ERASMUS UNIVERSITEIT ROTTERDAM

# Meta-analysis on the effects of mergers and acquisitions

**Influences on the Cost, Profit and Stock Price Effects analysed**

By

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# Preface

This thesis concludes my economic and business master study at the Erasmus University of Rotterdam, in the direction Economics of Markets, Organisations and Policy. It also concludes my long study period that started with a law study in Utrecht. Initially I had chosen to study the combination of law and economics at University of Utrecht, but the set-up of this study was altered and I consequently choose to first study law. My law study already had elements of economics, graduating in Private Law, and Economic Public and Business Law. After finishing my law studies I started the pre-master program for economics. When this was concluded I started the Master Economics of Markets, Organisations and Policy at the Erasmus University.

At the end of my master I had to choose my thesis subject. It was already clear that I wanted to write on a subject related to mergers and acquisitions. Since this subject had already interested me during my law studies and before. Largely because of the lasting impact mergers and acquisitions can have on the whole market. This lasting impact of one event strongly interested me.

Searching for a thesis subject it was already clear to me that there is an abundant amount of literature on mergers and acquisitions. After coming into contact with professor Dijkgraaf this thesis subject, that was to shed light on the results of the abundant literature, was quickly chosen. Gladly it is a subject that interested me greatly so I read the literature with much curiosity. During the writing of my thesis I was also very active in the stock market, were several notable mergers and acquisitions further strengthened my interest.

Performing this thesis was a great learning experience, not only about the literature but also about empirical analysis. The reader will likely notice the influence of my law study in my writing, as jurists tend to write detailed. The use of footnotes with all the relevant information is another example, it allows quick insight in the details of the reference. On the other hand when I write a legal paper, it will also be influenced by my economic background.

For his open and helpful support I would like to thank professor Dijkgraaf. His advice was practical and no-nonsense, this was of great help.

I would further gratefully thank my loving parents, who I love endlessly, who have supported me without question for whole my life!

Finally I'd like to thank all my friends who have helped me in my studies, and who have kept me from my studies.

# Abstract

Mergers and acquisitions draw a great deal of academic and public attention due to the large and widespread influence that they often have. The large amount of attention leads to a great deal of studies on the effect of mergers and acquisitions. However, the results of the studies are inconclusive and are often contradictory. Some studies find positive effects while others find negative or insignificant effects. This thesis aims to find the general effects of mergers and acquisitions, and to explain the differences that are found in the results. This for the three most researched effect areas: costs, profits, and stock prices. The analysis is performed using a stepwise least squares meta-analysis. From this it can be concluded that the general effect on costs is a cost increase, however significant studies show almost no cost effects. The general effect on profits is a profit decrease, but significant studies show a lower profit decrease. Finally there is a general increase in stock prices, but again significant studies show a lower increase in stock prices. The general result is strongly influenced, and can even be reversed when the studies fulfil (multiple) characteristics that have a significant influence. The cost effects are strongly influenced by analysing the years after 2000. While the profit effects are strongly influenced by analysing mergers and acquisitions in the USA. The stock price effects are strongly influenced by analysing the public services sector and focussing on targets.

The meta-analysis results show that is it of great importance to consider the characteristics of studies on the effects of mergers and acquisitions, as they influence the outcome.

# Contents

# 1 Introduction and motivation

Mergers and acquisition is a topic that receives a great deal of attention, in economic literature and research as well as in the public news. This attention can for a large part be explained by the often large and irreversible impact mergers and acquisitions have on: the involved firms, their employees, customers, suppliers, competitors, and in some cases the market as a whole. This attention again draws the interest of governments and researchers. Consequently there have been many studies on the different effects of mergers and acquisitions.

However, the vast numbers of academic studies have produced a wide variety of different results. These results are often conflicting in their outcome and the conclusions often point in different directions. Little analysis has been performed on the reasons for these different outcomes. The question remains unanswered as to why some studies find positive effects, while others find negative or no significant effects. This is uncomfortable, as it is now unclear what the main message of the literature is for the effects of mergers and acquisitions in general.

The aim of this thesis is to analyse the general effect of mergers and acquisitions on the performance of firms, and to analyse if the characteristics of the studies influence the results of these studies. The analysis is performed using a meta-analysis. Meta-analysis can (in short) be described as the statistical analysis of a collection of literature. To our knowledge this thesis forms the first meta-analysis of studies on the effects of mergers and acquisitions.

One can distinguish various areas on which mergers and acquisitions have effects. This thesis will analyse results of studies that analyse the effects of mergers and acquisitions on costs, profits and stock prices. This to find which factors significantly influence the results these studies find. These three specific ‘effect areas’ are chosen because they are analysed most often. The reason that multiple effect areas are analysed is to find if there are characteristics of the studies that influence the results in a specific way, irrespective of which effect is analysed.

**Construction**

This thesis is constructed as follows. The first chapter introduces the research question and setup of this work. The second chapter discusses the current literature on mergers and acquisitions. It addresses economic theory and motivation for mergers and acquisitions and links with the effects that mergers and acquisitions can have. Current conclusions of the research on merger and acquisition effects are also discussed. The third chapter describes the research method that is used and the variables that are used. The fourth, fifth and sixth

chapters present the results that are found on respectively costs, profits and stock prices. The general conclusion is presented in the seventh Chapter, which also presents possible issues for future research.

The appendix presents an overview of the studies that have been evaluated, some additional tables and the reference list.

# 2 Literature on Mergers and Acquisitions

A great deal has been written about mergers and acquisitions in the economic literature. This Chapter will address this literature. The first part goes into the basic economic literature and what it says about mergers and acquisitions and their effects. The second part discusses possible reasons for mergers and acquisitions, and the associated principal effects. In the third part, trends in mergers and acquisitions will be addressed shortly. The final part will go into the results of research on the effects of mergers and acquisitions. Mergers and acquisitions have effects in many different areas however the focus of this work is on the cost, profit, and share price effects. Other effects will be mentioned when it is relevant.

## 2.1 Economic Theory

This section aims to provide insight into the explanation for the possible effects of mergers and acquisitions. Basic economic theory discusses mergers and acquisitions and their possible effects. If two firms merge in a Cournot model with three firms, the theory concludes that a two firm market remains. In the new market the output and profit of the newly merged firm is lower than the aggregate of the two pre-merger firms, on the other hand the non-merged firm will increase output and profit. [1] The fact that this theory predicts mergers to be disadvantageous for the merging firms, while mergers occur regularly in the real economy is referred to as 'the merger paradox'. Crucial to the disadvantageous outcome is that the model views the merged firm as identical to the non-merged firms (all having identical costs).

However basic economic theory also indicates that when (in line with reality) the assumption of identical post-merger firms is dropped, the outcome changes. Due to its increased size the merged firm can become a Stackelberg leader and consequently receive larger profits. This outcome resolves the merger paradox, as the increased profits in this model justify mergers. When there are many firms in the market, the merger could be followed by other firms leading to a group of merged Stackelberg leaders. This possibly induces a merger wave.[2]

[1] This can be found in basic economic literature, for instance L. Pepall, D.J. Richards, G. Norman, 2005, Industrial Organization, Contemporary theory and practice, *Thomson*, 2005, pp. 358-391.
[2] L. Pepall, D.J. Richards, G. Norman, 2005, Industrial Organization, Contemporary theory and practice, *Thomson*, 2005, pp. 394-401.

Alternatively, mergers could lead to cost reductions for the merged firms. When variable costs are reduced by the merger, then mergers can be profitable if the cost gains due to a merger between a high-cost firm and a low-cost firm are large enough.[3] This because production is shitted to the low-cost firm.

When a model is used that allows for product differentiation, as is the case in the Bertrand model, competition is not on quantity but on price. Mergers can be profitable when the two merged firms offer differentiated products for which they coordinate prices.[4]

Huck et al. introduce a different theory why mergers can be profitable, even without cost advantages.[5] They state that the newly merged firm should not be seen as a single new firm, but as a combination of the two old separate firms (in the newly merged firms seen as affiliates) lead by a joint headquarters. A crucial element is that, within the merged firm information flows more quickly and freely. The market becomes a sort of hybrid market, where inside the merged firm one of the new affiliates becomes similar to a Stackelberg leader and the other affiliate the Stackelberg follower. The merged firm's competitors, however, behave as Cournot firms. First the leader chooses its output, which is observed by the follower, then the follower and the other firms choose their output. The outputs are only observed at the end of the second stage. The results of solving this model show a profitable merger and an improvement of welfare,[6] while reducing the profits of the competitors.[7]

## 2.2 Merger Reasons

This section addresses reasons for mergers and acquisitions, as the effects of mergers and acquisitions can be greatly influenced by the underlying motivations. Mergers and acquisitions are generally motivated by decreasing costs and/or by increasing profits.[8] In the literature various mechanisms for firms to decrease costs, or increase profits through mergers and acquisitions are given. The main mechanisms put forward are: more synergy and expanding market power.

[3] L. Pepall, D.J. Richards, G. Norman, 2005, Industrial Organization, Contemporary theory and practice, *Thomson*, 2005, pp. 387-394. The author explains that the production will be shifted to the firm with lower variable costs.
[4] L. Pepall, D.J. Richards, G. Norman, 2005, Industrial Organization, Contemporary theory and practice, *Thomson*, 2005, pp. 391-403.
[5] S. Huck, K.A. Konradz and W. Müller, 2003, Profitable Horizontal Mergers without Cost Advantages: The Role of Internal Organization, Information and Market Structure, *Economica*, 2004, No. 71, pp. 575–587.
[6] They define social welfare as: the sum of consumer and producer rents, which is a monotonic function of the total equilibrium quantity.
[7] S. Huck, K.A. Konradz and W. Müller, 2003, Profitable Horizontal Mergers without Cost Advantages: The Role of Internal Organization, Information and Market Structure, *Economica*, 2004, No. 71, pp. 575–587. The conclusion follows from solving their model, in case of a market with al least four firms. They call it a market with 'partial Stackelberg leadership'.
[8] This is stated separately, as reducing cost is regularly stated as an individual merger reason, even though decreasing costs in effect aims to increase profits.

Additional main merger reasons given in the literature are market discipline and managerial hubris.[9] The associated effects are discussed. However the effects have much interaction, as lowering costs should lead to an increase in profits, what again should have a positive effect on stock prices. To avoid repeating this process and to maintain the overview, only the principal effects will be addressed here.

Synergy related mergers and acquisitions are based on efficiency improvement, often involving improving economies of scale. When these mergers are successful, they should primary have cost improving effects.

Mergers that are 'motivated' by expanding market power could have a profit increasing effect when the increased market power is used to increase prices. However due to the increasingly tight completion legislation this phenomenon should have diminished over the years.

Market discipline related mergers and acquisitions are related to take-overs of inefficient firms or firms with incompetent management. This should have cost and/or profit enhancing effects.

Mergers 'motivated' by managerial hubris are the result of self serving actions of the acquirer's management to over-expand their firms, as well as from other agency costs. It is sometimes referred to as 'empire building'. This would likely result in a decrease of performance on all fields, however this 'merger reason' and its effects are more difficult to recognize as this motivation is not made public.

Another 'motivation' that is put forward is increasing research and development. This incentive is based on the Schumpeter hypothesis. This hypothesis states that firm size or market power is a factor that positively influences technological progress. The effects of increased research and development are more multi-directional, this as research and development can have varying goals. For instance: improving the production process and thus reducing costs[10], developing new products and thus increasing profits, or maintaining market share and revenue.

Mergers and acquisitions as an alternative to investments is another reason. In this case firms choose to acquire or merge with another firm in order to obtain certain products, technologies or markets rather than obtaining them through organic growth. The effects can vary with the objectives.

Financial markets will assess the merger and acquisition activity, and the positive or negative evaluation should be visible in the stock prices.[11] Furthermore

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[9] G. Andrade; M. Mitchell and E. Stafford, 2001, New Evidence and Perspectives on Mergers, *The Journal of Economic Perspectives*, 2001, Vol. 15, No. 2, pp. 103-120. With concern to the three year stock market effect the equal weight result has been included in the dataset. Here all firms in the sample have an equal weighing in the calculation.

[10] Even though cost reductions will lead to increased profits, the primary goal is cost reduction.

[11] K. Ikeda and N. Doi, 1983, The Performances of Merging Firms in Japanese Manufacturing Industry: 1964-75, *The Journal of Industrial Economics*, 1983, Vol. 31, No. 3, pp. 257-266. and G. Andrade and E. Stafford, 2000, Investigating the economic role of mergers, *Journal of Corporate Finance*, 2000, Vol. 10, pp. 1 – 36.

there is a merger reason that is not accepted by all financial economists, this is financial synergy. This synergy is based on a reduction of the cost of capital, attributable to increased firm size. However this theory is not generally accepted based on the theory of fully arbitraged financial markets. However this discussion falls outside the reach of this thesis.[12]

There are thus numerous reasons for mergers and acquisitions, the underlying reasons will have effects on the different effect areas that are analysed. The term 'effect-area' is used to describe the area which is affected by a merger or acquisition.

## 2.3 Merger trends & Waves

This section discusses certain patterns that can be observed within the occurrence of mergers and acquisition. First it appears that over time there are changing trends in the motivations for mergers and acquisitions. Gaining market power has become more difficult since the 1940's, due to the introduction and enforcement of antitrust laws.[13] This motivation has thus become a less likely driving force, but as a motivation it cannot be completely eliminated. Anti-trust and competition laws are also not completely preventing anti-competitive coordination of prices as illustrated by recent and regular discoveries of price-fixing agreements and market distributions by competitors.[14]

In the 1960's mergers seemed mainly driven by diversification, where firms wanted to benefit from growth perspectives in other markets. While in the 1980's the driving forces seemed to be divestitures and market discipline. The 1980's are notorious for hostile takeovers, though figures show that only 14% of take-overs were hostile. Research has shown that since the 1990's mergers appear to be highly driven by deregulation, as almost half of the merger activity can be attributed to deregulation. Furthermore, there was a strong increase in cross border deals, as competition increased due to globalisation.[15]

Contrasting the diversification trend of the 1960's, firms in recent years appear to focus on their 'core business'.[16]

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[12] See for more discussion: S. Chatterjee, 1986, Types of Synergy and Economic Value: The Impact of Acquisitions on Merging and Rival Firms, *Strategic Management Journal*, 1986, Vol. 7, No. 2, pp. 119-139.

[13] D.F. Broder, Julian Maitland-Walker, 2005, *A Guide to US antitrust law*, Thomson, Sweet and Maxwell, London, 2005, from p. 31.

[14] See for instance the recent discoveries on: www.antitrustreview.com

[15] G. Andrade; M. Mitchell and E. Stafford, 2001, New Evidence and Perspectives on Mergers, *The Journal of Economic Perspectives*, 2001, Vol. 15, No. 2, pp. 103-120; and M. Martynova and L. Renneboog, 2008, A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance,* 2008, no. 32, pp. 2148–2177.

[16] See for instance: R.G. Matthews, 2007, Why Firms Are Returning to Their Roots, *Wall Street Journal - Eastern Edition* 10/22/2007, Vol. 250 Issue 95, pA2.

Another phenomenon that gets a large amount of attention is that mergers and acquisitions appear to occur in waves, and that within these waves there is strong clustering by industry. Research has shown the effects of mergers and acquisitions to differ within the waves itself. A number of merger waves have been identified, they occurred in the early 1900's, the 1920's, 1960's, 1980's, and the 1990's. A recently accumulating merger wave appears to have been cut short by the sudden and sharp turmoil in financial markets.[17]

The following picture[18] illustrates these merger waves.

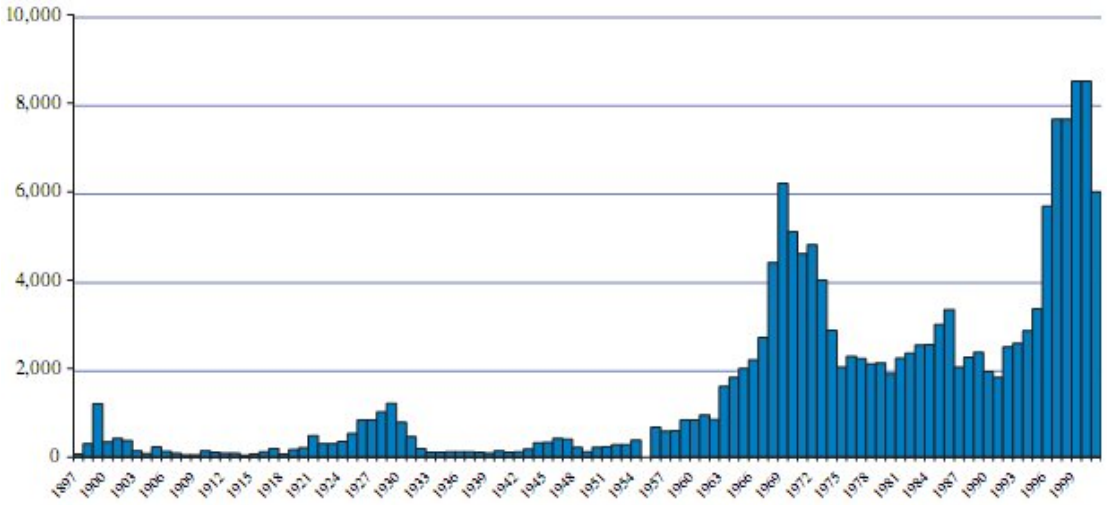


Fig. 1. US merger waves since 1897 (total number of deals) Source: 1897–1904 from Gaughan (1999); 1904–1954 from Nelson (1959); 1955–1962 from *Historical Statistics of the US-Colonial Times to 1970*; 1963–1997 from *Mergerstat Review*, 1998–2002 from *Value Creators Report*.

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Early studies on the occurrence of merger waves have found these waves to be driven by economic, regulatory and technological shocks. While the main triggers of the merger waves differ between the waves.[19] Later studies have found that despite of the varying triggers several other common factors can be identified that facilitate merger waves. Merger waves tend to take place in periods of economic recovery after serious economic crises. The waves take place in time with a rapid expansion of credit, caused by growing external capital markets and stock market booms. Later on in a merger wave, mergers and acquisitions appear also to be driven by managerial herding and hubris. Where mergers and acquisitions that take place in the last part of a merger wave, show poorer results. The merger waves are typically ended by a steep decline in stock markets and an economic

[17] Martynova and L. Renneboog, 2008, A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance,* 2008, no. 32, pp. 2148–2177.
[18] M. Martynova and L. Renneboog, 2008, A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance,* 2008, no. 32, p. 2150.
[19] M. Mitchell and J.H.Mulherin, 1996. The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics*. 1996, no. 41, pp. 193–229. and J. Harford, 2003, Efficient and Distortional Components to Industry Merger Waves, *Not published,* University of Washington AFA 2004 San Diego Meetings.

recession. Researchers expect that the heterogeneity in the forces driving the mergers may explain the varying patterns and profitability.[20]

## 2.4 Research Results

This section gives an overview of results that have been found by studies that analyse the effects of mergers and acquisitions. Abstracts of the results found by the studies in the dataset, which is used for the meta-analysis, can be found in the data section of the appendix. The following gives a general overview of the results found by these studies.

As is mentioned in the introduction, the results of the studies on the effects of mergers and acquisitions point in opposite directions.

Of the studies that analyse the cost effects of mergers and acquisitions some find no significant effects, such as Balance et al. and Focarelli et al. who respectively analyse the public utilities and the banking sectors.[21] Avkiran and Engberg et al. who respectively analyse the cost effects in the banking and public utilities sectors, find considerable but insignificant cost increases.[22] While another study of Kwoka and Pollitt on the public utilities sector finds that, pre-merger the target firms are the out-performing firms while the acquiring firms are underperforming. However post-merger the out-performance of the target firm declines, and the initial merger-induced rise in performance of the acquiring firm over time turns into a drop in performance.[23]

On the other hand there are other studies that find mergers and acquisitions to improve cost-performance. Ashton et al., Koetter, and Lichtenberg et al., among others, find positive effects of mergers and acquisitions on costs.[24] They analyse

[20] M. Martynova and L. Renneboog, 2008, A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance,* 2008, no 32, pp. 2148–2177. and J. Harford, 2003, Efficient and Distortional Components to Industry Merger Waves, *Not published,* University of Washington AFA 2004 San Diego Meetings.

[21] A.J. Balance, S. Reid and D. Saal, Investigation into evidence for economies of scale in the water and sewerage industry in England and Wales, *Not published,* acquired from Stone and Webster Consultants. and D. Focarelli, F. Panetta, C. Salleo, 2002, Why Do Banks Merge?, *Journal of Money*, *Credit & Banking,* 2002, Vol. 34, Issue 4, pp. 1047-1066.

[22] N.K. Avkiran, 1998, The evidence on efficiency gains: The role of mergers and the benefits to the public, *Journal of Banking & Finance,* 1999, Vol. 23, No. 7, pp. 991-1013. and J. Engberg, D. Wholey, R. Feldman, and J.B. Christianson, The effect of mergers on firms' costs: evidence from the HMO industry, *The Quarterly Review of Economics and Finance*, 2004, No. 44, pp. 574–600. The notation et al. is used to improve readability.

[23] J. Kwoka and M. Pollitt, 2007, Industry Restructuring, Mergers, and Efficiency: Evidence from Electric Power, *Not published,* Cambridge University working paper, CWPE 0725& EPRG 0708.

[24] J. Ashton and K. Pham, 2007, Efficiency and Price Effects of Horizontal Bank Mergers, *Not published,* ESRC Centre for Competition Policy, University of East Anglia, CCP Working Paper 07-9. and M. Koetter, 2005, Evaluating the German Bank Merger Wave, *Not published,* Tjalling C. Koopmans Research Institute, Utrecht School of Economics, Discussion Paper Series 05-16. and F. R. Lichtenberg and M. Rim, 1989, The effects of mergers on prices, costs, and capacity utilization in the US air transportation industry 1970-1984, *Not published,* The J. Levy Economics Institute, WP No. 32.

the financial and public utilities sectors. The results that are found in the current literature on the cost effects of mergers and acquisitions are thus inconclusive. The cost-effect section of this meta-analysis aims to offer explanation for these disagreeing results.

The studies on the profit effects of mergers and acquisitions also find diverse results, however most studies find insignificant or positive results. The study of Cosh et al. analyses mergers and acquisitions in all sectors expect the finance sector, and finds negative but insignificant changes in profitability.[25] Focarelli et al. also find negative but insignificant effects, but then for the banking sector. Houston et al. analyse the financial industry and also fail to find significant effects.[26] Altunbas et al. as well as Andrade et al. do find positive effects of mergers and acquisitions in respectively the finance, and the mining and manufacturing industries.[27] The meta-analysis on the profit effects aims to provide clarification for these inconclusive results.

Results on the stock price effects are also mixed. Insignificant effects are also found by Chatterjee and by Kane who respectively analyse all industries and the finance sector.[28] Hereby should be noted that Chatterjee does cautiously conclude that horizontal mergers outperform non-horizontal mergers. Negative results are found by Christian et al. and by Agrawal et al. who respectively analyse the mining and manufacturing sector and all sectors.[29] On the other hand positive results are found by Banerjee et al. and by Andrade et al., who analyse the same sectors as the previous authors.[30] There seems to be a consensus in the results on the stock price effects of mergers and acquisitions, which is that the

[25] A. Cosh, A. Hughes, 1995, Failures, acquisitions and post-merger success: the comparative financial characteristics of large and small companies, *not published*, *acquired from ESCR-Center for business research*. The et al. notation is used to improve readability.

[26] J. F. Houston, C. M. James, and M. D. Ryngaert, 2001, Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders, *Journal of Financial Economics,* 2001, No. 60, Issues 2-3, pp. 285-331.

[27] Y. Altunbas, P. Molyneux and J. Thornton, 1996, Big-Bank Mergers in Europe: An Analysis of the Cost Implications, *Economica,* 1997, Vol. 64, pp. 317-329. G. Andrade; M. Mitchell and E. Stafford, 2001, New Evidence and Perspectives on Mergers, *The Journal of Economic Perspectives*, 2001, Vol. 15, No. 2, pp. 103-120.

[28] S. Chatterjee, 1986, Types of Synergy and Economic Value: The Impact of Acquisitions on Merging and Rival Firms, *Strategic Management Journal*, 1986, Vol. 7, No. 2, pp. 119-139. E.J. Kane, 2000, Incentives for Banking Mega mergers: What Motives Might Regulators Infer from Event- Study Evidence?, *Journal of Money, Credit and Banking*, 2000, Vol. 32, No. 3, Part 2: (August), pp. 671-701.

[29] C. Christian and J.P. Jones, 2004, The Value-Relevance of Earnings and Operating Cash Flows During Mergers, *Managerial Finance, 2004,* Vol. 30, No. 11, pp. 16-29. A. Agrawal, J.F. Jaffe and G.N. Mandelker, 1992, The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly**,** *The Journal of Finance*, 1992, Vol. 47, No. 4, pp. 1605-1621.

[30] G. Andrade and E. Stafford, 2000, Investigating the economic role of mergers, *Journal of Corporate Finance*, 2000, Vol. 10, pp. 1 – 36. A. Banerjee and E.W. Eckard, 1998, Are Mega-Mergers Anticompetitive? Evidence from the First Great Merger Wave, *The RAND Journal of Economics*, 1998, Vol. 29, No. 4, pp. 803-827.

stock prices of targets outperform those of the acquirer.[31] The meta-analysis of the stock price effects aims to explain the conflicting results.

**Explanation for conflicting results**

The literature also produces motivations for some of the conflicting results. The analysis of Fridolfsson and Stennek finds that defensive mergers can explain reduced profits and increased share prices.[32] That is, if it is better for firms to be a 'merger insider' than an 'outsider'. This can drive up share prices of unprofitable mergers. They thus conclude that the common practice of controlling for external shocks by measuring performance relative to the firms' peers might produce biased results.

The study of Chatterjee relates to this issue by evaluating the effects of mergers and acquisitions on rival firms.[33] His model builds on mergers and acquisitions motivated by efficiency improvement, hereby should be noted that he excludes collusion effects. The post-merger improvement in efficiency lets the merged firm produce at lower costs allowing lower product prices and requiring less factor inputs, thus raising factor prices. Competitors now face lower sale price and higher prices of inputs, negatively influencing their performance and possibly forcing them to merge or acquirer themselves. The expectation of these 'follow-up' mergers and acquisitions can drive up their stock prices. Stock prices could thus not only be driven up for the merging firms, but also for competitors.

There are also studies that analyse if there is a difference between small and large take-over deals. The study of Kane analyses the banking sector and finds larger share price increases for larger banks.[34] He relates this occurrence to a lower investment risk for banks that are so large that they are too-big-to-fail. This is a very hot topic in the current credit crisis, so it is likely that much research on this topic will be produced in the time to come.

Gugler et al. analyse if there is a difference between the effects of domestic and cross border mergers and acquisitions. He however does not find a considerable difference between them.[35]

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[31] B.E. Eckbo, 1985, Mergers and the Market Concentration Doctrine: Evidence from the Capital Market, *The Journal of Business*, 1985, Vol. 58, No. 3. (Jul), pp. 325-349. S.N. Kaplan, and M.S. Weisbash, 1992, The Success of Acquisitions: Evidence from Divestitures, *The Journal of Finance*, 1992, Vol. 47, No. 1, pp. 107-138.

[32] S.O. Fridolfsson and J. Stennek, 2005, Why mergers reduce profits and raise share prices—a theory of pre-emptive mergers, *Journal of the European Economic Association,* 2005, Vol. 3, No. 5, pp. 1083–1104.

[33] S. Chatterjee, 1986, Types of Synergy and Economic Value: The Impact of Acquisitions on Merging and Rival Firms, *Strategic Management Journal*, 1986, Vol. 7, No. 2, pp. 119-139.

[34] E.J. Kane, 2000, Incentives for Banking Mega mergers: What Motives Might Regulators Infer from Event- Study Evidence?, *Journal of Money, Credit and Banking*, 2000, Vol. 32, No. 3, Part 2: (August), pp. 671-701.

[35] K. Gugler, D.C. Mueller, B.B. Yurtoglu, and C. Zulehner, 2003, The effects of mergers: an international comparison, *International Journal of Industrial Organization,* 2003, No. 21, pp. 625–653. The study analyses various effect areas.

**Other characteristics**

There are also studies that compare the effects of mergers and acquisitions with characteristics that have not yet been mentioned. The different characteristics that are discussed here could not be included as variables in the meta-analysis. This is because there were too few studies making these differentiations, often only one or two. For instance, a study that evaluates if there are different effects for the different manners of financing a deal. This section will discuss some of these other differences analysed by studies on the effects of mergers and acquisitions. It will go too far for this thesis to go deeply into these differentiations. Therefore they are discussed briefly to present the results and to inform the reader of the existence of these results.

There is a study in the data sample that distinguishes between the effects of mergers and the effects of acquisitions, and analyses the differences in their effects. This is the study of Focarelli, Panetta and Salleo on the Italian banking sector.[36] They find no significant differences in effects of mergers and of acquisitions.

Asquith, Bruner and Mullins analyse possible differences as a consequence of different forms of deal-financing.[37] They find significantly higher stock returns following the merger announcement for cash financed deals compared to stock financed deals. They related this difference to the information that the form of financing gives to investors about the investment value (quality) of the merger.

The study of Harford analyses if there is a difference in stock price returns for mergers that take place inside or outside of merger waves.[38] He finds higher returns for mergers and acquisitions inside of a merger wave. Where deals that take place early in a wave receive higher returns and late deals a lower return. He addresses this phenomenon to late deals being motivated by managerial herding.

**Related research**

The following studies present other research related to the effects of mergers and acquisitions. A study by Kaplan and Weisbach analyses divestures of business units previously obtained by mergers and acquisitions.[39] They find that (in contrary to appearance) there is no indication that these deals are failures, as they find that on the majority of these divestitures no losses or a gain was reported.

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[36] D. Focarelli, F. Panetta, C. Salleo, 2002, Why Do Banks Merge?, *Journal of Money*, *Credit & Banking,* 2002, Vol. 34, Issue 4, pp. 1047-1066. They do find that mergers and acquisitions are apparently driven by different motives.

[37] P. Asquith, R.F. Bruner and D.W. Mullins jr., 1990, Merger Returns and the Form of Financing, *Not published,* University of Virginia, WP. No. 3203-90-EFA.

[38] J. Harford, 2003, Efficient and Distortional Components to Industry Merger Waves, *Not published,* University of Washington AFA 2004 San Diego Meetings.

[39] S.N. Kaplan, and M.S. Weisbash, 1992, The Success of Acquisitions: Evidence from Divestitures, *The Journal of Finance*, 1992, Vol. 47, No. 1, pp. 107-138.

Based on their research on both stock prices and profitability, Andrade and Stafford conclude that mergers fulfil a double economic role.[40] It is an alternative to internal investments, facilitating growth. On the other hand it is also a means of industry contraction in lesser economic times. In the latter case they find the acquirers to be better performers, suggesting improvements of industry efficiency.

The Banerjee and Stafford study on the merger wave in the early 1900, regularly seen as mainly driven by forming anti-competitive trusts, finds evidence that these mergers were not motivated by gaining monopoly power, but by increasing efficiency.[41]

## 2.5 Conclusion on literature

The results that are found on the effects of mergers and acquisitions indicate that there is no clear conclusion in the current literature on the cost, profit and stock price effects of mergers and acquisitions. Research has shown that the motivations for mergers and acquisitions appear in trends that vary over time. Aside of the changing motivations several constant driving forces have been identified in case of merger waves. The literature also shows that the reasons that motivate mergers or acquisitions can influence the effects. These motivations can also offer some explanation for the conflicting results that are found on the effects of mergers and acquisitions.

This thesis aims to contribute to the literature on mergers and acquisitions by using a meta-analysis to analyse the results of a balanced sample of studies on mergers and acquisitions, and to analyse whether the variation in their results can be explained based on characteristics of the studies.

