Jul2003
	Aug2000		Aug2003
			Sep2003
			Oct 2003
			Nov2003

[16] Full data table is presented in the Appendix 1

6 SAMPLE DESCRIPTION AND RESULTS

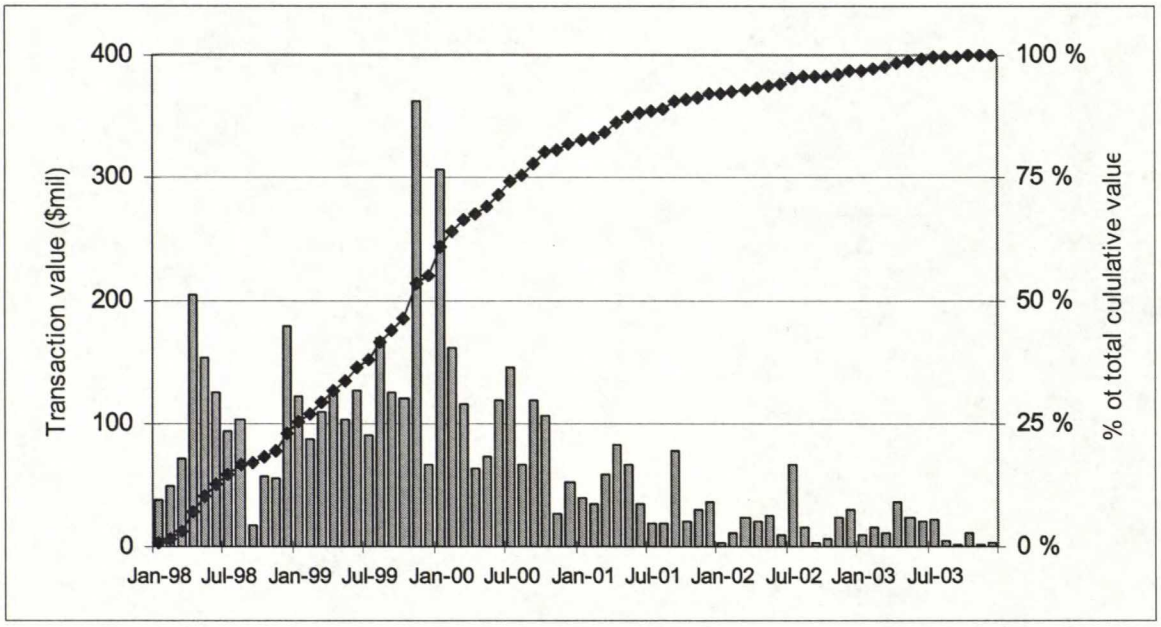
This chapter describes the features of the sample data including deal characteristics, distributions of deals by acquirer nationalities and distributions of deal in time. Furthermore, the chapter introduces empirical findings of both univariate tests and logistic regressions performed in this Thesis.

6.1 DESCRIPTIVE STATISTICS

6.1.1 Distribution and Characteristics of Sample Transactions

Figure 1 below presents the monthly distribution and the cumulative percentage the of transaction value during 1998-2003. As can be seen from the figure, the monthly transaction value during 1998-2003 is unevenly distributed and it is clearly relatively more concentrated on the first three years of the sample compared to the latter three years. Interestingly, six of the top ten months ranked according to transaction value are also classified in this study as periods of high overall stock market valuations[17]. Moreover, the remaining four top ten months are classified as neutral and none of those is consequently classified as period of low stock market valuations.

Figure 1: Monthly Distribution of the Transaction Value (1998-2003, N = 3242)



[17] See Chapter 5.3 and Table 14

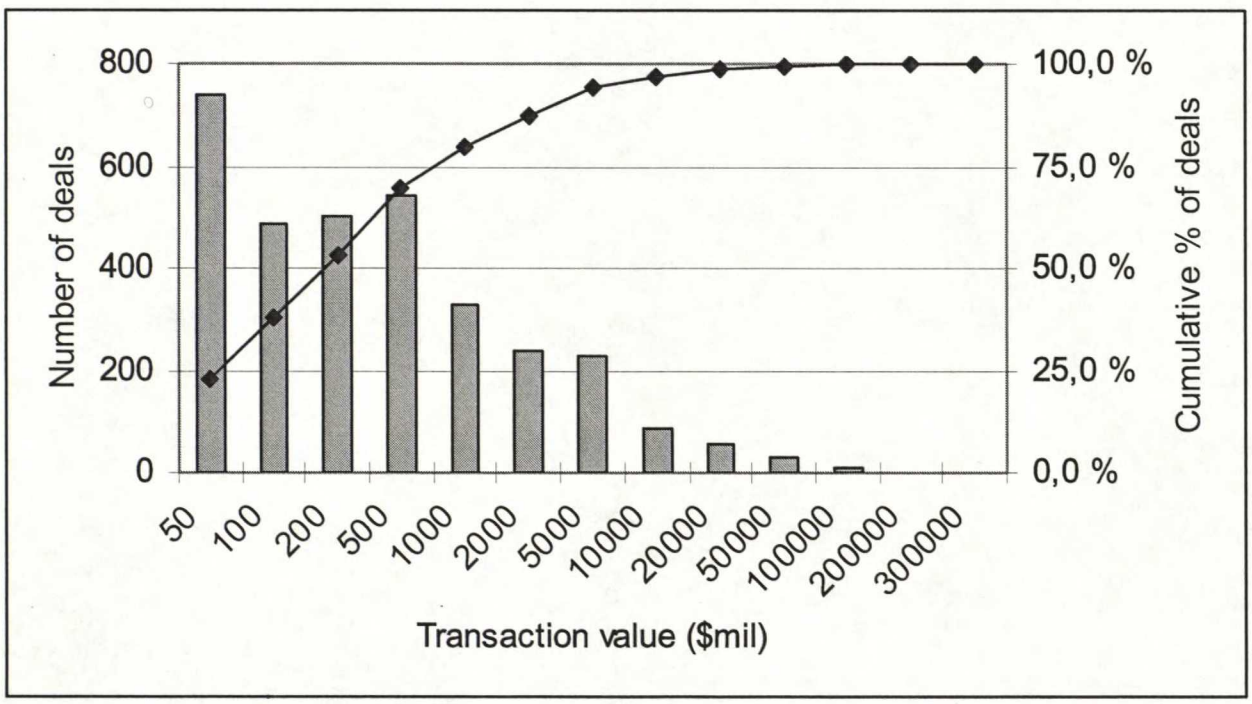
The deal size and characteristics are presented next. As Table 18 below shows, the average transaction value in the sample was 1547 million dollars, while the median value was only 175 million dollars. Consequently an overwhelming majority (84.8%) of the deals are below the average transaction value. Distribution of the deals according to transaction value is illustrated in the Figure 2 on the bottom of the page. Furthermore, the average size of an acquirer measured by enterprise value is 4.3 times larger than target while the median of acquirer enterprise value is 7.7 times greater than target.

