EU Mergers' Impact on Operating Performance

An Event Study of Merger-Related Operating Performance

Changes in the EU after the IFRS Enforcement

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Abstract: By examining a sample of 52 cross-industry corporate mergers completed between 2008-2011, this study investigates mergers' impact on operating performance in the EU, as well as potential determinants for post-merger performance. The results provide some evidence that mergers improve operating performance of merging firms. They also imply that the main driver of these improvements is rather better cost and/or pricing management than asset utilization. Additionally, we find strong evidence that mergers fully paid by stock perform worse than transactions paid with cash or a mix of cash and stock, and weaker evidence that mergers where the acquirer and target are from the same country, and where the acquirer is heavily leveraged, perform better than their respective opposites. Regarding determinants acquisition size and industry-relatedness, no results prove robust enough to determine any significant influence on performance change.

Keywords: Mergers, Operating Performance, M&A, Synergies, Value Creation

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1.   Introduction

1.1   Background and purpose of the study

For several decades, shareholder value creation has been the main focus of M&A research. Whereas a majority of the studies examine stock market reactions, relatively few are concerned with operating performance changes. Although shareholder value undoubtedly is of great interest to the owners of a firm, operating performance is also highly relevant since it underlies the long-term share price development. Arguably, it says something about the actual realization of synergies, and not only the expectations of such (Amel-Zadeh, 2009), as it measures actual economic results. Of the studies that actually do study operating performance, a vast majority measure returns in relation to market values. While this should capture actual synergies better than stock returns, it has its drawbacks, as it still relies upon the assumption of efficient capital markets (Healy et al., 1992). Although the alternative of solely relying on accounting data requires much more complicated methods, and implies large risks of generating distorted results, it is in theory a more accurate way of measuring operating performance changes.

This thesis is an event study examining operating performance changes in a sample of EU mergers, based entirely on reported financial data. On a broader scale, our aim is to determine mergers' impact on operating performance in general, and to identify key characteristics attributable to potential performance changes. In a more narrow sense, we want to contribute to previous research by examining the mergers cross-sectionally and cross-geographically on the rarely explored EU market. Due to high growth in European M&A activity the last two decades, such research has hereto been wanting. Although similar studies have been produced (e.g. Gmelich, M.B., 2011; Martynova, 2006), all seem to lack a satisfactory degree of comparability, as their sample mergers were completed before the IFRS enforcement for listed companies 2005[1]. Hence, comparing cross-geographically implies comparing reported financial data across different accounting standards. As this study only examines data reported from 2005 and onwards, the prospects of achieving a high degree of comparability are better than in previous research. Furthermore, by complementing previous research designs with three methodological adjustments, we aspire for better measuring precision.

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[1] Regulation No. 1606/2002, Article 4, European Parliament and The Council of The European Union

1.2 Overall research approach

Using a sample of 52 corporate mergers in the EU, taking place from 2008 until 2011, we conduct an event study investigating changes in operating performance from pre-merger to post-merger years. We recognize that performance changes might be influenced by other factors than the merger, such as industry, economic, and firm-specific factors. We therefore benchmark the merged firms with peer groups of matched firms to isolate their excess performance, if any.

As performance measures we use six different measures in order to overcome, as far as possible, biases induced by any single measure. Furthermore, we test if changes in operating performance are more likely to come from changes in asset productivity or operating margin, using a DuPont analysis. In an attempt to identify some main determinants of merger-related changes in performance we apply a multivariate regression analysis testing to what extent certain merger-specific characteristics may have an influence on post-merger performance.

Moreover, the above mentioned research design adjustments appear in three forms: the introduction of the accounting measure adjusted invested capital (AIC), a new type of control group when constructing performance benchmarks, and a new requirement when selecting firms to include in these groups. These will be further explained in Section 4.

1.3 Definitions

The M&A terminology is often surrounded with some confusion. As the definitions vary significantly across different dictionaries, this is not surprising. The definitions used in this study have been inspired by either the Financial Times Lexicon (FTL) or the glossary provided by www.mergermarket.com (MM), the online M&A database from which some of the sample data have been retrieved.

Acquisition or takeover (FTL)

The acquisition (by an "acquirer") of a majority or controlling interest in a company ("the target"), normally through the purchase of shares.

Merger (FTL)

The combination of two (or more) companies into a new or existing legal entity. Can be either:

a) the acquisition by one company of all the shares in another (others), with one of the companies surviving as the legal entity, or

b) the creation of a new legal entity combining the assets and operations of two companies, with shareholders of both companies being offered shares in that new entity.

Most of the transactions examined in this study fall under one of the two *merger* definitions. However, as a few have complicated structures, they would be classified as acquistions or takeovers but not fully as mergers. Despite this we will, for simplicity reasons, refer to all studied transactions as mergers.