[40] G. Andrade and E. Stafford, 2000, Investigating the economic role of mergers, *Journal of Corporate Finance*, 2000, Vol. 10, pp. 1 – 36.
[41] A. Banerjee and E.W. Eckard, 1998, Are Mega-Mergers Anticompetitive? Evidence from the First Great Merger Wave, *The RAND Journal of Economics*, 1998, Vol. 29, No. 4, pp. 803-827.

# 3 Research Method: Meta-Analysis

To analyse and understand the effects of mergers and acquisitions and to find an explanation for the great variance in the results found in the literature, a meta-analysis is performed. This research method is still not very common in economics. The following section therefore offers a description of this research method. The second part of this chapter discusses the regression model that is used. The third and fourth parts describe the variables that are used.

## 3.1 Meta-Analysis

Meta-analysis is a research method used to compare and summarize the results of multiple studies. It is a regression method that makes it possible to analyse what the general effect is according to the literature and which factors cause the differences in the outcomes. It has been described as 'analysis of analysis'.[42] Meta-analysis makes it possible to transform the results of multiple studies into one overall result. That also has a smaller degree of uncertainty, as it has a smaller probability of type II errors, meaning that the null hypothesis (of no influence of the variable) is incorrectly accepted.[43]

Meta-analysis was first mainly used in medical studies, psychology, and environmental economics. Florax gives an overview of around 40 meta-analysis performed between 1980 and 2001, mainly on pollution and recreation and land use.[44] Since the 1990's meta-analysis has also been used in labour economics,[45] industrial economics,[46] and general economics.[47] To the best of our knowledge, this thesis constitutes the first ever meta-analysis on the effects of mergers and acquisitions.

[42] G. V. Glass, (1976), Primary, secondary, and meta-analysis of research, *Educational Researcher*, 1976, No. 5, pp. 3-8.
[43] L.J.Th. van Kamp, and T.A.B. Snijders, 1997, Meta-analysis (in Dutch), special Issue, *Tijdschrift voor Onderwijsresearch,* 1997, No 22, p. 3.
[44] R.J.G.M. Florax, 1992, Accounting for dependence among study results in Meta-Analysis: methodology and applications to the valuation and use of natural resources, *not published*, Vrij Universiteit van Amsterdam, Serie research memoranda, 2002-5.
[45] D. Card and A.B. Krueger, 1995, Time-series minimum-wage studies: A meta-analysis, *American Economic Review*, 1995, vol. 85, pp. 238-243.
[46] S.B. Jarrell and T.D. Stanley, 1990, A meta-analysis of the union-nonunion wage gap, *Industrial and Labor Relations Review*, 1990, vol. 44, pp. 54-67.
[47] T.D. Stanley, 1998, New wine in old bottles: A meta-analysis of Ricardian equivalence, *Southern Economic Journal*, 1998, vol. 64, pp. 713-727.

**Application**

In a meta-analysis multiple characteristics are taken from the studies that it analyses. These characteristics are used as the meta-independent variables in the meta-analysis. These meta-independent variables are regressed against the effect-sizes found by the studies in the dataset. These effect-sizes are the dependent meta-variable.[48] In this way meta-analysis makes it possible to compare the influence of factors that in general are relatively constant within a study.[49]

**Objectivity**

A meta-analysis is considered to be more objective than a traditional literature review, because the analysis and interpretation of the results is based on quantitative analysis. However there still remains a level of subjectivity. Nonetheless in the area's where subjective judgement is used this is done in a more formalized approach. For instance the rules for inclusion or exclusion of studies in the datasets are made explicit and discussed in detail in the data section. Stanley and Jarrell write: "Since the factors which produce the variation in empirical results are modelled and tested, subjective judgment about the importance or interpretation of various parts of the literature can be minimized".[50]

**Publication bias**

Since meta-analysis is a method to aggregate the results of previous studies it is important which studies are included in the dataset of the meta-analysis. A main element in this is a possible publication bias. The 1992 study of De Long and Lang has lead economists to the realisation that there may exist a tendency among editors of academic journals to publish studies that reject their null hypothesis more often.[51] Thus studies that find statistically significant results would have a higher chance of being published. It is also possible that papers remain unpublished as a result of what can be called self-censuring by its authors. Consequently, if only published studies are included in a meta-analysis, the risk exists that the sample of studies is biased and that valuable information on the influence of certain characteristics could be omitted. For this reason it is vital to include published as well as unpublished studies into the dataset. For this meta-analysis a selection of studies made by Professor Elbert Dijkgraaf of the

[48] The terminology meta independent-variable and meta-dependent variable are taker from the terminology used by T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, pp. 299-308. This is one of the main articles that introduced meta-analysis in economics.

[49] T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, pp. 299-308.

[50] T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, p. 305.

[51] B.J. De Long and K. Lang, 1992, "Are All Economic Hypotheses False?", *Journal of Political Economy*, Vol. 100, No. 6, pp. 1257-1272.

Tinbergen institute of the Erasmus University is used. It includes both published and unpublished studies, and entitles over 100 studies, with over 2500 pages. A selection had to be made on the studies in this 'initial dataset'. The data section in the appendix discusses the studies that were analysed for this meta-analysis in more detail, and gives the relevant reasons for inclusion or exclusion in the dataset. Only studies that empirically analyse comparable effects of mergers and acquisitions, and who present quantifiable results can be included.

The main reasons for not including the studies in the database are: that these studies do not perform their own empirical research; that they do not present quantifiable results; that they do not analyse the effects but other aspects of mergers and acquisitions. After the selection 25 studies, with 55 observations are included in the dataset. Due to the large number of studies on the effect of mergers and acquisition, there will without doubt be studies that are not included in the dataset. However the dataset is composed of a wide variety of studies from different countries and time periods. This in an effort to form a good representation of the population of studies on the effects of mergers and acquisitions.

The following table states the studies that are included in the database.

| Author(s) | Year | Title |
|---|---|---|
| A. Agrawal, J.F Jaffe and G.N.Mandelker | 1992 | The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly |
| Y. Altunbas and D.M. Ibanez | 2004 | Mergers and acquisitions and bank performance in Europe |
| G. Andrade, M. Mitchell and E. Stafford | 2001 | New Evidence and Perspectives on Mergers |
| J. Ashton and K. Pham | 2007 | Efficiency and Price Effects of Horizontal Bank Mergers |
| P. Asquith, R.F. Bruner and D.W. Mullins | 1990 | Merger Returns and the Form of Financing |
| N.K. Avkiran | 1997 | The evidence of efficiency gains: The role of mergers and the benefits to the public |
| A. Ballance, S. Reid and D. Saal | 2004 | Investigation into evidence for economies of scale in the water and sewerage industry in England and Wales |
| A. Banerjee and E.W. Eckard | 1998 | Are mega-mergers anticompetitive? Evidence from first great merger wave |
| S. Chatterjee | 1986 | Types of Synergy and Economic Value: The impact of Acquisitions on Merging and Rival Firms |
| C. Christian and J.P. Jones | 2004 | The Value - Relevance of Earnings and Operating Cash Flows During Mergers |
| A. Cosh and A. Hughes | 1995 | Failures, acquisitions and post-merger success: the comparative financial characteristics of large and small companies |

| | | |
|---|---|---|
| J. Cubbin and G. Hall | 1979 | The use of real cost as an efficiency measure: an application to merging firms |
| B.E. Eckbo | 1986 | Mergers and the Market Concentration Doctrine Evidence from Capital Market |
| J. Engberg, D. Wholey, R. Feldman and J. B. Christianson | 2003 | The effect of mergers on firms' costs: evidence from the HMO industry |
| D. Focarelli, F. Panetta and C. Salleo | 2002 | Why do banks merge? |
| J. Harford | 2003 | Efficient and Distortional Components to Industry Merger Waves |
| J. F. Houston, C. M. James and M. D. Ryngaert | 2001 | Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders |
| E.J. Kane | 2000 | Incentives for Banking Mega mergers: What Motives Might Regulators Infer from Event-Study Evidence? |
| S.N. Kaplan and M.S. Weisbash | 1992 | The Success of Acquisitions: Evidence from Divestitures |
| M. Koetter | 2005 | Evaluating the German Bank Merger Wave |
| J. Kwoka and M. Pollitt | 2007 | Industry restructuring, mergers, and efficiency: Evidence from Electric power |
| B. Lev and G. Mandelker | 1972 | The Microeconomic Consequences of Corporate Mergers |
| F. R. Lichtenberg and M. Kim | 1989 | The effects of mergers on prices, costs, and capacity utilization in the US air transportation industry |
| N. Sung and M. Gort | 2006 | Mergers, capital gains, and productivity: Evidence from U.S. telecommunications mergers |
| J.C. Wang | 2003 | Merger-Related Cost Savings in the Production of Bank Services |

## 3.2 Analysis Method

The following section discusses the regression method that is used to perform the meta-analyses.

### 3.2.1 Stepwise Regression Analysis

The meta-analysis on the effects of mergers and acquisitions is performed using a ‘forward Stepwise Least Squares regression’. This regression method iteratively adds the independent variables bases on the highest level of significance. The reason that this model is used instead of the regular OLS estimation method is the large number of independent variables. The large number of independent variables mainly is a consequence of using vectors of dummy variables. The methodology of the stepwise regression method diminishes degrees of freedom related troubles.

The model starts without independent variables and a list of independent variables that one wants to analyse. First it adds the variable from the list with the

lowest p-value, based on estimations of the model through the Ordinary Least Squares (OLS) method. Next it checks the list again and adds the variable with the lowest p-value. It then checks the added variables to verify that none exceeds a specified p-limit (the p-value stopping criterion), if so that variable is excluded. After that the next variable with the lowest p-value is included and the aforementioned process is repeated. The model adds variables until there are no more variables that fall within the set p-value limit (the p-value stopping criterion), or until a fixed number of independent variables is reached, or until all variables on the list are included. The p-value stopping criterion is initially set at 0.5, this because if it is set at 0.1 (thus excluding all insignificant variables) the process can excluded variables that are insignificant but that influence the significant variables. The model is also alternatively estimated with a p-value stopping criterion of 0.1. The results of this model and differences with the basic model are discussed in the 'alternative regression methods' section.

The Stepwise Lest Squares regression method also checks the variables that are included on multicollinearity and excludes collinear variables.[52]

**Regression model**

Just as in a regular OLS regression, quantitative data are required. It is thus required that the studies in the dataset present quantitative results. Only studies that present quantitative results are included in the dataset. This are the studies that present quantitative results of the positive or negative effects they find. The results should measure the effects in percentage change, based on an empirical analysis of the effects of mergers and acquisitions, and it should be indicated if the results are significant.

This meta-analysis uses the general meta-analysis model that was presented by Stanley and Jarrell, it has the following form:

$$Y_j = \beta_0 + \sum_{k=1}^{K} \beta_k Z_{jk} + e_j, \qquad j=1,2,\ldots N$$

Where $Y_j$ is the reported estimate of the $j^{th}$ study in the dataset from a total of N studies; $Z_{jk}$ are the meta-independent variables, representing the characteristics of the studies in the dataset, which aim to explain the variation in $Y_j$ ; $\beta_k$ is the meta-regression coefficient which indicates the effect of the associated study characteristic and $e_j$ is the meta-regression disturbance term. The meta-independent variables are discussed in the next section.[53]

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[52] Eviews 6.0 help-file, under 'Stepwise Least Squares Regression' viewed August 12, 2009.

[53] T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, p. 302. The terminology of meta-independent variables and dependent meta-variables comes from this work.

### 3.2.2 Points of Attention

In the literature on meta-analysis several points of attention are raised. This section addresses the issues that arise when a meta-analysis is conducted. One issue has already been mentioned, namely, that the dataset is a representative sample of the literature. This issue is discussed in the data section.

Another issue, which is related to the comparability of the effect-sizes, is discussed in the third section of this chapter that describes the variables.

**Independent observations**

A statistical assumption made is that the observations are independent. Since multiple observations are taken from many of the studies in the dataset, the observations are clearly not independent. Furthermore it is likely that different studies will analyse several of the same mergers and acquisitions. This goes especially for studies that analysis large numbers of mergers and acquisitions or over a long time period. This issue is addressed in the literature on meta-analysis.

Stanley indicates that the possible negative effects from a lack of independence is not greater in the case of meta-analysis than in the case of the primary literature, as the latter is also not a result of controlled experiments.[54] The possibility of interdependence remains. Florax, De Groot and De Mooij indicate that the possible effects are usually simply disregarded.[55] However it is possible that future research in the field of meta-analysis will appear on this subject. Since the current literature on meta-analysis indicates that this issue is not severe enough to demand extra attention, this work will not go deeper into this technical meta-analysis subject.

**Heteroscedastic**

Another issue in meta-analysis is that it is very likely that studies in the dataset use different datasets, different sample sizes and different independent variables. As a consequence it is likely to expect that the variances of these estimated coefficients are not equal, leading to heteroscedastic meta-regression errors. This does not pose considerable problems for meta-analysis as the OLS estimates of the meta-analysis coefficients will be unbiased and consistent in any case.[56]

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[54] T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, p. 304.

[55] R.J.G.M Florax, H.L.F. de Groot and R.A. de Mooij, 2002, Meta-analysis: A tool for upgrading inputs of macroeconomic policy models, *Not published,* Tinbergen Institute Discussion Paper, TI 2002-041/3, p. 9.

[56] T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, p. 304.

Based on the mentioned statements on these issues in the literature, the Stepwise Least Squares regression method can be used to perform the meta-analysis in this thesis.

### 3.2.3 The Model

To perform the meta-analysis, the values of the dependent meta-variables and meta-independent variables had to be extracted from the studies. The results and characteristics of the underlying studies are codified and inserted in the database in a quantitative format.

**Dependent meta-variable**

As previously discussed, mergers and acquisitions can have effects in different areas. The dataset contains studies analysing different effect areas of mergers and acquisitions. Consequently it is first classified on which effect areas the studies analyse the effects of mergers and acquisitions. Based on this classification three categories are distinguished in the effects of mergers and acquisitions. Namely effects on: costs, profits, and stock markets. Separate meta-analyses are done on the effects in these three areas.[57]

Furthermore, it should be noted that the majority of the studies analyse more than one different effect of mergers and acquisitions. As many as possible of these different analysed effects are included in the database as separate observations. For instance, in the case of a study that analyses both the cost effects and the stock market effects of mergers and acquisitions. In this case one observation on the results of the cost effects is included in the database as well as one observation on the stock market effects.

The studies were searched for the percentage change in the effect analysed by the study. The main result of the study is used, as indicated by the authors of the study in their research formulation and/or in the introduction and/or in the conclusion of the study. If multiple figures are given, the result is taken of which the authors of the study indicate that it is the best one.

This figure is labelled as the effect-size, this is the left hand side of the meta-regression analysis in case of the stepwise meta-analysis. The figure will be drawn directly from the results as presented in the studies, if not indicated otherwise for a specific study. In some studies the percentage change is not directly provided, in these cases the percentage change has been calculated. If this has been done, then this is indicated for that specific study.

[57] A vector of three dummy variables is included that have the value of '1' if the relevant effect area is researched and a value of 'NA' in other cases. This dummy variable is multiplied with the dependent variable. The product is consequently used in the analysis as it has an unchanged value for the effect area that is analysed, and a NA for the other effect areas. In this way the meta-analyses on the separate effect areas are only based on the observations on that effect.

**Meta-independent variables**

The characteristics, whose influence is analysed, have to be chosen. In their article, which is an important contribution to the introduction of meta-analysis in economics, Stanley and Jarrell suggest to analyse the influence of several characteristics. These include: the sample size, selected characteristics of the authors of the primary literature and measures of research or data quality.[58] Florax, De Groot and De Mooij also suggest including background variables such as: geographical location and the time period to which the study pertains.[59] Based on these suggestions, as well as those in the literature on mergers and acquisitions, the following model is formed.

**The Stepwise Least Squares meta-regression:**

$$EFFECT_j = \beta_0 + \beta_1 * REGION + \beta_2 * SECTOR + \beta_3 * CROSS\_BORDER + \beta_4 * TYPE + \beta_5 * BENCHMARK + \beta_6 * ACQUIRER + \beta_7 * QUALITY + \beta_8 * NO\_MERGERS + \beta_9 * TIME\_PERIOD + \beta_{10} * YEARS\_POST + \beta_{11} * THRESHOLD + \beta_{12} * LARGEDEALS + \beta_{13} * SIGNIFICANT + \beta_{14} * SIGNIFICANCE\_LEVEL + \varepsilon_j$$

With $j = 1,2,\ldots N$

The variables will later be discussed in more detail, at this point they will first be shortly addressed. Some of the variables are discrete variables, others are dummy variables, or a vector of dummy variables.

The dependent variable is the effect of mergers and acquisitions ($EFFECT_j$) found in the $j^{th}$ study in the dataset. The effects are separated into different effect areas, on which the analyses is done separately.

The independent variables are an intercept ($\beta_0$); a vector of dummy variables indicating the analysed geographical region (REGION); a vector of dummy variables indicating the industry sector the study analyses (SECTOR); a dummy variable indicating if the studies analyses only domestic mergers,[60] or domestic

[58] T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, pp. 302-303.
[59] R.J.G.M Florax, H.L.F. de Groot and R.A. de Mooij, 2002, Meta-analysis: A tool for upgrading inputs of macroeconomic policy models, *Not published, Tinbergen Institute Discussion Paper*, TI 2002-041/3, p. 6.
[60] In this part, aiming to improve readability, the term 'mergers' will be used for 'mergers and acquisitions'.

and cross border mergers (CROSS_BORDER); a vector of dummy variables indicating what type of mergers are analysed: horizontal, non-horizontal, or both types (TYPE); a dummy variable for the benchmark that is used (BENCHMARK); a vector of dummy variables indicating if the results are for: acquirers, targets, or both (ACQUIRER); a vector of dummy variables that are a proxy for the quality of the study (QUALITY); a discrete variable with the analysed number of mergers (NO MERGERS); a vector of dummy variables indicating the analysed time period (TIME PERIOD); a discrete variable indicating the length of the analysed post-merger time period (YEARS POST); a dummy variable indicating if the study uses a minimum threshold of any level for the mergers it analyses (THRESHOLD); a dummy variable indicating if a large threshold is used (LARGE DEALS); a dummy variable indicating if the study results are significant (SIGNIFICANT); and a vector of dummy variables indicating the level of significance of the study results (SIGNIFICANCE LEVEL); and finally an error term.

The following section discusses the properties of the dependent meta-variables and subsequently the meta-independent variables that have been included in the database, as well as variables that could not be included.

## 3.3 Properties of the Dependent Meta-Variables

**Effect area**

The effects of mergers and acquisitions can be analysed on many different effect areas. The results of the effects in different effect areas cannot be accumulated as they are incomparable. Consequently the studies are categorised based on the different effects they analyse. A parameter is included that indicates the different effects that are analysed. It distinguishes between analyses of the effects on: costs, profits, and stock prices.[61]

Obviously the results for a specific effect area need to be comparable. However not all studies that analyse the same effect analyse it in an identical way. The measurement methods used in the studies differentiated more and less between studies and effect classes. Florax, De Groot and De Mooij, indicate that this is a common problem in economics.[62]

Because a meta-analysis aggregates the results of the studies, it is important that the results of the studies are comparable. It is thus relevant that the studies that are analysed by a meta-analysis all analyse the same effect, and that they

[61] Initially the effects of mergers and acquisitions on revenues was set as a separate effect area. However it turned out that none of the studies included in the datasets evaluated the effects on revenues. Consequently this effect group has been dropped.

[62] R.J.G.M Florax, H.L.F. de Groot and R.A. de Mooij, 2002, Meta-analysis: A tool for upgrading inputs of macroeconomic policy models, *Not published, Tinbergen Institute Discussion Paper*, TI 2002-041/3, p. 9.

use measurement methods that produce comparable results. The following section consequently discusses the research methods that were used in the different effect areas.

Studies that analyse stock price effects practically all analyse 'abnormal stock returns'. Abnormal returns are defined as the percentage difference of the merging firm's stock performance with that of a benchmark. The differences that are observed are whether the studies use as benchmark: the stock market performance of peers, or the firm's own (normal) stock market performance. This benchmark variable is included as separate meta-independent variable.

The profits measures that are used vary between: return on equity, return on assets and the development of pre-tax profits. Even though these profitability measures formally are not equal and technically comparable, they will be taken together to be able to find a general result of the effect of mergers and acquisitions on profitability. To make the results better comparable, the percentage change has been taken as effect size.

The same applies for the measures of the effects on costs. Again different measures are used by the studies in the dataset. The measures differentiated from effects on operational costs to unit costs. Despite that these cost measures technically are not the same, they all represent the cost performance of firms. For the purpose of analysing the effects of mergers and acquisitions they fall into a comparable category. Furthermore the change as a result of mergers and acquisitions is again measured in percentages.

The following tables indicate the distribution of the studies over these effect groups.

Effect area distribution

| Effect area | Observation Count | Percent |
|---|---|---|
| STOCKPRICE | 31 | 56,36 |
| COST | 16 | 29,09 |
| PROFIT | 8 | 14,55 |
| Total | 55 | 100.00 |

This table show that in both datasets the largest part of the studies analyse effects on stock prices and on costs. This will lead to more accurate results of the meta-analyses on the effects of mergers and acquisitions in these effect areas. It also allows the stepwise regression model to include a larger maximum number of independent variables.

## 3.4 Properties of the Meta-Independent Variables

To analyse the differences in the outcomes of the studies on mergers and acquisitions, multiple characteristics of the studies have been distilled from the studies and included into the database for the meta-analysis. These characteristics of the studies are from a wide variety of elements of the studies to analyse their possible influence. They are used as the meta-independent variables and their properties will now be addressed, but first two remarks.

The majority of the studies analyses the effects of mergers and acquisitions in multiple effect areas, or analyses one effect area multiple times (for instance the stock market effect over different time periods). As a result various studies provide multiple observations to the dataset. However in some tables describing the variables every study in the dataset is included only once. This for the purpose of getting an overview of the number of studies that analyse a specific area. They are then labelled 'single count'.

For instance, a study on the USA that analyses the stock price and the cost effects of mergers and acquisitions. These multiple effects are included as multiple observations in the database. In a single count of the geographical area however, the study will be counted as one study on the USA. This to get a better overview of how many separate studies analyse the USA. Normally the observations are counted twice: one observation on stock price effects and one observation on cost effects.

A different example is a study that analyses the effects of mergers and acquisitions separately for acquirers and for targets. Since this study presents two separate results, they are included as two observations. So in an overview of how many studies analyse the different countries or sectors, this study is counted twice. However in a 'single count' of the studies that analyse these countries or sectors, this study is counted once. This gives an overview of how many individual studies analyse a certain country or sector, in contrast to the number of observations.

Secondly, several of the independent variables consist of a vector of dummy variables that consist of the different possible dummy-values of that variable. [63] In some cases however there are no observations on one of those dummy variables.

For instance, three different mergers types are distinguished,[64] but in the case of the meta-analysis on cost effects there are no studies that analyse 'only non-horizontal mergers'. As a consequence the dummy variable for non-horizontal mergers cannot be included in that regression. This is the case for a number of variables. As a result the dummy variable that is set as reference can differ. Therefore, the dummy-variable that is set as reference is specified per effect area

[63] Here the term dummy value is used to indicate the classification that the dummy variable can have. For instance USA is the dummy-value of the dummy variable that indicates the USA region.
[64] Horizontal mergers; non-horizontal mergers; and both horizontal and non-horizontal mergers.

analysis, were it is also indicated if there are dummy-variables that could not be included.

The meta-independent variables will now be discussed. The data in the first two variables had to be adjusted by grouping several of the variable's values, the motivation for this will be set forth.

### 3.4.1 Region

The first parameter captures the geographical market which is analysed in the study. This is done because it can be expected that there are differences in the effects of mergers and acquisitions in different geographical areas. Reasons for the differences in effects can be the result of regulatory influence (such as labour law), corporate culture, how advanced the economy is, or a wide variety of other factors. This meta-independent variable is discussed in more detail, because the classification had to be adjusted.

The following table indicate the 'single count' geographical distribution of the studies in the dataset. Note that even when a study analyses multiple effects of mergers and acquisitions and consequently has multiple observations included in the meta-analysis datasets, the study is counted only one time. This to provide insight into the number of studies that analysed the different regions.

Tabulation Country

| Country | Observation Count | Percent |
|---|---|---|
| 0 (repeated study entry) | 30 | 54,55 |
| Australia | 1 | 1,82 |
| Europe | 1 | 1,82 |
| Germany | 1 | 1,82 |
| Italy | 1 | 1,82 |
| UK | 4 | 7,27 |
| USA | 17 | 30,91 |
| Total | 55 | 100.00 |

From the above stated table two things become clear. Firstly, the studies on European countries are very much scattered over the Member States. For this reason it will not be possible to do analysis on individual Member States. As the meta-analysis results would then often depend on just one single study of that Member State. Consequently, all studies on individual European countries are grouped and labelled as 'Europe'. Secondly, the vast majority of studies concentrate on Europe or the USA. There are hardly any results on other regions outside Europe and the USA.[65] A more accurate analysis can thus be made on Europe and the USA.

[65] However this 'OTHER' group is included to not have to drop the observations on other variables. The name 'OTHER' is used, to indicate studies on the (rest of the) world outside the Eu or the USA.

The variable indicating the region that is analysed by the studies thus consists of a vector of three dummy variables. The three dummy variables indicate the three different values that are distinguished, they are: EU, USA, and OTHER.

The regional dummy variable indicating the EU gets a '1' if the study only analyses mergers and acquisitions in the EU, and a '0' in other cases. The regional dummy variable indicating the USA gets a '1' if the study only analyses mergers and acquisitions in the USA, and a '0' in other cases. The regional dummy variable for OTHER, get a '1' if the study analyses mergers and acquisitions out-side the EU and USA or from all around the world, and a '0' in other cases.

The following table indicates the grouped geographical distribution of all the observations in this meta-analysis, thus possibly with multiple entries per study. Again it shows that the vast majority of studies analyses the USA and Europe, this implies that the main analysis that can be made is on differences between the USA and Europe. [66]

Tabulation of REGION

| Region | Observation Count | Percent | Observation Count | Percent |
|---|---|---|---|---|
| 0 (=repeated entry) | | | 30 | 54,55 |
| EU | 13 | 23,64 | 7 | 12,73 |
| OTHER | 1 | 1,82 | 1 | 1,82 |
| USA | 41 | 74,55 | 17 | 30,91 |
| Total | 55 | 100.00 | 55 | 100.00 |

Descriptive Statistics

| REGION | REGION="EU" | REGION="Other" | REGION="USA" |
|---|---|---|---|
| Mean | 0.236 | 0.018 | 0.745 |
| Median | 0.000 | 0.000 | 1.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 |
| Std. Dev. | 0.429 | 0.135 | 0.440 |
| Observations | 55 | 55 | 55 |

The expectations on the influence of this variable are that the benefits of mergers and acquisitions in the three effect areas will be larger in the USA than in Europe. This difference would mainly be caused by the fact that the USA has less stringent labour laws, allowing more flexibility and speed in the restructuring of the newly merged firms. This will allow the firms to gain more merger synergies, and/or to gain them more quickly.

[66] The study that focuses on the region 'OTHER' is included, as this study does provide information on the other characteristics. Though this dummy variable will likely not have a significant influence in the meta-analysis and thus will likely not be included by the stepwise regression. In this light it will be interesting to see more analysis on mergers and acquisitions outside the USA and Europe which will also analyse possible differences in performance between the different regions.

### 3.4.2 Sector

The industry sector on which the studies focus their analysis is identified. This is done because it can be expected that mergers and acquisitions have different effects in different industries. Since different industries are characterized by different cost functions, have different consumer markets, different technologies, and many other differences. The original industry classification of this variable could not be maintained, this is therefore discussed in more detail.

The original industry classification was taken integrally from the classifications that are used by the analysed studies. This resulted in the table below. The first column, labelled 'sector' indicates the distribution of all the observations in the datasets, thus possibly with multiple entries per study. The fourth column indicates the distribution of the studies over the sectors when every study is included one time, it is labelled 'sector of study'. Here the second observation from a study is not counted, for instance.

Tabulation of INDUSTRY and SECTOR OF STUDY

| | INDUSTRY | | SECTOR OF STUDY | |
|---|---|---|---|---|
| Value | Count | Percent | Single Count | Percent |
| 0 (=repeated entry) | | | 30 | 54.54 |
| Air Transport | 1 | 1.82 | 1 | 1.82 |
| All | 18 | 32.73 | 7 | 12.73 |
| All (excl. railroad & utilities) | 1 | 1.82 | 1 | 1.82 |
| All excl. financial institutions | 3 | 5.45 | 2 | 3.64 |
| All excl. Insurance, banks & railroads | 3 | 5.45 | 1 | 1.82 |
| Banking | 14 | 25.45 | 8 | 14.55 |
| Electricity | 4 | 7.27 | 1 | 1.82 |
| Healthcare | 1 | 1.82 | 1 | 1.82 |
| Mining and manufacturing | 6 | 10.91 | 1 | 1.82 |
| Telecom | 3 | 5.45 | 1 | 1.82 |
| Water | 1 | 1.82 | 1 | 1.82 |
| Total | 55 | 100.00 | 55 | 100.00 |

The zero indicates the number of repeated entries of the studies

The above stated table clearly shows that, except for the financial and the ALL industries, the different industry classes are too fragmented to be used in the meta-analysis. Consequently the classification is consolidated into the following more general groups, which are based on the one-digit SIC codes[67]:

- Finance: banking and insurance
- Mining and Manufacturing
- Public Services: electricity, transportation, water, telecom, postal & healthcare
- All Sectors
- All Sectors, however excluding certain industries

[67] Details on the SIC were found on the U.S. Department of labor, downloaded from www.osha.gov/pls/imis/sic_manual on January 01, 2009.

It should be noted that the public services sector is composed of the SIC industries starting with a '4',[68] supplemented with postal and healthcare. This because too few studies focus on these industries individually. Therefore they cannot be used to analyse if there is a significant difference in results between these individual industries. Furthermore, these industries are relatively related as they have a governmental history. They generally are former state-owned or subsidized industries.

The fore last category is included as several studies analyse all industries together. The last category is separately included as several studies analyse all industries though with the exception of several specific industries, namely: financials, railroads, and utilities. The reason the studies state for this exclusion is that these industries are more or differently regulated.[69] This group is indicated as: 'ALL_EXCL'.

The industry grouping results in the following tabulation of the observations in this meta-analysis.

Tabulation of SECTOR_GROUP

| | SECTOR_GROUP | | SECTOR_GROUP_SINGLE | |
|---|---|---|---|---|
| Value | Count | Percent | Single Count | Percent |
| 0 (=repeated entry) | | | 30 | 54.55 |
| All | 18 | 32.73 | 7 | 12.73 |
| ALL_EXCL | 7 | 12.73 | 4 | 7.27 |
| Finance | 14 | 25.45 | 8 | 14.55 |
| Mining and manufacturing | 6 | 10.91 | 1 | 1.82 |
| Public services | 10 | 18.18 | 5 | 9.09 |
| Total | 55 | 100.00 | 55 | 100.00 |

These tables show that the studies in the dataset mainly focus on the groups: finance, public services and all industries. It also shows that fewer studies focussed on the mining and manufacturing sector. However the groups mining and manufacturing, and ALL_EXCL are closely connected. This because the sectors that are excluded in ALL_EXCL (namely: finance, railroads, and utilities) are by large the sectors that make up the other sector groups: finance, and public utilities. Hereby leaving sectors in ALL_EXCL that are close to the mining and manufacturing sector. Because of this and because there are relatively few observations in mining and manufacturing, and in ALL_EXCL these two groups

[68] This is the division with: transportation, communications, and electric, gas and sanitary service.
[69] For instance: A. Banerjee and E.W. Eckard, 1998, Are Mega-Mergers Anticompetitive? Evidence from the First Great Merger Wave, *The RAND Journal of Economics*, 1998, Vol. 29, No. 4, pp. 803-827. and C. Christian and J.P. Jones, 2004, The Value-Relevance of Earnings and Operating Cash Flows During Mergers, *Managerial Finance, 2004,* Vol. 30, No. 11, pp. 16-29.

are combined into the group: 'MM+ALL_EXCL'.[70] Correspondingly a vector of four dummy variables is created.[71] The descriptive statistics are presented below.