Table 18: Size Characteristic of Deals, Acquirers and Targets (1998-2003, N = 3242)

	Deal Value	Acquirer Enterprise Value	Target Enterprise Value
Average	1 547	15 567	3 614
Median	175	2 409	314
Min	10	0.21	0.84
Max	202 785	593 461	391 973
St.dev.	7 083	42 348	19 629

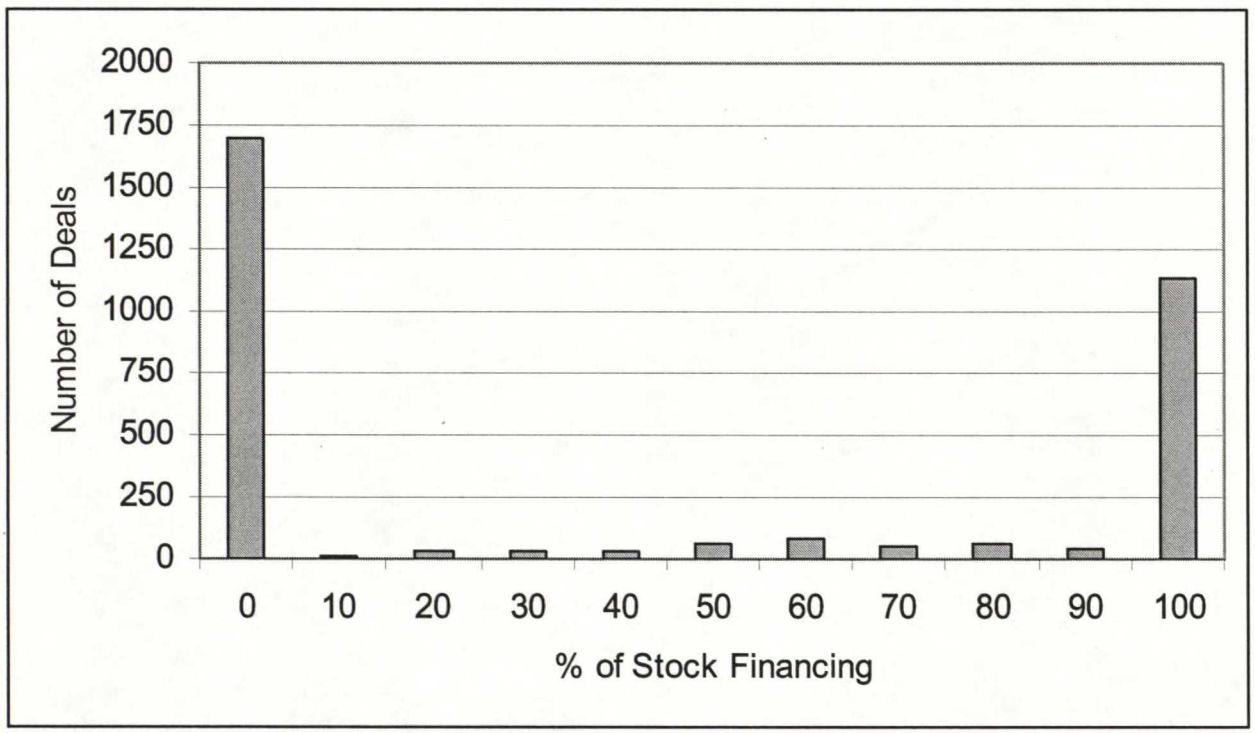
* in millions of dollars

Figure 2: Distribution of the Sample Deals According to Transaction Value (1998-2003, N = 3242)



Moreover, this study employs logistic regression analysis which presumes binary distribution[18]. The rationale for using logit methodology is illustrated below in Figure 2, which presents the distribution of the sample by method of payment in terms of percentage stock used. As the figure shows, the distribution of method of payment is obviously not normal and it is very close to a pure binomial distribution. Hence, the use of logit regression model is clearly justified.

Figure 3: Distribution of the Sample Transactions by Method of Payment (1998-2003, N = 3242)



Distribution of method of payment is further illustrated in Table 19 on the next page. The table presents a sensitivity analysis of the definition of stock and cash payment. It shows how number deals financed by stock, cash and mixed payment alternate as the definition of stock and cash payment[19] is relaxed from 100% to 70%. Overall it can be stated that the share of mixed payment is almost negligible with a share of 7 to 14 percent depending on the definition of cash and stock payments.

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[18] See Equation 16 in Chapter 5.2

[19] Cash payments includes cash and liabilities

As can be seen from Table 19, pure cash deals account for 52% of the total number of deals while pure stock deals account for 33% of the deals. Compared to previous research on U.S. mergers and acquisitions the share of cash transactions is clearly higher. Andrade et al. (2001) report that of M&A transactions by U.S. firms between 1990 and 1998, 57.8% of deals are financed entirely with stock, whereas 70.9% of the deals include some stock financing. On their complete sample between years 1973 and 1998 Andrade et al. report that 35.4% of deals are financed purely with cash and 45.6% purely with stock.

On the contrary to Andrade et al., Faccio and Masulis (2004) report that their sample of European mergers and acquisitions taking place between 1997 and 2000 contains 80% pure cash deals, 11.3% of pure stock deals and 8.4% of mixed financing deals.

The differences in method of payment distribution compared to Faccio and Masulis may be result from the fact that their sample of European transactions contains also private targets. Eighty percent (80%) of the acquisitions of unlisted targets in the Faccio and Masulis study are financed entirely with cash, whereas only 60% of the listed targets are acquired entirely by cash.

Table 19: Effects of Alternating Definitions for Method of Payment (1998-2003, N = 3242)

	Grouping of cash and stock deals according to % of deal value							
	100 %		90 %		80 %		70 %	
	N	%	N	%	N	%	N	%
Cash Deals	1 700	52 %	1 710	53 %	1 737	54 %	1 772	55 %
Stock Deals	1 081	33 %	1 139	35 %	1 183	36 %	1 247	38 %
Mixed Payment	461	14 %	393	12 %	322	10 %	223	7 %
Total	**3 242**	**100 %**	**3 242**	**100 %**	**3 242**	**100 %**	**3 242**	**100 %**

Since the sample used in this study consists of global data, it is necessary to analyze the differences of deal characteristics between different nationalities. Table 20 on the next page presents data regarding cumulative deal values, number of transactions and information about how major deal characteristics vary according to acquirer nationality. An interesting detail of Table 20 is that stock acquisitions account for 42% of the total transaction value.

Table 20: Distribution of the Sample Deals by Acquirer Nationality (1998-2003, N = 3242)

Nationality	N	Transaction value ($bil)*	% of Total Transaction Value	% of World GDP (2000)**	% of Deals with Acquirer M/B > Target M/B	Stock Payment % of total value
U.S.	1819	2792	55.7 %	31.0 %	86 %	43 %
U.K.	306	790	15.8 %	4.55 %	87 %	34 %
France	97	279	5.56 %	4.14 %	76 %	59 %
Japan	159	202	4.02 %	15.0 %	81 %	52 %
Germany	58	176	3.51 %	5.92 %	78 %	25 %
Canada	199	125	2.49 %	2.28 %	91 %	46 %
Italy	38	100	1.99 %	3.40 %	84 %	38 %
Netherlands	53	70	1.40 %	1.17 %	87 %	35 %
Spain	31	63	1.26 %	1.78 %	94 %	66 %
Bermuda	22	50	1.01 %	0.01 %	100 %	25 %
Switzerland	31	49	0.98 %	0.76 %	71 %	33 %
Australia	105	47	0.93 %	1.19 %	90 %	33 %
Belgium	18	41	0.82 %	0.72 %	100 %	32 %
Hong Kong	10	38	0.77 %	0.52 %	70 %	98 %
Singapore	25	30	0.60 %	0.29 %	84 %	39 %
Sweden	36	19	0.39 %	0.76 %	92 %	53 %
Denmark	21	18	0.36 %	0.40 %	95 %	25 %
South Africa	35	18	0.36 %	0.40 %	83 %	44 %
Taiwan	16	18	0.35 %	0.98 %	94 %	4 %
Russia	6	15	0.30 %	0.82 %	100 %	2 %
Finland	18	14	0.29 %	0.38 %	83 %	53 %
Others	139	61	1.21 %	23.5 %	91 %	62 %
Total	**3242**	**5017 ($bil)**			**86 %**	**42 %**

*Countries ranked according to cumulative transaction value
** GDP data is acquired from Statistics Finland: http://www.stat.fi/tk/tp/maailmanumeroina/

As could be expected, U.S. based acquisitions account for 55.7% of the total deal value and 56.1% of total number of deals. Moreover, U.S. deals combined with Japan, Canada and major European countries U.K., France, Germany and Italy comprise 84.6% of the total global transaction value between 1998 and 2003. Table 18 includes also relative shares of world gross domestic product (GDP) from year 2000. Compared to relative shares in world GDP, relatively most active acquirer countries have been Bermuda, United Kingdom, Singapore and United States. On the contrary, companies domiciled in Japan, Russia and Germany have not been nearly as active in the takeover market as would be expected by the level of economic activity in their home countries.