Deal consideration (MM)

The value of the sum paid by the acquirer for the equity stake in the target.

Deal value (MM)

The sum of the deal consideration plus the value of the net debt in the target, where applicable.

Abnormal performance change

Referring to changes in performance attributable to the merger when comparing post- and pre-merger years (see Figure 1, Appendix B).

1.4 Delimitations

Due to the broad scope of this study, distinct and carefully considered delimitations have been crucial to generate qualitative results. Perhaps the most obvious requirement was that

accounting data must be accessible and comparable for all firms studied. Hence, the first delimitation made was to only include public firms with securities traded on at least one regulated stock exchange during the entire period studied. The second was to chose a period of merger completion years for which the IFRS enforcement applied both three years before and after completion. Thus, the period chosen was 2008-2011.

We study the merger effect based on accounting data three years before and three years after the merger. Although it is debatable whether a range of three years is sufficient for potential synergistic effects to materialize, we find support in previous research. La Porta et al. (1999), provide empirical evidence for a general lag of approximately 2 years for a merger to affect performance. Moreover, Ghosh (2001), and Martynova (2006), are two examples of studies applying the same period range in similar research designs.

A potential weakness of the completion years being 2008-2011, is that they occur in between two 'merger waves'. Consequently, the M&A activity was abnormally low during the period studied, likely having a limiting effect on the average deal size of our merger window. As argued by e.g. Healy et al. (1992) and Penman, S. (1991), smaller mergers tend to be relatively less profitable, why this could induce a downward bias on our observed performance changes. However, as most precedent studies examine periods of abnormally high M&A activity, it could just as well be argued that their observed performance changes are biased upwards. Moreover, as our benchmark method accounts for external economic influences, we do not regard our results considerably distorted by the Financial Crisis '07-08.

On a final note, although we acknowledge that there might be other reasons behind a merger than the rational aim to achieve synergies or other operating improvements, for example career ambitions of the acquiring company's management, it is beyond the scope of this study to attempt adjustments for such. Thus, the sample might include mergers that were in fact not meant to create any synergies, which, to the extent it has occured, might have confounded the results correspondingly. Considering the Financial Crisis '07-08, the risk for this may be abnormally large for our merger window as many firms were forced to make decisions due to financial distress.

1.5   Main findings

The results of this study provide some evidence that mergers improve operating performance of merging firms. They also imply that the main driver of these improvements is rather better cost and/or pricing management than asset utilization. Additionally, we find strong evidence that mergers fully paid with stock perform worse than transactions paid with cash or a mix of cash and stock, and weaker evidence that mergers where the acquirer and target are from the same country, and where the acquirer is heavily leveraged, perform better than their respective opposites. Regarding determinants acquisition size and industry-relatedness, no results proved robust enough to determine any significant influence on performance change.

2.   Previous Research and Theoretical Framework

In this section, we present the previous research and theoretical framwork considered when designing the study and analyzing its results. First, a brief summary is given of the present European M&A context in 2.1. Then, relevant theoretical background is described for the corporate rationale behind mergers in 2.2. Finally, previous research conclusions are summarized for operating performance changes in 2.3 and for determinants of change in 2.4.

2.1   The European M&A context

The creation of the Single European Market was one of the main pillars when the European Economic Community was formed. Its subsequent implementation in the 1990s and 2000s has led to an unprecedented increase in merger activity among European corporations. European companies have been considered to be at a disadvantage in this respect compared to their American counterparts, which operate on a large single market. Hence it has been argued that the consolidation of the European market would help European firms to compete globally (Papadopoulos, 2011).

Through the EU Merger Directive, first introduced in 1992[2] and revised in 2006,[3] a number of regulatory obstacles were removed for cross-border mergers, most importantly allowing an acquiring firm to be liable to the laws of its domicile country as far as possible. This has

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[2] Directive 1990/434/EEC
[3] Directive 2005/19/EC

contributed to a significant increase in merger activity on European markets, a development generally considered essential for creating globally competitive corporations out of firms that have traditionally been largely confined to domestic markets, thus unable to exploit the economies of scale available to their American counterparts.

Yet little research has been conducted on the performance on European mergers (Martynova et al., 2006). As already mentioned, the great majority of studies on the subject has thus far been focused on domestic markets, predominantly the US and UK. There may be a number of reasons for this lack of other European studies. One might be the less developed continental stock markets, which make it harder for the researcher to retrieve accounting and performance data as private companies usually do not disclose their financial reporting anywhere near the extent required from listed companies. Another problem is the historically differing accounting regulations among EU member states, limiting cross-border comparability. However, since the IFRS enforcement in 2005, requiring all listed EU firms to adopt the standards, this issue has been significantly reduced. Although results of previous research indicate that compliance was not universal as of 2005 (e.g. Pownall & Wieczynska, 2012), the comparability is deemed sufficient for the purposes of this study from 2005 and onwards.