Descriptive Statistics

| SECTOR | SECTOR_ GROUP_ADJ= "ALL" | SECTOR_ GROUP_ADJ= "FINANCE" | SECTOR_ GROUP_ADJ= "MM+ALL_EXCL" | SECTOR_ GROUP_ADJ= "PUBLIC SERVICES" |
|---|---|---|---|---|
| Mean | 0.327 | 0.255 | 0.236 | 0.182 |
| Median | 0.000 | 0.000 | 0.000 | 0.000 |
| Maximum | 1.000 | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 | 0.000 |
| Std. Dev. | 0.474 | 0.440 | 0.429 | 0.389 |
| Observations | 55 | 55 | 55 | 55 |

The expectations are that the benefits of mergers and acquisitions in the public services sector will be higher than those in finance. Since the finance sector is more advanced on the consolidation curve,[72] which could mean that the best or the most lucrative deals would have already been undertaken. The finance sector on the other hand would outperform the mining and manufacturing sector based on its position on the consolidation curve.

### 3.4.3 Cross border

Whether a study analyses only domestic mergers and acquisitions, or also cross-border acquisitions will influence the dataset that is used and thus possibly the outcome of the study. Additionally, cross border mergers and acquisitions are often used to enter new geographical markets. This expansion will likely influence the performance of the firms.[73] A parameter has thus been included that captures whether the study analysis only domestic, or domestic and cross-border mergers and acquisitions.[74] This variable is composed of the following two dummy

[70] No separate table is given, since the effect of joining these two groups can be clearly seen in the previous table it simply sums the two categories. A summed table can be found in the Appendix.

[71] Dummy variables are created for the different sector groups and the relevant dummy variable gets a '1' when the study analyses that sector and a '0' in other cases.

[72] The consolidation curve theory entitles that all industries evolve in a similar manner through a so-called consolidation curve, which has four faces. Respectively: opening, scale, focus, and balance and alliance. In the first face the industry concentration lowers, but from the second face on the industry becomes more concentrated mainly through mergers, acquisitions and failures. Industries that are more advanced have less large opportunities. For more information on the consolidation curve see: G.K. Deans, F. Kroeger and S. Zeisel, 2002, The consolidation curve, All industries have similar life cycles, *Harvard Business Review,* 2002, No. 12, pp. 20 – 21. and K. Ktiemani. V. Scott and N. Waiters, 2005, Conquering the Consolidation Curve, *Electric perspectives*, 2005, sept/okt. pp. 75 – 79.

[73] A.L. Ranft and S.J. Marsh, 2008, Accessing knowledge through acquisitions and alliances: an empirical examination of new market entry, *Journal of Managerial Issues*, Vol. 20 Issue 1, pp. 51-67.

[74] This distinction is often stated in the studies, if not so it will be deducted from the provided data, for instance if it is stated that the study only analyses mergers between firms that are quoted on the New York stock exchange then, this will be seen as a study that only analyses domestic mergers and acquisitions. Even though non-U.S. firms are quoted on the NYSE, the majority involves U.S. firms or firms that are at least active in the USA.

variables. The dummy variable 'domestic' gets a '1', when the study only analyses domestic mergers and acquisitions, and a '0' in other cases. Alternatively the dummy variable 'cross border' gets a '1' if the study analyses both domestic and cross border mergers and acquisitions, and a '0' otherwise.

The descriptive statistics of this variable are presented below:

Descriptive Statistics

| CROSS BORDER | M_A_AREA= "cross border" | M_A_AREA= "domestic" |
|---|---|---|
| Mean | 0.036 | 0.963 |
| Median | 0.000 | 1.000 |
| Maximum | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 |
| Std. Dev. | 0.188 | 0.188 |
| Observations | 55 | 55 |

Expectations on this variable are less clear, this is apparent in the literature. The study of Gugler et al. does not find significant differences between domestic and cross border mergers and acquisitions.[75] However the study of Altubas and Ibanez (which researches the European banking sector) analyses differences between domestic and cross border mergers and acquisitions. It also finds cross border deals to outperform domestic deals.[76] They relate this out-performance to different merger motives, were cross border mergers and acquisitions take place to increase diversification and reduce risk. However in light of the current credit crunch the effectiveness of this motivation can be drawn into question.

More in general one could expect other factors to be of influence. The cross border deals could be more beneficial because the merging or acquiring firms have a larger universe of firms from which to choose the best possible addition to their existing business. This presumes that the acquisition or merger with a firm that pre-deal appears to be a better addition, in practice also actually outperforms the acquisition or merger with a firm that pre-deal appears less well. However it should first be established whether or not there actually is a difference.

### 3.4.4 Merger type

The literature on mergers and acquisitions indicates that horizontal mergers and acquisitions have different effects on the market than non-horizontal mergers. Horizontal mergers are mergers between firms competing in the same industry. To analyse if this distinction influences the results of the studies on mergers and acquisitions, dummy variables have been included that indicates if a study

[75] K. Gugler, D.C. Mueller, B.B. Yurtoglu, C. Zulehner, 2003, The effects of mergers: an international comparison, *International Journal of Industrial Organization,* 2003, No. 21, pp. 625–653.
[76] Y. Altunbas and D.M. Ibáñez, 2004, Mergers and Acquisitions and Bank Performance in Europe the Role of Strategic Similarities, *Not published,* ECB Working Paper Series NO. 398 / October 2004.

analysed: horizontal mergers, non-horizontal mergers or both types of mergers.[77] The descriptive statistics of the variable are presented below:

Descriptive Statistics

| MERGER TYPE | (TYPE_HORIZONTAL=0 AND NON_HORIZONTAL=1) | (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=1) |
|---|---|---|---|
| Mean | 0.091 | 0.491 | 0.418 |
| Median | 0.000 | 0.000 | 0.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 |
| Std. Dev. | 0.292 | 0.505 | 0.498 |
| Observations | 55 | 55 | 55 |

Economic theory says that horizontal mergers are mainly motivated by obtaining gains in economies of scale or gaining market power, whereas vertical mergers are motivated by obtaining economies of integration. Here the expectation is that horizontal mergers would be more beneficial. As it can be expected that the combination of economies of scale with increased market power and with combining and perfecting technologies, would exceed economies of integration benefits. Though the benefits of increasing market power are limited by competition and anti-trust legislation.

### 3.4.5 Benchmark

The performance of mergers and acquisitions will depend on the benchmark by which the effects are measured. In the dataset a variable is included that indicates whether the effects are measured against the firm's own pre-merger performance or against the performance of a peer group, respectively indicated by: itself and peers.[78] The descriptive statistics of the variable are presented now:

Descriptive Statistics

| BENCHMARK | BENCHMARK_ RELATIVE_TO_ PE="itself" | BENCHMARK_ RELATIVE_TO_ PE="peers" |
|---|---|---|
| Mean | 0.273 | 0.727 |
| Median | 0.000 | 1.000 |
| Maximum | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 |
| Std. Dev. | 0.449 | 0.449 |
| Observations | 55 | 55 |

[77] The description has been placed in the footnotes to save space and improve readability. The merger type variable is a vector of the following dummy variables. The dummy variable 'horizontal' gets a '1', when the study only analyses horizontal mergers and acquisitions, and a '0' in other cases. The dummy variable 'non-horizontal' gets a '1', when the study only analyses non-horizontal mergers and acquisitions, and a '0' in other cases. Alternatively the dummy variable 'horizontal and non-horizontal' gets a '1' if the study analyses both horizontal and non-horizontal' mergers and acquisitions, and a '0' otherwise.

[78] The benchmark dummy value 'Itself' gets a '1' when the study uses the firms' own pre-merger performance as benchmark, and a '0' in other cases. Alternatively the dummy value 'peers' gets a '1' if the study uses its peers as benchmark, and a '0' otherwise.

The influence of this factor is less researched and discussed in the literature so expectations are more provisional. However, basic micro economic theory does indicate that mergers and acquisitions can have positive externalities for competitors. After a merger there are fewer players in the market, thus giving outsiders a larger share of the pie. Mergers can increase market concentration and reduce competition. Consequently, competitors (the peers) can reap positive effects with no effort, whereas the merging firms need to exert effort to gain benefit.

In the case of share prices have Chatterjee, and Fridolfsson and Stennek advocated theories which state that, measuring a firm's performance against peers could lead to biased results. This is due to increased share prices of peers as a consequence of expected follow-up mergers.[79] A given increase for the firm could thus be lower relative to its competitors (peers) than measured against own pre-merger performance.

### 3.4.6 Acquirer / target

Additionally it has been included in the dataset for which entity the study analysed the effects of merger and acquisitions, for the acquirer, the target or the acquirer and target combined.[80]

The descriptive statistics of the variable are presented now:

Descriptive Statistics

| ACQUIRER | (ACQUIRER=0 AND TARGET=1) | (ACQUIRER=1 AND TARGET=0) | (ACQUIRER=1 AND TARGET=1) |
|---|---|---|---|
| Mean | 0.218 | 0.309 | 0.473 |
| Median | 0.000 | 0.000 | 0.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 |
| Std. Dev. | 0.417 | 0.466 | 0.504 |
| Observations | 55 | 55 | 55 |

The literature on the effects of mergers and acquisitions generally finds that the benefits for targets exceed those of the acquirers.[81] The expectations are that the results of this meta-analysis will be in line with this.

[79] S. Chatterjee, 1986, Types of Synergy and Economic Value: The Impact of Acquisitions on Merging and Rival Firms, *Strategic Management Journal*, 1986, Vol. 7, No. 2, pp. 119-139. and S.O. Fridolfsson and J. Stennek, 2005, Why mergers reduce profits and raise share prices—a theory of pre-emptive mergers, *Journal of the European Economic Association,* 2005, Vol. 3, No. 5, pp. 1083–1104.

[80] The merger type variable is a vector of the following dummy variables. The dummy value 'Acquirer' gets a '1', when the study only analyses the effects for the acquirer, and a '0' in other cases. The dummy value 'Target' gets a '1', when the study only analyses the effects for the target, and a '0' in other cases. Alternatively the dummy value 'acquirer and target' gets a '1' if the study analyses the results for both acquirers and targets, and a '0' otherwise.

[81] Basic economic theory: L. Pepall, D.J. Richards, G. Norman, 2005, Industrial Organization, Contemporary theory and practice, *Thomson*, 2005, pp. 364-391. Research paper: A. Agrawal, J.F.

### 3.4.7 Quality

As a proxy of the quality of a study, a parameter based on the outlet class has been included. The outlet class constitutes whether the study has been published or not, and if it has been published then the quality of the publishing journal has been taken as a proxy for the quality of the study. Assuming that higher quality journals will have a higher standard for the articles they publish. This is a quality proxy that is regularly used in meta-analyses. The quality indication of the journal is based on the 'journal ranking' of the Tinbergen Institute.[82] As a result a vector of five dummy variables is included. The descending quality order is: AA, A, B, C, and the N indicates not-published studies.

The following table presents the descriptive statistics of this variable.[83]

Descriptive Statistics

| QUALITY | QUALITY_ OUTLET_ CLASS="AA" | QUALITY_ OUTLET_ CLASS="A" | QUALITY_ OUTLET_ CLASS="B" | QUALITY_ OUTLET_ CLASS="C" | QUALITY_ OUTLET_ CLASS="N" |
|---|---|---|---|---|---|
| Mean | 0.055 | 0.164 | 0.255 | 0.218 | 0.309 |
| Median | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Maximum | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Std. Dev. | 0.229 | 0.373 | 0.440 | 0.417 | 0.466 |
| Observations | 55 | 55 | 55 | 55 | 55 |

Expectations on the influence of this variable are less apparent. Based on the quality presumption the results of studies published in higher rated journals should be closer to the 'true state'. However, as indicated by De Long and Lang, a possible publication bias could lead to more significant and higher results to be published in higher ranking journals.[84] Whilst more insignificant, but more extreme results could be found in studies that are not published or published in low rated journals.

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Jaffe and G.N. Mandelker, 1992, The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly**,** *The Journal of Finance*, 1992, Vol. 47, No. 4, pp. 1605-1621.

[82] Available at www.tinbergen.nl/research/ranking2.html, downloaded mach 4 2008. It ranks as follows: AA: generally accepted top-level journals; A: very good journals covering economics in general and the top journals in each field; B: good journals for all research fields within the Tinbergen Institute; C: published but not ranked by Tinbergen Institute; N: Not published.

[83] The Quality variable is a vector of the following dummy variables. The dummy value 'AA' gets a '1', when the study is published in a journal rated 'AA', and a '0' in other cases. The dummy value 'A' gets a '1', when the study is published in a journal rated 'A', and a '0' in other cases. The dummy value 'B' gets a '1', when the study is published in a journal rated 'B', and a '0' in other cases. The dummy value 'C' gets a '1', when the study is published in a journal rated 'C', and a '0' in other cases. Alternatively the dummy value 'N' gets a '1', when the study is not published, and a '0' in other cases.

[84] B.J. De Long and K. Lang, 1992, "Are All Economic Hypotheses False?", *Journal of Political Economy*, Vol. 100, No. 6, pp. 1257-1272.

### 3.4.8 Number of mergers

One of the basic elements of a meta-analysis is the number of observations used in the analysed studies. Consequently the number of mergers and acquisitions analysed by the studies have been included, indicated as NO_MERGERS.

The descriptive statistics of this variable are presented now:

Descriptive Statistics

| NO_MERGERS | NO_MERGERS |
|---|---|
| Mean | 397.654 |
| Median | 70.000 |
| Maximum | 3688.000 |
| Minimum | 2.000 |
| Std. Dev. | 710.290 |
| Observations | 55 |

Expectations on the positive or negative effects of this variable are hard to form, but the expectations are that less extreme results will be found in studies with more observations.

### 3.4.9 Time period

It is specified in the database in which year the study's analysis began and how many years it covered. Dummy variables have been constructed that indicate which decades the studies analyse.[85] This, to analyse if the analysed time period influences the results that are found. The studies that analyses time periods before 1960 have been grouped together.

The descriptive statistics of this variable are presented below:

Descriptive Statistics

| TIME PERIOD | Y__1960 | Y_1960_1969 | Y_1970_1979 | Y_1980_1989 | Y_1990_1999 | Y_2000_ |
|---|---|---|---|---|---|---|
| Mean | 0.072 | 0.218 | 0.418 | 0.564 | 0.527 | 0.254 |
| Median | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 | 0.000 |
| Maximum | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Std. Dev. | 0.262 | 0.417 | 0.498 | 0.500 | 0.503 | 0.440 |
| Observations | 55 | 55 | 55 | 55 | 55 | 55 |

Here the expectation is to see more beneficial effects further into the past. This as the enforcement of merger control and competition regulation has become more stringent over the years, potentially banning the most lucrative deals.

With respect to stock price performance, there is an expectation of a significant difference between the years before and after 2000. This due to the strong rise in the usage of Information Communication Technology. That allowed more

[85] The relevant time-period dummy variable receives a '1' if the study analyses that time period and a '0' otherwise.

information to be shared more globally and many times faster than before.[86] One can carefully expect the stock price effects of mergers and acquisitions to be larger in either way.

### 3.4.10 Years post

The outcome of the effects of mergers and acquisitions will most likely vary over time and thus depend on the moment the effects are measured. Hence the length of the time period following the merger or acquisition that is researched is included as a parameter.

The difference between the 'post merger years figure' of (a study analysing the 'announcement effect' over) one or a few days, and the figure of a (study that analyse the effects over) multiple years, is very large. For instance between a post-merger time period of 1 day (0.00274 year) and 3 years. This large difference in figures could create estimation problems. Therefore a figure of 0.5 is given to studies that analyse a post-merger time period shorter than half a year.[87] Although somewhat arbitrarily chosen this adjusted figure does allow distinction between short run and long run effects.[88] The following tables show that this adjustment does not have a large impact on the values of the descriptive statistics.

The descriptive statistics of this variable are presented below. A distribution count over the values is also shown[89]:

Descriptive Statistics

| YEARS POST | YEARS_POST _M_A_1 | YEARS_POST _M_A |
|---|---|---|
| Mean | 2.164 | 2.020 |
| Median | 1.000 | 1.000 |
| Maximum | 6.000 | 6.000 |
| Minimum | 0.500 | 0.003 |
| Std. Dev. | 1.864 | 2.126 |
| Observations | 55 | 55 |

Distribution count

| YEARS_POST _M_A_1 | | |
|---|---|---|
| Value | Count | Percent |
| 0.50 | 23 | 41.82 |
| 1.00 | 6 | 10.91 |
| 2.00 | 3 | 5.45 |
| 2.50 | 1 | 1.82 |
| 3.00 | 8 | 14.55 |
| 5.00 | 12 | 21.82 |
| 6.00 | 2 | 3.64 |
| Total | 55 | 100.00 |

The expectations for cost performance are that it can take time before all the cost savings are realised. Immediate realisation can be limited due to financial

[86] The rise of the usage of ICT already started in the nineties, accelerating in the late nineties. However the time periods that are used in this meta-analysis group the years 1990-1999, and I would expect the internet usage in the early nineties was not common enough to have an impact on this time period.
[87] This variable is a continuous variable, except that a minimum level of 0.5 is set.
[88] For instance, the short run stock performance can be seen as representing the while the longer run performance is based more on the practical realization of the merger or acquisition.
[89] Even though this is a continuous variable, the studies use relatively standardized post-merger time periods. This allows a distribution count.

limits, capacity limits, existing contracts or legalisation.[90] This implies that when a longer post-merger time period is analysed, more cost savings are achieved, and also more profits are realized.

### 3.4.11 Deal value: Thresholds and Large Deals

Several studies impose a minimum threshold on the deal value of the mergers and acquisitions they include in their datasets. This means that they thus do not include the smaller deals that fall below the threshold. It is established whether a study enforces a threshold, and if so how large it is. To determine if setting a threshold on the deal value influences the results, two dummy variables are included.

The first dummy variable indicates if any level of minimum threshold[91] is imposed. The second indicates if a study uses a high threshold and only includes large mergers and acquisitions.[92] If the deal value threshold is larger than 100 million U.S. dollar it is considered to be a large merger, this is represented in the large deals dummy variable.[93]

The descriptive statistics of this variable are presented below:

Descriptive Statistics

| DEAL_VALUE | THRESHOLD | LARGE_DEALS |
|---|---|---|
| Mean | 0.582 | 0.182 |
| Median | 1.000 | 0.000 |
| Maximum | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 |
| Std. Dev. | 0.498 | 0.389 |
| Observations | 55 | 55 |

The expected influence of these variables is not clear cut. It could be possible that in case of smaller deals the benefits are larger. This as it is possible that these smaller firms benefit more from increasing their economies of scale.[94] Following this, larger deals could show smaller benefits.

[90] For instance, it will take time to implement new processes, or to renew production facilities, or renegotiate contracts, and labour laws can limit reorganisations as well.
[91] Thresholds that have been used vary from absolute $ terms of minimum deal value, to the requirements to be listed on a large cap stock market.
[92] The threshold dummy variable gets a '1', when the study imposes any level of minimum threshold, and a '0' in other cases. The dummy value 'Large deals' gets a '1', when the study only analyses large mergers and acquisitions, and a '0' in other cases.
[93] The studies that used a threshold all stated them in US dollars. Furthermore inflation has not been of large enough influence to require these numbers to be adjusted, this because inflation does not cause the thresholds used to surpass the 100 million. For instance $ 10 million, in 1972 dollars will accumulate to nearly 52 million in 2008, well below the $ 100 million marker. Using the average inflation for this period of 4.68%, as computed using www.measuringworth.com/calculators/inflation on 12/02/2008.
[94] Furthermore for large firms it could be the case that even if these large firms enjoy economies of scale the returns of increasing their production will generally decrease, this if the production has already become large enough. It becomes increasingly difficult to gain the same cost advantages

In contrary however, in case of very large deals there is the to-big-to-fail hypothesis. This entitles that firms can become so large that in case they come into troubles they will be saved by the government. This because they have become so important to a nation's economy that the country cannot let them go belly up. This could lead firms to take excessive risk. Advocates of this theory point to cases such as the savings-and-loans crisis of the 80's, and the current issues in financial institutions and U.S. carmakers. It is a topic that currently receives a great deal of public and politic attention, there suggestion that there will even be policy based on this hypothesis.

### 3.4.12 Significant

A variable is included to indicate whether the results of the studies are significant or not.[95] The meta-analysis literature indicates that this could be a factor of influence, as studies with significant results could possibly receive larger exposure.[96] Significant studies could be more likely to be published and researchers could therefore work towards finding significant results.[97] Nonetheless the results of studies that find significant results are seen as being more reliable. This variable primarily indicates if there is a difference between the effects that are found by studies that find significant results and studies that do not find significant results. Significant results are generally seen as more reliable.

The descriptive statistics of this variable are presented below:

Descriptive Statistics

| SIGNIFICANT | |
|---|---|
| Mean | 0.655 |
| Median | 1.000 |
| Maximum | 1.000 |
| Minimum | 0.000 |
| Std. Dev. | 0.480 |
| Observations | 55 |

It is carefully expected that the results of studies with significant results could be more positive. In case of the stock price effects, the significance could also be

by increasing production, for instance due to rising overhead or logistic costs. This touches the theory that mergers and acquisitions could be driven by managerial hubris. In the sense that managers prefer to run larger firms, even if it is not efficient for the firm to grow.

[95] The significant variable gets a '1' when the result of the study is significant at at least the 10% level, and a '0' when the result is insignificant.

[96] R.J.G.M Florax, H.L.F. de Groot and R.A. de Mooij, 2002, Meta-analysis: A tool for upgrading inputs of macroeconomic policy models, *Not published, Tinbergen Institute Discussion Paper*, TI 2002-041/3, p. 6-7.

[97] B.J. De Long, and K. Lang, 1992, "Are All Economic Hypotheses False?", *Journal of Political Economy*, Vol. 100, No. 6, pp. 1257-1272.

influenced by the stock market volatility in the analysed time period.[98] This is an issue though that belongs to the field of financial markets analysis.

### 3.4.13 Significance level

The relevance of the significance is already discussed in the previous section, a variable is also included that indicates the level of significance of the study results. The three standard levels are distinguished, the 1, 5 or 10% level.[99] There are no clear expectations on this variable.

The following table presents the descriptive statistics of the vector of dummy variables that indicate the level of significance.

Descriptive Statistics

| SIGNIFICANCE _LEVEL | SIGNIFICANCY _LEVEL__=1 | SIGNIFICANCY _LEVEL__=5 | SIGNIFICANCY _LEVEL__=10 |
|---|---|---|---|
| Mean | 0.255 | 0.273 | 0.473 |
| Median | 0.000 | 0.000 | 0.000 |
| Maximum | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 |
| Std. Dev. | 0.440 | 0.449 | 0.504 |
| Observations | 55 | 55 | 55 |

Aside from these variables some other variables could not be included, they are discussed in the next section.

[98] Higher stock price volatility is often associated with more nervous markets, as the VIX index that indicates the implied volatility of the S&P500 is often called 'the panic index'. The common perception is that more nervous markets are not very good for stock prices.

[99] The dummy variable indicating the 1% level of significance receives a value of '1' if the results of the study are significant at the 1% level of significance, and a '0' otherwise. The dummy variable indicating the 5% level gets a '1' if the results are significant at the 5% level.

### 3.4.14 Dropped variables

Some other characteristics that were initially included as parameters are dropped, because too few studies analysed these different characteristics.

**Mergers vs. acquisitions**

Initially a parameter was included that indicated if studies differentiated between the effect of mergers and the effect of acquisitions. This variable had to be dropped, as only two studies made this separation. Moreover the vast majority of the studies used the two terms randomly without differentiation.

**Research design**

This parameter identified the research model that is used by the study. It presents a hefty challenge which is often mentioned in the meta-analysis literature. Namely that, in economics it seems researchers are continuously looking for new, innovative research methods. This is in contradiction to other research fields (such as medicine and physics) where researchers often replicate each other's models.[100] Our sample of studies also faces this issue, and the studies use a wide variety of research models. The exception is the measurement of stock markets effects, as is discussed in the 'Dependent meta-variable' section 3.3, under 'effect size'.[101] Because of the great variety of the research models that are used, not enough studies use the same models to allow this parameter to be included.

**Statistical values**

Multiple parameters were initially identified that captured statistical outcomes of the studies, such as the t- and p-value, standard error, and $R^2$. However it turned out that the statistical values that the studies presented varied so much that none of these values could be included in the meta-analysis. While some studies presented many statistical values, others do not present any and merely indicate if the study's results are significant at a certain level. It is therefore only possible to included whether the studies' results were significant and at which level.

**Stock or cash deals**

Furthermore a parameter was included that captured whether the analysed mergers and acquisitions where limited to stock deals or cash deals only. This parameter could not be analysed as it turned out that there was only one study that made this differentiation.[102]

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[100] R.J.G.M. Florax, F.L.F. de Groot, R.A. Mooij, 2002, Meta-analysis, *Not Published, Tinbergen Institute Discussion Paper*, TI2002-041/3, p. 8.
[101] In case of the stock markets effects, all the studies analyse average abnormal return.
[102] Unfortunately it was also not possible to analyse mergers inside or outside merger waves, as this differentiation was almost not made.

# 4 Results Cost Effects

The following Three Chapters presents the results of the meta-analyses on the effects of mergers and acquisitions. This chapter discusses the results of the cost effects analysis. The fifth Chapter discusses the results of the profits effects analysis, followed by the results on the stock price effects in the sixth Chapter.

These chapters are organised as follows: they first describe any relevant adjustments of the model that is estimated, because for some regressions not all the variables can be included. Then the results and the cohering model are presented, followed by a discussion of the significant variables. Next alternative estimation models and their possible differences in results with the basic model are discussed. The chapter is closed by a conclusion of the results.

## 4.1 Model

To be able to analyse the costs effects the model had to be adjusted, as not all of the independent variables could be included in the model because they were not researched by the cost studies. These adjustments are discussed next. The descriptive statistics of the independent variables are presented first.

Descriptive statistics: COST-EFFECTS
No. Observations: 16

| Variable | mean | median | maximum | minimum | standard deviation | reference |
|---|---|---|---|---|---|---|
| Region | | | | | | |
| EU | 0.438 | 0.000 | 1.000 | 0.000 | 0.512 | X |
| USA | 0.500 | 0.500 | 1.000 | 0.000 | 0.516 | |
| OTHER | 0.063 | 0.000 | 1.000 | 0.000 | 0.250 | |
| Sector | | | | | | |
| All | 0.063 | 0.000 | 1.000 | 0.000 | 0.250 | |
| FINANCE[103] | 0.438 | 0.000 | 1.000 | 0.000 | 0.512 | X |
| MM+ALL_EXCL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| PUBLIC SERVICES | 0.500 | 0.500 | 1.000 | 0.000 | 0.516 | |
| Cross border | | | | | | |
| CROSS BORDER | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | X |
| DOMESTIC | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | |
| Type | | | | | | |
| (TYPE_HORIZONTAL=0 AND NON_HORIZONTAL=1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | 0.938 | 1.000 | 1.000 | 0.000 | 0.250 | |

[103] The finance sector has been set as reference because it has more observations then the sectors group 'All', general econometrics says it thus forms a better reference group.

| | | | | | | |
|---|---|---|---|---|---|---|
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=1) | 0.063 | 0.000 | 1.000 | 0.000 | 0.250 | X |
| Benchmark | | | | | | |
| ITSELF | 0.376 | 0.000 | 1.000 | 0.000 | 0.500 | X |
| PEERS | 0.625 | 1.000 | 1.000 | 0.000 | 0.500 | |
| Acquirer | | | | | | |
| (ACQUIRER=0 AND TARGET=1) | 0.188 | 0.000 | 1.000 | 0.000 | 0.403 | |
| (ACQUIRER=1 AND TARGET=0) | 0.250 | 0.000 | 1.000 | 0.000 | 0.447 | |
| (ACQUIRER=1 AND TARGET=1) | 0.563 | 1.000 | 1.000 | 0.000 | 0.512 | X |
| Quality | | | | | | |
| AA | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| A | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| B | 0.313 | 0.000 | 1.000 | 0.000 | 0.479 | X |
| C | 0.063 | 0.000 | 1.000 | 0.000 | 0.250 | |
| N | 0.625 | 1.000 | 1.000 | 0.000 | 0.500 | |
| NO MERGERS | 205.688 | 20.000 | 1417.000 | 2.000 | 473.667 | |
| Time period | | | | | | |
| Y__1960 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| Y_1960_1969 | 0.063 | 0.000 | 1.000 | 0.000 | 0.250 | |
| Y_1970_1979 | 0.125 | 0.000 | 1.000 | 0.000 | 0.342 | |
| Y_1980_1989 | 0.438 | 0.000 | 1.000 | 0.000 | 0.512 | |
| Y_1990_1999 | 0.875 | 1.000 | 1.000 | 0.000 | 0.342 | X |
| Y_2000_ | 0.563 | 1.000 | 1.000 | 0.000 | 0.512 | |
| YEARS POST | 3.219 | 3.000 | 6.000 | 1.000 | 1.741 | |
| THRESHOLD | 0.063 | 0.000 | 1.000 | 0.000 | 0.250 | |
| LARGE DEALS | 0.063 | 0.000 | 1.000 | 0.000 | 0.250 | |
| SIGNIFICANT | 0.438 | 0.000 | 1.000 | 0.000 | 0.512 | |
| Significance Level | | | | | | |
| 1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 5 | 0.313 | 0.000 | 1.000 | 0.000 | 0.479 | X |
| 10 | 0.688 | 1.000 | 1.000 | 0.000 | 0.479 | |

### Cross border

This characteristic cannot be analysed for the effect on costs of mergers and acquisitions, as all the studies that analyse costs effects all analyse the effects of domestic mergers and acquisitions. Consequently it is not possible to contrast studies that analyse domestic mergers and acquisitions with those that analyse cross border mergers and acquisitions.

**Unobserved dummy-values**

Not all of the dummy variables can be included in the model. This is due to the fact that none of the studies on cost effects fulfil these dummy-values. For instance none of the studies on cost effects analyse the mining and manufacturing sector. As a result the dummy-variable indicating the mining and manufacturing sector cannot be included as there are no observations on this dummy-value. The following table presents the specific dummy-values that are not analysed by the cost-effect studies, and thus cannot be included in this meta-analysis.

| Variable | Unobserved dummy-value |
|---|---|
| Sector | MM+ALL_EXCL |
| Merger type | non-horizontal mergers |
| Quality | AA and A |
| Time period | Before 1960 |
| Significance level | 1% |

After dropping the cross border variable and the dummy variables that are not observed, the model that can potentially be used to analyse the cost effects is the one below.

$$EFFECT\_COST_j = \beta_0 + \beta_1 * REGION + \beta_2 * SECTOR + \beta_3 * TYPE + \beta_4 * BENCHMARK + \beta_5 * ACQUIRER + \beta_6 * QUALITY + \beta_7 * NO\_MERGERS + \beta_8 * TIME\_PERIOD + \beta_9 * YEARS\_POST + \beta_{10} * THRESHOLD + \beta_{11} * LARGEDEALS + \beta_{12} * SIGNIFICANT + \beta_{13} * SIGNIFICANCE\_LEVEL + \varepsilon_j$$

## 4.2 Estimation Results

The stepwise regression analysis analyses which of the independent variables from the potential model are significant and are consequently included in the model that it uses to analyse the cost-effects. As there are 16 observations on the cost effects a maximum of 6 independent variables is set.[104] This gives the following results on the cost effects of mergers and acquisitions:

[104] The maximum number of independent variables is the number of observations divided by 2.5.

| Dependent Variable: | EFFECT_COST | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 16 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Stepwise forwards | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 | | | |
| Stopping criterion: | Number of search regressors = 6 | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **C** | **0.062** | 0.026 | 2.421 | 0.0386 |
| **SIGNIFICANT** | **-0.064** | 0.018 | -3.638 | 0.0054 |
| **YEARS_POST_M_A_1** | **-0.017** | 0.005 | -3.139 | 0.0119 |
| **(ACQUIRER=1 AND TARGET=0)** | **-0.039** | 0.019 | -2.022 | 0.0739 |
| **Y_2000_** | **0.042** | 0.018 | 2.316 | 0.0458 |
| REGION="USA" | -0.020 | 0.018 | -1.113 | 0.2946 |
| REGION="Other" | 0.035 | 0.035 | 0.987 | 0.3492 |
| R-squared | 0.730 | | | |
| Adjusted R-squared | 0.549 | Mean dependent var | | -0.013 |
| S.E. of regression | 0.031 | S.D. dependent var | | 0.046 |
| Sum squared residual | 0.008 | Akaike info criterion | | -3.830 |
| Log likelihood | 37.64 | Schwarz criterion | | -3.492 |
| F-statistic | 4.049 | Hannan-Quinn criter. | | -3.813 |
| Prob(F-statistic) | 0.030 | Durbin-Watson stat | | 3.646 |

Variables significant at least at the 10 % level are in bold. Negative coefficients indicate cost reductions.