In the global data used this thesis 86% of the acquirers have higher market-to-book –ratios compared to targets. The figure is somewhat higher compared to the 66% of Andrade et al. (2001) in U.S. data between 1973 and 1998. Nonetheless it strongly supports Hypothesis 1 stating that more highly valued firms acquire less highly valued firms.

With respect to the connection of method of payment and acquirer nationality, companies from Hong Kong, Spain, France and Finland have been relatively most active stock acquirers. On the contrary Russian, Taiwanese and German firms have been most keen on cash financing.

There does not seem to be big differences in comparisons of market-to-book –ratios of targets and bidders. In each country at least acquirer M/B is higher than target M/B in at least 70% of the deal. However, compared to United States (86%), major European countries Germany (78%) and France (76%) have to some extent fewer deals where acquirer M/B exceeds target M/B.

In order to further describe the distribution of market-to-book –ratios in the sample, Table 21 below presents the market-to-book –ratios and count of transactions divided according to target and acquirer industries by using 1-digit Standard Industry Codes (SIC). The industry definitions of 1-digit SIC codes are presented in Appendix 2.

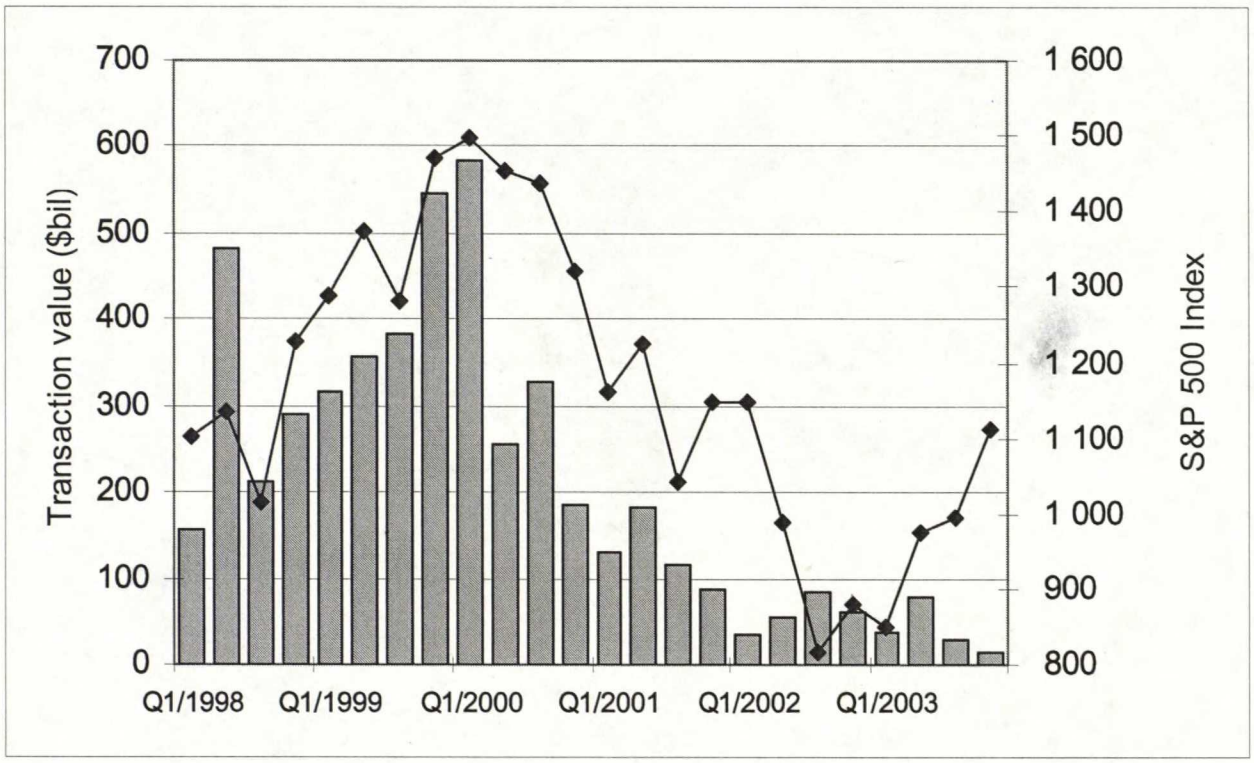
Table 21: Comparison of Market-to-Book -Ratios by 1-Digit SIC-Codes (1998-2003, N = 3242)

Acquirers	SIC 1	SIC 2	SIC 3	SIC 4	SIC 5	SIC 6	SIC 7	SIC 8	SIC 9
Average	2.37	4.55	5.05	4.93	3.56	2.78	6.87	6.01	3.90
Median	2.00	2.52	2.82	2.76	2.48	2.12	4.15	3.78	3.90
Min	0.09	0.01	0.12	0.00	0.325	0.075	0.06	0.31	2.03
Max	17.07	28.66	48.81	38.61	13.86	48.20	47.85	39.97	5.77
St.dev.	1.84	4.84	6.44	6.24	2.88	3.68	8.18	6.89	2.64
N	210	338	519	223	157	689	349	67	2
Targets	**SIC 1**	**SIC 2**	**SIC 3**	**SIC 4**	**SIC 5**	**SIC 6**	**SIC 7**	**SIC 8**	**SIC 9**
Average	1.77	3.35	2.95	3.22	2.44	1.58	4.71	3.39	n/a
Median	1.32	1.88	1.78	1.82	1.51	1.34	2.28	1.84	n/a
Min	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.39	n/a
Max	14.3	43.96	36.27	47.70	31.90	13.50	45.63	33.75	n/a
St.dev.	1.78	4.95	3.92	5.11	3.55	1.14	6.67	5.83	n/a
N	172	295	487	178	156	630	413	71	-
Mean Difference	0.60	1.20	2.10	1.71	1.13	1.20	2.16	2.62	-

6.1.2 Comparison to Stock Market Valuation Levels

As stated in the studies by Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2003) the transaction value appears to correlate with a major stock index. Figure 4 below exhibits the quarterly transaction value compared to Standard & Poor's 500 Composite Stock Price Index. Correlation in the figure seems to be quite apparent.

Figure 4: Quarterly Transaction Value of Mergers and Acquisitions vs. Standard & Poor's 500 Composite Index



Even more interestingly, the percentage of transactions financed by stock appears to correlate with share indexes. Figure 5 on the next page illustrates the effect. It presents a comparison of quarterly percentage of stock financed Nasdaq-based acquisitions compared to average Nasdaq Index calculated from daily closing prices[20]. This is consistent with of both Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2003), whose theories predict that stock market valuation levels have an impact on the choice of payment in mergers and acquisitions.