2.2   Corporate rationale behind mergers

The financial theory behind M&A activity suggests that a successful merger creates value, which the acquirer and target companies would not have been able to achieve on their own (Berk and DeMarzo, 2011). The most common type of additional value emanates from synergies in the form of either cost reductions or revenue enhancements, or a combination of both. Catalysts for improved performance could include the reduction of redundant resources and/or access to new markets. Economies of scale is also a commonly claimed synergy, as is economies of scope. Vertical integration, whereby the combined entity gains from increased coordination throughout the value chain is yet another common argument. Sometimes firms are also acquired to access know-how present in the target company, whether it is some special expertise in an industry or geographical expertise as in the case of cross-border transactions. There are also financial synergies, such as reducing cost of capital by diversifying the business, or by increasing its size.

A less commonly showcased synergy may be monopoly gains, whereby the combined company is large enough to achieve some monopoly power in its market. This type of value creation is strongly regulated against by anti-trust laws, however, and many proposed European mergers have been stopped by the authorities on grounds that the combined entity would hold monopoly power in the whole or parts of the Single Market.

The above mentioned gains are argued from a strictly rational idea of value creation. However, there may also be less rational reasons behind mergers, as in the case of misalignment of owners' and managers' goals. Such agency problems can arise due to conflicts of interest where managers engage in empire building in order to gain prestige and high compensation for running large companies and are willing to take risks with the firms' cash, as suggested by the free cash flow hypothesis (Jensen, 1986). If looking beyond the literature, however, it is far from certain to what extent synergies of the kinds above are the true driving forces behind M&A, or if these arguments are rather a common veneer behind which managers' hide to further their own interests.

2.3   Operating performance changes following mergers

Previous studies aimed at measuring changes in operating performance based on reported financial data have produced conflicting results. On this basis they can be divided into three main categories; those that show significant post-merger performance improvements (Healy et al., 1992; Linn and Switzer, 2001; Ghosh, 2001; Rahman and Limmack, 2004; Powell and Stark 2005), those whose results are predominantly negative (Yeh and Hoshino, 2001; Kruse et al., 2002; Knapp et al., 2005; Amel-Zadeh, 2009), and the inconclusive without any significant results (Sharma and Ho, 2002; Moeller and Schlingemann, 2004; Martynova et al., 2006). Of these, proponents for improvements however compose a noticeable majority, as found by a survey by Amel-Zadeh (2009).

Most studies use a set of different performance measures, and in many cases these have shown contradictory results, presumably due to different biases associated with different accounting characteristics. Moreover, even though some of the above-mentioned studies use similar models for extracting merger performance, there are often differences in the construction of benchmarks used to isolate the merger-related change in performance. More

detailed descriptions of methods used in previous research for designing peer groups will be given in Section 4.

Furthermore, some research has analyzed the change in performance by dividing the return measures into margins and capital turnover, to better explain changes in post-merger performance. Both Switzer (1996) and Healy et al. (1992) find significant increases in asset productivity, but no significant change in operating margin.

2.4   Determinants of post-merger performance

2.4.1 Size of deal

As several studies have pointed out, e.g. Healy et al. (1992) and Martynova et al. (2006), there is reason to believe that large transactions might in general be more likely to entail synergies, operational efficiencies and economies of scale than smaller ones due to their larger scope for generating such improvements. On the other hand they may also have greater potential for destruction of value as larger organizations might be more difficult to integrate. The evidence from previous studies on this issue is inconsistent: Linn and Switzer (2001) and Switzer (1996) find evidence that larger transactions outperform smaller ones, whereas the majority of empirical evidence does not show any significant results regarding whether the size of the transaction has any relation to post-merger performance (Powell and Stark, 2005; Moeller and Schlingmann, 2003; Healy et al. 1992).

2.4.2 Type of payment

There is also evidence that the method of payment in transactions may be related to the post-merger operating performance. Several studies have found cash transactions outperforming deals paid for through shares (Linn and Switzer 2001; Ghosh, 2001; Moeller and Schlingemann, 2004). A possible explanation for the latter outcome is that cash transactions are more frequently financed with new debt (Ghosh and Jain, 2000), and classic financial theory suggests that debt serves as a constraint on management and reduces the risk of mismanagement of excess cash flows (Berk and DeMarzo, 2011). Thus debt-financed cash transactions are more likely to lead to improved operating performance as companies then tend to be managed with more discipline.

Another conceivable explanation is that hostile takeovers are usually paid for in cash. These often imply replacing the incumbent management could result in improved performance (Denis and Denis, 1995; Parrino and Harris, 1999). However, empirical evidence is not consistent in this respect, and many studies find no significant relationship between type of payment and post-merger operating performance (Healy et al., 1992; Heron and Lie, 2002; Powell and Stark, 2005).