The results presents the meta-independent variables that have been included this means that the following model has been estimated:

$$EFFECT\_COST_j = \beta_0 + \beta_1 * REGION + \beta_2 * ACQUIRER + \beta_3 * TIME\_PERIOD + \beta_4 * YEARS\_POST + \beta_5 * SIGNIFICANT + \varepsilon j$$

The results show five significant variables, hereby noting that a negative number indicates a reduction in costs, and a positive number an increase in costs. The $R^2$ is relatively high and indicates that the included independent variables for a large part determine the results of studies on the cost effects of mergers and acquisitions.

In general this meta-analysis finds a significant increase in costs for studies analysing cost-effects of mergers and acquisitions who do not fulfil the characteristics indicated by the significant variables. Hereby it should be noted that the variable representing significant results indicates that, when only significant results are observed then the cost effects are near zero. When the study also fulfils other characteristics that have a significant influence the general effect can be strengthened but also reversed. For instance, only including significant results and only analysing acquirers leads to finding a cost decreasing

effect of mergers and acquisitions.[105] On the other hand studies that find insignificant results and analyse the post 2000 time period find higher increases in costs.

The significant variables that influence the results are discussed in the following section.

## 4.3 Variables Influencing Cost Results

**Significant**

The meta-independent variable that indicates if the results that the studies found are significant, is itself significant in the meta-analysis. The influence is negative, meaning that studies with significant results found larger reductions (or lower increases) in costs than studies with insignificant results. This indicates that studies with relatively more reliable results found a better cost performance compared to the studies with less reliable results.[106] The influence is such that when only significant results are included (and the other significant variables are not fulfilled) the general effect of mergers and acquisitions on costs reduces to near zero.

The explanation for this difference is not directly clear. It could point to a publication bias, as suggested by De Long and Lang.[107] However more research is needed to determine the cause. Nevertheless it can be established that the more reliable (significant) results show a constant level of costs following mergers and acquisitions.

**Post-merger years**

The variable indicating the post-merger time period finds significantly lower costs when a longer time period is analysed. This means that the general increase in costs, increases less when a longer time period is analysed.[108] It turns into a decrease in costs if the analysed time period is long enough, namely longer than 3.7 years (0.062/0.017).

The influence is in line with expectations and with previous empirical research. The underlying reason that is provided in the literature is that it takes the newly merged firm time to achieve cost savings. Merging firms need this time to learn how to manage their new organization.[109] Furthermore, it can take time to replace or adjust production processes. The results are in line with this.

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[105] This effect is: 0.062 – 0.064 -0.039 = a cost reduction of 0.041.

[106] The better cost performance could still be an increase in costs, but then a lesser increase.

[107] B.J. De Long and K. Lang, (1992),: "Are All Economic Hypotheses False?", *Journal of Political Economy*, Vol. 100, No. 6, pp. 1257-1272.

[108] (when the other significant variables are not fulfilled)

[109] G. Andrade; M. Mitchell and E. Stafford, 2001, New Evidence and Perspectives on Mergers, *The Journal of Economic Perspectives*, 2001, Vol. 15, No. 2, pp. 103-120. and K. Ikeda and N. Doi, 1983, The Performances of Merging Firms in Japanese Manufacturing Industry: 1964-75, *The Journal of Industrial Economics*, 1983, Vol. 31, No. 3, pp. 257-266.

**Acquirer**

The variable that represents which of the merging parties results are analysed has a significant influence. It indicates that when studies only analyse the cost performance of the acquiring firm they find a significantly larger reduction (or lower increase) in costs, compared with when they analyse the combined results of both acquirer and target. This implies that the acquiring firms achieve a larger reduction in costs. The dummy variable which indicates that only the target firm's performance was analysed, is not significant.[110] This implies that the acquiring firm is the party that receives the largest cost reduction and benefits the most from the merger. The reasons that the acquiring firm achieves a larger cost reduction could be that, due to restructuring of production processes, it benefits the most from increased economies of scale. It could also indicate that the target firm was the most cost efficient firm and that the acquiring firm reaps the benefits of integrating the more efficient target. This is supported by empirical research that finds that target firms often are the more efficient firms.[111] However, future research could provide more clarification.

**Time period**

The time period dummy variable indicating the post 2000 time period has a positive significant influence. This implies that the studies that analyse mergers and acquisitions that took place since the year 2000, find higher costs (or a lower reduction in costs) compared to the 1990-1999 time period.[112] However no significant influence is found for the older time periods. An explanation for this is not directly apparent. However, it could be a sign that the most recent mergers and acquisitions are not primarily driven by cost reductions. Possibly due to technological improvements in Information and Communication Technologies (ICT) many firms are already producing at high levels of efficiency. Besides this, firms are becoming increasingly larger and more global. Mergers could thus become more motivated by gaining market share and surviving (not being acquired themselves), then by gaining more cost efficiency. This is a possible topic for future research. The precise explanation cannot be determined based on de dataset, but it can be concluded that the time period that is analysed influences the results that are found on the cost effects of mergers and acquisitions.

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However other studies find the contrary effect: J. Kwoka and M. Pollitt, 2007, Industry Restructuring, Mergers, and Efficiency: Evidence from Electric Power, *Not published,* Cambridge University working paper, CWPE 0725& EPRG 0708.

[110] Thus indicating that the results of studies on only the target firms does not significantly differ from those that analyse both target and acquiring firms combined.

[111] J. Kwoka and M. Pollitt, 2007, Industry Restructuring, Mergers, and Efficiency: Evidence from Electric Power, *Not published,* Cambridge University working paper, CWPE 0725& EPRG 0708.

[112] Also relative to the other analysed time periods, as they are do not significantly differ form the 1990 – 1999 reference.

**Insignificant variables**

Two further variables are included in the basic model, but these do not have a significant influence on the results that are found. These are two variables indicating the geographical region that is analysed. They are not discussed further as they do not have a significant influence on the cost effects that are found.

## 4.4 Alternative Regression Methods

In the section that describes the stepwise estimation method it is discussed that, several estimation parameters have to be set. This section discusses the effects of setting different estimation parameters.

When the p-value stopping criterion is set to a p-value of 0.1 instead of 0.5 then the regression produces only two significant variables. Namely, the variable indicating if the study-results are significant or not, and the variable indicating the post-merger time period that is analysed. This can be seen in the following table. Lowering the stopping criterion caused several of the significant variables found by the basic model to not be included in this model. Also it lowers the $R^2$ remarkably. It thus appears best to use the 0.5 p-value.

| Dependent Variable: | EFFECT_COST | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 16 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Stepwise forwards | | | |
| Stopping criterion: | p-value forwards/backwards = **0.1/0.1** | | | |
| Stopping criterion: | Number of search regressors = 6 | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| **C** | **0.048** | 0.023 | 2.107 | 0.0551 |
| **SIGNIFICANT** | **-0.049** | 0.019 | -2.634 | 0.0206 |
| **YEARS_POST_M_A_1** | **-0.012** | 0.006 | -2.204 | 0.0461 |
| R-squared | 0.441 | | | |
| Adjusted R-squared | 0.355 | Mean dependent var | | -0.013 |
| S.E. of regression | 0.037 | S.D. dependent var | | 0.046 |
| Sum squared residual | 0.018 | Akaike info criterion | | -3.605 |
| Log likelihood | 31.837 | Schwarz criterion | | -3.460 |
| F-statistic | 5.136 | Hannan-Quinn criter. | | -3.597 |
| Prob(F-statistic) | 0.023 | Durbin-Watson stat | | 3.081 |

Variables significant at least at the 10 % level are in bold. Negative coefficients indicate cost reductions.

When the regression was estimated using the forward uni-directional method, the same results were produced.[113] Unlike the stepwise regression this method does not re-check included variables for exceeding the p-value stopping criterion after a new variable has been included. Once a variable has been included it stays in the estimation model.

In the section that describes the independent variables it is discussed that the post-merger time period has been adjusted. Time periods shorter than half a year have been set to half a year, this because of the large difference in values of a post-merger period of 3 years and that of 1 day (0.002739 year). When the regression is analysed using the unadjusted post-merger time period, which is not minimized at 0.5 year, the results are unchanged.[113]

## 4.5 Conclusion on Cost Effects

The general effect that is found on the cost effects of mergers and acquisitions is an increase in costs. This general effect is strongly influenced by the characteristics of the studies. When only significant study results are included then the effect is near zero, indicating no effects on costs.

The results of this meta-analysis, lead to the conclusion that the results which are found by studies analysing the cost-effects of mergers and acquisitions are influenced by a number of the studies characteristics. The explanations for the influences fall outside the reach of this thesis and will need to be established by future research, however some indication is provided.

As mentioned, there is a difference in the results that are found by studies that find significant results and those that find insignificant results. The studies that find insignificant results find an increase in costs, while studies with significant results (seen as the more reliable studies) find the costs to remain virtually unchanged.

Secondly, studies that analyse a longer post-merger period find lower (or less high) costs. The cause that is given in the literature is that it takes the merging firms some time before the cost savings are achieved. This as the firm needs time to adjust to its newly formed organisation.

Thirdly, the research results are influenced if the studies analyse only the performance of the acquiring firm, if so then these studies find larger reductions (or lower increases) in costs. This variable has the largest influence on the cost effects (aside from the variable indicating significant results). It could be the case that the acquiring firm benefits most from the increase in economies of scale, or that the acquirer improves its production because it acquired a more cost efficient target.

[113] As this alternative method produced the same results as the basis model, the table with the results is placed in the appendix to save space. See B.2.

Finally, the results of the cost effects are influenced by the time period that it analyses. Here there are cost increasing (or less cost reducing) effects found for mergers and acquisitions that took place after 2000. The explanation for this could be that these mergers and acquisitions are not driven by gaining cost reductions but by other motivations. This variable has the greatest impact on the results that are found by cost effect studies, besides of the variable indicating that significant results are found.

It can be concluded that the general cost increasing effect that is found can become a cost reducing effect when the studies has specific characteristics or a combination of characteristics. For instance, studies that have significant results and analyse the cost effects for acquirers over multiple post merger years do find a decrease of costs.

When the model is alternatively estimated with a lower p-value stopping criterion of 0.1, fewer variables are significant and the explanatory power of the model is lowered. This alternative method is thus not preferable. The results are unchanged when a uni-directional regression method is used or when the unadjusted post-merger time period is used.

It is surprising to find that the benchmark variable was not significant, as it could be expected that measuring costs relative to the firms' own pre-merger performance would produce different results than comparing them to peers. Additionally it was expected that the geographical region would be of influence, as it is often stated that the more flexible labour laws in the USA allow for stronger reorganisations and consequently larger cost reductions. Furthermore, it is surprising not to find a significant influence of the sector that is analysed. This because the sectors have large differences in markets and production methods (thus with different economies of scale).

# 5 Results Profit Effects

This Chapter presents the results of the stepwise meta-analysis on the results found by studies on the profit effects of mergers and acquisitions.

The Chapter is organised as follows, it first describes any relevant adjustments of the model. Then the results and the cohering model are presented, followed by a discussion of the significant variables, and the alternative estimation models. The chapter is closed by a conclusion on the results.

## 5.1 Model

First a check of the observations and variables is performed. The descriptive statistics of the independent variables are presented below.

Descriptive statistics: Profit-effects
No. Observations: 8

| Variable | mean | median | maximum | minimum | standard deviation | reference |
|---|---|---|---|---|---|---|
| Region | | | | | | |
| EU | 0.750 | 1.000 | 1.000 | 0.000 | 0.463 | X |
| OTHER | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| USA | 0.250 | 0.000 | 1.000 | 0.000 | 0.463 | |
| Sector | | | | | | |
| ALL | 0.125 | 0.000 | 1.000 | 0.000 | 0.354 | |
| FINANCE[114] | 0.625 | 1.000 | 1.000 | 0.000 | 0.518 | X |
| MM+ALL_EXCL | 0.250 | 0.000 | 1.000 | 0.000 | 0.463 | |
| PUBLIC SERVICES | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| Cross border | | | | | | |
| CROSS BORDER | 0.125 | 0.000 | 1.000 | 0.000 | 0.354 | X |
| DOMESTIC | 0.875 | 1.000 | 1.000 | 0.000 | 0.354 | |
| Type | | | | | | |
| (TYPE_HORIZONTAL=0 AND NON_HORIZONTAL=1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | 0.625 | 1.000 | 1.000 | 0.000 | 0.518 | |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=1) | 0.375 | 0.000 | 1.000 | 0.000 | 0.518 | X |
| Benchmark | | | | | | |
| ITSELF | 0.375 | 0.000 | 1.000 | 0.000 | 0.518 | X |
| PEERS | 0.625 | 1.000 | 1.000 | 0.000 | 0.518 | |

[114] The finance sector has been set as reference because it has more observations then the sectors group 'All', it thus forms a better reference group.

| | | | | | | |
|---|---|---|---|---|---|---|
| Acquirer | | | | | | |
| (ACQUIRER=0 AND TARGET=1) | 0.375 | 0.000 | 1.000 | 0.000 | 0.518 | |
| (ACQUIRER=1 AND TARGET=0) | 0.125 | 0.000 | 1.000 | 0.000 | 0.354 | |
| (ACQUIRER=1 AND TARGET=1) | 0.500 | 0.500 | 1.000 | 0.000 | 0.535 | X |
| Quality | | | | | | |
| A | 0.250 | 0.000 | 1.000 | 0.000 | 0.463 | |
| AA | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| B | 0.250 | 0.000 | 1.000 | 0.000 | 0.463 | X |
| C | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| N | 0.500 | 0.500 | 1.000 | 0.000 | 0.535 | |
| NO MERGERS | 311.625 | 60.500 | 2000.000 | 23.000 | 684.641 | |
| Time period | | | | | | |
| Y__1960 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| Y_1960_1969 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| Y_1970_1979 | 0.375 | 0.000 | 1.000 | 0.000 | 0.518 | |
| Y_1980_1989 | 0.750 | 1.000 | 1.000 | 0.000 | 0.463 | |
| Y_1990_1999 | 0.750 | 1.000 | 1.000 | 0.000 | 0.463 | X |
| Y_2000_ | 0.250 | 0.000 | 1.000 | 0.000 | 0.463 | |
| YEARS POST | 2.500 | 2.500 | 5.000 | 1.000 | 1.309 | |
| THRESHOLD | 0.500 | 0.500 | 1.000 | 0.000 | 0.535 | |
| LARGE DEALS | 0.375 | 0.000 | 1.000 | 0.000 | 0.518 | |
| SIGNIFICANT | 0.375 | 0.000 | 1.000 | 0.000 | 0.518 | |
| Significance Level | | | | | | |
| 1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 5 | 0.125 | 0.000 | 1.000 | 0.000 | 0.354 | X |
| 10 | 0.875 | 1.000 | 1.000 | 0.000 | 0.354 | |

The number of studies that analyse the profit effects is lower than those on cost effects, this has some consequences. First, the number of independent variables that can be included is lower, and as the results are based on fewer observations the estimations are less accurate than in case of the costs and stock price estimates. Second, the number of dummy variables that are not analysed by any of the studies in the dataset is larger. This means that the corresponding dummy variables cannot be included. The following table presents these dummy variables that cannot be included.

| **Variable** | **Unobserved dummy-value** |
|---|---|
| Region | Other |
| Sector | public services |
| Merger type | Non-horizontal mergers |
| Quality | AA and C |
| Time period | Before 1960 and 1960-1969 |
| Significance level | 1% |

However none of the independent variables had to be completely dropped because all variables are analysed by the studies on profit-effects. This means that the potential model that could be estimate includes all the variables and is thus:

$$EFFECT\_PROFITS_j = \beta_0 + \beta_1 * REGION + \beta_2 * SECTOR + \beta_3 * CROSS\_BORDER + \beta_4 * TYPE + \beta_5 * BENCHMARK + \beta_6 * ACQUIRER + \beta_7 * QUALITY + \beta_8 * NO\_MERGERS + \beta_9 * TIME\_PERIOD + \beta_{10} * YEARS\_POST + \beta_{11} * THRESHOLD + \beta_{12} * LARGEDEALS + \beta_{13} * SIGNIFICANT + \beta_{14} * SIGNIFICANCE\ LEVEL + \varepsilon_j$$

## 5.2 Estimation Results

The stepwise regression analysis analyses which of the variables from the potential model are significant, these are consequently included in the profit effects model. There are eight observations, which means that three variables can be included.[115] The results of the stepwise regression analysis on the profit effects are the following:

| Dependent Variable: | EFFECT_PROFITS | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 8 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Stepwise forwards | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 | | | |
| Stopping criterion: | Number of search regressors = 3 | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| **C** | **-0.168** | 0.031 | -5.475 | 0.0054 |
| **REGION="USA"** | **0.135** | 0.018 | 7.372 | 0.0018 |
| **SIGNIFICANCY_LEVEL__=10** | **0.143** | 0.027 | 5.249 | 0.0063 |
| **SIGNIFICANT** | **0.044** | 0.014 | 3.064 | 0.0375 |
| R-squared | 0.933 | | | |
| Adjusted R-squared | 0.883 | Mean dependent var | | 0.007 |
| S.E. of regression | 0.016 | S.D. dependent var | | 0.048 |
| Sum squared residual | 0.001 | Akaike info criterion | | -5.075 |
| Log likelihood | 24.300 | Schwarz criterion | | -5.035 |
| F-statistic | 18.615 | Hannan-Quinn criter. | | -5.343 |
| Prob(F-statistic) | 0.008 | Durbin-Watson stat | | 3.665 |

Variables significant at least at the 10 % level are in bold.

[115] As 8/2.5 = 3.2 the limit is set at three variables.

The results presents the significant meta-independent variables that have been included, this means that the following model has been estimated:

$$EFFECT\_PROFITS_j = \beta_0 + \beta_1 * REGION + \beta_2 * SIGNIFICANT + \beta_3 * SIGNIFICANCE\ LEVEL + \varepsilon_j$$

The results show four significant variables and a quite high $R^2$. The quite high $R^2$ is most likely a consequence of the relative low number of observations, as it is not caused by multicollinearity because the stepwise regression analysis method corrects for multicollinearity.

In general this meta-analysis finds a significant decrease in profits for studies analysing profit-effects of mergers and acquisitions who do not have the characteristics indicated by the significant variables. The general profit effect is strongly influenced several significant variables, these are discussed next.

## 5.3 Variables Influencing Profit Results

**Region**

The variable indicating the region that is analysed by the study is significant. It indicates that studies find higher post-merger increases in profits (or lower decreases in profits) if they analyse mergers and acquisitions in the USA compared to the EU. This is an indication that compared to the EU, firms in the USA are more able to improve their profit performance. The most likely explanation for this are the less strict labour laws in the USA, allowing firms to carry out bigger reorganisations with more flexibility. This explanation is supported by empirical research.[116] However the meta-analysis on the cost effects shows no significant difference in cost reductions between the USA and the EU. This points to the case that the increase in profits (or lower decrease) is not a result of cost reductions, but of increased revenue.[117]

Based on merger motivation theory, an explanation exists on the revenue side. Namely that firm in the USA are able to obtain more market power in the USA than in the EU. However, both the USA and the EU have stringent competition laws. This explanation thus appears less plausible. Nevertheless the larger geographical market in the USA could mean that despite of competition law, firms are more able to exploit post-merger increases in market power. This because a larger market has higher levels of tolerable market power, and/or because in the

[116] D. Focarelli, F. Panetta, C. Salleo, 2002, Why Do Banks Merge?, *Journal of Money*, *Credit & Banking,* 2002, Vol. 34, Issue 4, pp. 1047-1066.

[117] One should be aware that this conclusion has to be made with care, as it is almost certain that the dataset used by the cost and profit studies are not the same, this could also cause this difference.

EU there are national competition watchdogs in addition to the European commission's oversight meaning that there is a double layer of enforcement.[118] However determining the explanation is a case for future research.

**Significant and Significance level**

The variables that indicate if the results of the analysed study are significant, and the level of significance, are itself significant in this meta-analysis. Because they are closely related they will be discussed together in this part.

There is a significant difference in the results that are found by studies that produce significant results and those that produce insignificant results. The studies that produced significant results found significantly higher increases (or less decreases) in profits than studies that produce insignificant results. The general effect remains a reduction in profits though when only significant results are included.[119] This indicates that the more reliable studies found a significantly better profit performance. This could point to a (unintentional) bias of researchers. It is however not possible to draw a final conclusion based on the available information. Explanation for this difference is thus a case for future research.

The variable that indicates the 10% significance level has a significant and positive influence, compared to the reference significance level of 5%. This indicates that higher increases (or lower decreases) in profits are found by studies with a lower level of significance. Hereby should be noted that none of the studies' results are significant at the 1% level. The above indicates that studies with results significant at the 10% level found a better (or less worse) profit performance than those with results significant at the 5% level, and that studies with significant results found higher increases (or lower decrease) of profits than those with insignificant results. This indicates that studies with results that are significant between the 5-10% level find the largest increase in profits.

The causes for this phenomenon are an issue that future research could further analyse.

## 5.4 Alternative Regression Methods

Again several alternative calculation methods are reviewed. When the stepwise regression analysis is performed with the p-value stopping criterion set at 0.1[120] the results are not affected. The results stay exactly the same as in the basic profit effects model.[121]

[118] This is a case for comparative international competition law though.
[119] When other significant variables are not fulfilled; -.0168 + 0.044 is still negative.
[120] Instead of the previously used stopping criterion of 0.5.
[121] Because the results are the same as those from the basic model, the results are presented in the appendix to save space. See B.3.

When the model is estimated using the forward uni-directional method, the results also remain unchanged.[121] These alternative estimation methods thus do not influence the results.

In the section that describes the independent variables it is discussed that the post-merger time period has been adjusted. Time periods shorter than half a year have been set to half a year, this because of the large difference in values of a post-merger period of 3 years and that of 1 day (0.00274 year). When the post-merger time period is not minimized at 0.5 year, the results of the basic model are not changed.[121]

Raising the number of included variables by one, thus having four variables gives the results as in the table below.[122] The extra included variable, indicating the post-merger time period, does not have a significant influence and also does not pivotally affect the other variables. Adding this variable does however increase the influence of the significant variables, and raises the explanatory power of the model. Due to the restricted number of observations this model is not preferable though, but is does confirm the results of the basic model.

| Dependent Variable: | EFFECT_PROFITS; extra regressor | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 8 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Stepwise forwards | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 | | | |
| Stopping criterion: | Number of search regressors = **4** | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| **C** | **-0.219** | 0.055 | -3.980 | 0.0284 |
| **REGION="USA"** | **0.161** | 0.029 | 5.503 | 0.0118 |
| **SIGNIFICANCY_LEVEL__=10** | **0.158** | 0.030 | 5.285 | 0.0132 |
| **SIGNIFICANT** | **0.059** | 0.020 | 3.002 | 0.0576 |
| YEARS_POST_M_A_1 | 0.010 | 0.009 | 1.101 | 0.3512 |
| R-squared | 0.952 | | | |
| Adjusted R-squared | 0.889 | Mean dependent var | | 0.007 |
| S.E. of regression | 0.016 | S.D. dependent var | | 0.048 |
| Sum squared residual | 0.001 | Akaike info criterion | | -5.164 |
| Log likelihood | 25.658 | Schwarz criterion | | -5.115 |
| F-statistic | 15.007 | Hannan-Quinn criter. | | -5.499 |
| Prob(F-statistic) | 0.025 | Durbin-Watson stat | | 1.983 |

Variables significant at least at the 10 % level are in bold.

[122] In the basic model 3 variable are included (8/2.5=3.2), because of the low number of variables one extra is added to evaluate the effect. Formally for these 4 variables, 10 (=4*2.5) observations would be required.

## 5.5 Conclusion on Profit Effects

The meta-analysis on the profits effects of mergers and acquisitions finds that in general the profits are reduced, if the studies do not fulfil the significant characteristics. The significant characteristics have a strong influence on the outcome that is found. Future research is needed to explain the found influences, but some indication is given.

Studies that analyse the effects of mergers and acquisitions on profits find significantly higher increases (or less decreases) in profits when they analyse mergers and acquisitions in the USA compared with the EU. This variable has a strong influence. An explanation that is offered in the literature is that firms have more flexibility in the USA to reorganize the newly merged firms due to more flexible labour laws. This explanation is however not supported by the results of the meta-analysis on the cost effects, as these results did not show a better cost performance in the USA. An alternative explanation related to increased revenue, is that firms in the USA could be able to obtain more market power.

Additionally, the studies that find significant results, seen as the more reliable studies, find a higher increase (or lower decrease) of profits. Furthermore, higher increases (or lower decreases) in profits are found by studies with results that are significant at the 10% level, than by studies significant at the 5% level.

The general profit decreasing effect can change into a positive effect when a combination of the characteristics is fulfilled, such as when only observing significant results of studies on the USA.

Alternatively estimating the model with a lower p-value stopping criterion, does not affect the results. Neither does estimating the model using uni-directional regression method change the results. When the unadjusted time period is used the results are unchanged as well. If the maximum number of independent variables is raised by one, the extra variable is not significant. The results are also not pivotally changed.

It was surprising to not find a significant influence of the sector that was analysed. This was expected because of the large differences in production facilities and markets between the various sectors. Also a difference was expected between horizontal and non-horizontal mergers and acquisitions. As these have different effects on the market and on the market power of the firms involved. Furthermore is was surprising not to find a significant influence of the distinction between analysing only domestic mergers and acquisitions, and analysing cross border deals as well. This as entering new geographical markets, and thus increasing revenues, is a common reason for mergers and acquisitions and entering these markets should then impact profits.

# 6 Results Stock Price Effects

This Chapter gives the results of the stepwise meta-analysis on the results found by the studies that analyse the effects of mergers and acquisitions on stock prices.

This Chapter is organised as follows: it first describes any relevant adjustments of the model. Then the results and the cohering model are presented, followed by a discussion of the significant variables, and the alternative estimation models. The chapter is closed by a conclusion on the results.

## 6.1 Model

First a check of the observations and variables is performed. The descriptive statistics of the independent variables are presented below.

| Descriptive statistics<br>No. Observations: | Stock price-effects<br>31 | | | | | |
|---|---|---|---|---|---|---|
| Variable | Mean | median | maximum | minimum | standard deviation | reference |
| Region | | | | | | |
| EU | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| OTHER | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| USA | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | |
| Sector | | | | | | |
| ALL | 0.516 | 1.000 | 1.000 | 0.000 | 0.508 | X |
| FINANCE | 0.065 | 0.000 | 1.000 | 0.000 | 0.250 | |
| MM+ALL_EXCL | 0.355 | 0.000 | 1.000 | 0.000 | 0.486 | |
| PUBLIC SERV | 0.065 | 0.000 | 1.000 | 0.000 | 0.250 | |
| Cross border | | | | | | |
| CROSS BORDER | 0.032 | 0.000 | 1.000 | 0.000 | 0.180 | X |
| DOMESTIC | 0.968 | 1.000 | 1.000 | 0.000 | 0.180 | |
| Type | | | | | | |
| (TYPE_HORIZONTAL=0 AND NON_HORIZONTAL=1) | 0.161 | 0.000 | 1.000 | 0.000 | 0.374 | |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | 0.226 | 0.000 | 1.000 | 0.000 | 0.425 | |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=1) | 0.613 | 1.000 | 1.000 | 0.000 | 0.495 | X |
| Benchmark | | | | | | |
| ITSELF | 0.194 | 0.000 | 1.000 | 0.000 | 0.402 | X |
| PEERS | 0.806 | 1.000 | 1.000 | 0.000 | 0.402 | |
| Acquirer | | | | | | |
| (ACQUIRER=0 AND TARGET=1) | 0.194 | 0.000 | 1.000 | 0.000 | 0.402 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| (ACQUIRER=1 AND TARGET=0) | 0.387 | 0.000 | 1.000 | 0.000 | 0.495 | |
| (ACQUIRER=1 AND TARGET=1) | 0.420 | 0.000 | 1.000 | 0.000 | 0.502 | X |
| Quality | | | | | | |
| A | 0.226 | 0.000 | 1.000 | 0.000 | 0.425 | |
| AA | 0.097 | 0.000 | 1.000 | 0.000 | 0.301 | |
| B | 0.226 | 0.000 | 1.000 | 0.000 | 0.425 | X |
| C | 0.355 | 0.000 | 1.000 | 0.000 | 0.486 | |
| N | 0.097 | 0.000 | 1.000 | 0.000 | 0.301 | |
| No Mergers | 518.936 | 196.000 | 3688.000 | 2.000 | 806.068 | |
| Time period | | | | | | |
| Y__1960 | 0.129 | 0.000 | 1.000 | 0.000 | 0.341 | |
| Y_1960_1969 | 0.355 | 0.000 | 1.000 | 0.000 | 0.486 | |
| Y_1970_1979 | 0.581 | 1.000 | 1.000 | 0.000 | 0.502 | |
| Y_1980_1989 | 0.581 | 1.000 | 1.000 | 0.000 | 0.502 | |
| Y_1990_1999 | 0.290 | 0.000 | 1.000 | 0.000 | 0.461 | X |
| Y_2000_ | 0.097 | 0.000 | 1.000 | 0.000 | 0.301 | |
| YEARS POST | 1.629 | 0.500 | 6.000 | 0.500 | 1.987 | |
| THRESHOLD | 0.871 | 1.000 | 1.000 | 0.000 | 0.341 | |
| LARGE DEALS | 0.194 | 0.000 | 1.000 | 0.000 | 0.402 | |
| SIGNIFICANT | 0.839 | 1.000 | 1.000 | 0.000 | 0.374 | |
| Significance Level | | | | | | |
| 1 | 0.452 | 0.000 | 1.000 | 0.000 | 0.506 | |
| 5 | 0.290 | 0.000 | 1.000 | 0.000 | 0.461 | X |
| 10 | 0.258 | 0.000 | 1.000 | 0.000 | 0.445 | |

The largest number of studies in the dataset analyse the effects on stock prices. This means that the results of this meta-analysis will be more robust, and that a larger maximum number of independent variables can be set. Despite of the larger number of observations one variable cannot be included, this is the region variable.

Region

This variable cannot be included since all the studies that analyse the stock price effect were performed on mergers and acquisitions in the USA. It can thus not be analysed if the results differ for the different regions.