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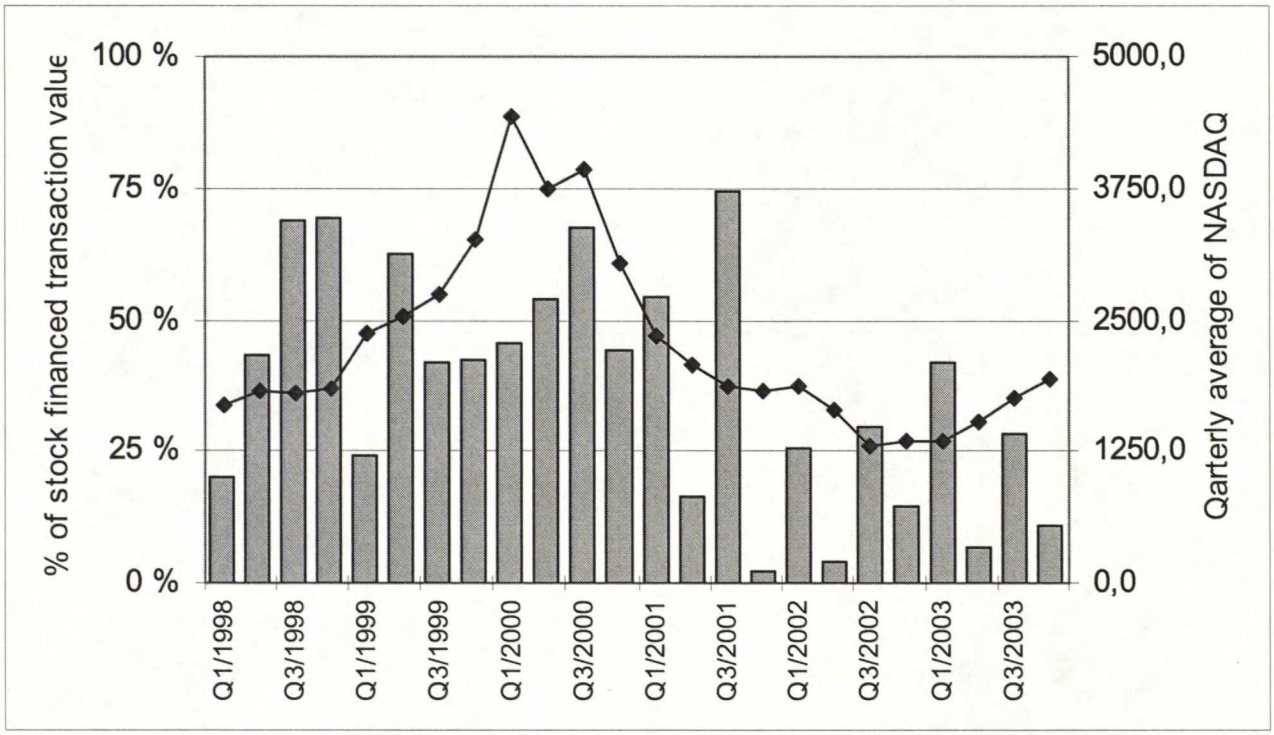
[20] "Nasdaq-based" stands for acquisitions in which the acquirer is listed in NASDAQ Stock Exchange

However, while Figure 5 indicates that there appears to be a connection between stock financing and stock market valuation, it must be stated that the effect is evident only in U.S. data. No correlation seemed to occur e.g. between method of payment in European transactions and major European stock indices, or in Japanese transactions and NIKKEI Index. The reason for this ambiguity remains unclear.

Figure 5: Percentage of Stock Financed Transaction Value in Deals with NASDAQ-Listed Acquirer Compared to Quarterly Average Value of NASDAQ Composite Stock Price Index (1998-2003, N = 834)



6.2 RESULTS OF UNIVARIATE TESTS

Comparisons of acquirer and target market-to-book –ratios are done in several separate t-tests. While the univariate t-tests are not very robust methods for making general inferences, they provide important information about the sample data. Similar univariate tests are performed e.g. in the working paper by Dong et al. (2003).

Testing of Hypothesis 1: Comparisons within industries

Running t-tests for the means differences of average market-to-book -ratios within same industry supports hypothesis stating that acquirers have higher ratios. T-statistics shown in Table 22 are statistically significant at least at 1% level in each industry. This supports very strongly Hypothesis 1 stating that acquirer market-to-book –ratios are higher than target ratios.

Table 22: Mean Difference t-Tests of Target and Acquirer M/B -Ratios within Same Industries

	SIC1	SIC2	SIC3	SIC4	SIC5	SIC6	SIC7	SIC8
Mean Difference	0.60	1.20	2.10	1.71	1.13	1.20	2.16	2.62
N	380	631	1004	399	311	1317	760	136
t-Stat	3.21	3.07	6.19	2.94	3.09	7.85	4.02	2.42
Significance	0.001***	0.002***	0.000***	0.003***	0.002***	0.000***	0.000***	0.017***

Note: *, **, and *** denote for statistical significance levels of 10%, 5%, and 1%, respectively.

Testing of Hypothesis 1: Deal Specific Comparison

Comparing the differences of market-to-book –ratios of target and acquirer in each deal further supports Hypothesis 1 stating that the acquirers are more highly valued in terms of market-to-book –ratio. Below is presented a summary table of a one-sample t-test comparing testing whether the average difference of acquirer market-to-book –ratio and target market-to-book –ratio differs from zero. T-statistic of 12.53 in a sample of 1751 observations strongly supports the assumption that acquirers are more highly valued than targets.

Table 23: Deal-Specific Comparison of Acquirer and Target Market-to-Book Ratios

	Acquirer M/B - Target M/B
Mean Difference	1.82
Std. Deviation	6.09
N	1751
t-statistic	12,53
Significance (2-tailed)	1.49E-34***

Note: *, **, and *** denote for statistical significance levels of 10%, 5%, and 1%, respectively.

Consequently as results illustrated in Table 22 and in Table 23 indicate, Hypothesis 1 can be accepted. This result is consistent with Martin (1996) and Andrade et al. (2001).

Testing of Hypothesis 2: Comparing M/B's of Stock and Cash Acquirers

Next, I continue to test the Hypothesis 2 about the market-to-book -ratios of stock and cash acquirers. Firstly, I have grouped equal sized quintiles according to market-to-book –ratios. As the table below shows, the highest quintiles have higher probability for stock payment and lower probability for cash payment when compared to the lower quintiles. However, the differences are minimal and therefore do not allow for any conclusions. On the contrary, Dong et al. (2003) find than the differences between highest and lowest quintile are statistically significant at 1% level[21]. However, their methodology is different while Dong et al. group the acquirers to quintiles monthly while the on this thesis the grouping is done from the complete data of six years and therefore does not take into account the possible time-variance in market-to-book -ratios.

Table 24: Probabilities of Choosing Cash and Stock Payment by Acquirer M/B -Ratio Quintiles

Acquirer M/B Rank from Highest to Lowest	All Stock	All Cash	Mixed	N
1	33.9 %	49.4 %	16.7 %	511
2	35.0 %	50.3 %	14.7 %	511
3	33.1 %	54.2 %	12.7 %	511
4	31.9 %	56.2 %	11.9 %	511
5	31.1 %	54.2 %	14.7 %	511
Difference 1-5	2.8 %	-4.8 %	2.0 %	

[21] See Table 9 in Chapter 3.3

Hypothesis 2 is now tested by comparing the means of industry adjusted market-to-book –ratios of stock and cash acquirers using independent samples t-test. The test is made by comparing the mean ratio of deals that can be characterized as either stock or cash deals. The comparison in Table 25 below shows that using both 100% and 70% definitions, the average and median market-to-book – ratio's are higher in stock financed transactions. However, the results are statistically significant only in between the groups where the definition of method of payment is relaxed to 70% of the deal value.

Since the result of the t-test is contradicting, I continue to the logistic analysis analyzing the determinants explaining the choice of method of payment.