2.4.3 Industry-relatedness

A merger where the acquirer and target belong to the same industry can generally be expected to produce synergies easier to lock in than in mergers across industries. Healy et al. (1992) mention familiarity of the industry and overlapping organizations as reasons for this. Meanwhile, cross-industry mergers may also be argued to have greater potential for creating operational and/or financial synergies, as argued by Martynova et al. (2006) and Berk and DeMarzo (2011).

There are also some problems regarding diversified firms that can deteriorate post-merger performance, for example rent-seeking behavior by managers (Scharfstein and Stein, 2000), bargaining problems within the firm (Rajan et al., 2000), and bureaucratic rigidity (Shin and Shulz, 1998). Again the empirical evidence is fragmented. Ghosh (2001) finds significant increases in post-merger performance for diversifying mergers. In contrast some studies (Healy et al., 1992; Heron and Lie, 2002) find a positive correlation between industry-relatedness and improved performance, whereas other studies find this relationship to be insignificant (Switzer 1996; Linn and Switzer 2001; Powell and Stark, 2005).

2.4.4 Leverage of acquirer

The above mentioned restraining nature of leverage can also arguably reduce the risk of engaging in unprofitable M&A activity, as managers have less cash flow to potentially mismanage (Jensen, 1986). Harford (1999) and Ghosh and Jain (2000) reach the conclusion that leverage effectively increases the chance of improved post-merger performance, although these papers study stock price reactions on the merger announcement rather that operating performance. Other studies do not find similar results: Switzer (1996) and Linn and Switzer

(2001) report no significant relationship between the gearing ratio of the acquirer and post-merger performance.

2.4.5. Domestic vs. cross-border transactions

Whether cross-border transactions are generally profitable or not has been discussed frequently. This is an issue of particular relevance in a European context, as the harmonization of regulations in Europe has sought to encourage this (Papadopoulos, 2011).

Cross-border transactions are arguably likely to be able to benefit from economic market imperfections, e.g. in the labor, capital and product markets (Martynova et al., 2006). On the other hand it is well documented that regulatory and cultural differences can make presumably profitable transactions fail due to difficulties in realizing announced synergies. Many studies support this more negative view on cross-border transactions (Schoenberg, 1999; Moeller and Schlingemann, 2004), concluding that post-merger performance of acquiring firms merging with foreign targets falls significantly short of that of purely domestic mergers. Meanwhile, Gugler et al. (2003) show a significant improvement of cross-border deals on post-merger performance, whereas Martynova et al., (2006) find no significant difference.

3.   Formulation of Hypotheses

Based on the purpose of this study and the previous research presented in Section 2, we below formulate hypotheses that we then test in Section 6.

3.1   Performance change

The first two hypotheses are formulated to capture potential changes in operating performance, as well as their nature in terms of the two-variable DuPont model.

3.1.1   *Changes in performance following corporate mergers*

As detailed in Section 2, previous studies on accounting-measured changes in operating performance are split between reaching significant positive, negative, and insignificant

results, however with an overweight towards the positive (Amel-Zadeh, 2009). Thus, we hypothesize:

H₁: Mergers improve operating performance of merging firms

3.1.2 *DuPont analysis of changes in performance*

Previous studies have also analyzed operational changes in more depth, especially splitting the return-based metric into operating margin and asset turnover (Switzer, 1996; Healy et al., 1992). Most empirical evidence suggest that the latter, rather than the former, experiences significant changes. Hence, we hypothesize:

H₂: Asset turnover, rather than operating margin, is the main driver of operating performance changes induced by a merger

3.2 Determinants of Change

The hypotheses below are formulated to answer the question if certain characteristics of a transaction have any impact on post-merger performance.

3.2.1 *Deal size and performance changes*

As studies such as Healy et al. (1992) and Martynova et al. (2006) have shown empirically, there is evidence that the size of the merger is correlated with the post-merger performance improvements. There are also studies, however, showing no significant change in performance, as well as, suggestions that size can hinder the realization of synergies and would rather have a negative effect on mergers. Hence we hypothesize that:

H₃: Larger mergers induce larger improvements in operating performance

3.2.2 *Type of payment*

The method of payment, by stock or cash, seems to influence post-merger performance, according to some of the studies mentioned in Section 2. Cash transactions are often associated with debt financing, which can have a constraining effect on management and keep it from engaging in unprofitable acquisitions. Another theory is that hostile takeovers often

involve cash payment, and that these transactions have better opportunities for improved performance as the acquirer sees potential for the firm if, for example, current management is removed. We therefore hypothesize:

H_4: Cash transactions lead to improved performance in relation to stock transactions