Excluding the region variable leaves the potential stock price model to be estimated:

$$EFFECT\_STOCKPRICE_j = \beta_0 + \beta_1 * SECTOR + \beta_2 * CROSS\_BORDER + \beta_3 * TYPE + \beta_4 * BENCHMARK + \beta_5 * ACQUIRER + \beta_6 * QUALITY + \beta_7 * NO\_MERGERS + \beta_8 * TIME\_PERIOD + \beta_9 * YEARS\_POST + \beta_{10} * THRESHOLD + \beta_{11} * LARGEDEALS + \beta_{12} * SIGNIFICANT + \beta_{13} * SIGNIFICANCE\ LEVEL + \varepsilon_j$$

## 6.2 Estimation Results

The effects on stock prices is analysed by 31 studies this means that the maximum number of meta-independent variables to be included is set at 12. Estimating the stepwise regression gives the following results:

| Dependent Variable: | EFFECT_STOCKPRICE | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 31 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Stepwise forwards | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 | | | |
| Stopping criterion: | Number of search regressors = 12 | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| **C** | **0.175** | 0.073 | 2.418 | 0.0264 |
| **(ACQUIRER=0 AND TARGET=1)** | **0.203** | 0.025 | 8.234 | 0.0000 |
| **YEARS_POST_M_A_1** | **-0.025** | 0.006 | -3.979 | 0.0009 |
| THRESHOLD | 0.043 | 0.043 | 1.004 | 0.3287 |
| **SECTOR_GROUP_ADJ= "Public services"** | **0.225** | 0.060 | 3.777 | 0.0014 |
| **SIGNIFICANT** | **-0.143** | 0.028 | -5.111 | 0.0001 |
| **SIGNIFICANCY_LEVEL__=10** | **-0.122** | 0.031 | -3.964 | 0.0009 |
| **Y_1960_1969** | **0.061** | 0.024 | 2.489 | 0.0228 |
| **M_A_AREA="domestic"** | **-0.139** | 0.056 | -2.484 | 0.0230 |
| **QUALITY_OUTLET_CLASS="A"** | **0.070** | 0.029 | 2.409 | 0.0269 |
| **QUALITY_OUTLET_CLASS="AA"** | **0.063** | 0.036 | 1.735 | 0.0998 |
| **Y_1970_1979** | **0.042** | 0.024 | 1.762 | 0.0951 |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | 0.042 | 0.026 | 1.606 | 0.1257 |
| R-squared | 0.918 | | | |
| Adjusted R-squared | 0.863 | Mean dependent var | | 0.018 |
| S.E. of regression | 0.046 | S.D. dependent var | | 0.124 |
| Sum squared residual | 0.038 | Akaike info criterion | | -3.022 |
| Log likelihood | 59.844 | Schwarz criterion | | -2.421 |
| F-statistic | 16.683 | Hannan-Quinn criter. | | -2.826 |
| Prob(F-statistic) | 0.000 | Durbin-Watson stat | | 2.934 |

Variables significant at least at the 10 % level are in bold

The results present the meta-independent variables that are included in the basic model that is estimated by the stepwise regression. The model that is estimated is thus:

$$EFFECT\_STOCKPRICE_j = \beta_0 + \beta_1 * SECTOR + \beta_2 * CROSS\_BORDER + \beta_3 * TYPE + \beta_4 * ACQUIRER + \beta_5 * QUALITY + \beta_6 * TIME\_PERIOD + \beta_7 * YEARS\_POST + \beta_8 * THRESHOLD + \beta_9 * SIGNIFICANT + \beta_{10} * SIGNIFICANCE\ LEVEL + \varepsilon_j$$

The results of the stepwise regression analysis show that eleven of the thirteen included variables have a significant influence on the results that are found. The $R^2$ of the model is quite high, which indicates that the included meta-independent variables for a large part explain the results that are found by the studies on the stock price effects.

In general a large significant increase in stock prices is found by this meta-analysis for stock price effect studies analysing mergers and acquisitions that do not fulfil the significant variables. The significant variables greatly influence the outcome of the stock price effects, they are discussed now.

## 6.3 Variables Influencing Stock Price Results

**Sector**

The variable that indicates the public services sector has a significant influence on the results that the studies find. This influence is large and positive.

This indicates that studies that analyse the public services sector find larger stock price increases (or lower decreases) than those that analyse the other sectors. The out-performance of the public services industry can be caused by the fact that this industry has been privatised more recently. This industry could thus be less developed and have more lucrative deals available, as there is (for instance) more room for efficiency improvement.[123] These more lucrative deals could lead to better stock price returns. However future research is needed to determine the best explanation for the higher returns in the public services industry.

Changing the reference sector between 'ALL' and the finance sector, as used for the previous effect classes, produced the same results. These results can be found in the appendix.[124]

[123] Basic economic theory and in specific G.K. Deans, F. Kroeger and S. Zeisel, 2002, The consolidation curve, All industries have similar life cycles.., *Harvard Business Review,* 2002, No. 12, pp. 20 – 21. And K. Ktiemani. V. Scott and N. Waiters, 2005, Conquering the Consolidation Curve, *Electric perspectives*, 2005, sept/okt. pp. 75 – 79.

[124] In this analysis is the sector ALL set as reference because more studies analyse this sector, making it a better reference. As the results are unchanged, the results are placed in the appendix to save space. See B.4.

**Cross border**

The variable that indicates if the studies analyse domestic mergers and acquisitions compared to domestic and cross border deals is significant. It has a large negative influence, what means that if studies only analyse domestic mergers and acquisitions they find significantly lower (or less high) stock price effects. Clarification for this difference is inconclusive as there is no clear explanation in the literature.

The study of Gugler et. al. does not find significant differences between domestic and cross border deals, it analyses mergers and acquisitions from different sectors and all around the world.[125] However the study of Altubas and Ibanez on the banking sector, does find higher returns for cross border deals.[126] However they relate the out-performance to industry specific merger reasons. The previous mentioned study focuses on one sector. More in general can the out-performance of cross border mergers and acquisitions, with care, be linked to other grounds. It is very well possible that firms which undertake cross border deals outperform because they have a larger universe of possible partners/targets. This can allow them to find better merger and acquisition partners, which is rewarded by investors. Furthermore, an often stated reason for mergers and acquisitions is to enter new geographical markets.[127] This can be positively appreciated by investors. However there are many other possible grounds, a cross border deal can make the firm visible to more consumers and investors, or it is possible that cross border deals are undertaken by more ambitious firms who want to benefit from the increasing globalisation.[128] This discussion falls outside the reach of this work and so more research will be needed to determine the cause of the higher returns for cross border deals.

**Acquirer**

The variable that indicate that the stock prices are only analysed for the targets is, large positive and significant. This indicates that, studies which analyse the effects of merger and acquisitions for target firms find a significantly higher increase (or lower decrease) in their stock price.[129] This is an expected and well known result, which is documented extensively in the literature. It indicates that a premium is paid for the target firm, often to persuade the target firm's

[125] K. Gugler, D.C. Mueller, B.B. Yurtoglu, and C. Zulehner, 2003, The effects of mergers: an international comparison, *International Journal of Industrial Organization,* 2003, No. 21, pp. 625–653.
[126] Y. Altunbas and D.M. Ibáñez, 2004, Mergers and Acquisitions and Bank Performance in Europe the Role of Strategic Similarities, *Not published,* ECB Working Paper Series NO. 398 / October 2004.
[127] A.L. Ranft and S.J. Marsh, 2008, Accessing knowledge through acquisitions and alliances: an empirical examination of new market entry, *Journal of Managerial Issues*, Vol. 20 Issue 1, pp. 51-67.
[128] M. Martynova and L. Renneboog, 2008, A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance,* 2008, no. 32, pp. 2148–2177.
[129] Compared to acquirers, and the combination of acquirers and targets.

shareholders to agree with the takeover. There is no significant difference in the stock price effects for acquiring firms and the reference combination of target and acquiring firms. This result is in line with empirical studies that find a small negative, to no effects for the acquiring firm.[130]

**Quality**

The proxy variables that indicate the quality of the studies are significant and positive for studies in the higher class journals, those rated AA and A. However there is no significant difference between studies published in B, and C rated journals or unpublished studies. This means that studies that are published in higher rated journals find significantly higher (or less low) stock market returns than studies published in lower rated journals or not published at all. This indicates a possible publication bias. The studies of Florax, and De Long show that the existence of a publication bias of editors of economic journals is not unrealistic, and at least the idea that it exists could lead to self-censoring by authors.[131]

The distinction that is found between for the higher rated journals would support this hypothesis. Disregarded the reason it is striking that there is an indication that the higher rated journals appear to publish, what could be called, biased results. However, opponents of this conclusion could state that these are higher quality studies which use higher-quality techniques and are thus able to find results closer to 'the true' effect, which is a higher performance. The reason for the difference in outcomes between the studies published in differently rated journals falls outside the reach of this thesis, and will need to be researched further.

**Time period**

The dummy variables that indicate that the studies analyse the time periods between 1960 and 1969, and 1970 and 1979 are significant and positive. This indicates that higher (or less low) stock prices are found when these time periods are analysed. The study of Agrawal, analyses different time periods and overall finds negative returns except in the 1970's.[132] However the authors do not give a clear explanation for this occurrence. They only state that, financial markets had

[130] See among others: A. Banerjee and E.W. Eckard, 1998, Are Mega-Mergers Anticompetitive? Evidence from the First Great Merger Wave, *The RAND Journal of Economics*, 1998, Vol. 29, No. 4, pp. 803-827; B.E. Eckbo, 1985, Mergers and the Market Concentration Doctrine: Evidence from the Capital Market, *The Journal of Business*, 1985, Vol. 58, No. 3. (Jul), pp. 325-349.

[131] B.J. De Long and K. Lang, 1992, "Are All Economic Hypotheses False?", *Journal of Political Economy*, Vol. 100, No. 6, pp. 1257-1272 ; R.J.G.M Florax, H.L.F. de Groot and R.A. de Mooij, 2002, Meta-analysis: A tool for upgrading inputs of macroeconomic policy models, *Not published, Tinbergen Institute Discussion Paper*, TI 2002-041/3, p. 9.

[132] A. Agrawal, J.F. Jaffe and G.N. Mandelker, 1992, The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly**,** *The Journal of Finance*, 1992, Vol. 47, No. 4, pp. 1605-1621.

not become more efficient over the analysed time period, and that it is possible that the market is slow to adjust to the merger event.

Financial markets have become much faster due to the information technology revolution that occurred after the Agrawal study, but this did not lead to higher returns. Quite the opposite, higher returns are found in the older time periods.

A different cause could be found in the merger wave theory. The variables indicate that the stock price returns were larger for the 1960 – 1969 and 1970 – 1979 time period. The merger wave that occurred roughly from 1966 – 1973 does fall into these time periods. The research by Harford has shown stock price returns to be higher inside a merger wave.[133] However there were also merger waves in the 1980s and 1990s, but no higher performance is found for these time periods. Making the merger wave out-performance explanation less likely.

Besides this, over the years more stringent antitrust and competition laws have been introduced and enforced.[134] This can explain less high stock price returns in more recent years. Since a main motive for mergers and acquisitions, obtaining more market power, had thus become more difficult to obtain. However, this is a legal discussion. Although at least some investors likely reduced the benefits of this merger motivation in their stock price valuations. Nonetheless, (as indicated in the theoretical section on mergers and acquisitions) other factors have also changed over time. Such as the driving forces behind merger and acquisition waves. The explanation could well lay in these other factors, so further research is needed to explain the out-performance of the 1960 – 1979 time period.

**Post-merger years**

The variable indicating the number of post-merger years is significant and negative. This indicates that if studies analyse a longer time period following mergers and acquisitions they find lower stock prices, or the increase in stock prices declines. The decreasing effect on stock prices of a longer post-merger time period can be a consequence of numerous factors. Such as a high stock price increase as a positive reaction to the merger announcement and the completion of the deal, followed by a decrease in stock prices due to later occurring difficulties with the takeover or failing to meet (the high) expectations. However this is a discussion that essentially belongs to the discipline of stock market analysis. Nevertheless the cause will need to be analysed further by future research.

[133] J. Harford, 2003, Efficient and Distortional Components to Industry Merger Waves, *Not published,* University of Washington AFA 2004 San Diego Meetings.

[134] For instance the introduction in 1976 of the Hart Scott Radino-act, that required firms planning mergers and acquisition to notify the DOJ and FTC, and wait for 30 days of examination. For more on this see. Douglas F. Broder, Julian Maitland-Walker, 2005, *A Guide to US antitrust law*, Thomson, Sweet and Maxwell, London, 2005, from p. 31.

**Significant and Significance level**

The variable that indicates if the results of the studies are significant or not is itself significant in the meta-analysis, and it has a negative influence. This indicates that studies that produce significant results, and thus more reliable results, found significantly lower (or less high) stock price effects.

The variable indicating the 10% level of significance is also negative and significant. There is no significant difference, though, between studies significant at the 5 and 1 percent level. This indicates that the more trustworthy studies, those significant at the 1% and 5% level, produce higher (or less negative) stock price effects than those studies that are only significant at the lowest level (10%) or not significant at all. It is possible that the underlying reason is grounded in the volatility of the stock market. In the sense that less significant effects are found by studies that have a larger stock price volatility in their sample, thus when financial markets are 'more nervous'. In more nervous markets stock prices move strongly positive or negative. Previous positive stock price reactions could thus be cancelled out by nervous actions. However with the current information it is not possible to explain the outcome, so more research is needed on this subject.

**Insignificant variables**

The stepwise regression model also included two insignificant variables. These variables are the ones that indicate the type of merger and if the study imposes a threshold of any level for the studies that is analyses. These variables did not relevantly influence the results and are thus not discussed further. When the regression is estimated with alternative settings this will influence the inclusion of the variables and thus the model, this is discussed below.

## 6.4 Alternative Regression Methods

Several alternative calculation methods are reviewed. When the stepwise regression analysis is performed with the p-value stopping criterion set at 0.1 instead of the previously used 0.5 the results are affected. A number of variables are no longer included in the regression analysis. The results are displayed here.

| | |
|---|---|
| Dependent Variable: | EFFECT_STOCKPRICE; p-value at 0.1 |
| Method:<br>Included observations: | Stepwise Regression<br>31 after adjustments |
| Number of always included regressors:<br>Number of search regressors:<br>Selection method:<br>Stopping criterion:<br>Stopping criterion: | 1<br>27<br>Stepwise forwards<br>p-value forwards/backwards = **0.1/0.1**<br>Number of search regressors = 12 |

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.082 | 0.058 | 1.423 | 0.1682 |
| **(ACQUIRER=0 AND TARGET=1)** | **0.195** | 0.026 | 7.363 | 0.0000 |
| **YEARS_POST_M_A_1** | **-0.037** | 0.006 | -6.529 | 0.0000 |
| **THRESHOLD** | **0.084** | 0.043 | 1.961 | 0.0621 |
| **SECTOR_GROUP_ADJ= "Public services"** | **0.273** | 0.058 | 4.711 | 0.0001 |
| **SIGNIFICANT** | **-0.132** | 0.031 | -4.229 | 0.0003 |
| **SIGNIFICANCY_LEVEL__=10** | **-0.147** | 0.032 | -4.571 | 0.0001 |
| **Y_1960_1969** | **0.044** | 0.023 | 1.928 | 0.0663 |

| | | | |
|---|---|---|---|
| R-squared | 0.868 | | |
| Adjusted R-squared | 0.828 | Mean dependent var | 0.018 |
| S.E. of regression | 0.052 | S.D. dependent var | 0.124 |
| Sum squared residual | 0.061 | Akaike info criterion | -2.873 |
| Log likelihood | 52.538 | Schwarz criterion | -2.503 |
| F-statistic | 21.572 | Hannan-Quinn criter. | -2.753 |
| Prob(F-statistic) | 0.000 | Durbin-Watson stat | 2.954 |

Variables significant at least at the 10 % level are in bold.

From this it is obvious that lowering the stopping criterion of the p-value to 0.1 has multiple effects. Not only are the variables dropped that were above the 0.1 p-value in the basic model, but also several variables that previously were significant (thus below 0.1). This indicates that a different model is estimated. Moreover the constant is no longer significant, indicating that the general result of this model is no longer reliable at the 90% confidence level.

The merger type variable is significant in the basic model and is not included in this alternative model. However the threshold variable is not significant in the basic model, but it becomes significant when the p-value stopping criterion is lowered. The influence of the threshold variable is captured by the variables that are dropped when this alternative model is estimated. The four variables that were

significant in the basic model and that are dropped in this alternative model are: the cross border variable, two dummy variables for the quality proxy, and one dummy variable indicating the analysed time period. The threshold variable has a significantly positive influence. The cross border variable can be linked with the threshold variable, by hypothesising that cross border deals are generally undertaken by larger firms. A link with the quality proxies and the analysed time period of the 1970s is less apparent, but the use of thresholds could differ for this time period. More research is needed to offer explanation though.

Because the basis model produces a significant general effect and gives information on the significant influence of more variables, and because the $R^2$ of the basic model is higher, the basic model is seen as the preferable model. Nevertheless the threshold variable will now be discussed.

**Threshold**

The significant positive influence of the threshold variable indicates that when studies impose a minimum threshold, they find larger stock price increases (or lower stock price decreases. This would be an indication of underperformance by smaller mergers and acquisitions that are excluded because they do not pass the threshold. Possible explanations could range from a lack of market power, to a lower level of attention from investors for smaller stocks.

It is not possible to offer more explanation based on the available data. This partly because a characteristic that was analysed, namely difference in results for small and large deals, does not apply here. This distinction is based on economic theory that states that some firms can become too big to fail. As mentioned before this is a very hot topic due to the current turmoil in financial markets. This does not relate to a threshold of any level particularly since the variable for large deals is not significant. The relation of the effects of using a threshold of any level and the results remains a subject for future research.

**Uni-directional method**

When the model is estimated using the forward uni-directional method, the results remain exactly the same. The results can be found in the appendix.[135] This alternative uni-directional estimation method does not influence the results, and therefore does not require discussion.

**Post-merger years**

In the basic model the post-merger period is set at a minimum of half a year. This to prevent estimation problems due to the large difference between a post merger period of one day (0,00274 year) and of 5 years. Alternatively calculating the regression with the unadjusted post-merger period does not notably affect the

[135] Because the results of the basic model are not changed, the table is placed in the appendix to save space.

regression results. It does not pivotally affect the significance of this variable or of the other variables, or the $R^2$ of the model. The impact on the value of the post-merger variable is presented below.[136] Where 'YEARS_POST_M_A_1' indicates the value adjusted to 0,5 and YEARS_POST_M_A the unadjusted value:

| Stock Price<br>Post-merger years | Coefficient | Std. Error | t-Statistic | Prob. | model $R^2$ |
|---|---|---|---|---|---|
| YEARS_POST_M_A_1 | **-0.025** | 0.006 | -3.979 | 0.0009 | 0.918 |
| YEARS_POST_M_A | **-0.023** | 0.006 | -4.036 | 0.0008 | 0.919 |

[136] Because using this alternative variable did not change the outcome of the basic model, the full results are presented in the appendix to save space. See B.4.

## 6.5 Conclusion on Stock Price Effects

In general this meta-analysis finds a significant increase in stock prices for studies that analyse the effects of mergers and acquisition which do not fulfil the variables that have a significant influence on the results. These variables have a large influence on the results that are found. They for a large part explain the variance in the results found by the studies on stock price effects. More research is needed to explain the observed influences, however some possible explanations can be given.

If studies analyse the public services sector they find significantly higher (or less negative) stock prices. These higher results could be due to the fact that this sector has been privatized more recently, causing more lucrative deals to be available. Investors recognise this causing a better stock price performance. This variable has the strongest effects on the results.

When studies focus on domestic mergers and acquisitions they find significantly lower increases (or larger decreases) in stock prices than when they also analyse cross border deals. Possible explanations could be the availability of better merger partners, or could lay in different characteristics of the firms that undertake cross border mergers and acquisitions, such as growth ambitions.

There is a large significant difference in the results that are found depending on whether the effects are analysed for the target, or for the acquirer and the combination of acquirer and target. It has one of the strongest influences. The target firms receive larger (or less negative) increases in stock prices. This is a well known outcome that is found by numerous studies, and it is confirmed by the outcome of this meta-analysis. The higher stock price returns are attributed to a premium that is paid to the shareholders of the target firm to convince them to approve the deal.

Studies which are published in the higher rated journals, those rated AA and A, find significantly higher (or less negative) stock price effects than studies published in lower rated journals or in unpublished studies. This points to the presence of a (possibly self imposed) publication bias, however this needs to be confirmed.

Two significant time period variables are found, indicating that when studies analyse the 1960s and 1970s they find significantly higher (or less negative) stock price returns. A likely explanation for this lays in the more stringent enforcement of competition laws.

The results of the studies on the stock price effects are also influenced by the post-merger time period that is analysed. A longer analysed time period produces significantly more negative (or less positive) results. One could speculate that during a longer time period more external factors influence the results. It is striking though that the meta-analysis on the cost effects finds a positive influence of a

longer post-merger period on the cost performance. These results are thus not in line with each other, as a better cost performance should lead to higher stock prices. On the other hand, when a longer time period is analysed the stock price can be influenced by numerous internal and external factors that are unrelated to the merger, and which cannot be clearly identified. These factors are not corrected for in the effect studies.

Significantly more negative (or less positive) results are found by studies whose results are significant at the lowest level. Additionally, more negative (or less positive) results are found by studies that produce significant, and thus more reliable, results. The insignificant results could occur in more nervous markets.

The general stock price increasing effect of mergers and acquisitions that is found is thus strongly influenced by multiple study characteristics. These characteristics can further increase the general effect (such as when targets in the public services sector are analysed), or the general effect can turn into a decrease of stock prices (such as when only significant results are included from studies on domestic mergers and acquisitions, and the other variables are not fulfilled).

When a lower p-value stopping criterion is set, then the variables indicating cross border, quality and time period are not included in the model. They are replaced by the variable indicating the use of a threshold, the link with the excluded variables is not clear. However the fact that the threshold variable has a significant influence in the alternative model indicates that the results of a study can be influenced by whether or not the study imposes any level of minimum threshold.

A large number of variables have shown to be of influence of the stock price results that are found. It was expected though that only analysing large deals would also have a significant influence. This because in the current financial turmoil it is often stated that some firms have become too big to fail. The insignificance of only analysing large deals does not support the case that investors act on these statements by valuing large deals higher.

It is remarkable that, unlike in the case of stock prices, the meta-analysis on the profit effects did not find an out-performance of analysing cross border deals. This would indicate that the positive effects that are expected by investors are not followed by higher realized profits. This anomaly is an issue that future research could analyse.

Additionally this meta-analysis does not find support for the theory of Fridolfsson and Stennek that measuring stock prices against peers leads to biased results.[137] This as no significant difference is found between setting the peers' or the firm's own pre-merger performance as benchmark.

[137] S.O. Fridolfsson and J. Stennek, 2005, Why mergers reduce profits and raise share prices—a theory of pre-emptive mergers, *Journal of the European Economic Association,* 2005, Vol. 3, No. 5, pp. 1083–1104.

# 7 General Conclusion

The aim of this thesis is to find the general effects of mergers and acquisitions on costs, profits, and stock prices as well as to determine which study characteristics influence the results. This to provide clarification on the often conflicting messages in the literature on the effects of mergers and acquisitions. It is the first meta-analysis on the effects of mergers and acquisitions, and it is performed using a stepwise least squares regression analysis.

This Chapter presents the general conclusion. It is constructed as follows. First the conclusions on the three effect areas are presented, and then the second section presents issues for future research.

## 7.1 The effects on costs, profits and stock prices

This meta-analysis finds the following results for studies that do not fulfil the characteristics indicated by the significant variables. In general an increase in costs is found following mergers and acquisitions. The general effect on profits is a reduction in profits, whereas in general an increase in stock prices is found. The general effects are strongly influenced by the characteristics of the study, and can even be reversed dependent on which characteristics are fulfilled.

One of the striking results is to find that in all three effect areas there is a significant difference in the results of the studies with significant results (the more reliable results) and those with insignificant results. Moreover there is an inverse relation of significant results to the general effect.

The cost effect analysis in general finds an increase in costs, while the results of significant studies show virtually no cost increasing effects. In the case of the profits the general effect is a decrease of profits, while less negative results are found by the significant studies. The stock price analysis in general finds an increase in stock prices, yet less stock price increasing results are found by the significant studies. A common explanation is that, more reliable (significant) studies show less extreme results. However more analysis is required to clarify this inverse relation and the fact that negative effects are found on costs and profits, while the stock price effects are positive.

This meta-analysis finds that various different characteristics significantly influence the results that the studies find. They are presented next, because the difference between significant and insignificant results is discussed above, this is not repeated. Part of the influencing characteristics is explained by existing research, but for most characteristics more research is needed to explain their influence.

The results of studies on the cost effects of mergers and acquisitions are influenced the strongest by analysing the post-2000 time period. It leads to cost increasing (or less decreasing) effects being found. Whereas analysing a longer post merger time period and only analysing acquirers leads to more cost decreasing (or less increasing) effects being found.

Studies on the profit effects of mergers and acquisitions find higher profit increases (or lower decreases) when they only analyse deals in the USA.

The results of studies on the stock price effects are influenced by multiple characteristics of the study. Only analysing targets and analysing the public services sector have the biggest influence and both lead to higher (or less negative) stock price effects being found. Furthermore, higher (or less negative) stock prices are found in studies that are published in higher ranked journals, which can be seen as a proxy for the quality of the studies. Higher increases (or lower decreases) in stock prices are also found by studies that analyse deals that took place between 1960 and 1979. Whereas larger reductions (or less increases) in stock prices are found by studies analysing only domestic deals, and by studies analysing a longer post merger time period.

Perhaps unnecessarily one is reminded that, the influences of the characteristics can reinforce or cancel out the effects when multiple characteristics are fulfilled.

It can be concluded that there do not appear to be characteristics that have the same positive or negative influence on the results in the different effect fields. This is unexpected, as it seemed logical that a characteristic that has a positive influence on costs would also have a positive influence on profits, and that this would be translated into positive stock price effects. Moreover it is shown that several characteristics even have an opposite influence in different effect areas.

The number of post-merger years that a study analyses influences the results that are found. Strikingly however it is of conflicting influence. Leading to more positive (or less negative) results in case of cost effects analysis, but to more negative (or less positive) results in case of stock prices analyses. The influence on costs can be explained as it can take time before merger synergies are achieved, thus letting it take some time to achieve cost improvements. However if stock prices are analysed over a longer time period, the results are more negative (or less positive). This could be the consequence of external influences on the stock price unrelated to the merger or acquisition.

Furthermore, when acquirers are analysed the results of cost effect studies are better (or less worse), while the results of stock price studies are higher (or less negative) when targets firms are analysed. The out-performance of the target firms is explained by the premium that is paid to the shareholders of the target firms to persuade them to agree to the deal. However, this meta-analysis shows that the acquiring firms improve their cost performance, but that this is not reflected in the stock prices.

An important conclusion is that the results of studies on mergers and acquisition are influenced by numerous characteristics of the studies, and that the effect areas are each influenced by specific characteristics.

It is very well possible that the results are also influenced by other factors that were not analysed here. These factors are not easily quantifiable, such as the employees' sentiment regarding the merger or acquisition. Research in the field of organisational economics has shown that the success of a merger can be strongly influenced by factors such as the support of the employees for the merger and the different corporate cultures.[138] For now this meta-analysis has shows various factors that influence the results that are found on the effects of mergers and acquisitions. Researchers and readers should be aware of these influencing factors when evaluating the effects of mergers and acquisitions. It also underwrites the importance for researchers to well describe and justify their data selection.

## 7.2 Limitations and future research

The results show that the different effect areas are each influenced by specific characteristics. There are some limitations on the results that are found though.

This thesis does provide careful explanation for the influencing characteristics. However it goes beyond the reach of this thesis to examine what drives the influences that are found, since this thesis mainly aims to analyse the variance that is found in the effects of mergers and acquisitions. Future research could further analyse the influencing factors, suggestions therefore are presented later.

Analysing the effect areas with a larger number of observations would provide more reliable results. The current number of observations (especially on the profit effects) is quite limited. Furthermore, a deeper analysis is possible by also analysing studies that do not present quantitative results. Additionally future research could also focus on (other) specific effects-areas.

Although some indication is given for possible explanations of the observed influences on the characteristics, more research is needed to explain the following influences.

Regarding the cost effect studies, future research could analyse the influence of: only analysing the acquirer, or analysing the years after 2000.

Concerning the profit effect studies, the out-performance of analysing mergers and acquisitions in the USA could be further analysed.

[138] See among others: S. Cartwright and C.L. Cooper, 1990, The Impact of Mergers and Acquisitions on People at work: Existing Research and Issues, *British Journal of Management*, 1990, Vol. 1, pp. 65-76. and R. Larsson and S. Finkelstein, 1999, Integration Strategic, Organizational, and Human Resource Perspectives on Mergers and Acquisitions: A case survey of Synergy Realization, *Organization Science*, 1999, vol. 10, no. 1, pp. 1-21.

In case of the stock price effects, the influence of analysing a longer post merger time period, especially because the opposite relation occurs in case of the cost-effects. Further research can also be performed on the influence of analysing the public services sector. As well as on the influence of analysing the time period from 1960 – 1979. Analysing the influence of including only domestic, or cross border deals as well, is another possibility. The influence of the quality proxy, namely the journal in what the study is published, is also a field of future research.

The difference that is found between the results of studies that produce significant results and those that do not find significant results is an issue for future research that applies to all effect areas. This is also the case for the inverse relation between the results of significant studies and the general results on all the effect areas. Additionally more research could be performed on the opposite influence of the post merger time period on the cost results and on the stock price results. Finally, additional research could be performed on the case that merger targets receive higher increases (or lower decreases) in stock prices, while this meta-analysis shows that analysing acquirers (and not targets) results in higher reductions (or lower increases) of costs being found.

Further analysing these influences is relevant as the results of this thesis indicate their influence on the effects, and because the current literature does not provide clear explanations for the majority of the influences.

# 8 Appendix

## A Dataset

This section will address the data that is used in this meta-analysis. As mentioned before, the selection of studies used in a meta-analysis is of crucial importance. This as only studies that research comparable effects can be included. This has the effect that not all the studies in the data sample could be used, and that a selection had to be made.

The first part of this section addresses the studies that analyse the effects of mergers and acquisitions and are included in the dataset for the meta-analysis. These studies analyse the effects of mergers and acquisitions based on empirical research performed by the authors themselves. These are the studies on which the meta-analysis is performed. These studies and their results are discussed below in more detail specifically for the reader that wants more information on the included studies.

The second part of this section addresses the studies that for a wide variety of reasons have been excluded from the dataset. The reasons why these studies are excluded are described.

The last part of this section addresses the studies that were deemed not applicable because: they were either not relevant, merely performed a literature review, or evaluated the causes for mergers but not the effects.

In the majority of studies no differentiation is made between the effects of mergers and the effect of acquisitions, and their effects are generalized. The effects of Mergers and Acquisitions are here therefore also combined, unless indicated otherwise.

### A.1 Included studies in dataset

The 1992 study of Agrawal, Jaffe and Mandelker analyses the post-merger abnormal stock returns over a period of multiple decades.[139] They find significant negative average returns for the acquiring firm. Their research show severe negative returns for the 50s, 60s, and 80s, but positive returns for the 70s. Yet the results for the 70s are not significant. The authors however do not provide an explanation for this divergence.

[139] A. Agrawal, J.F. Jaffe and G.N. Mandelker, 1992, The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly**,** *The Journal of Finance*, 1992, Vol. 47, No. 4, pp. 1605-1621. Performance measured by Return on Equity. They also analyse the influence of several different strategies, however it would go to far for this work to go into this in detail. For this one is referred to the article.

The 2004 study of Altunbas and Ibáñez analyses post-merger profit performance in the European Banking sector.[140] They analyse both cross-border and domestic mergers and find an increase in performance in both cases, where the increase in performance for cross-border mergers is noticeably higher. The authors relate this higher performance to industry specific reasons, such as diversification of credit risk strategies. However in light of the recent financial crisis this can be seriously drawn into question.