Table 25: Independent Sample t-Test Comparing the Industry Adjusted M/B –Ratios of Stock and Cash Acquirers

	All Stock	All Cash	Min 70% Stock	Min 70% Stock
Mean	-1.92	-2.21	-1.93	-3.93
Variance	32.25	28.51	31.03	9.11
Observations	843	1350	971	1107
df	2191		2076	
t-Stat	1.202		10.367	
Significance (2-tailed)	0.230		0.000***	

Note: *, **, and *** denote for statistical significance levels of 10%, 5%, and 1%, respectively.

6.3 RESULTS OF LOGIT REGRESSIONS

This section presents the results of the main regression model used to find out whether the predicted variables are significant in the process of choosing the method of payment in mergers and acquisitions. Secondly, I present the results of a logistic regression ran on a sub-sample consisting of U.S. deals occurring during periods of high overall stock market valuations.

Table 26 on the next page is probably the most important piece of information in this thesis. Moreover, the correlation matrix of the variables used in the thesis is presented in Table 27 on page 83. As the results in Table 26 show, the predictions of Shleifer and Vishny about acquirer valuation levels do not hold[22]. The sign of acquirer industry adjusted M/B –ratio is positive, but the low Wald statistic of 0.304 and thus low significance of 0.582 do not give any indication that the acquirer industry adjusted market-to-book –ratio would have impact on the choice over method of payment. Thus, the main Hypothesis 2 is clearly rejected. This result contradicts with those of Ang and Cheng (2003) and Dong et al. (2003). On the other hand, considerable differences in research methodologies do not allow for a direct comparison between the results.

Whereas the Sheifer and Vishny prediction does not seem to hold on general level, the predictions of Rhodes-Kropf and Viswanathan do seem to hold. The dummy variable indicating that periods of high stock market valuations contribute positively to the choosing of stock payment is statistically significant at 1% level. Consistently, months classified as periods of low stock market valuations have negative effect on the stock payment. The latter result is statistically significant at 5% level. Consequently Hypothesis 3 is clearly accepted.

Moreover, the sign on cross-border industry is negative as predicted, but the statistical significance is very low. On the contrary, signs on acquirer leverage and target size are negative indicating that higher leverage and bigger targets are not associated with stock payments. Thus, Hypotheses 4, 5 and 6 are also rejected. Finally, the prediction power of this logit model is fairly poor while it has only 67.14% of correct predictions.

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[22] Obviously this statement is subject to the critisism that industry adjusted M/B –ratios can not be used for estimating overvaluation.

Table 26: Results of Logit Regression Analysis Explaining Method of Payment

The sample consists of 1622 merger and acquisitions in the period of 1998 to 2003. The dependent variable (ALL STOCK) takes a value of 1 for acquisitions in which the transaction is financed entirely with stock, if any cash is used variable receives a value of zero. Industry adjustions to the M/B -ratio are done by subtracting the corresponding enterprise value weighted industry average (calculated from the sample firms) from the M/B -ratio of the company. Stock market conditions are definined using two procedures described in Chapter 5.3. All significance tests are two-sided. ***, **, and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Dependent Variable ALL STOCK (1=Yes)					
Variable	Expected Sign	Coefficient	Wald	Significance	
Acquirer and Target Characteristics					
Acquirer industry adjusted M/B	+	0,006	0,304	0,582	
Target industry adjusted M/B	+/-	0,005	0,126	0,723	
Acquirer leverage	+	-0,160	0,440	0,507	
Natural logarithm of Target Size	+	-0,022	0,066	0,797	
Stock Market Conditions					
High overall stock market valuations	+	0,601	24,793	0,000	***
Low overall stock market valuations	-	-0,380	5,063	0,024	**
Industry Dummies					
Acquirer industry SIC 1 (dummy)		3,188	0,151	0,698	
Acquirer industry SIC 2 (dummy)		3,592	0,192	0,662	
Acquirer industry SIC 3 (dummy)		3,694	0,203	0,653	
Acquirer industry SIC 4 (dummy)		3,527	0,185	0,667	
Acquirer industry SIC 5 (dummy)		3,660	0,199	0,656	
Acquirer industry SIC 6 (dummy)		3,665	0,199	0,655	
Acquirer industry SIC 7 (dummy)		3,429	0,175	0,676	
Acquirer industry SIC 8 (dummy)		3,620	0,194	0,659	
Deal Characteristics					
Natural logarithm of transaction value	+	-0,017	0,039	0,844	
Cross-Border Transaction (dummy)	-	-0,041	0,073	0,788	
Cross-Industry Transaction (dummy)	-	0,234	2,930	0,087	*
Acquirer domiciled in U.S. (dummy)		-0,191	2,215	0,137	
Additional Model Details					
Intercept		-3,48	0,179	0,672	
-2 Log Likelihood		2010,6			
Nagelkerke R^2		0,045			
Cox & Snell Pseudo R-Square		0,032			
Correct Predictions		67,14 %			
Observations (N)		1622			

Table 27: Correlation Matrix of Logit Varibles

	Intercept	Acquirer M/B	Target M/B	Acquirer Leverage	Deal Value	Target Size	High Markets	Low Markets	Acq. SIC 1	Acq. SIC 2	Acq. SIC 3	Acq. SIC 4	Acq. SIC 5	Acq. SIC 6	Acq. SIC 7	Acq. SIC 8	Cross-Border Deal	Cross-Industry Deal
Acquirer M/B	0,012																	
Target M/B	0,019	-0,155																
Acquirer Leverage	0,005	0,050	0,053															
Deal Value	-0,024	-0,070	0,018	0,220														
Target Size	-0,006	0,033	-0,097	-0,275	-0,921													
High Markets	0,006	-0,022	-0,045	-0,026	-0,062	0,029												
Low Markets	-0,006	-0,004	0,023	-0,006	0,005	0,023	0,250											
Acq. SIC 1	-0,996	-0,004	0,000	-0,004	0,005	-0,007	-0,004	-0,004										
Acq. SIC 2	-0,996	-0,001	0,002	-0,004	0,004	-0,006	-0,005	-0,005	0,999									
Acq. SIC 3	-0,996	-0,001	0,005	-0,002	0,005	-0,006	-0,005	-0,005	0,999	1,000								
Acq. SIC 4	-0,996	-0,001	0,003	-0,007	0,003	-0,007	-0,004	-0,003	0,999	1,000	1,000							
Acq. SIC 5	-0,996	-0,003	0,001	-0,005	0,005	-0,006	-0,003	-0,004	0,999	1,000	1,000	0,999						
Acq. SIC 6	-0,997	-0,005	-0,001	-0,007	0,012	-0,014	-0,005	-0,005	0,999	1,000	1,000	1,000	1,000					
Acq. SIC 7	-0,996	0,001	0,007	-0,001	0,003	-0,005	-0,006	-0,005	0,999	1,000	1,000	1,000	0,999	1,000				
Acq. SIC 8	-0,996	-0,005	0,005	-0,001	0,005	-0,006	-0,003	-0,003	0,999	0,999	0,999	0,999	0,999	0,999	0,999			
Cross-Border	0,001	-0,034	-0,027	-0,092	-0,092	0,054	-0,005	0,041	0,000	-0,002	-0,003	0,000	0,000	0,000	-0,002	-0,001		
Cross-Industry	-0,020	-0,030	0,033	0,014	-0,047	0,067	-0,022	-0,024	0,014	0,012	0,013	0,010	0,013	0,014	0,012	0,007	-0,052	
U.S. Acquirer	-0,014	-0,064	-0,016	0,012	0,006	-0,018	0,046	0,052	0,008	0,005	0,003	0,005	0,006	0,004	0,002	0,004	0,477	0,003

A Sub-Sample of U.S. Bull Market Acquisitions

As presented in Chapter 5.3, the methods of classifying months to periods of high and low overall stock market valuations were built on Standard & Poor's 500 Composite Index. Since S&P 500 consists of U.S. companies and nearly half of the deals in the sample are from outside of U.S., a look at a sub-sample consisting only of deals with U.S. as the acquirer domicile is needed.