3.2.3 *Industry-relatedness*

Intra-industry mergers are generally expected to generate larger synergies than mergers between companies in different industries. While there are some suggestions that it is rather diversifying mergers that genereate synergies, we nonetheless hypothesize that:

H_5: Mergers within the same industry generate better post-merger performance than cross-sectional mergers

3.2.4 *Leverage of the acquirer*

The free cash flow hypothesis formulated the idea that leverage can act as brake on management willingness to spend excess cash flows, by simply reducing this excess. There are some studies that come to the conclusion that more leveraged acquirers engage in more profitable mergers, as discussed in Section 2.4. We hypothesize that:

H_6: Relatively more leveraged acquirers experience better post-merger performance

3.2.5 *Domestic vs. cross-border transactions*

Whether cross-border transactions should be thought to generally imply improved or deteriorated performance, compared to domestic transactions, is debatable, as discussed in Section 2. Whereas market imperfections could lead to benefits, there are also issues with culture clashes and differing laws. In this study, we hypothesize:

H_7: Domestic mergers lead to superior performance compared to cross-border transations

4.   Method

According to Barber & Lyon (1996), the research design of an event study concerning operating performance should include three fundamental choices. First, the performance measures to examine. Second, a benchmark against which to compare actual performance. Third, the statistical tests for assessing the robustness of the findings. Following the logic of Barber and Lyon (1996), the performance measures used in this study will be presented in Section 4.1. In Section 4.2 and 4.3, the change model for examining changes in operating performance and the DuPont analysis are introduced, respectively. Next, the methodology employed for evaluating determinants of operating performance changes is described in 4.4. Then, the processes of collecting the data are described in Section 4.5 and finally, the choice of statistical tests in 4.6.

4.1   Performance measures

This paper aims to examine the change in performance due to mergers by comparing operating performance before and after a merger. Consequently, chosen performance measures should be able to reveal any increased efficiency or productivity related to the merger. They should also minimize distortions induced by differing accounting policies and managerial discretion across firms. Thus, we carefully have to determine what accounting measures to include in our return and margin measures, i.e. the choice of accrued or cash flow income as a numerator and an appropriate denominator with which to scale the numerator.

We have selected earnings before interest, taxes, depreciation, and amortization (EBITDA) and free cash flow from operations (FCFO) to compare pre and post-merger operating performance. To scale these earnings and cash flows we have also chosen three deflators: adjusted book value of assets (ABVA), adjusted book value of invested capital (AIC) and sales.

4.1.1 *Choice of numerator*

As Amel-Zadeh (2009) points out, most previous studies use some kind of income or operating cash flow measure. The aim when selecting measures is to be able to achieve maximal comparability of operating performance among firms across time and industries. We

have chosen an earnings measure and a cash flow measure, as we believe they complement each other in several important aspects.

We use EBITDA, since it arguably implies superior comparability of operating performance between firms and industries, compared to many other earnings measures. By not selecting a measure further down the income statement we avoid the distorting effect of different tax rates across countries, as well as different capital structures. Highly leveraged firms have higher interest expenses, which impacts earnings negatively, and has nothing to do with operating performance. However, it could be argued that depreciation should be included in operating performance, as these expenses are linked to investments essential for operations, in some industries. An opposing argument would be the potential bias induced against sample firms in relation to their benchmark, as the revaluation of the target's assets associated with the purchase method could lead to higher depreciation and amortization charges in post-merger years (Amel-Zadeh, 2009). Moreover, there is a level of managerial discretion associated with depreciation and amortization charges, e.g. the amortization of goodwill. For these reasons, we have chosen to use EBITDA as one of our measures.

As also argued by Amel-Zadeh (2009), the combination of accounting measures should complement each other and be derived both from the income and cash flow statement. While EBITDA is an earnings measure, it neglects to account for several factors relevant for an operational analysis. Two such factors are capital expenditure and working capital changes. To capture these, we include the pure cash flow measure free cash flow from operations (FCFO) as a second numerator.

4.1.2 *Choice of deflator*

To compare the chosen earnings and cash flow measures we need to scale them with an appropriate deflator. The main debatable point when deciding upon deflator, has traditionally been whether to use market or book value of assets, or alternatively sales. Proponents of market value of assets (e.g. Healy et al., 1992; Switzer, 1996; Harford, 1999; Linn and Switzer, 2001; Megginson et al., 2004) argue that using market values simplifies inter-temporal and cross-sectional comparisons due to varying accounting policies over time and

between companies, Barber and Lyon (1996). Furthermore, assets are valued at the same point in time and are thus more comparable than when using book values.