The 2001 study of Andrade, Mitchell and Stafford analyses the stock markets effects of mergers and acquisitions over multiple decades.[141] They find positive abnormal returns over all periods, which they explain by increases in abnormal operating profit performance of the merged firms they analysed. Additionally they also analyse the effects on the profitability.

The 2007 study of Ashton and Pham analyses the cost effects of domestic mergers and acquisitions in the U.K. banking sector.[142] The results show post-merger improvements in bank efficiency, however they state that more research is needed as to why there is little pass through from efficiency gains to prices.

The Avkiran study of 1999 analyses the effects of mergers and acquisitions between the Australian trading banks. They analyse only a small sample and find very diverse results this leads them to state caution in applying their findings in general. The study does not directly present a usable effect size, consequently the effects size used in the meta-analysis had to be calculated by taking the average of the individual results.

The 2004 study of Ballance, Reid and Saal analyses the effects on costs of mergers and acquisitions in the U.K. water industry. They do not find significant effects of the mergers and acquisitions.[143]

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[140] Y. Altunbas and D.M. Ibáñez, 2004, Mergers and Acquisitions and Bank Performance in Europe the Role of Strategic Similarities, *Not published,* ECB Working Paper Series NO. 398 / October 2004.

[141] G. Andrade; M. Mitchell and E. Stafford, 2001, New Evidence and Perspectives on Mergers, *The Journal of Economic Perspectives*, 2001, Vol. 15, No. 2, pp. 103-120. With concern to the three year stock market effect the equal weight result has been included in the dataset. Here all firms in the sample have an equal weighing in the calculation.

[142] J. Ashton and K. Pham, 2007, Efficiency and Price Effects of Horizontal Bank Mergers, *Not published,* ESRC Centre for Competition Policy, University of East Anglia, CCP Working Paper 07-9.

[143] A.J. Balance, S. Reid and D. Saal, Investigation into evidence for economies of scale in the water and sewerage industry in England and Wales, *Not published,* acquired from Stone and Webster Consultants.

The 1998 study of Banerjee and Eckard analyses the effects of the first great merger wave around 1900 in which large markets share mergers took place comparable with the mergers in the 1990's.[144] They find significant positive returns for the participants, which they state are most akin to present day takeover targets.

The 2004 study of Christian and Jones analyses the influence of certain elements to forecast future earnings after a merger.[145] This is done by measuring the influence of earnings and cash flow on abnormal stock returns after a merger. The abnormal stock returns are included in our dataset as well as the effects on cash flow.[146] The study sets no minimum deal value, but it does consider only publicly traded firms. As it sets no further demands related to the index where the stocks should be traded, thus considering large and small cap traded funds, the study is noted as not maintaining a minimum threshold.[147]

They find that in the year of the merger, operating cash flows provide incremental value-relevant information beyond earnings.

The 1995 study of Cosh and Hughes researches the characteristics of U.K. firms that have failed or have been acquired.[148] The study focuses on large mergers.[149] The study showed an insignificant decline in profitability in the three and five years after the mergers. The rate of decline did decrease between the three and five years.

Firms with a higher pre-merger profitability had a higher rate of post merger failures and firms with lower pre-merger profitability had a higher rate of success. The authors conclude this to be the most striking result and that "acquisitions therefore appears to have been the best chance of improving relative profitability when the acquired company was performing poorly relative to its industry prior to acquisition".[150]

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[144] A. Banerjee and E.W. Eckard, 1998, Are Mega-Mergers Anticompetitive? Evidence from the First Great Merger Wave, *The RAND Journal of Economics*, 1998, Vol. 29, No. 4, pp. 803-827.
[145] C. Christian and J.P. Jones, 2004, The Value-Relevance of Earnings and Operating Cash Flows During Mergers, *Managerial Finance, 2004,* Vol. 30, No. 11, pp. 16-29.
[146] The effect size for the cash flow effect was not directly given in the study and has been calculated using the pre- and post-merger figures in the study.
[147] This also because many other studies use this same requirement without mentioning it, for instance by analyzing stock market returns. Furthermore it should be noted that this study only analysis stock mergers, this characteristic could not be included in the dataset as this is the only study to make this distinction.
[148] A. Cosh, A. Hughes, 1995, Failures, acquisitions and post-merger success: the comparative financial characteristics of large and small companies, *not published*, *acquired from ESCR-Center for business research*.
[149] They include all 500 largest mergers in their time period and one out of two of the 1000 largest, and only 1 out 360 of small mergers, based on this at the appropriate variable it has been noted that this study analysis large mergers.
[150] A. Cosh, A. Hughes, 1995, Failures, acquisitions and post-merger success: the comparative financial characteristics of large and small companies, *not published*, p. 21. Additionally they note

The 1979 study of Cubbin and Hall analyses the effects of Mergers and Acquisitions by means of real average costs.[151] This is defined as total costs divided by the price index of inputs multiplied by output.

They perform their analysis on 10 individual merger cases. One of the cases deviates in the sense that the analysis has been performed on an aggregate industry instead of on a individual merger case. The total change in efficiency over a period of several years in the brewing industry has been studied. This case has been excluded from the results of this study for the following reasons. It deviates from the other performed analyses and it does not evaluate the effects of specific mergers. It merely evaluates the development of efficiency over a time period in which mergers occurred. The effect size used in this meta-analysis is the average calculated from the other 9 cases of the Cubbin and Hall study. Furthermore the authors indicate that their result for this case may be overestimated since no adjustments have been made for a number of externalities.

The Kane study of 2000 analyses the announcement stock market effects of mega banking mergers in the USA.[152] They find a non significant announcement-day effect. He does find a difference in effects depending on the size of the banks. His analysis finds that the largest banks receive the largest positive benefits.

An explanation that he provides is that these banks are 'to-big-to-fail', which offers them the possibility to shift risks to taxpayers. By becoming even larger through merging they are expected to be able to reap greater benefits resulting in the measured positive returns. There is no separate effect size given for these biggest mergers as it entitles only a limited number of cases.

The Eckbo study of 1985 analyses the effects of Mergers and Acquisitions to analyse the support for the market concentration doctrine which forms the base of the U.S. anti-mergers laws.[153] The study finds no support for the implications of this doctrine that the benefits of the merger should positively relate to concentration. In their analysis they also analyse the effects of different type of mergers. They find differences in Average Abnormal Returns between non horizontal mergers, horizontal mergers and horizontal challenged mergers. The challenged mergers are mergers in which case the merger was challenged by the government under Section 7 of the Clayton act.

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that larger firms that failed or were acquired performed significantly worse than smaller firms that failed or were acquired.

[151] J. Cubbin and G. Hall, 1979, The use of real cost as an efficiency measure: an application to merging firms, *The Journal of Industrial Economics*, 1979, Vol. 28, No. 1, pp. 73-88.

[152] E.J. Kane, 2000, Incentives for Banking Mega mergers: What Motives Might Regulators Infer from Event- Study Evidence?, *Journal of Money, Credit and Banking*, 2000, Vol. 32, No. 3, Part 2: (August), pp. 671-701.

[153] B.E. Eckbo, 1985, Mergers and the Market Concentration Doctrine: Evidence from the Capital Market, *The Journal of Business*, 1985, Vol. 58, No. 3. (Jul), pp. 325-349.

The Average Abnormal Returns are found to be larger for horizontal mergers than for the non-horizontal mergers, and larger for horizontal challenged mergers than for the horizontal (non-challenged) mergers[154].

The study also differentiates between bidder and target returns and finds large and significant positive returns for the target firms and ambiguous and less significant results for the acquiring firms. The results for horizontal and non horizontal mergers are comparable.

The 2003 study of Engberg, Wholey, Feldman and Christianson analyses the effects of Mergers and Acquisitions in the U.S. Healthcare industry, to be precise in the Health Maintenance Organisation industry.[155] They evaluate the cost effects using the change in returns to scale. The results do not indicate a significant change in costs, for which several possible reasons are given. These range from a lack of opportunities to save money from the mergers to additional (non-cost driven) motives behind the mergers.[156]

The 2002 study of Focarelli, Panetta and Salleo offers a thorough analysis of a large variety of effects of both Mergers and Acquisitions in the Italian banking sector.[157] This is one of the few studies that differentiates between mergers and acquisitions, and analyses their effects separately.

In the case of mergers they find no significant effect on profitability,[158] as the increase of income is overturned by the increase in costs. As a measure of costs they analysed Operating Costs and Labour Costs. The explanation they offer for the rise in costs is that, in case the wage level of the target bank is lower it is usually upgraded, whereas if it is higher it is rarely downgraded. Additionally the rigid labour regulations make it extremely difficult to reduce the workforce. This leads to the analysis that "This regulation-induced rigidity means that mergers

[154] As multiple effect sizes of this study have already been included is this study, only the results for horizontal and non horizontal mergers have been included in the dataset. This because the challenged horizontal mergers are also included in the horizontal merger group, and would otherwise overweigh and furthermore the results are comparable.

[155] J. Engberg, D. Wholey, R. Feldman, and J.B. Christianson, The effect of mergers on firms' costs: evidence from the HMO industry, *The Quarterly Review of Economics and Finance*, 2004, No. 44, pp. 574–600.

[156] For instance, the expansion of market power is indicated; J. Engberg, D. Wholey, R. Feldman, and J.B. Christianson, The effect of mergers on firms' costs: evidence from the HMO industry, *The Quarterly Review of Economics and Finance*, 2004, No. 44, pp. 592-593. The effect size could not be taken directly from the study and had to be computed using the pre- and post-merger figures.

[157] D. Focarelli, F. Panetta, C. Salleo, 2002, Why Do Banks Merge?, *Journal of Money*, *Credit & Banking,* 2002, Vol. 34, Issue 4, pp. 1047-1066. They analyse more effects then can be included in the dataset for this meta-analysis, thus a selection had to be made of which effect to include in the dataset. The main results as stated in their conclusion have been included.

[158] Measured by return to equity before taxes, and return to assets before taxes. D. Focarelli, F. Panetta, C. Salleo, 2002, Why Do Banks Merge?, *Journal of Money*, *Credit & Banking,* 2002, Vol. 34 Issue 4, p. 1061.

motivated by cost-cutting are not likely".[159] The revenues of services do start to increase directly. This leads to their conclusion that expanding revenues from financial services is a strategic objective for mergers.

For acquisitions the analysis finds no significant effects on profits or costs. They do find significant changes with respect to the outstanding loans. This leads them to the conclusion that the strategic objective for acquisitions is improving the quality of the loan portfolio of the passive bank. Since only one other study differentiated between mergers and acquisitions, this variable could not be included in the meta-analysis. The analysed differences could not be included in the dataset. Consequently only the effects of the acquisitions could be included.

Interestingly the profitability of the merged and acquired banks increases strongly and becomes large and significant in the period that is more than three years after the merger or acquisition. However because the study merely denotes this period as 'all years after the third', and does not indicate this time period precisely, these effects could not be included in the dataset.

The Harford study of 2003 analyses the differences in effects of mergers and acquisitions inside and outside merger waves.[160] The results show that mergers that take place in merger wave in general provide higher stock returns and additionally that early mergers in the merger wave generate higher returns than late mergers.[161] This indicates first mover advantages in merger waves. He concludes that herding behaviour likely causes merger waves continue beyond their optimal stopping point. Furthermore mergers in mergers waves are less likely to suffer from managerial hubris. As effect size the 3 day accouchement effect has been taken from the study.

The 2000 study of Harris, Ozgen and Ozcan analyses the change in technical efficiency after a hospital merger using the Data Envelopment Analysis (DEA).[162] The DEA analyses the efficiency based on the best practice frontier.[163]

They find an increase in efficiency and attribute this to an increase in scale efficiencies, rather than to technological efficiencies. As effect size the model with variable returns to scale has been taken. Since this is more realistic than

[159] D. Focarelli, F. Panetta, C. Salleo, 2002, Why Do Banks Merge?, *Journal of Money*, *Credit & Banking,* 2002, Vol. 34 Issue 4, p. 1062.
[160] J. Harford, 2003, Efficient and Distortional Components to Industry Merger Waves, *Not published,* University of Washington AFA 2004 San Diego Meetings.
[161] Early mergers are those in the first 12 month in the 24 month merger wave, late mergers are those in the last 12 months.
[162] J. Harris, H. Ozgen and Y. Ozcan, 2000, Do Mergers Enhance the Performance of Hospital Efficiency?, *The Journal of the Operational Research Society*, 2000, Vol. 51, No. 7, pp. 801 - 811.
[163] This frontier is found by analysing the dataset and finding the most efficient combination between input and output, this combination is given a score of one. The other observations are valued based on their score relative to the found best practice and given a value of between one and zero. The higher the score the closer the entity is to the best practice frontier. Then the change in efficiency score due to the merger is calculated.

assuming constant returns to scale, moreover the authors indicate that the variable returns to scale model identifies a greater number of best-practice establishments.

The 2001 study of Houston, James and Ryngaert analyses the relation between the managerial efficiency estimations at the merger announcement and the abnormal stock returns at the announcement.[164] They find a positive relation between the announced cost savings and positive announcement abnormal stock returns. The abnormal stock returns are nevertheless smaller than the projected change in cost savings.[165] Furthermore they find a negative relation between announced revenue increase and abnormal stock returns. The possible explanation that they offer is that the market does not believe the projected revenue increase will payoff the investment.

The effect sizes for the change in RoA and the combined efficiency ratio could not be drawn directly from the study, and have been calculated using the pre and post merger figures. The combined efficiency ratio has been categorized under the 'other' researched effect category, as this ratio is not comparable with studies to the cost effects.[166]

The 1992 study of Kaplan and Weisbach enlightens by analysing the effects of Mergers and Acquisitions through the evaluation of divestments of previously acquired businesses.[167] This study finds that 44% of the acquisitions completed in the 70's and 80's had been divested by 1989, however this does not mean that all those acquisitions were failures.

Their results show that a slight majority of divestments where not failures, rather they were made with a gain or with no losses.[168] Additionally the study shows that the announcement period abnormal stock returns are significantly lower for acquisitions that turn out to be unsuccessful (failures). This indicates that the market can differentiate between successful and unsuccessful acquisitions when they are announced. The announcement period abnormal stock returns are

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[164] J. F. Houston, C. M. James, M. D. Ryngaert, 2001, Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders, *Journal of Financial Economics,* 2001, Vol. 60, Issues 2-3, pp. 285-331.

[165] The market thus discounts management's gains forecasts, the reasons that they suggest for this are that the market anticipates that management underestimates the merger-costs.

[166] "The combined efficiency ratio is the sum of labour, equipment, and occupancy costs for both the bidder and the target divided by the sum of the taxable equivalent net interest income and noninterest income from nonrecurring items for the bidder and target". J. F. Houston, C. M. James, M. D. Ryngaert, 2001, Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders, *Journal of Financial Economics,* 2001, No. 60, Issues 2-3, p. 322.

[167] S.N. Kaplan, and M.S. Weisbash, 1992, The Success of Acquisitions: Evidence from Divestitures, *The Journal of Finance*, 1992, Vol. 47, No. 1, pp. 107-138.

[168] The authors compared the divestment selling price with the acquisition price based on accounting data, and also evaluated if the divestment is states as being a failure, by the firms itself or by analysts. S.N. Kaplan, and M.S. Weisbash, 1992, The Success of Acquisitions: Evidence from Divestitures, *The Journal of Finance*, 1992, Vol. 47, No. 1, pp. 109-114.

slightly negative for the acquirer, positive for the target and the combined returns are also positive.

Furthermore they find non-significant, slightly higher announcement period abnormal stock returns for acquisitions which are-not subsequently divested, compared to divested acquisitions. Finally they find that diversifying acquisitions were extensively more likely to be divested, however the success rates of diversifying acquisitions and related acquisitions mainly did not show significant differences[169]. The authors conclude that the targets are generally worth more then they were before the merger, but less that what the acquirer pays.

The Koetter study of 2005 analyses the effects of Mergers and Acquisitions in the German banking industry.[170] He finds that banks only slightly increase their post-merger cost efficiency. From this he concludes that the transfer of skill following mergers is fairly low. Furthermore he finds that mergers involving distressed targets have a higher success rate, also banks that absorb multiple targets are more successful.

The 2007 study of Kwoka and Pollitt analyses the effects of Merger and Acquisitions in the U.S. electricity industry.[171] They use the Data Envelopment Analysis to compare the performance with the best practice frontier. They find that the acquiring firms are less well performing firms, whereas the targets are better performing firms. Moreover the out-performance of the targets declines in the post-merger years, and the acquirer's initial increase in performance over the years turns into a decline in performance.[172] The authors present the following possible reasons behind the results, which are managerial motives, mistakes prompted by restructuring, and defensive mergers. However they do not present proof for these motives.

The 1972 study of Lev and Mandelker analyses microeconomic effects of Mergers and Acquisitions.[173] The study literally states it only analyses large acquisitions. The study finds positive, though not significant, stock returns for acquirers relative to non-merging firms.[174]Based on the values of the confidence

[169] They indicate multiple explanations for this, related acquisitions which would have been integrated would be more difficult to divest, changes in regulation could make previous acquisitions less optimal. For more details, one is referred to the article.
[170] M. Koetter, 2005, Evaluating the German Bank Merger Wave, *Not published,* Tjalling C. Koopmans Research Institute, Utrecht School of Economics, Discussion Paper Series 05-16.
[171] J. Kwoka and M. Pollitt, 2007, Industry Restructuring, Mergers, and Efficiency: Evidence from Electric Power, *Not published,* Cambridge University working paper, CWPE 0725& EPRG 0708.
[172] They present the results for multiple years. For the dataset the results for one and five years are chosen. The shortest time period result given and a medium term result.
[173] B. Lev and G. Mandelker, 1972, The Microeconomic Consequences of Corporate Mergers, *The Journal of Business*, 1972, Vol. 45, No. 1, pp. 85-104.
[174] They also analyse effects on riskiness of the acquiring firm, on its growth rate in the post merger years, on the financial structure, percentage of income taxes paid, and liquidity position of

interval[175] the authors do conclude that merging firms most likely enjoy positive effects of the merger.

The 1989 study of Lichtenberg and Rim analyses the effects of mergers in the U.S. airline industry and finds a reduction in unit costs.[176] They attribute the cost decline of the merging firms to reductions of input prices, mainly on labour -costs, and furthermore to increase in productivity, the latter largely due to load factor improvements. They note that the pre-merger productivity was below average and above average post-merger.

The 1990 study of Asquith, Bruner and Mullins analyses the stock market reaction to merger announcements and the relation with the form of financing.[177] It finds a slightly negative reaction for the bidders, and a considerable positive reaction for targets. The study enlightens by analysing the influence of the form of merger-financing. This shows that cash financed mergers show significantly positive returns, where stock financed mergers show lower to negative returns.[178] As only this study differentiates between cash and stock mergers this parameter could not be included in the model. As a consequence the result for all types of mergers has been taken as effect size.

The Chatterjee study of 1986 analyses the effects of mergers and acquisitions and differentiates between the grounds for value gains, distinguishing: collusive synergy, financial synergy and operational synergy grounds.[179] He finds significant value gains, whereby collusive synergies deliver the highest gains,[180] and financial synergies deliver more gains than operational gains.

He finds this by differentiating between the types of mergers. This shows that collusive synergies provide the highest returns. Furthermore unrelated mergers, which he relates to financial synergy, carry higher returns than related non

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the acquiring firms, the results where all not significant and very close to zero. The characteristic that it only includes large acquisitions is stated on page 86, though not clearly defined.

[175] Confidence interval: -.0239 to .1357. B. Lev and G. Mandelker, 1972, The Microeconomic Consequences of Corporate Mergers, *The Journal of Business*, 1972, Vol. 45, No. 1, pp. 93-94.

[176] F. R. Lichtenberg and M. Kim, 1989, The effects of mergers on prices, costs, and capacity utilization in the US air transportation industry 1970-1984, *Not published,* The J. Levy Economics Institute, WP No. 32. As effect size the result which includes fixed effects has been taken, as the authors note that this inclusion is 'desirable', see page 8 of the afore-mentioned study.

[177] P. Asquith, R.F. Bruner and D.W. Mullins jr., 1990, Merger Returns and the Form of Financing, *Not published,* University of Virginia, WP. No. 3203-90-EFA

[178] This result is stronger when the targets-firms had not received prior bids.

[179] S. Chatterjee, 1986, Types of Synergy and Economic Value: The Impact of Acquisitions on Merging and Rival Firms, *Strategic Management Journal*, 1986, Vol. 7, No. 2, pp. 119-139.

[180] He finds this result by standardising his results and comparing them to the results for horizontal mergers, which he contributes to collusive synergy.

horizontal mergers, which he relates to operational synergies.[181] The possible explanation that he offers is that the acquiring firm, through its larger size, is able to attract cheaper capital to make investments.

The 2006 study of Sung and Gort analyses the effects of two mergers in the US telecom industry.[182] They find no significant effects on productivity or on costs, but do find short run positive stock market effects, however the find that these positive effects disappear on the long run. As explanation for the absence of positive merger effects they suggest increased monitoring costs.

The Wang study of 2003 analyses the effects of mergers and acquisitions on the costs of banks using a new measure of bank output.[183] The study proposes a new alternative to the Book value and National Income Accounts based measurements of bank output. The new measure is based on the value added of bank services and finds improvements in the average costs of merged banks, and also, in contrast to the other two measures, finds increased productivity.

The 1998 study of Cummins, Tennyson and Weiss analyses the effects of mergers and Acquisitions in the U.S. life insurance industry. It finds significant, positive effects on efficiency, measured by total factor productivity.[184] They note that larger firms experience lower efficiency gains than smaller firms. As possible explanation they state that these firms might be too large already to exhibit further improvements in scale economies. However they do not clearly state a definition of what they constitute as 'large firms'.

### A.2 Studies excluded from the dataset

Following the mentioned importance of the dataset which is used in a meta-analysis a selection of the studies that are included in the dataset had to be made. Nonetheless studies on a wide variety of effects from Mergers and Acquisitions can be included, ranging from cost effects to stock market return. However to be included in the dataset studies should empirically analyse the direct effects of

[181] The effects size of this study had to be calculated, as this study splits the resluts of non-horizontal mergers into related, non-horizontal mergers and unrelated mergers (which are also not horizontal).
[182] N. Sung and M. Gort, 2006, Mergers, Capital Gains, and Productivity: Evidence from U.S. Telecommunications Mergers, *Contemporary Economic Policy,* 2006, Vol. 24, Issue 3, pp. 382-394.
[183] J.C. Wang, 2003, Merger-Related Cost Savings in the Production of Bank Services, *Not published, Research Department Federal Reserve Bank of Boston, Working Papers: 03-8.*
[184] J.D. Cummins, S. Tennyson and M.A. Weiss, 1998, Consolidation and Efficiency in the US Life Insurance Industry**,** *Journal of Banking and Finance,* 1999, Vol. 23 No. 2-4, pp. 325-357.

actual mergers and/or acquisitions. Furthermore a calculable effect-size of the effect of the mergers and/or acquisitions should be given.

This excludes studies that base their analysis of the effects of Mergers and Acquisitions on theoretical models. Furthermore there are studies in the sample that evaluate mergers and acquisitions, but do not provide a calculable effect size. A large part of the studies from the initial sample had to be excluded from the dataset, as a result of the above mentioned reasons. The reasons that lead to these exclusions will now be addressed for each per study.

The 2000 study of Andrade and Stafford has been excluded because this study does not give the direct effect of Mergers and Acquisitions.[185] Instead analysis is done on the characteristics of the acquirers and targets, and the investment role of mergers. They also evaluate the influence of industry shocks. Based on their analysis they conclude that mergers are an effective means for firms to improve efficiency following industry shocks.

The 1997 study of Altunbas, Molyneux and Thornton has been excluded as this study analyses the effects of mergers based on hypothetical mergers in the EU banking sector, and thus does not analyse the direct effects of actual Mergers and Acquisitions.[186] They base their model on factual figures of existing EU banks and conclude that overall there are benefits there are great variances and banks should chose their partner with great care.

The 1984 study of Barton and Sherman, has been excluded for the following reasons. This study is based upon the examination of two acquisitions by a single firm, which lead to an anti-trust suit due to the following increase in market share.[187] This resulted in the mandatory divestment of part of the company.[188] Thus this does not provide a representative study on the effects of Mergers and Acquisitions. Moreover only the profits attributed to these acquisitions are calculated and these are not weighed against the pre-merger profit performance. As the study does not provide a representative addition and does not provide effect measures of the acquisition it is excluded from the dataset. The measured overall effect of the acquisitions on profits was positive though.

[185] G. Andrade and E. Stafford, 2000, Investigating the economic role of mergers, *Journal of Corporate Finance*, 2000, Vol. 10, pp. 1 – 36.
[186] Y. Altunbas, P. Molyneux and J. Thornton, 1996, Big-Bank Mergers in Europe: An Analysis of the Cost Implications, *Economica,* 1997, Vol. 64, pp. 317-329.
[187] D.M. Barton and R. Sherman, 1984, The Price and Profit Effects of Horizontal Merger: A Case Study, The Journal of Industrial Economics, 1984, Vol. 33, No. 2, pp. 165-177.
[188] Federal Trade Commission Decisions, Docket 9146, Complaint, September 16, 1980, decision, July 1, 1983.

The Borenstein study of 1990 has been excluded because it does not provide a calculable effect size. It merely provides a percentage point markets share growth, not the relative growth as a result of the merger[189].

The study investigates the effects of two major airline mergers and the resulting effects on market power and prices. The effects on market power are included in the dataset.[190] The results are positive, that is the mergers lead to more market power, in both cases, though less convincing (less significant) in one of the cases.

The Breen study of 2004 on a major U.S. railway merger had been excluded as it does not provide enough quantifiable effects of the merger.[191] It indicates that there are "positive effects" on costs, but these are not related to pre merger standards. It is also indicated that there were multiple, specific external disruptions that were not corrected for. Such as floods and hurricanes, bad infrastructure, spill over effects from Mexico, and rising fuel costs. These disruptions make assessing the cost effect of the merger not representative, moreover the relative effects are not calculable.

The Cabrial study of 1999 has been excluded as the analysis of the Merger effects has been made based on a theoretical, mathematical model.[192] The outcome of the model indicated cost benefits of mergers, however that these could lead to more difficult post-merger entry. This could potentially have negative effects on consumers.

The 1976 study of Christensen and Greene has been excluded because it purely estimates the economies of scale in the U.S. electric generation market.[193] The study does not deal with the direct effect of mergers and acquisitions. It attributes a large part of the cost reductions to technological development. They estimate fairly constant returns to scale. Although they conclude that a small number of (large) firms in not required for efficient production. They do conclude that the number of firms required for operating at optimal size is smaller than the number of active firms, thus indicating cost benefits of consolidation (mergers).

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[189] S. Borenstein, 1990, Airline Mergers, Airport Dominance and Market Power, *The American Economic Review*, Vol. 80, No. 2, Papers and Proceedings of the Hundred and Second Annual Meeting of the American Economic Association. (May, 1990), pp. 400-404, published by The American Economic Association.

[190] The price influence in not included as this is to prone to other influences and the corrections are too subjective.

[191] D.A. Breen, 2004, The Union Pacific/Southern Pacific Rail Merger: A Retrospective on Merger Benefits, *not published, acquired from The Bureau of Economics*.

[192] L.M.B. Cabrial, 1999, Horizontal mergers with free-entry: why cost efficiencies may be a weak defense and asset sales a poor remedy, *International Journal of Industrial Organization,* 2003, no. 21, pp. 607–623. As it is a theoretical study, the year of the study has been taken as first and last year of the analysis, this is done with all theoretical studies.

[193] L.R. Christensen and W.H. Greene, 1976, Economies of Scale in U.S. Electric Power Generation**,** *The Journal of Political Economy*, 1976, Vol. 84, No. 4, pp. 655-676.

The 1995 study of Dranove and Shanley has been excluded from the dataset because the authors do not evaluate the direct effect of mergers.[194] Instead an analysis of the cost effects of mergers has been performed by comparing the differences in cost between merged hospitals and a random combination of non merged hospitals in a single year.

This study does not show a significant difference in costs, but the merged hospitals do appear to have reputation benefits.

The 2005 study of M. Filippinia and M. Zolaa into the Swiss postal industry has been excluded from the dataset as it does not perform an empirical analysis of the effects of Mergers and Acquisitions.[195] Rather the authors perform an empirical research of the costs and economies of scale of small local post offices. From the results they conclude that merging and integrating small offices could theoretically benefit efficiency.

The 2005 study of Fridolfsson and Stennek has been excluded from the dataset because they perform a theoretical analysis of the driving forces of mergers and do not empirically anlyse the effects of Mergers and Acquisitions.[196] They evaluate why empirical research, in majority, finds decreasing profitability effects of mergers, but an increase in stock prices.

Their conclusion is the following, unprofitable mergers may occur because of externalities that make being an 'outsider' to a merger deal worse than being an 'insider'. Consequently making a defensive or pre-emptive merger the best option.

Furthermore these externalities also affect competitors. This leads the authors to argue that, direct competitors should be excluded from the control group when evaluating stock price effects of Mergers and Acquisitions.

The authors thus conclude that even unprofitable mergers can be beneficial for the acquirer by pre-empting competitors and thus create a positive stock market reaction.

The 2000 study of Gort and Sung has been excluded from the dataset as they hypothesize about the effects of mergers in the U.S. telecom industry but do not

[194] D. Dranove, Mark Shanley, 1995, Cost Reductions or Reputation Enhancement as Motives for Mergers: The Logic of Multihospital Systems, Strategic Management Journal, 1995, Vol. 16, No. 1, pp. 55-74.

[195] M. Filippinia and M. Zolaa, 2005, Economies of scale and cost efficiency in the postal services: empirical evidence from Switzerland, *Applied Economics Letters*, 2005, No. 12, pp. 437–441.

[196] S.O. Fridolfsson and J. Stennek, 2005, Why mergers reduce profits and raise share prices—a theory of pre-emptive mergers, *Journal of the European Economic Association,* 2005, Vol. 3, No. 5, pp. 1083–1104. As it is a theoretical study, the year of the study has been used as first and last year of the time period of the analysis.

analyse the direct effects of mergers in this industry.[197] Rather they empirically estimate cost function and based on this they hypothesize about potential positive or negative effects of mergers.

They conclude that the economies of scale that are reached are reversed by diseconomies of scale, such as rising labour costs. Moreover they note that "There seems to be a generally negative relationship between firm size and overall economies of scale. In particular, the two largest carriers even exhibited decreasing returns to scale".[198] They state that the forecasting of merger gains is often focussed on economies of scale, while ignoring diseconomies of scale which lead to a zero change in net costs.

The 2003 study of Gugler, Mueller, Yurtoglu and Zulehner had to be excluded from the dataset because no direct effect-size of Mergers and Acquisitions could be calculated based on the data provided in the article.[199] A broad analysis of Mergers and Acquisitions around the world has been performed. They compare the actual results with projected results based on the merging firms' pre-merger performance adjusted by the development of non merging firms in the same industry.

They find that the majority of mergers deliver higher profits, but lower sales. They relate the results to an increase in market power of the merging firms.[200] Additionally they did not find a significant difference between domestic and cross-border mergers, or between the manufacturing and the services industry.[201]

The 2003 study of Huck, Konradz and Müller has been excluded as their analysis of the effects of Mergers and acquisitions is based on a theoretical model.[202] The model does however provide fresh and enlightening insights.