Moreover, to test the Hypothesis 4 stating that the significance of high market-to-book –ratios is higher during periods of high overall stock market valuations, it is necessary to filter out deals that occur during months that are defined as normal or low overall valuations. Furthermore, as Figures 4 and 5 in Chapter 6.1 pointed out, there appears to be a clear correlation between the method of payment and high overall stock market valuation levels. An additional reason for the construction of the sub-sample is that initial results from regressions run for a data consisting of global deals taking place during periods of high overall stock market valuations did not produce any interesting results.

Consequently, Table 28 on the next page presents the results of a logit regression of 150 U.S. transactions taking place during the 14 months classified as bull markets. As the table shows, high acquirer market-to-book –ratios are a factor in choosing stock as the method of payment during periods of high stock market valuations at 5% statistical significance level. The difference in Wald Statistics of acquirer M/B between the full sample and the sub-sample is obvious[23]. Consequently, I accept the Hypothesis 4 stating that high acquirer valuation levels are a factor in choosing the method of payment during periods of high overall stock market valuations.

This supports the intuition that the predictions of Shleifer and Vishny do not apply to an average deal, since mergers and acquisitions have many other drivers besides possible stock market misvaluation. However, during peak periods of stock market valuations, it is more likely that highly valued companies try to capitalize on their floated share prices by acquiring other companies before their share prices return to intrinsic levels.

Moreover, the hypotheses concerning cross-border deals, acquirer leverage and target size are rejected also in this model. Finally, the prediction power has increased significantly, while 82.67% of the predictions by the model are correct.

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[23] Wald statistic for acquirer M/B in the full sample is 0.304 while in the sub-sample it is 3.965

Table 28: Results of Logit Regression Analysis of Sub-Sample Consisting of U.S. Deals During Periods of High Stock Market Valuations

This table presents the results of the logit regression model run for a subsample of 150 U.S. mergers and acquisitions occuring during months that are defined as periods of high stock market valuations during 1998-2003. The dependent variable (ALL STOCK) takes a value of 1 for acquisitions in which the transaction is financed entirely with stock, if any cash is used variable receives a value of zero. Industry adjustions to the M/B -ratio are done by subtracting the corresponding enterprise value weighted industry average (calculated from the sample firms) from the M/B -ratio of the company. Stock market conditions are definined using two procedures described in Chapter 5.3. All significance tests are two-sided. ***, **, and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Dependent Variable ALL STOCK (1=Yes)					
Variable	Expected Sign	Coefficient	Wald	Significance	
Acquirer and Target Characteristics					
Acquirer industry adjusted M/B	+	0,083	3,965	0,046	**
Target industry adjusted M/B	+/-	-0,123	1,690	0,194	
Acquirer leverage	+	-0,718	0,397	0,529	
Natural logarithm of Target Size	+	0,461	1,473	0,225	
Industry Dummies					
Acquirer industry SIC 1 (dummy)		-6,705	0,063	0,802	
Acquirer industry SIC 2 (dummy)		-0,394	0,101	0,751	
Acquirer industry SIC 3 (dummy)		-0,967	0,675	0,411	
Acquirer industry SIC 4 (dummy)		1,815	1,156	0,282	
Acquirer industry SIC 5 (dummy)		-1,260	0,589	0,443	
Acquirer industry SIC 6 (dummy)		-0,827	0,397	0,529	
Acquirer industry SIC 7 (dummy)		-1,244	1,015	0,314	
Acquirer industry SIC 8 (dummy)		redundant			
Deal Characteristics					
Natural logarithm of transaction value	+	-0,556	2,060	0,151	
Cross-Border Transaction (dummy)	-	0,564	0,433	0,511	
Cross-Industry Transaction (dummy)	-	0,621	1,035	0,309	
Additional Model Details					
Intercept		0,426			
-2 Log Likelihood		124,35			
Nagelkerke R^2		0,1762			
Cox & Snell Pseudo R-Square		0,1076			
Correct Predictions		82,67 %			
Observations (N)		150			

7 SUMMARY AND CONCLUSIONS

The purpose of this thesis was investigate whether stock market driven acquisitions –theory by Shleifer and Vishny (2003) and market valuation and merger waves –theory by Rhodes-Krofp and Viswanathan (2003) affect the acquirer's choice of method of payment in mergers and acquisitions. Before the concluding discussion, a summary table of the results of this thesis is presented below.

Table 29: Summary of the Results

	Hypothesis	t-Test Results	Logit results
H1	Both stock and cash bidders are on average higher valued than targets	Accepted***	n/a
H2	Acquirers with high equity valuations measured by industry adjusted market-to-book –ratios choose stock as the method of payment in mergers and acquisitions	Mixed result	Rejected
H3	Favorable general stock market valuation levels increase possibility for a stock bid	n/a	Accepted***
H4	Acquirers with high market-to-book –ratio choose stock as medium of payment more often during periods of favorable overall stock market valuation levels	n/a	Accepted for U.S. data**
H5	Cross-border acquirers prefer cash as method of payment	n/a	Rejected
H6	Large targets are acquired rather by stock than cash	n/a	Rejected
H7	Low acquirer leverage is associated with cash financing	n/a	Rejected

Note: *, **, and *** denote for statistical significance levels of 10%, 5%, and 1%, respectively.

As the table shows, the most important contribution of this thesis is the finding that as predicted by Rhodes-Kropf and Viswanathan, periods of high overall stock market valuations are highly correlated with stock payments in mergers and acquisitions. Furthermore, as further predicted by Rhodes-Kropf and Viswanathan, periods of high overall stock market valuations seem to create an opportunity for the acquirers to used their highly valued equity as currency in acquisitions.

On the contrary to the initial assumptions of this thesis, the main prediction of the main theory by Shleifer and Vishny that overvaluated firms use stock payment appears to hold only during bull markets.

Moreover, the result that 86% of the acquirers have higher market-to-book –ratios than targets is consistent with the earlier research by Martin (1996) and Andrade et al. (2001). From the perspective of the Q-theory (Jovanovic and Rousseau, 2003) the market for corporate control appears to function as it should: Resources flow from low valuated companies to highly valuated companies.

The main finding concerning the correlation of stock payment and bull markets may also be explained by other factors besides misvaluation. An intuitive psychological aspect is that managers and owners are more willing to take on risks and challenges when everything looks good and the overall market sentiment is positive. Rising share prices represent more wealth and therefore support ideas that people either become 'velocity-blind' and do not recognize the risks or the risk-taking ability becomes relatively larger when wealth-levels crow.

Furthermore, talking about misvaluation in finance literature is always controversial. Even more controversial is to propose a proxy for such a phenomenon. Consequently, while the predictions of the Shleifer and Vishny misvaluation theory are very straight-forward as such, it is extremely difficult to empirically verify them at least by using such a divisive measure for valuation as M/B – ratio is. Perhaps an approach identical to Rhodes-Kropf, Robinson and Viswanathan (2003) using a break-down of market-to-book –ratio would be better in catching the misvaluation effects associated with mergers and acquisition. On the other hand, a more precise method of categorizing firms to groups of high and low valuation would bring about better results. Compared to e.g. to the widely supportive findings of Dong et al. (2003), the findings of this thesis offer extremely limited support to the Shleifer and Vishny misvaluation theory.

Finally, it would be interesting to study the long-term share price performance of the highly valued companies making stock purchases during periods of high overall stock market valuations. The results of such study would extremely useful for determining whether the predictions of Sheifer and Vishny hold or not.