The problem when using market values is that it is a forward-looking measure and represents the expected future returns, as discussed by Powell and Stark (2005). Thus expected changes in operating performance are reflected in the market valuation immediately, and measuring any change becomes problematic. Healy et al. (1992) claim to adjust for this by subtracting the change in market value around the date of announcement. The authors then rely on the assumption of market efficiency, which can be debated, especially for our chosen time period. Deflating earnings and cash flows with market values of assets also implies a mismatch between numerator and denominator, as the first is based on actual results and the second on expectations, as discussed by Amel-Zadeh (2009). He further concludes that using market values of assets generally overstate improvements compared to book values of assets, possibly due to an effect of decreasing market values of assets following mergers, as some empirical evidence from studies in the UK suggest (e.g. Agrawal et al., 1992; Gregory, 1997). We therefore use book values of assets, which are arguably more stable and easier to compare over time, and adjust these for revaluations attributable to the merger (for a further elaboration on this, see Appendix A).

Furthermore, our study aims to focus on operations and we thus include a measure to effectively isolate returns on operating assets and better compare firms' operating performance. As discussed by Runsten and Johansson (2005), invested capital can be viewed as an asset base more focused on the operational part of a business, as finacial assets and non interest bearing liabilities are removed. E.g., large stockpiles of cash would lower asset return and distort the appearance of a firm's operational productivity. Thus, removing financial assets should arguably increase comparability across firms. Considering the above, we have decided to also include book value of invested capital (AIC) as an asset base deflator, adjusted for revaluations at the merger year in the same way as the book value of total assets (see Appendix A). Introducing the AIC deflator is the first of the the three methodology adjustments mentioned in Section 1.2.

Ghosh (2001) and Barber and Lyon (1996) argue that sales is a better deflator than market or book value of assets because it implies better comparability with earnings as both are retrieved from the income statement and matched in timing. While this is true, the ensuing performance metric measures profitability rather than productivity of assets.

Table 1: Accounting measure descriptions

Measure	Abbreviation	Category
EBITDA return on invested capital	*EBITDA/AIC*	Operational return
FCFO over invested capital	*FCFO/AIC*	Operational return
EBITDA return on total assets	*EBITDA/ABVA*	Operational return
FCFO over total assets	*FCFO/ABVA*	Operational return
EBITDA margin	*EBITDA/Sales*	Operational profitability
FCFO margin	*FCFO/Sales*	Operational profitability
Capital turnover (invested capital)	*Sales/AIC*	Asset productivity
Capital turnover (total assets)	*Sales/ABVA*	Asset productivity

4.2   Test of H_1: Corporate mergers improve operating performance of merging firms

As discussed in Section 2, essentially two types of approaches have been used in previous research to quantify the operating performance change of merging firms. These are generally referred to as the change model and the intercept model. Although they both use the same benchmarking method for generating pre- and post- merger abnormal performance, as decribed below, their mathematical logic differ when computing the change in abnormal performance.

4.2.1   *Benchmarking method*

The fundamental idea of the benchmarking methods used in precedent studies is to isolate the change in operating performance following a merger that can be attributed to the merger itself. This change is determined by comparing performance before and after the merger. To isolate the change associated with the merger we need to compare each of our sample firms'

result to a benchmark essentially controlling for how the firms would have performed, had the merger not occurred (Barber and Lyon, 1996). We thus introduce the metric abnormal performance (AP), calculated for each year before the merger and compared to post-merger years, as demonstrated in Equation 1.

$$AP_{t,i} = P_{t,i} - E(P_{t,i}) \qquad \text{(Equation 1)}$$

In the equation, P is the combined performance for the acquirer and target, and $E(P)$ the expected performance for the pro forma combined firms in the absence of the merger. Furthermore, i denotes each merger case and t the appropriate year of calculation. For a more thorough explanation on how P and $E(P)$ are calculated, see Appendix B.

In our study, we measure AP over a range of three years before and three years after the merger year ($t = 0$). The mean for the pre- and post-merger years are denoted $MAP_{Pre,i}$ and $MAP_{Post,i}$, respectively, and are computed as follows.

$$MAP_{Pre,i} = \frac{AP_{-1,i} + AP_{-2,i} + AP_{-3,i}}{3} \qquad \text{(Equation 2)}$$

$$MAP_{Post,i} = \frac{AP_{1,i} + AP_{2,i} + AP_{3,i}}{3} \qquad \text{(Equation 3)}$$

Although the principles underlying-this model has been acknowledged by previous research, significant controversy has surrounded the estimation of the benchmark $E(P)$. Healy et al. (1992), calculated $E(P)$ as the performance of each studied firm's industry median peer. Among many others, Cornett and Tehranian (1992), Switzer (1996), and Manson et al. (2000) followed their example. Whereas this estimation method is theoretically sound in adjusting for external macro factors such as economy, politics, and technology affecting P, it does not account for size or performance of individual firms. Furthermore, as suggested by Franks and Harris (1989), Morck et. al. (1990), and Penman (1991), operating performance correlates with firm size and M&A activity. Benchmarking against an industry median would hence likely result in a positively biased AP as merging firms are usually larger than the industry median (Barber and Lyon, 1996; Ghosh, 2001).