Their analysis finds that mergers can be profitable due to the exchange of information between the merged firms, even when they assume no cost reductions. The core of their model is based on the view that firms after merging

[197] M. Gort and N. Sung, Estimating the Effects on Costs of Telecommunications Mergers, *Not published*.
[198] M. Gort and N. Sung, Estimating the Effects on Costs of Telecommunications Mergers, *Not published*, p. 9.
[199] The authors only provide an average absolute effect, the indicate the percentage of mergers that have a positive or negative effect. K. Gugler, D.C. Mueller, B.B. Yurtoglu, C. Zulehner, 2003, The effects of mergers: an international comparison, *International Journal of Industrial Organization,* 2003, No. 21, pp. 625–653.
[200] A separation between mergers that increase or decrease profits has been made, this is then related to the effects on sales. Based on this it is concluded that mergers are profit increasing by increased efficiency or market power. For a more details one is referred to the article.
[201] K. Gugler, D.C. Mueller, B.B. Yurtoglu, C. Zulehner, 2003, The effects of mergers: an international comparison, *International Journal of Industrial Organization,* 2003, No. 21, pp. 625. Following this the results for cross border, manufacturing mergers have been incorporated into the dataset.
[202] S. Huck, K.A. Konradz and W. Müller, 2003, Profitable Horizontal Mergers without Cost Advantages: The Role of Internal Organization, Information and Market Structure, *Economica*, 2004, No. 71, pp. 575–587.

keep producing as separate entities, but after the merger information flows more freely between the merged firms. This allows them to coordinate their production decisions, which increases profits of the merged firms, reduces profits for outsiders, and enhances welfare.[203]

The 2005 study of Huck, Konradz and Müller has been excluded because it is a theoretical evaluation of the reasons for and results of Merger and Acquisitions.[204] They build on their 2003 model, however in this study they do not directly evaluate the effects of the mergers. Instead they examine the motivations for Mergers and Acquisitions, building on their 2003 model.[205] They conclude that even when assuming no synergies or cost reductions by the merger, other elements can cause the merger to be profitable. These elements include the internal organization of the firm, and strategic interaction with other players such as the government.

The 1983 study of Ikeda and Doi had to be excluded.[206] The study does analyse the direct effect of Mergers and Acquisitions, however it does not provide a calculable effect size. The authors merely indicate which part of the firms show an improvement after merging, they do not indicate how large these improvements were. Interestingly the study analyses the effects relative to both the pre-merger profitability performance of the firms themselves and relative to the performance of its competitors.

They find that three years after the merger about half the firms show improvements in profitability,[207] but five years after the merger the majority of the cases the profitability rates increased. From which they concluded that there was a necessary gestation period during which merging firms learn how to manage their new organizations.[208] Additionally they find that 'big mergers' show a higher rate of profitable mergers, though they do not classify what constitutes 'big mergers'. The Return on Assets has been included in the dataset as the measure of profitability.

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[203] The firm moves from simple Cournot market to a Stackelberg market between the merged firms (in which one of the merged firms chooses a production level which the other one observes before making its production decision). The merged firm still has cournot competition with the remaining competitors.

[204] S. Huck, K.A. Konradz and W. Müller, 2005, Merger without cost advantages, *Not published,* CESIFO working paper, No. 1461.

[205] again assuming no cost reductions.

[206] K. Ikeda and N. Doi, 1983, The Performances of Merging Firms in Japanese Manufacturing Industry: 1964-75, *The Journal of Industrial Economics*, 1983, Vol. 31, No. 3, pp. 257-266.

[207] They also measure increases in other performance rates, such as selling, general expenses, firm growth.

[208] The three and five year effects were included in the dataset, as this corresponds best with the general conclusion of the study.

The 2005 study of Ivaldi and McCullough has been excluded from the dataset because it does not provide a calculatedly effect-size of the direct effect of Mergers and Acquisitions.[209] The authors analyse the effects on consumer surplus of Mergers and Acquisitions in the U.S. railroad industry, by estimating the production function based on empiric figures, and use this to calculate the consumer surplus. They find a significant increase in consumer surplus, this is indicated as a decrease in costs.

The Mueller study of 1985 has been excluded from the dataset as this study does not analyse the direct effects of Mergers and Acquisitions.[210] The author analyses the development of the market share of merging firms. He does this by comparing the development of the market share of firms that were acquired between two points in time, as he does not analyse the direct effects following mergers this study had been excluded.

The study does show that the market shares of acquired firms in both conglomerate and in horizontal mergers decline.

The 2006 study of Rudholm has been excluded from the dataset because this study does not measure de direct effects of Mergers and Acquisitions.[211] Instead it evaluates the development of the economies of scale from one company, over a longer period of time in which two acquisitions were made. The author finds positive effects on the economies of scale during the time period in which the acquisitions were made and he attributes the improvements to the acquisitions.

[209] M. Ivaldi and G. McCullough, Welfare Tradeoffs in U.S. Rail Mergers, *Not published,* acquired from: Center for Economic Policy Research.
[210] D.C. Mueller, 1985, Mergers and Market Share**,** *The Review of Economics and Statistics*, 1985, Vol. 67, No. 2, pp. 259-267.
[211] N. Rudholm, 2006, Mergers and Economies of Scale: Volkswagen AG 1976 – 2000, *Not published, acquired from Department of Business Administration and Economics*.

### A.3 Studies deemed not applicable

The following studies were deemed not applicable for use in this meta-analysis. Studies were deemed not applicable if they did not perform research that was relevant to the research question of this thesis. Furthermore studies that based their evaluations of Mergers and Acquisitions on literature, on the research of other authors were deemed not applicable. The same applies for studies that merely analysed economies of scale or scope .

Now we will go into the motivations why these studies were deemed not applicable. Nonetheless when a study does present enlightening insights, then these will be addressed.

The 1997 study of Basu and Fernald, has been deemed not applicable as it does not go into the effects of Mergers and Acquisitions.[212] Instead an analysis is done of the economies of scale in a broad selection of 34 industries in the USA.

The 1994 study of Berger and Humphrey, has been deemed not applicable because it only discusses studies performed by other researchers and the authors do not perform a empirical research of the effects of Mergers and Acquisitions, it therefore does not fit into a meta-analysis dataset.[213] The authors review the literature on the U.S. banking industry with respect to economics of scale, mergers, and efficiency, they then relate this to possible parallel application to the European situation.

The Chatterjee study of 2007 is not applicable as it is a management merger advisory article, based on case examples.[214] No empirical analysis has been performed and no general conclusion on the effect of Mergers and Acquisitions is made.

The 2005 study of Crutchley, Marshall and Payne, is deemed not applicable as this study analyses the valuation of internet firms during the 90's and the relation of the valuation with merger activity.[215] They find that the high valuation of these internet firms required higher return, this lead to their conclusion that "it is evident that managers were expected to produce significant growth prospects. We find

[212] S. Basu and J.G. Fernald, 1997, Returns to Scale in US Production: Estimates and Implications, The Journal of Political Economy, 1997, vol. 105, no. 2.
[213] A.N. Berger and D.B. Humphrey, 1994, Bank Scale Economies, Mergers, Concentration and Efficiency: The US experience, not publicized acquired from The Wharton Financial Institutions Center.
[214] S. Chatterjee, Why is synergy so difficult in mergers of related businesses?, *Strategy & Leadership*, 2007, vol. 35, no. 2, pp. 46-52.
[215] C. Crutchley, B.B. Marshall, J.D. Payne, 2005, Sharks in the Water: Why the merger wave among Internet firms became a feeding frenzy, *not published.*

evidence that these lofty valuations contributed to a merger wave, as relatively overvalued Internet firms acquired other firms".[216] Additionally they find that stock based acquisitions were more prevalent among acquiring firms with higher relative valuations leading up to the bursting of the Internet bubble.

No analysis of the effects of Merger and Acquisitions has been performed, and it thus does not provide a useful addition to the dataset. Interesting information has been summarized above.

The Dymski study of 2002 had been deemed not applicable, as it does not perform an analysis of the effects of Mergers and Acquisitions.[217] Nonetheless it does provide practical insights. The author analyses the trends in cross-border banking mergers around the world. Based on research by others and himself he concluded that cost efficiencies (economies of scale) do not form the driving factor behind these mergers.

He finds that banking mergers are mainly driven by other reasons and that these vary by region. Among these reasons are, capturing desired customers groups through acquisitions, macroeconomic influences and as a defence measure in cases of distress.

The 1999 Dermine study had been deemed not applicable as this studies does not entitles an empirical research into the direct effects of Mergers and Acquisitions.[218] Additionally a substantial part of the analysis is not based on own research but on the (empirical) research from the studies of others.

Instead an analysis is made of the forces of chance in the banking sector and the possible reasons for Mergers and Acquisitions.

The conclusion that is drawn is that there is clear evidence that size is important to operate on several segments of the capital markets. Furthermore size and international coverage aid in brand development and the diversification of risks. The potential benefits of banks of increase in size can be achieved by Mergers and Acquisitions. The authors continue with implications for regulation policy of these size increases and potential accompanying risks.

The 2006 Ding study had been deemed not applicable as this study does not focus on Mergers and Acquisitions of firms in the industrial, banking, services, IT or other industries (further indicated as 'regular firms'), but focuses on mutual fund

[216] C. Crutchley, B.B. Marshall, J.D. Payne, 2005, Sharks in the Water: Why the merger wave among Internet firms became a feeding frenzy, *not published,* p. 16.
[217] G.A. Dymski, 2002, The Global Bank Merger Wave: Implications for developing countries, *The Developing Economies*, 2002, XL-4, December, pp. 435–66.
[218] J. Dermine, 1999, The Economics of Bank Mergers in the European Union, a Review of the Public Policy Issues, *Not published,* Acquired from INSEAD, Fontainebleau.

mergers.[219] The mergers of equity funds falls outside the analysis of the current meta-analysis, as this are totally incomparable vehicles.

The mergers of mutual funds are totally different than mergers of regular firms, for a number of reasons. Mutual funds are not comparable to regular firms as they are portfolios of stocks, bonds and other securities, and are non firms that use productions factors found in regular firms. Furthermore funds do not serve as a means of producing a product of delivering a service, rather they form a way of investing money into financial products. Mergers of mutual funds are thus of a completely different category as mergers of regular firms.

The 2000 study of Farrell and Shapiro has been deemed not applicable because it does not entitle a empirical research into the effects of Mergers and Acquisitions. [220] Instead this study is a theoretical discussion of attaining economies of scale or synergies by mergers compared to autonomous growth. It is mainly related to anti-trusts legislation, its evaluation and rules for merger enforcement.

The 2000 study of Gassot, Pouillot and Balcon study has been deemed not applicable as it does not evaluate the effects of Mergers and Acquisitions.[221] The article goes into the trends and evolutions of the Telecommunication sector and the causes and technological developments that lead to the Merger and Acquisition wave in this industry.

The Gort Study of 1969 has been deemed not applicable as this study does not analyse the effects of Mergers and Acquisitions.[222] Rather it evaluates the merger rates in different industries and analyses the causes for Mergers and Acquisitions. The study does provide insights into several often mentioned reasons for mergers.

One of the findings of the study is that the distribution of acquisitions is highly concentrated in certain types of industries. Based on this the author concludes that the argument that personal ambitions of mangers to manage larger firms is not valid. As this would imply an unexplainable distribution of ambitious men across industries.

Additionally he found no support for the economies of scale explanation for Merger activity. Economies of scale would predict an inverse relation between

[219] B. Ding, 2006, Mutual Fund Mergers: A Long-Term Analysis, Not published, acquired from SUNY-School of Business.
[220] J. Farrell and C. Shapiro, 2000, Scale Economies and Synergies in Horizontal Merger Analysis, *not published,* Competition Policy Centre, working paper CPC00-15.
[221] Y. Gassot, D. Pouillot and L. Balcon, 2000, The Merger and Acquisition Frenzy**,** *Communications & Strategies*, 2000, No. 38, pp. 159-196.
[222] M. Gort, 1969, An Economic Disturbance Theory of Mergers, *The Quarterly Journal of Economics*, 1969, Vol. 83, No. 4, Nov, pp. 624-642.

rate of industry growth and merger activity.[223] As well as a positive relation between number of firms and merger activity.[224] The relations his study found were opposite of the relations that would support the economies of scale argument.

The Hackett study of 1996 has been deemed not applicable as this is a theoretical evaluation of mergers in the U.K. healthcare service based on the research of other studies.[225] The author also does not perform an analysis of the effects of Mergers and Acquisitions himself.

The Harford study of 2004 examines the causes of merger waves.[226] The study does compare the relative effects of mergers in or out of a merger wave. This study is deemed not applicable because no analysis of the direct effects of Mergers and Acquisitions is made. Furthermore the dataset this study used is the same one that is used in the 2003 Harford study.

The study finds that industry merger waves are driven by economic, regulatory and technological shocks, however in order to develop into a merger wave there needs to be sufficient overall capital liquidity.

The Hallowell study of 1999 has been deemed not applicable as it constitutes of a discussion of the economies of scale and scope, and gives advice for mergers in the services industry based on several examples.[227] The study does not analyse the direct effects of Mergers and Acquisitions.

The 2004 study of Huang and Kleiner has been deemed not applicable as this constitutes a Merger and Acquisition advisory study, which does not entitle an analysis of the effects of Mergers and Acquisitions.[228]

The 1971 study of Ijiri and Simon has been deemed not applicable, as this study evaluates and explains the effects of Mergers and Acquisitions on the industry concentration of the USA. Whereas it does not analyse the direct effects of

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[223] As a smaller rate of industry growth would make mergers a more attractive means to achieve growth. M. Gort, 1969, An Economic Disturbance Theory of Mergers, *The Quarterly Journal of Economics*, 1969, Vol. 83, No. 4, Nov, p. 630.

[224] As a larger number of firms would imply, a higher rate of inefficient firms and thus a higher merger activity. M. Gort, 1969, An Economic Disturbance Theory of Mergers, *The Quarterly Journal of Economics*, 1969, Vol. 83, No. 4, Nov, pp. 630 – 631, 637.

[225] M.C. Hackett, 1996, Are there alternatives to merger?, *Health Manpower Management,* 1996, Volume 22, Number 5, pp. 5–12.

[226] J. Harford, 2004, What drives merger waves?, *Journal of Financial Economics*, 2005, Vol. 77, pp. 529–560.

[227] R. Hallowell, 1999, Exploratory research: consolidations and economies of scope, *International Journal of Service Industry Management*, 1999, Vol. 10, No. 4, pp. 359-368.

[228] T.W. Huang and Brian H. Kleiner, 2004, New Developments Concerning Managing Mergers and Acquisitions, *Management Research News,* 2004, Vol. 27 Issue 4/5, pp. 54-62.

Mergers and Acquisitions.[229] The study evaluates the development of the industry concentration, as measured by the Pareto curve, over a time period in which Merger and Acquisitions took place. The authors find that Mergers and Acquisitions do not affect the industry concentration rate.

The 1986 study of Jemison and Sitkin has been deemed not applicable as this study does not analyse the effects of Mergers and Acquisitions.[230] This study instead evaluates the process that leads to mergers and the associated possible consequences and the relevance of this for managers.

The Jensen study of 1888 has been deemed not applicable.[231] It does not perform an analysis of the direct effects of Mergers and Acquisitions. The author instead discuses the developments in the U.S. economy related to Mergers and Acquisitions and its consequences, and bases his findings on examples, trends and studies by other authors.

The Kassirer study of 1996 had been deemed not applicable as it does not entitle an empirical analysis of the effects of Mergers and Acquisitions.[232] The author instead discusses the consequences of mergers and acquisitions for different stakeholders of healthcare institutions.

The 2001 study of Jovanovic and Rousseau has been deemed not applicable since this study does not analyse the direct effects of Mergers and Acquisitions.[233] The authors seek to explain Mergers and Acquisitions by the influence of technological change. They conclude that mergers are an effective means for an economy to adjust to technological change and reallocate capital. Technological change also relations stock price increases to merger activity.

The Keeler study of 1974 has been deemed not applicable, it analyses the economies of scale in the U.S. Railroad industry.[234] The study does not evaluate

[229] Y. Ijiri and H.A. Simon, 1971, Effects of Mergers and Acquisitions on Business Firm Concentration, *The Journal of Political Economy*, 1971, Vol. 79, No. 2. pp. 314-322.
[230] D.B. Jemison and S.B. Sitkin, 1985, Corporate Acquisitions: A Process Perspective, *The Academy of Management Review*, 1986, Vol. 11, No. 1, pp. 145-163.
[231] M.C. Jensen, 1988, Takeovers: Their Causes and Consequences, *The Journal of Economic Perspectives*, 1988, Vol. 2, No. 1, pp. 21-48.
[232] J.P. Kassirer, 1996, Mergers and Acquisitions — Who Benefits? Who Loses?, *The New England Journal of Medicine, 1996, No.* 334, pp. 722-723.
[233] B. Jovanovic and P.L. Rousseau, 2001, Mergers and Technological Change: 1885-1998, *Not published*, Vanderbilt University, Working Paper, No. 01-W16.
[234] T.E. Keeler, 1974, Railroad Costs, Returns to Scale, and Excess Capacity, *The Review of Economics and Statistics*, 1974, Vol. 56, No. 2, pp. 201-208.

the effects of Mergers and Acquisitions, in fact merging firms where explicitly excluded.[235]

The Kim study of 1985 has been deemed not applicable, since this study does not analyse the direct effects of Mergers and Acquisitions.[236] Rather it estimates the economies of scale in the U.S. water utility industry. He finds that there are indications for economies of scale, and also that the cost minimizing number of firms is lower that the number measured.

The 2001 study of Henriksen, Knarvik and Steen has been deemed not applicable as this study does not analyse the effects of Mergers and Acquisitions.[237] The authors analyse internal and external economies of scale in manufacturing industries within The European Union. They find positive externalities are limited both in geographical, and in technological reach, meaning that positive externalities are mainly enjoyed by firms within the same national industry.

The also conclude that there are significant differences across industries and industrial clusters in the levels at which there are economies of scale, this holds both for internal and external economies of scale.

The Lambrecht study of 2004 has been deemed not applicable.[238] The author analyses the timing of Mergers and Acquisitions in mergers waves. He finds that mergers will be pre-cyclical and hostile takeovers will occur later in the merger wave, however he does not analyse the direct effects of Mergers and Acquisitions. Moreover the cost savings he finds in his study are the direct results of the assumptions made in his theoretical model.

The 2006 study of Lausberg and Stahl has been deemed not applicable, as it does not analyse the effects of Mergers and Acquisitions, but rather the non-economic motives for Mergers and Acquisitions.[239] The authors evaluate the role that personal motives of decision makers play in merger decisions. Based on a survey of German bank Executive Committee members or chairmen they find that

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[235] T.E. Keeler, 1974, Railroad Costs, Returns to Scale, and Excess Capacity, *The Review of Economics and Statistics*, 1974, Vol. 56, No. 2, p. 203.
[236] H.Y. Kim, 1985, Economies of Scale in Multi-Product Firms: An Empirical Analysis**,** *Economica, New Series*, 1987, Vol. 54, No. 214, pp. 185-206.
[237] E. Henriksen, K.H.M. Knarvik and F. Steen, 2001, ECONOMIES OF SCALE IN EUROPEAN MANUFACTURING REVISITED, *Not published, Center for Economic Policy Research,* Discussion Paper No. 2896, ISSN 0265-8003*.*
[238] B.M. Lambrecht, 2004, The timing and terms of mergers motivated by economies of scale, *Journal of Financial Economics*, 2004, No. 72, pp. 41–62.
[239] C. Lausberg and T. Stahl, 2006, Motives and Non-Economic Reasons for Bank Mergers and Acquisitions, *Not published,* Submitted to the 7th Maryland Finance Symposium on Behavioural Finance March 29-31, 2007.

the motives: power, achievement sensation seeking, and prestige are of significant influence on Merger decisions by decision makers.

The Lenz study of 2007 has been deemed not applicable as this study analyses the pricing of merging companies and not the effects of Mergers and Acquisitions.[240] The author discusses a new pricing methodology based on knowledge management and the sociology theory.

The Labatkin study of 1983 has been deemed not applicable, as this study reviews the studies of others and does not perform an own analysis the effects of Mergers and Acquisitions.[241] They review studies from different economic disciplines and find that literature from industrial organisation states that the acquiring firms could benefit from technical, pecuniary and diversification synergies[242]. However empirical analysis form the field of financial economics finds that all the gains from the merger flow to the acquired firm.

The 2002 study of Lynch and Lind has been deemed not applicable as this study does not analyse the effects of Mergers and Acquisitions.[243] Instead it is an article on the field of management advisory related to Mergers and Acquisitions.

The 1981 study of G. Meeks and J.G. Meeks has been deemed not applicable as the authors discuss measures to calculate profitability and do not analyse the effects of Mergers and Acquisitions.[244]

The 1999 study of Milbourn, Boot and Thakor has been deemed not applicable as this study evaluates the motives for bank mergers and does not address the direct effects of Mergers and Acquisitions.[245] It offers two merger motives, one based on managerial hubris, and one on risk diversification.[246]

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[240] R. Lenz, 2007, The Logic of Merger and Acquisition Pricing, *Not published,* Source: University of Applied Sciences Bielefeld.
[241] M. Lubatkin, 1983, Mergers and the Performance of the Acquiring Firm, *The Academy of Management Review*, 1983, Vol. 8, No. 2, pp. 218-225.
[242] Where technical synergies refer to: marketing, production, scheduling, banking and compensation economies and experience with a common technology. Pecuniary synergies refer to monopoly power effects, and diversification synergies to lowering risk attributes relative to performance and portfolio management. M. Lubatkin, 1983, Mergers and the Performance of the Acquiring Firm, *The Academy of Management Review*, 1983, Vol. 8, No. 2, pp. 218-220.
[243] J.G. Lynch and B. Lind, 2002, Escaping merger and acquisition madness, *Startegy and Leadership,* 2002, Vol. 30, No. 2, pp. 5-12.
[244] G. Meeks and J.G. Meeks, 1981, Profitability Measures as Indicators of Post-Merger Efficiency, *The Journal of Industrial Economics*, 1981, Vol. 29, No. 4, pp. 335-344.
[245] T.T. Milbourn, A.W.A. Boot, A.V. Thakor, 1999, Megamergers and expanded scope: Theories of bank size and activity diversity, *Journal of Banking & Finance*, 1999, No. 23, pp. 195-214.
[246] The authors offer two explanations, they state that these explanations compete but could be complementary. Firstly a reputation-based model indicates that mergers could be a consequence of managerial hubris and herding behavior, which negatively affect share-holder value. Secondly

The 1986 study of Montgomery and Wilson has been deemed not applicable, this study evaluates which share of mergers is subsequently divested, it does not analyse the effects of the Mergers and Acquisitions.[247] The study finds that unrelated acquisitions are resold at a moderately higher rate than related acquisitions.[248]

The 1983 study of Murray and White has been deemed not applicable as it does not analyse the effects of Mergers and Acquisitions but economies of scale and scope.[249] The authors find significant increasing returns to scale, and economies of scope for certain products.[250] They conclude that it would be impossible for a small number of firms to operate efficiently.

The 1988 study of Nahavandi and Malekzadeh has been deemed not applicable, as this study discusses integration-issues of firms after Mergers and Acquisitions, but does no analyse the effects of Mergers and Acquisitions.[251]

The 1973 study of Nielsen and Melicher has been deemed not applicable, this study analyses mergers and acquisitions and studies differences in the characteristics of firms for which high or low merger premiums are paid.[252] No study is performed on the effects of the Mergers and Acquisitions.

The Fauli – Oller study of 2000 has been deemed not applicable as this study analyses the grounds for merger waves, and does not analyse the direct effects of Mergers and Acquisitions.[253]

The 1984 study of Paine and Power has been deemed not applicable as this study does not analyse the effects of Mergers and Acquisitions, but instead discusses rules given by another author for success acquisitions.[254]

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risk diversification could be a motive for scope expansion, and could benefit share holders if there is sufficient uncertainty.

[247] C.A. Montgomery; V.A. Wilson, 1986, Mergers That Last: A Predictable Pattern?, *Strategic Management Journal*, 1986, Vol. 7, No. 1, pp. 91-96.

[248] The difference though is not significant, and the authors indicate that this contradicts popular believe that the mergers of the 1960s has become the divestitures of the 1970s and 1980s, In In particular the unrelated acquisitions of that period.

[249] J.D. Murray and R.W. White, 1983, Economies of Scale and Economies of Scope in Multiproduct Financial Institutions: A Study of British Columbia Credit Unions, 1983, *The Journal of Finance*, 1983, Vol. 38, No. 3, pp. 887-902.

[250] Strong indication of economies of scope for mortgage lending and consumer lending, and some indication of economies of scope for the investment side of credit union operations.

[251] A. Nahavandi and A.R. Malekzadeh, 1988, Acculturation in Mergers and Acquisitions, *The Academy of Management Review*, 1988, Vol. 13, No. 1, pp. 79-90.

[252] J.F. Nielsen and R.W. Melicher, 1973, A Financial Analysis of Acquisition and Merger Premiums, *The Journal of Financial and Quantitative Analysis*, 1973, Vol. 8, No. 2, pp. 139-148.

[253] R. Fauli-Oller, 2000, Takeover Waves, *Journal of Economics & Management Strategy,* 2000, Vol. 9, Issue 2, pp. 189-210.

[254] F.T. Paine and D.J. Power, 1984, Merger Strategy: An Examination of Drucker's Five Rules for Successful Acquisitions, *Strategic Management Journal*, 1984, Vol. 5, No. 2, pp. 99-110.

The 1977 study of Panzar and Willig has been deemed not applicable because this study does not analyse the effects of Mergers and Acquisitions, rather it assess economies of scale in multi-output firms.[255]

The Pautler study of 2001 has been deemed not applicable as the author discusses literature and other studies about Mergers and Acquisitions, but does not perform his own analysis of the effects of Mergers and Acquisitions.[256]

The Hartman study of 1996 has been deemed not applicable as the author himself does not perform an analysis of the effects of Mergers and Acquisitions. Instead he evaluates ex-ante predictions of merger success and research by others.[257]

The Rhoades study of 1997 has been deemed not applicable, since the study basis its evaluation on the outcomes of nine other case studies.[258] All of the studies found significant cost cutting, hereby it is noted that reductions in staff accounted for around half of the cost cutting.

The 2000 study of Saxena and Subrahmanyam of has been deemed not applicable as these authors do not analyse the effects of mergers and acquisitions. Rather they analyse the presence of economies of scope in the savings and loans industry.[259]

The 2001 study of Stennek and Verboven has been deemed not applicable as they do not perform their own analysis, but instead review theoretical and empirical literature.[260] From this they conclude that the effects of mergers and acquisitions have to be analysed on a case by case assessment. This as cost efficiencies can greatly depend on firm, industry and time specific factors.[261]

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[255] J.C. Panzar and R.D. Willig, 1977, Economies of Scale in Multi-Output Production, *The Quarterly Journal of Economics*, Vol. 91, No. 3, pp. 481-493.
[256] P.A. Pautler, 2001, Evidence on Mergers and Acquisitions, *The antitrust bulletin*, 2003, Vol. 48, No. 1, pp. 119-222.
[257] R.S. Hartman, 1996, Predicting The Efficiency Effects Of Mergers, *Journal of Forensic Economics,* 1996, Vol. 9, No. 3, pp. 295—323.
[258] S.A. Rhoades, 1997, The efficiency effects of bank mergers: An overview of case studies of nine mergers, *Journal of Banking & Finance,* 1998, No. 22, pp. 273-291.
[259] A.K. Saxena and V. Subrahmanyam, 2000, Cost Efficiency and Scale/Scope Economies Among S&Ls, *Managerial Finance,* 2000, Vol. 26, No. 2.
[260] J. Stennek and F. Verboven, 2001, Merger Control and Enterprise Competitiveness - Empirical Analysis and Policy Recommendations, *Not published*, Report for EC Contract III/99/065.
[261] They do note that economies of scale appear to be more present at lower volumes of output.

The Trautwein study of 1990 has been deemed not applicable as this study does not analyse the effects of mergers and acquisitions, but rather evaluates merger motives.[262]

The Walsh study of 1988 has been deemed not applicable as this study evaluates the management turnover after mergers for target firms, but does not analyse the effects of mergers and acquisitions for the firms itself.[263] He finds higher turnover after mergers, especially for very senior management. He notes that the later point towards symbolic measures as these are the most visible managers. He finds no significant variance for different types of mergers.

The Warf study of 2003 has been deemed not applicable as this study focuses more on social implications of Mergers and acquisitions, mainly in the telecommunications industry. It does not analyse the effects of mergers and acquisitions that this thesis analyses.[264]

[262] F. Trautwein, 1990, Merger Motives and Merger Prescriptions, *Strategic Management Journal*, 1990, Vol. 11, No. 4, pp. 283-295.
[263] J.P. Walsh, 1988, Top Management Turnover Following Mergers and Acquisitions, *Strategic Management Journal*, 1988, Vol. 9, No. 2, pp. 173-183.
[264] B. Warf, 2003, Mergers and Acquisitions in the Telecommunications Industry, *Growth and change : a journal of regional development* , 2003, Vol. 34, No. 3, pp. 321-344.

# B Tables

Tabulation sector; mining and manufacturing combined with ‘all excl’

| Tabulation of SECTOR_GROUP | | | | |
|---|---|---|---|---|
| Included observations: 62<br>Included studies: 27 | | | | |
| Number of categories: 5 | | | | |
| | SECTOR_ GROUP | | SECTOR_GROUP_SINGLE | |
| Value | Count | Percent | Single Count | Percent |
| 0 (=repeated entry) | | | 37 | 57.81 |
| All | 18 | 28.13 | 7 | 10.94 |
| MM+ALL_EXCL | 14 | 21.88 | 5 | 7.81 |
| Finance | 17 | 29.69 | 9 | 14.06 |
| Public services | 13 | 20.31 | 6 | 9.38 |
| Total | 62 | 100.00 | 64 | 100.00 |

## B.2 Results Alternative Cost Estimations

Uni-directional

| Dependent Variable: | EFFECT_COST | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 16 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | **Uni-directional** | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 | | | |
| Stopping criterion: | Number of search regressors = 6 | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **C** | **0.063** | 0.026 | 2.421 | 0.0386 |
| **SIGNIFICANT** | **-0.064** | 0.018 | -3.638 | 0.0054 |
| **YEARS_POST_M_A_1** | **-0.017** | 0.005 | -3.139 | 0.0119 |
| **(ACQUIRER=1 AND TARGET=0)** | **-0.039** | 0.019 | -2.022 | 0.0739 |
| **Y_2000_** | **0.042** | 0.018 | 2.316 | 0.0458 |
| REGION="USA" | -0.020 | 0.018 | -1.113 | 0.2946 |
| REGION="Other" | 0.035 | 0.035 | 0.987 | 0.3492 |
| R-squared | 0.730 | | | |
| Adjusted R-squared | 0.549 | Mean dependent var | | -0.013 |
| S.E. of regression | 0.031 | S.D. dependent var | | 0.046 |
| Sum squared residual | 0.008 | Akaike info criterion | | -3.830 |
| Log likelihood | 37.64 | Schwarz criterion | | -3.492 |
| F-statistic | 4.049 | Hannan-Quinn criter. | | -3.813 |
| Prob(F-statistic) | 0.030 | Durbin-Watson stat | | 3.646 |

Variables significant at least at the 10 % level are in bold. Negative coefficients indicate cost reductions.