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APPENDIX 1: Stock Market Data Used in "Irrational Exuberance"

Date	S&P 500 Comp. (P)	Earnings (E)	CPI	Real Price	Real Earnings	P/E10 Ratio	P/E10 Diff. From Mean	10-year Tr. Note Rate	S&P500 Earnings yield	Difference in yields	Combined Overall Valuation Levels High	Low	Normal
Jan1998	963,4	39,7	161,6	1006,3	41,4	32,9	-0,8	5,54 %	3,04 %	2,50 %	0	0	1
Feb1998	1023,7	39,6	161,9	1067,4	41,3	34,7	1,1	5,57 %	2,88 %	2,69 %	0	0	1
Mar1998	1076,8	39,5	162,2	1120,6	41,1	36,3	2,7	5,65 %	2,75 %	2,90 %	0	0	1
Apr1998	1112,2	39,4	162,5	1155,3	40,9	37,3	3,6	5,64 %	2,68 %	2,96 %	0	0	1
May1998	1108,4	39,2	162,8	1149,3	40,6	37,0	3,3	5,65 %	2,71 %	2,94 %	0	0	1
Jun1998	1108,4	39,0	163,0	1147,8	40,4	36,8	3,2	5,50 %	2,72 %	2,78 %	0	0	1
Jul1998	1156,6	38,7	163,2	1196,3	40,0	38,3	4,6	5,46 %	2,61 %	2,85 %	0	0	1
Aug1998	1074,6	38,4	163,4	1110,1	39,7	35,4	1,8	5,34 %	2,82 %	2,52 %	0	0	1
Sep1998	1020,6	38,1	163,6	1053,1	39,3	33,5	-0,1	4,81 %	2,98 %	1,83 %	0	0	1
Oct 1998	1032,5	38,0	164,0	1062,7	39,1	33,8	0,1	4,53 %	2,96 %	1,57 %	0	0	1
Nov1998	1144,4	37,8	164,0	1177,9	38,9	37,4	3,7	4,83 %	2,68 %	2,15 %	0	0	1
Dec1998	1190,1	37,7	163,9	1225,6	38,8	38,8	5,2	4,65 %	2,58 %	2,07 %	0	0	1
Jan1999	1248,8	37,9	164,3	1283,0	39,0	40,6	6,9	4,72 %	2,46 %	2,26 %	0	0	1
Feb1999	1246,6	38,2	164,5	1279,2	39,2	40,4	6,8	5,00 %	2,48 %	2,52 %	0	0	1
Mar1999	1281,7	38,4	165,0	1311,2	39,3	41,4	7,7	5,23 %	2,42 %	2,81 %	0	0	1
Apr1999	1334,8	39,3	166,2	1355,6	39,9	42,7	9,1	5,18 %	2,34 %	2,84 %	0	0	1
May1999	1332,1	40,1	166,2	1352,9	40,8	42,6	8,9	5,54 %	2,35 %	3,19 %	0	0	1
Jun1999	1322,6	41,0	166,2	1343,2	41,7	42,2	8,5	5,90 %	2,37 %	3,53 %	1	0	0
Jul1999	1381,0	42,0	166,7	1398,4	42,5	43,8	10,2	5,79 %	2,28 %	3,51 %	1	0	0
Aug1999	1327,5	43,0	167,1	1341,0	43,4	41,9	8,3	5,94 %	2,38 %	3,56 %	1	0	0
Sep1999	1318,2	44,0	167,9	1325,2	44,2	41,3	7,7	5,92 %	2,42 %	3,50 %	1	0	0
Oct 1999	1300,0	45,4	168,2	1304,6	45,5	40,6	6,9	6,11 %	2,47 %	3,64 %	0	0	1
Nov1999	1391,0	46,8	168,3	1395,1	46,9	43,2	9,6	6,03 %	2,31 %	3,72 %	1	0	0
Dec1999	1428,7	48,2	168,3	1432,9	48,3	44,2	10,6	6,28 %	2,26 %	4,02 %	1	0	0
Jan2000	1425,6	49,1	168,8	1425,6	49,1	43,8	10,1	6,66 %	2,28 %	4,38 %	1	0	0
Feb2000	1388,9	50,0	169,8	1380,7	49,7	42,2	8,5	6,52 %	2,37 %	4,15 %	1	0	0
Mar2000	1442,2	50,9	171,2	1422,0	50,2	43,2	9,6	6,26 %	2,31 %	3,95 %	1	0	0
Apr2000	1461,4	51,3	171,3	1440,0	50,5	43,5	9,9	5,99 %	2,30 %	3,69 %	1	0	0
May2000	1418,5	51,6	171,5	1396,1	50,8	42,0	8,3	6,44 %	2,38 %	4,06 %	1	0	0
Jun2000	1462,0	51,9	172,4	1431,4	50,8	42,8	9,1	6,10 %	2,34 %	3,76 %	1	0	0
Jul2000	1473,0	52,5	172,8	1438,9	51,3	42,8	9,1	6,05 %	2,34 %	3,71 %	1	0	0
Aug2000	1485,5	53,1	172,8	1451,1	51,9	42,9	9,2	5,83 %	2,33 %	3,50 %	1	0	0
Sep2000	1468,1	53,7	173,7	1426,6	52,2	41,9	8,3	5,80 %	2,39 %	3,41 %	0	0	1
Oct 2000	1390,1	52,5	174,0	1348,6	50,9	39,4	5,7	5,74 %	2,54 %	3,20 %	0	0	1
Nov2000	1378,0	51,2	174,1	1336,1	49,7	38,8	5,1	5,72 %	2,58 %	3,14 %	0	0	1
Dec2000	1330,9	50,0	174,0	1291,2	48,5	37,3	3,6	5,24 %	2,68 %	2,56 %	0	0	1
Jan2001	1335,6	48,5	175,1	1287,6	46,7	37,0	3,3	5,16 %	2,70 %	2,46 %	0	0	1
Feb2001	1305,8	47,0	175,8	1253,8	45,1	35,8	2,2	5,10 %	2,79 %	2,31 %	0	0	1
Mar2001	1185,9	45,4	176,2	1136,0	43,5	32,3	-1,3	4,89 %	3,09 %	1,80 %	0	0	1

APPENDIX 1: Stock Market Data Used in "Irrational Exuberance"