Three studies deviating from the conventional industry median approach are Ghosh (2001), Linn and Switzer (2001), and Heron and Lie (2002). Instead of industry medians, they estimate expected returns by using matched firms. This implies screening firms similar to the merging firms until the single best match is found for both the acquirer and target, respectively. The parameters used in the screening have included different combinations of industry-relatedness, size, and pre-merger operating performance. While this type of estimation method accounts for size and performance better than the industry median, its accuracy in accounting for external macro factors is lower.

Summing up, the industry median and the matched firm approaches are the two main methods used for estimating $E(P)$ in the most renowned merger-focused operating performance studies. However, if looking beyond the merger research, alternative methods can be found. For example, Bergström et al. (2007), studying operating impact of private equity buyouts, apply peer groups in a methodology context in many ways similar to the one in this study. Like the matched firm method, it implies screening for firms with different parameters. However, instead of selecting only one benchmark firm, a group of matched firms is collected for each sample firm. $E(P)$ is then estimated as the asset-weighted average of the peer group. It follows that this method should prove a good compromise between the other two methods' deficiencies described above. Further, as an average can be used (when using smaller peer groups like the ones in this study), it is associated with lower risk of biases arising from abnormal firm-specific characteristics. Hence, peer groups were chosen for estimating $E(P)$ in this study. The process of constructing the peer groups is explained in detail in 4.5.2. This is the second method adjustment we introduce to achieve a research design with higher measuring accuracy than previous studies (see Section 1.2).

4.2.2 *The change model vs. the intercept model*
As mentioned in the introduction of this section, the change and intercept model are identical in how abnormal performance is calculated. The differences arise when calculating the actual changes in abnormal performance. Whereas the change model applies Equation 4, the intercept model applies Equation 5, as demonstrated below.

$$\Delta MAP_{t,i} = MAP_{Post,i} - MAP_{Pre,i} \qquad \text{(Equation 4)}$$

$$MAP_{Post,i} = \alpha + \beta_1 MAP_{Pre,i} + \varepsilon_i \qquad \text{(Equation 5)}$$

As displayed, the change model computes mean abnormal performance change (ΔMAP), by simply deducting the mean pre-merger abnormal performance (MAP_{Pre}) from the post-merger equivalent (MAP_{Post}). In contrast, the intercept model utilizes a simple regression for the same purpose. Following the example of e.g. Switzer (1996) and Martynova (2006), we construct a model where MAP_{Post} is set as the dependent variable and MAP_{Pre} the independent. Considering the rationale of simple regression theory, the intercept of the function (α) will thus take the value of the change in mean abnormal performance.

The rationale of this study's benchmarking method and models are illustrated i Figure 1.

Figure 1: Derivation of mean abnormal performance change
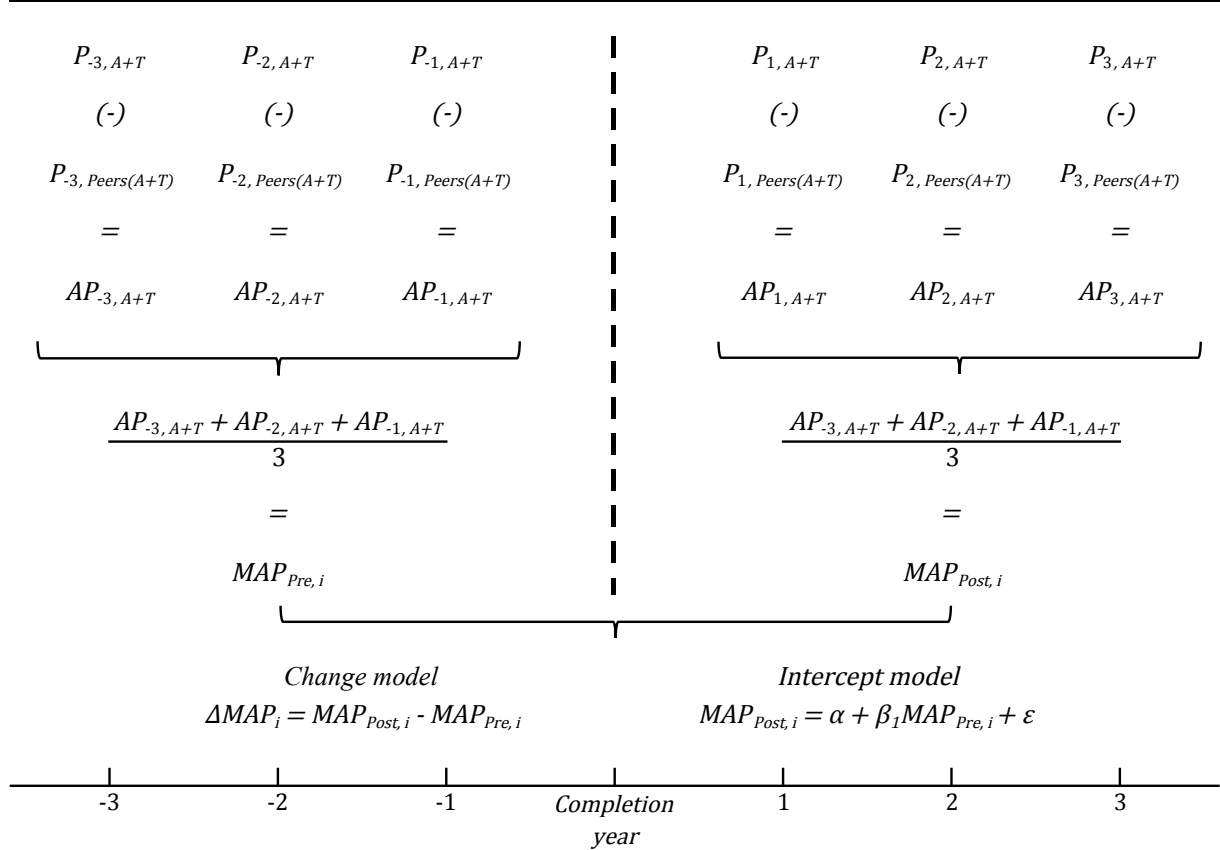
P is the observed value of a certain accounting measure for a certain year. *AP* represents the abnormal performance and *MAP* the mean abnormal performance. The performance of an acquirer's or target's peer group a certain year is computed as the weighted average performance of the 3-5 peer firms included in the group (see Appendix B).