Unadjusted post merger time period

| Dependent Variable: | EFFECT_COST | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 16 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Uni-directional | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 | | | |
| Stopping criterion: | Number of search regressors = 6 | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **C** | **0.063** | 0.026 | 2.421 | 0.0386 |
| **SIGNIFICANT** | **-0.064** | 0.018 | -3.638 | 0.0054 |
| **YEARS_POST_M_A_1** | **-0.017** | 0.005 | -3.139 | 0.0119 |
| **(ACQUIRER=1 AND TARGET=0)** | **-0.039** | 0.019 | -2.022 | 0.0739 |
| **Y_2000_** | **0.042** | 0.018 | 2.316 | 0.0458 |
| REGION="USA" | -0.020 | 0.018 | -1.113 | 0.2946 |
| REGION="Other" | 0.035 | 0.035 | 0.987 | 0.3492 |

| | | | |
|---|---|---|---|
| R-squared | 0.730 | | |
| Adjusted R-squared | 0.549 | Mean dependent var | -0.013 |
| S.E. of regression | 0.031 | S.D. dependent var | 0.046 |
| Sum squared residual | 0.008 | Akaike info criterion | -3.830 |
| Log likelihood | 37.644 | Schwarz criterion | -3.492 |
| F-statistic | 4.049 | Hannan-Quinn criter. | -3.813 |
| Prob(F-statistic) | 0.030 | Durbin-Watson stat | 3.646 |

## B.3 Results Alternative Profit Estimations

P-value at 0.1

| Dependent Variable: | EFFECT_PROFITS | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 8 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Stepwise forwards | | | |
| Stopping criterion: | p-value forwards/backwards = **0.1/0.1** | | | |
| Stopping criterion: | Number of search regressors = 3 | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| **C** | **-0.168** | 0.031 | -5.475 | 0.0054 |
| **REGION="USA"** | **0.135** | 0.018 | 7.372 | 0.0018 |
| **SIGNIFICANCY_LEVEL__=10** | **0.143** | 0.027 | 5.249 | 0.0063 |
| **SIGNIFICANT** | **0.044** | 0.014 | 3.064 | 0.0375 |
| R-squared | 0.933 | | | |
| Adjusted R-squared | 0.883 | Mean dependent var | | 0.007 |
| S.E. of regression | 0.016 | S.D. dependent var | | 0.048 |
| Sum squared residual | 0.001 | Akaike info criterion | | -5.075 |
| Log likelihood | 24.300 | Schwarz criterion | | -5.035 |
| F-statistic | 18.615 | Hannan-Quinn criter. | | -5.343 |
| Prob(F-statistic) | 0.008 | Durbin-Watson stat | | 3.665 |

Variables significant at least at the 10 % level are in bold.

**Uni-directional method**

| Dependent Variable: | EFFECT_PROFITS | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 8 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | **Uni-directional** | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5 | | | |
| Stopping criterion: | Number of search regressors = 3 | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| **C** | **-0.168** | 0.031 | -5.475 | 0.0054 |
| **REGION="USA"** | **0.135** | 0.018 | 7.372 | 0.0018 |
| **SIGNIFICANCY_LEVEL__=10** | **0.143** | 0.027 | 5.249 | 0.0063 |
| **SIGNIFICANT** | **0.044** | 0.014 | 3.064 | 0.0375 |
| R-squared | 0.933 | | | |
| Adjusted R-squared | 0.883 | Mean dependent var | | 0.007 |
| S.E. of regression | 0.016 | S.D. dependent var | | 0.048 |
| Sum squared residual | 0.001 | Akaike info criterion | | -5.075 |
| Log likelihood | 24.300 | Schwarz criterion | | -5.035 |
| F-statistic | 18.615 | Hannan-Quinn criter. | | -5.343 |
| Prob(F-statistic) | 0.008 | Durbin-Watson stat | | 3.665 |

Variables significant at least at the 10 % level are in bold.

Unadjusted post merger time period

| Dependent Variable: | EFFECT_PROFITS | | | |
|---|---|---|---|---|
| Method: | Stepwise Regression | | | |
| Included observations: | 8 after adjustments | | | |
| Number of always included regressors: | 1 | | | |
| Number of search regressors: | 27 | | | |
| Selection method: | Stepwise forwards | | | |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 | | | |
| Stopping criterion: | Number of search regressors = 3 | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| **C** | **-0.168** | 0.031 | -5.475 | 0.0054 |
| **REGION="USA"** | **0.135** | 0.018 | 7.372 | 0.0018 |
| **SIGNIFICANCY_LEVEL__=10** | **0.143** | 0.027 | 5.249 | 0.0063 |
| **SIGNIFICANT** | **0.044** | 0.014 | 3.064 | 0.0375 |
| R-squared | 0.933 | | | |
| Adjusted R-squared | 0.883 | Mean dependent var | | 0.007 |
| S.E. of regression | 0.016 | S.D. dependent var | | 0.048 |
| Sum squared residual | 0.001 | Akaike info criterion | | -5.075 |
| Log likelihood | 24.300 | Schwarz criterion | | -5.035 |
| F-statistic | 18.615 | Hannan-Quinn criter. | | -5.343 |
| Prob(F-statistic) | 0.008 | Durbin-Watson stat | | 3.665 |

Variables significant at least at the 10 % level are in bold.

## B.4 Results Alternative Stock Price Estimations

Reference sector finance instead of 'ALL'

| | |
|---|---|
| Dependent Variable: | EFFECT_STOCKPRICE<br>Reference: finance sector |
| Method:<br>Included observations: | Stepwise Regression<br>31 after adjustments |
| Number of always included regressors:<br>Number of search regressors:<br>Selection method:<br>Stopping criterion:<br>Stopping criterion: | 1<br>27<br>Stepwise forwards<br>p-value forwards/backwards = 0.5/0.5<br>Number of search regressors = 12 |

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| **C** | **0.175** | 0.073 | 2.418 | 0.0264 |
| **(ACQUIRER=0 AND TARGET=1)** | **0.203** | 0.025 | 8.234 | 0.0000 |
| **YEARS_POST_M_A_1** | **-0.025** | 0.006 | -3.979 | 0.0009 |
| THRESHOLD | 0.043 | 0.043 | 1.004 | 0.3287 |
| **SECTOR_GROUP_ADJ= "Public services"** | **0.225** | 0.060 | 3.777 | 0.0014 |
| **SIGNIFICANT** | **-0.143** | 0.028 | -5.111 | 0.0001 |
| **SIGNIFICANCY_LEVEL__=10** | **-0.122** | 0.031 | -3.964 | 0.0009 |
| **Y_1960_1969** | **0.061** | 0.024 | 2.489 | 0.0228 |
| **M_A_AREA="domestic"** | **-0.139** | 0.056 | -2.484 | 0.0230 |
| **QUALITY_OUTLET_CLASS= "A"** | **0.070** | 0.029 | 2.409 | 0.0269 |
| **QUALITY_OUTLET_CLASS= "AA"** | **0.063** | 0.036 | 1.735 | 0.0998 |
| **Y_1970_1979** | **0.042** | 0.024 | 1.762 | 0.0951 |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | 0.042 | 0.026 | 1.606 | 0.1257 |

| | | | |
|---|---|---|---|
| R-squared | 0.918 | | |
| Adjusted R-squared | 0.863 | Mean dependent var | 0.018 |
| S.E. of regression | 0.046 | S.D. dependent var | 0.124 |
| Sum squared residual | 0.038 | Akaike info criterion | -3.022 |
| Log likelihood | 59.844 | Schwarz criterion | -2.421 |
| F-statistic | 16.683 | Hannan-Quinn criter. | -2.826 |
| Prob(F-statistic) | 0.000 | Durbin-Watson stat | 2.934 |

Variables significant at least at the 10 % level are in bold.

Uni-directional model

| Dependent Variable: | EFFECT_STOCKPRICE; Uni-directional |
|---|---|
| Method: | **Uni-directional** |
| Included observations: | 31 after adjustments |
| Number of always included regressors: | 1 |
| Number of search regressors: | 27 |
| Selection method: | Stepwise forwards |
| Stopping criterion: | p-value forwards/backwards = 0.5 |
| Stopping criterion: | Number of search regressors = 12 |

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| **C** | **0.175** | 0.073 | 2.418 | 0.0264 |
| **(ACQUIRER=0 AND TARGET=1)** | **0.203** | 0.025 | 8.234 | 0.0000 |
| **YEARS_POST_M_A_1** | **-0.025** | 0.006 | -3.979 | 0.0009 |
| THRESHOLD | 0.043 | 0.043 | 1.004 | 0.3287 |
| **SECTOR_GROUP_ADJ= "Public services"** | **0.225** | 0.060 | 3.777 | 0.0014 |
| **SIGNIFICANT** | **-0.143** | 0.028 | -5.111 | 0.0001 |
| **SIGNIFICANCY_LEVEL__=10** | **-0.122** | 0.031 | -3.964 | 0.0009 |
| **Y_1960_1969** | **0.061** | 0.024 | 2.489 | 0.0228 |
| **M_A_AREA="domestic"** | **-0.139** | 0.056 | -2.484 | 0.0230 |
| **QUALITY_OUTLET_CLASS= "A"** | **0.070** | 0.029 | 2.409 | 0.0269 |
| **QUALITY_OUTLET_CLASS= "AA"** | **0.063** | 0.036 | 1.735 | 0.0998 |
| **Y_1970_1979** | **0.042** | 0.024 | 1.762 | 0.0951 |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | 0.042 | 0.026 | 1.606 | 0.1257 |

| | | | |
|---|---|---|---|
| R-squared | 0.918 | | |
| Adjusted R-squared | 0.863 | Mean dependent var | 0.018 |
| S.E. of regression | 0.046 | S.D. dependent var | 0.124 |
| Sum squared residual | 0.038 | Akaike info criterion | -3.022 |
| Log likelihood | 59.844 | Schwarz criterion | -2.421 |
| F-statistic | 16.683 | Hannan-Quinn criter. | -2.826 |
| Prob(F-statistic) | 0.000 | Durbin-Watson stat | 2.934 |

Variables significant at least at the 10 % level are in bold.

Unadjusted post merger time period

| | |
|---|---|
| Dependent Variable: | EFFECT_STOCKPRICE; YEARS_POST_M_A unadjusted |
| Method: | Stepwise Regression |
| Included observations: | 31 after adjustments |
| Number of always included regressors: | 1 |
| Number of search regressors: | 27 |
| Selection method: | Stepwise forwards |
| Stopping criterion: | p-value forwards/backwards = 0.5/0.5 |
| Stopping criterion: | Number of search regressors = 12 |

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| C | 0.166 | 0.072 | 2.307 | 0.0332 |
| (ACQUIRER=0 AND TARGET=1) | 0.202 | 0.025 | 8.241 | 0.0000 |
| **YEARS_POST_M_A** | **-0.023** | 0.006 | -4.036 | 0.0008 |
| THRESHOLD | 0.040 | 0.043 | 0.932 | 0.3639 |
| SECTOR_GROUP_ADJ="Public services" | 0.220 | 0.059 | 3.753 | 0.0015 |
| SIGNIFICANT | -0.143 | 0.028 | -5.132 | 0.0001 |
| SIGNIFICANCY_LEVEL__=10 | -0.122 | 0.031 | -3.992 | 0.0009 |
| Y_1960_1969 | 0.061 | 0.024 | 2.499 | 0.0224 |
| QUALITY_OUTLET_CLASS= "A" | 0.070 | 0.029 | 2.423 | 0.0262 |
| M_A_AREA="domestic" | -0.138 | 0.056 | -2.494 | 0.0226 |
| QUALITY_OUTLET_CLASS= "AA" | 0.063 | 0.036 | 1.729 | 0.1010 |
| Y_1970_1979 | 0.043 | 0.024 | 1.802 | 0.0882 |
| (TYPE_HORIZONTAL=1 AND NON_HORIZONTAL=0) | 0.041 | 0.026 | 1.605 | 0.1259 |

| | | | |
|---|---|---|---|
| R-squared | 0.919 | | |
| Adjusted R-squared | 0.864 | Mean dependent var | 0.018 |
| S.E. of regression | 0.046 | S.D. dependent var | 0.124 |
| Sum squared residual | 0.038 | Akaike info criterion | -3.036 |
| Log likelihood | 60.051 | Schwarz criterion | -2.434 |
| F-statistic | 16.926 | Hannan-Quinn criter. | -2.840 |
| Prob(F-statistic) | 0.000 | Durbin-Watson stat | 2.938 |

Relevant variable in bold.

# C Reference list

## C.1 Books and articles


A. Agrawal, J.F. Jaffe and G.N. Mandelker, 1992, The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly**,** *The Journal of Finance*, 1992, Vol. 47, No. 4, pp. 1605-1621.

Y. Altunbas and D.M. Ibáñez, 2004, Mergers and Acquisitions and Bank Performance in Europe the Role of Strategic Similarities, *Not published,* ECB Working Paper Series NO. 398 / October 2004.

Y. Altunbas, P. Molyneux and J. Thornton, 1996, Big-Bank Mergers in Europe: An Analysis of the Cost Implications, *Economica,* 1997, Vol. 64, pp. 317-329.

G. Andrade and E. Stafford, 2000, Investigating the Economic Role of Mergers, *Journal of Corporate Finance*, 2000, Vol. 10, pp. 1 – 36.

G. Andrade; M. Mitchell and E. Stafford, 2001, New Evidence and Perspectives on Mergers, *The Journal of Economic Perspectives*, 2001, Vol. 15, No. 2, pp. 103-120.

J. Ashton and K. Pham, 2007, Efficiency and Price Effects of Horizontal Bank Mergers, *Not published,* ESRC Centre for Competition Policy, University of East Anglia, CCP Working Paper 07-9.

P. Asquith, R.F. Bruner and D.W. Mullins jr., 1990, Merger Returns and the Form of Financing, *Not published*, University of Virginia, WP. No. 3203-90-EFA.

N.K. Avkiran, 1998, The evidence on efficiency gains: The role of mergers and the benefits to the public, *Journal of Banking & Finance*, 1999, Vol. 23, No. 7, pp. 991-1013.

A.J. Balance, S. Reid and D. Saal, Investigation into Evidence for Economies of Scale in the Water and Sewerage Industry in England and Wales, *Not published,* acquired from Stone and Webster Consultants.

A. Banerjee and E.W. Eckard, 1998, Are Mega-Mergers Anticompetitive? Evidence from the First Great Merger Wave, *The RAND Journal of Economics*, 1998, Vol. 29, No. 4, pp. 803-827.

D.M. Barton and R. Sherman, 1984, The Price and Profit Effects of Horizontal Merger: A Case Study, *The Journal of Industrial Economics*, 1984, Vol. 33, No. 2, pp. 165-177.

S. Basu and J.G. Fernald, 1997, Returns to Scale in US Production: Estimates and Implications, *The Journal of Political Economy*, 1997, vol. 105, no. 2.

A.N. Berger and D.B. Humphrey, 1994, Bank Scale Economies, Mergers, Concentration and Efficiency: The US experience, *not published*, acquired from The Wharton Financial Institutions Centre.

S. Borenstein, 1990, Airline Mergers, Airport Dominance and Market Power, *The American Economic Review*, Vol. 80, No. 2, Papers and Proceedings of the Hundred and Second Annual Meeting of the American Economic Association. (May, 1990), pp. 400-404,

D.A. Breen, 2004, The Union Pacific/Southern Pacific Rail Merger: A Retrospective on Merger Benefits, *not published,* acquired from The Bureau of Economics.

D.F. Broder, Julian Maitland-Walker, 2005, *A Guide to US antitrust law*, Thomson, Sweet and Maxwell, London, 2005.

L.M.B. Cabrial, 1999, Horizontal Mergers with Free-Entry: why cost efficiencies may be a weak defense and asset sales a poor remedy, *International Journal of Industrial Organization,* 2003, no. 21, pp. 607–623.

D. Card and A.B. Krueger, 1995, Time-Series Minimum-Wage Studies: A meta-analysis, *American Economic Review*, 1995, vol. 85, pp. 238-243.

S. Cartwright and C.L. Cooper, 1990, The Impact of Mergers and Acquisitions on People at work: Existing Research and Issues, *British Journal of Management*, 1990, Vol. 1, pp. 65-76.

S. Chatterjee, 1986, Types of Synergy and Economic Value: The Impact of Acquisitions on Merging and Rival Firms, *Strategic Management Journal*, 1986, Vol. 7, No. 2, pp. 119-139.

S. Chatterjee, Why is synergy so difficult in mergers of related businesses?, *Strategy & Leadership*, 2007, vol. 35, no. 2, pp. 46-52.

L.R. Christensen and W.H. Greene, 1976, Economies of Scale in U.S. Electric Power Generation**,** *The Journal of Political Economy*, 1976, Vol. 84, No. 4, pp. 655-676.

C. Christian and J.P. Jones, 2004, The Value-Relevance of Earnings and Operating Cash Flows During Mergers, *Managerial Finance, 2004,* Vol. 30, No. 11, pp. 16-29.

A. Cosh, A. Hughes, 1995, Failures, Acquisitions and Post-Merger Success: the comparative financial characteristics of large and small companies, *not published*, acquired from ESCR-Center for business research.

C. Crutchley, B.B. Marshall, J.D. Payne, 2005, Sharks in the Water: Why the merger wave among Internet firms became a feeding frenzy, *not published working paper,* Financial Management Association.

J. Cubbin and G. Hall, 1979, The use of real cost as an efficiency measure: an application to merging firms, *The Journal of Industrial Economics*, 1979, Vol. 28, No. 1, pp. 73-88.

J.D. Cummins, S. Tennyson and M.A. Weiss, 1998, Consolidation and Efficiency in the US Life Insurance Industry**,** *Journal of Banking and Finance,* 1999, Vol. 23 No. 2-4, pp. 325-357.

G.K. Deans, F. Kroeger and S. Zeisel, 2002, The Consolidation Curve, All industries have similar life cycles, *Harvard Business Review,* 2002, No. 12, pp. 20 – 21.

J. Dermine, 1999, The Economics of Bank Mergers in the European Union, a Review of the Public Policy Issues, *Not published,* acquired from INSEAD, Fontainebleau.

B. Ding, 2006, Mutual Fund Mergers: A Long-Term Analysis, *Not published*, acquired from SUNY-School of Business.

D. Dranove, Mark Shanley, 1995, Cost Reductions or Reputation Enhancement as Motives for Mergers: The Logic of Multihospital Systems, Strategic Management Journal, 1995, Vol. 16, No. 1, pp. 55-74.

G.A. Dymski, 2002, The Global Bank Merger Wave: Implications for developing countries, *The Developing Economies*, 2002, XL-4, December, pp. 435–66.

B.E. Eckbo, 1985, Mergers and the Market Concentration Doctrine: Evidence from the Capital Market, *The Journal of Business*, 1985, Vol. 58, No. 3. (Jul), pp. 325-349.

J. Engberg, D. Wholey, R. Feldman, and J.B. Christianson, The Effect of Mergers on Firms' Costs: evidence from the HMO industry, *The Quarterly Review of Economics and Finance*, 2004, No. 44, pp. 574–600.

J. Farrell and C. Shapiro, 2000, Scale Economies and Synergies in Horizontal Merger Analysis, *not published,* Competition Policy Centre, working paper CPC00-15.

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

M. Filippinia and M. Zolaa, 2005, Economies of Scale and Cost Efficiency in the Postal Services: empirical evidence from Switzerland, *Applied Economics Letters*, 2005, No. 12, pp. 437–441.

R.J.G.M. Florax, 1992, Accounting for Dependence among Study Results in Meta-Analysis: methodology and applications to the valuation and use of natural resources, *not published*, Vrij Universiteit van Amsterdam, Serie research memoranda, 2002-5.

R.J.G.M. Florax, H.L.F. de Groot and R.A. de Mooij, 2002, Meta-analysis: A tool for Upgrading Inputs of Macroeconomic Policy Models, *Not published*, Tinbergen Institute Discussion Paper, TI 2002-041/3.

D. Focarelli, F. Panetta, C. Salleo, 2002, Why Do Banks Merge?, *Journal of Money*, *Credit & Banking,* 2002, Vol. 34, Issue 4, pp. 1047-1066.

S.O. Fridolfsson and J. Stennek, 2005, Why Mergers Reduce Profits and Raise Share Prices—a theory of pre-emptive mergers, *Journal of the European Economic Association,* 2005, Vol. 3, No. 5, pp. 1083–1104.

Y. Gassot, D. Pouillot and L. Balcon, 2000, The Merger and Acquisition Frenzy**,** *Communications & Strategies*, 2000, No. 38, pp. 159-196.

G. V. Glass, 1976, Primary, Secondary, and Meta-Analysis of Research, *Educational Researcher*, 1976, No. 5, pp. 3-8.

M. Gort and N. Sung, Estimating the Effects on Costs of Telecommunications Mergers, *Not published*, downloaded February 12, 2009 from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=164249.

M. Gort, 1969, An Economic Disturbance Theory of Mergers, *The Quarterly Journal of Economics*, 1969, Vol. 83, No. 4, Nov, pp. 624-642.

K. Gugler, D.C. Mueller, B.B. Yurtoglu, C. Zulehner, 2003, The Effects of Mergers: an International Comparison, *International Journal of Industrial Organization,* 2003, No. 21, pp. 625–653.

M.C. Hackett, 1996, Are there Alternatives to Merger?, *Health Manpower Management,* 1996, Volume 22, Number 5, pp. 5–12.

R. Hallowell, 1999, Exploratory Research: Consolidations and Economies of Scope, *International Journal of Service Industry Management*, 1999, Vol. 10, No. 4, pp. 359-368.

J. Harford, 2003, Efficient and Distortional Components to Industry Merger Waves, *Not published,* University of Washington, AFA 2004 San Diego Meetings.

J. Harris, H. Ozgen and Y. Ozcan, 2000, Do Mergers Enhance the Performance of Hospital Efficiency?, *The Journal of the Operational Research Society*, 2000, Vol. 51, No. 7, pp. 801 - 811.

R.S. Hartman, 1996, Predicting The Efficiency Effects Of Mergers, *Journal of Forensic Economics,* 1996, Vol. 9, No. 3, pp. 295—323.

E. Henriksen, K.H.M. Knarvik and F. Steen, 2001, Economies of Scale in European Manufacturing Revisited, *Not published,* Center for Economic Policy Research, Discussion Paper No. 2896, ISSN 0265-8003.

J. F. Houston, C. M. James, and M. D. Ryngaert, 2001, Where do merger gains come from? *Journal of Financial Economics*, 2001, Vol. 60, Issues 2-3, pp. 285-331

T.W. Huang and Brian H. Kleiner, 2004, New Developments Concerning Managing Mergers and Acquisitions, *Management Research News,* 2004, Vol. 27 Issue 4/5, pp. 54-62.

S. Huck, K.A. Konradz and W. Müller, 2003, Profitable Horizontal Mergers without Cost Advantages: The Role of Internal Organization, Information and Market Structure, *Economica*, 2004, No. 71, pp. 575–587.

S. Huck, K.A. Konradz and W. Müller, 2005, Merger without Cost Advantages, *Not published,* CESIFO working paper, No. 1461.

Y. Ijiri and H.A. Simon, 1971, Effects of Mergers and Acquisitions on Business Firm Concentration, *The Journal of Political Economy*, 1971, Vol. 79, No. 2. pp. 314-322.

K. Ikeda and N. Doi, 1983, The Performances of Merging Firms in Japanese Manufacturing Industry: 1964-75, *The Journal of Industrial Economics*, 1983, Vol. 31, No. 3, pp. 257-266.

M. Ivaldi and G. McCullough, Welfare Tradeoffs in U.S. Rail Mergers, *Not published,* acquired from: Center for Economic Policy Research.

S.B. Jarrell and T.D. Stanley, 1990, A Meta-Analysis of the Union-Nonunion Wage Gap, *Industrial and Labor Relations Review*, 1990, vol. 44, pp. 54-67.

D.B. Jemison and S.B. Sitkin, 1985, Corporate Acquisitions: A Process Perspective, *The Academy of Management Review*, 1986, Vol. 11, No. 1, pp. 145-163.

M.C. Jensen, 1988, Takeovers: Their Causes and Consequences, *The Journal of Economic Perspectives*, 1988, Vol. 2, No. 1, pp. 21-48.

B. Jovanovic and P.L. Rousseau, 2001, Mergers and Technological Change: 1885-1998, *Not published*, Vanderbilt University, Working Paper, No. 01-W16.

L.J.Th. van Kamp, and T.A.B. Snijders, 1997, Meta-analysis (in Dutch), special Issue, *Tijdschrift voor Onderwijsresearch,* 1997, No 22, p. 3.

E.J. Kane, 2000, Incentives for Banking Mega mergers: What Motives Might Regulators Infer from Event- Study Evidence?, *Journal of Money, Credit and Banking*, 2000, Vol. 32, No. 3, Part 2: (August), pp. 671-701.

S.N. Kaplan, and M.S. Weisbash, 1992, The Success of Acquisitions: Evidence from Divestitures, *The Journal of Finance*, 1992, Vol. 47, No. 1, pp. 107-138.

J.P. Kassirer, 1996, Mergers and Acquisitions — Who Benefits? Who Loses?, *The New England Journal of Medicine, 1996, No.* 334, pp. 722-723.

T.E. Keeler, 1974, Railroad Costs, Returns to Scale, and Excess Capacity, *The Review of Economics and Statistics*, 1974, Vol. 56, No. 2, pp. 201-208.

H.Y. Kim, 1985, Economies of Scale in Multi-Product Firms: An Empirical Analysis**,** *Economica, New Series*, 1987, Vol. 54, No. 214, pp. 185-206.

M. Koetter, 2005, Evaluating the German Bank Merger Wave, *Not published,* Tjalling C. Koopmans Research Institute, Utrecht School of Economics, Discussion Paper Series 05-16.

K. Ktiemani. V. Scott and N. Waiters, 2005, Conquering the Consolidation Curve, *Electric perspectives*, 2005, sept/okt. pp. 75 – 79.

J. Kwoka and M. Pollitt, 2007, Industry Restructuring, Mergers, and Efficiency: Evidence from Electric Power, *Not published,* Cambridge University working paper, CWPE 0725& EPRG 0708.

B.M. Lambrecht, 2004, The Timing and Terms of Mergers Motivated by Economies of Scale, *Journal of Financial Economics*, 2004, No. 72, pp. 41–62.

R. Larsson and S. Finkelstein, 1999, Integration Strategic, Organizational, and Human Resource Perspectives on Mergers and Acquisitions: A case survey of Synergy Realization, *Organization Science*, 1999, vol. 10, no. 1, pp. 1-21.

C. Lausberg and T. Stahl, 2006, Motives and Non-Economic Reasons for Bank Mergers and Acquisitions, *Not published,* Submitted to the 7th Maryland Finance Symposium on Behavioural Finance March 29-31, 2007.

R. Lenz, 2007, The Logic of Merger and Acquisition Pricing, *Not published,* acquired from: University of Applied Sciences Bielefeld.

B. Lev and G. Mandelker, 1972, The Microeconomic Consequences of Corporate Mergers, *The Journal of Business*, 1972, Vol. 45, No. 1, pp. 85-104.

F. R. Lichtenberg and M. Kim, 1989, The Effects of Mergers on Prices, Costs, and Capacity Utilization in the US Air Transportation Industry 1970-1984, *Not published,* The J. Levy Economics Institute, WP No. 32.

B.J. de Long, and K. Lang, 1992, "Are All Economic Hypotheses False?", *Journal of Political Economy*, Vol. 100, No. 6, pp. 1257-1272.

M. Lubatkin, 1983, Mergers and the Performance of the Acquiring Firm, *The Academy of Management Review*, 1983, Vol. 8, No. 2, pp. 218-225.

J.G. Lynch and B. Lind, 2002, Escaping Merger and Acquisition Madness, *Startegy and Leadership,* 2002, Vol. 30, No. 2, pp. 5-12.

M. Martynova and L. Renneboog, 2008, A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance,* 2008, no. 32, pp. 2148–2177.

R.G. Matthews, 2007, Why Firms Are Returning to Their Roots, *Wall Street Journal - Eastern Edition,* 10/22/2007, Vol. 250 Issue 95, pA2.

G. Meeks and J.G. Meeks, 1981, Profitability Measures as Indicators of Post-Merger Efficiency, *The Journal of Industrial Economics*, 1981, Vol. 29, No. 4, pp. 335-344.

T.T. Milbourn, A.W.A. Boot, A.V. Thakor, 1999, Megamergers and Expanded Scope: Theories of bank size and activity diversity, *Journal of Banking & Finance*, 1999, No. 23, pp. 195-214.

M. Mitchell and J.H.Mulherin, 1996, The Impact of Industry Shocks on Takeover and Restructuring activity. *Journal of Financial Economics*. 1996, no. 41, pp. 193–229.

C.A. Montgomery; V.A. Wilson, 1986, Mergers That Last: A Predictable Pattern?, *Strategic Management Journal*, 1986, Vol. 7, No. 1, pp. 91-96.

D.C. Mueller, 1985, Mergers and Market Share**,** *The Review of Economics and Statistics*, 1985, Vol. 67, No. 2, pp. 259-267.

J.D. Murray and R.W. White, 1983, Economies of Scale and Economies of Scope in Multiproduct Financial Institutions: A Study of British Columbia Credit Unions, 1983, *The Journal of Finance*, 1983, Vol. 38, No. 3, pp. 887-902.

A. Nahavandi and A.R. Malekzadeh, 1988, Acculturation in Mergers and Acquisitions, *The Academy of Management Review*, 1988, Vol. 13, No. 1, pp. 79-90.

J.F. Nielsen and R.W. Melicher, 1973, A Financial Analysis of Acquisition and Merger Premiums, *The Journal of Financial and Quantitative Analysis*, 1973, Vol. 8, No. 2, pp. 139-148.

F.T. Paine and D.J. Power, 1984, Merger Strategy: An Examination of Drucker's Five Rules for Successful Acquisitions, *Strategic Management Journal*, 1984, Vol. 5, No. 2, pp. 99-110.

J.C. Panzar and R.D. Willig, 1977, Economies of Scale in Multi-Output Production, *The Quarterly Journal of Economics*, Vol. 91, No. 3, pp. 481-493.

P.A. Pautler, 2001, Evidence on Mergers and Acquisitions, *The antitrust bulletin*, 2003, Vol. 48, No. 1, pp. 119-222.

L. Pepall, D.J. Richards, G. Norman, 2005, Industrial Organization, Contemporary theory and practice, *Thomson*, 2005, pp. 364-391.

A.L. Ranft and S.J. Marsh, 2008, Accessing knowledge through acquisitions and alliances: an empirical examination of new market entry, *Journal of Managerial Issues*, Vol. 20 Issue 1, pp. 51-67.

S.A. Rhoades, 1997, The Efficiency Effects of Bank Mergers: An overview of case studies of nine mergers, *Journal of Banking & Finance,* 1998, No. 22, pp. 273-291.

N. Rudholm, 2006, Mergers and Economies of Scale: Volkswagen AG 1976 – 2000, *Not published*, acquired from The Department of Business Administration and Economics.

A.K. Saxena and V. Subrahmanyam, 2000, Cost Efficiency and Scale/Scope Economies Among S&Ls, *Managerial Finance,* 2000, Vol. 26, No. 2.

T.D. Stanley and S.B. Jarrell, 1989, Meta-regression Analysis: a Quantitative Method of Literature Surveys, *Journal of Economic Surveys,1989,* Vol. 19, No. 3, pp. 299-308.

T.D. Stanley, 1998, New Wine in Old Bottles: A meta-analysis of Ricardian equivalence, *Southern Economic Journal*, 1998, vol. 64, pp. 713-727.

J. Stennek and F. Verboven, 2001, Merger Control and Enterprise Competitiveness - Empirical Analysis and Policy Recommendations, *Not published*, Report for EC Contract III/99/065.

N. Sung and M. Gort, 2006, Mergers, Capital Gains, and Productivity: Evidence from U.S. Telecommunications Mergers, *Contemporary Economic Policy,* 2006, Vol. 24, Issue 3, pp. 382-394.

F. Trautwein, 1990, Merger Motives and Merger Prescriptions, *Strategic Management Journal*, 1990, Vol. 11, No. 4, pp. 283-295.

J.P. Walsh, 1988, Top Management Turnover Following Mergers and Acquisitions, *Strategic Management Journal*, 1988, Vol. 9, No. 2, pp. 173-183.

J.C. Wang, 2003, Merger-Related Cost Savings in the Production of Bank Services, *Not published,* Research Department Federal Reserve Bank of Boston, Working Papers: 03-*8.*

B. Warf, 2003, Mergers and Acquisitions in the Telecommunications Industry, *Growth and change: a journal of regional development*, 2003, Vol. 34, No. 3, pp. 321-344.

### C.2 Other

Tinbergen Institute literature ranking downloaded March 4, 2008 from: www.tinbergen.nl/research/ranking2.html.

Eviews 6.0 help-file, under ‘Stepwise Least Squares Regression’ viewed August 12, 2009.