Date	S&P 500 Comp. (P)	Earnings (E)	CPI	Real Price	Real Earnings	P/E10 Ratio	P/E10 Diff. From Mean	10-year Tr. Note Rate	S&P500 Earnings yield	Difference in yields	Overall Valuation Levels High	Low	Normal
Apr2001	1189,8	42,6	176,9	1135,4	40,6	32,2	-1,5	5,14 %	3,11 %	2,03 %	0	0	1
May2001	1270,4	39,7	177,7	1206,7	37,7	34,1	0,4	5,39 %	2,93 %	2,46 %	0	0	1
Jun2001	1238,7	36,8	178,0	1174,7	34,9	33,1	-0,6	5,28 %	3,02 %	2,26 %	0	0	1
Jul2001	1204,5	34,0	177,5	1145,4	32,3	32,2	-1,5	5,24 %	3,11 %	2,13 %	0	0	1
Aug2001	1178,5	31,1	177,5	1120,7	29,6	31,4	-2,2	4,97 %	3,18 %	1,79 %	0	0	1
Sep2001	1044,6	28,3	178,3	989,0	26,8	27,7	-6,0	4,73 %	3,61 %	1,12 %	0	0	1
Oct 2001	1076,6	27,1	177,7	1022,7	25,7	28,6	-5,1	4,57 %	3,50 %	1,07 %	0	0	1
Nov2001	1129,7	25,9	177,4	1074,9	24,6	30,0	-3,6	4,65 %	3,33 %	1,32 %	0	0	1
Dec2001	1144,9	24,7	176,7	1093,7	23,6	30,5	-3,1	5,09 %	3,28 %	1,81 %	0	0	1
Jan2002	1140,2	24,7	177,1	1086,8	23,5	30,3	-3,4	5,04 %	3,30 %	1,74 %	0	0	1
Feb2002	1100,7	24,7	177,8	1045,0	23,4	29,1	-4,6	4,91 %	3,44 %	1,47 %	0	0	1
Mar2002	1153,8	24,7	178,8	1089,3	23,3	30,3	-3,4	5,28 %	3,30 %	1,98 %	0	0	1
Apr2002	1112,0	25,4	179,8	1044,0	23,8	29,0	-4,6	5,21 %	3,45 %	1,76 %	0	0	1
May2002	1079,1	26,1	179,8	1013,0	24,5	28,1	-5,5	5,16 %	3,56 %	1,60 %	0	0	1
Jun2002	1015,3	26,7	179,9	952,6	25,1	26,4	-7,2	4,93 %	3,78 %	1,15 %	0	0	1
Jul2002	903,6	27,9	180,1	846,9	26,2	23,5	-10,2	4,65 %	4,26 %	0,39 %	0	1	0
Aug2002	912,6	29,1	180,7	852,5	27,2	23,6	-10,1	4,26 %	4,24 %	0,02 %	0	1	0
Sep2002	867,8	30,3	181,0	809,3	28,3	22,4	-11,3	3,87 %	4,47 %	-0,60 %	0	1	0
Oct 2002	854,6	29,4	181,3	795,7	27,4	22,0	-11,7	3,94 %	4,56 %	-0,62 %	0	1	0
Nov2002	909,9	28,5	181,3	847,2	26,5	23,3	-10,3	4,05 %	4,28 %	-0,23 %	0	1	0
Dec2002	898,3	27,6	180,9	838,2	25,7	23,1	-10,6	4,03 %	4,33 %	-0,30 %	0	1	0
Jan2003	895,8	28,5	181,7	832,2	26,5	22,9	-10,7	4,05 %	4,37 %	-0,32 %	0	1	0
Feb2003	837,6	29,4	183,1	772,2	27,1	21,2	-12,4	3,90 %	4,71 %	-0,81 %	0	1	0
Mar2003	846,6	30,3	184,2	775,8	27,8	21,3	-12,3	3,81 %	4,69 %	-0,88 %	0	1	0
Apr2003	890,0	31,7	183,8	817,4	29,1	22,4	-11,2	3,96 %	4,46 %	-0,50 %	0	1	0
May2003	936,0	33,1	183,5	861,0	30,5	23,6	-10,1	3,57 %	4,24 %	-0,67 %	0	1	0
Jun2003	988,0	34,6	183,7	907,9	31,7	24,8	-8,8	3,33 %	4,03 %	-0,70 %	0	1	0
Jul2003	992,5	35,6	183,9	911,0	32,7	24,9	-8,8	3,98 %	4,02 %	-0,04 %	0	1	0
Aug2003	989,5	36,7	184,6	904,8	33,6	24,6	-9,0	4,45 %	4,06 %	0,39 %	0	1	0
Sep2003	1019,4	37,8	185,2	929,2	34,4	25,2	-8,4	4,27 %	3,96 %	0,31 %	0	1	0
Oct 2003	1038,7		185,5	945,2		25,6	-8,0	4,29 %	3,90 %	0,39 %	0	1	0
Nov2003	1054,9		185,8	958,4		25,9	-7,7	4,30 %	3,86 %	0,44 %	0	1	0
Dec2003	1080,64		184,3	989,8		26,7	-7,0	4,27 %	3,75 %	0,52 %	0	0	1
Average	1164,9	38,3	173,8	1136,8	37,5	33,64		5,10 %	3,13 %	1,96 %	14	17	41
St.dev	186,05	8,73	7,51	204,87	9,19	7,39		0,78 %	0,75 %	1,48 %			

Sources: Stock Market Data Used in Robert J. Shiller's book "Irrational Exuberance" - updated version: http://www.econ.yale.edu/~shiller/data/ie_data.htm

Oct, Noc, Dec CPI obtained from U.S. Department of Labor website: http://www.bls.gov/cpi/home.htm#data; December S&P Index value is obtained from yahoo finance website

APPENDIX 2: U.S. Standard Industry Code (SIC 1987) Descriptions

2-digit SIC Code	1-digit SIC Code used in the Thesis	Industry Definitions
		Mineral and Construction Industries
10	1	Metal mining
12	1	Coal mining
13	1	Oil and gas extraction
14	1	Nonmetallic minerals, except fuels
15	1	General building contractors
16	1	Heavy construction contractors
17	1	Special trade contractors
		Manufacturing
20	2	Food and kindred products
21	2	Tobacco manufactures
22	2	Textile mill products
23	2	Apparel and other textile products
24	2	Lumber and wood products
25	2	Furniture and fixtures
26	2	Paper and allied products
27	2	Printing and publishing
28	2	Chemicals and allied products
29	2	Petroleum and coal products
30	3	Rubber and miscellaneous plastics products
31	3	Leather and leather products
32	3	Stone, clay, glass, and concrete products
33	3	Primary metal industries
34	3	Fabricated metal products
35	3	Industrial machinery and equipment
36	3	Electrical and electronic equipment
37	3	Transportation equipment
38	3	Instruments and related products
39	3	Miscellaneous manufacturing industries
		Transportation, Communication, and Utilities
41	4	Local and interurban passenger transit
42	4	Motor freight transportation and warehousing
43	4	U.S. Postal Service
44	4	Water transportation
45	4	Transportation by air
46	4	Pipelines, except natural gas
47	4	Transportation services
48	4	Communications
49	4	Electric, gas, and sanitary services

Source: U.S. Cencus Bureau website:
http://www.census.gov/epcd/www/naicstab.htm

APPENDIX 2: U.S. Standard Industry Code (SIC 1987) Descriptions

2-digit SIC Code	1-digit SIC Code used in the Thesis	Industry Definitions
		Wholesale and Retail Trade
50	5	Wholesale trade--durable goods
51	5	Wholesale trade--nondurable goods
52	5	Building materials, hardware, garden supply, & mobile
53	5	General merchandise stores
54	5	Food stores
55	5	Automotive dealers and gasoline service stations
56	5	Apparel and accessory stores
57	5	Furniture, home furnishings and equipment stores
58	5	Eating and drinking places
59	5	Miscellaneous retail
61	6	Nondepository credit institutions
62	6	Security, commodity brokers, and services
63	6	Insurance carriers
64	6	Insurance agents, brokers, and service
65	6	Real estate
67	6	Holding and other investment offices
		Service Industries
70	7	Hotels, rooming houses, camps, and other lodging plac
72	7	Personal services
73	7	Business services
75	7	Automotive repair, services, and parking
76	7	Miscellaneous repair services
78	7	Motion pictures
79	7	Amusement and recreational services
80	8	Health services
81	8	Legal services
82	8	Educational services
83	8	Social services
84	8	Museums, art galleries, botanical & zoological garden
86	8	Membership organizations
87	8	Engineering and management services
88	8	Private households
89	8	Miscellaneous services
		Public Administration
91	9	Executive, legislative, and general government
92	9	Justice, public order, and safety
93	9	Finance, taxation, and monetary policy
94	9	Administration of human resources
95	9	Environmental quality and housing
96	9	Administration of economic programs
97	9	National security and international affairs

Source: U.S. Cencus Bureau website:
http://www.census.gov/epcd/www/naicstab.htm