4.3   Test of H₂: DuPont analysis

Approaching the second hypothesis, we will further examine the components of our operating return measure by dividing it into the operating margin and capital turnover rate. Using the DuPont relationship allows us to look further into any improvements in operating return presented by our measuring models, and determine whether potential changes are more attributable to changes in operating margins or asset productivity. Like all other measures to which the benchmarking method has been applied, abnormal capital turnover is calculated for three years prior to the merger and three years following the merger year. The mean of the three years before is then deducted from the mean of the three years following the merger to determine whether any change has occured. A corresponding calculation is performed for the operating margin.

4.4   Test of H₃ – H₇: Multivariate analysis

To test potential determinants of post-merger operating performance we carry out a series of multiple regressions. The independent variables are selected in accordance with the writings in Sections 2.4 and 3. The dependent variable is set as mean post-merger abnormal performance (MAP_{post}).

$$MAP_{post} = \alpha + \beta_1 MAP_{pre} + \beta_2 \ln(SIZE) + \beta_3 LEV + \beta_4 STOCK + \beta_5 MIX + \beta_6 IND$$
$$+ \beta_7 DOM + \varepsilon_i$$

MAP_{pre} serves as a control variable for the regressions, implying that a firm's abnormal performance is likely to be correlated across time. For the purpose of testing Hypothesis 3, continuous variable $\ln(SIZE)$ is included. As our sample includes a range of deal sizes with significant variance (the largest deal being approximately 1500% larger than the smallest) we have chosen to take the natural logarithm of the deal size for normalized values and minimal distortions. For Hypothesis 4, a third continuous variable is introduced in the form of LEV, measured as the total debt divided by the book value of total assets at the end of the fiscal year prior to the completion year. Next, two dummy variables, $STOCK$ and MIX, are introduced for Hypothesis 5. The purpose of these is to examine whether the method of payment has any influence on performance, with 1 being entered for $STOCK$ if the transaction was paid with

stock as payment and 0 if it was paid by cash or a mix of cash and stock. MIX was given a value of 1 if a mix of cash and stock was used for payment, and 0 if cash or stock was used. So a cash transaction implies that both $STOCK$ and MIX take the value 0. Industry-relatedness, measured by the matching of ICB codes[4], is also entered as the dummy variable IND with a 1 if the acquirer and target share the same 2-digit ICB code and 0 if they do not, for the purpose of testing Hypothesis 6. Finally, Hypothesis 7 is tested by introducing the dummy variable DOM, with 1 meaning a domestic transaction and 0 meaning a cross-border transaction. For a more detailed description of the iterative process used in the multivariate regression analysis, see Appendix C.

4.5   Data collection

4.5.1 Collecting the sample data

To compile a list on potential sample mergers, the Mergermarket database has been used. In accordance with the study's delimitations (Section 1.4) and previous research (Section 2), a transaction needed to fulfill the following requirements to be included in the sample:

    a. The transaction was completed within the period 2008-2011

    b. Both merging firms were tax residents and listed on a regulated stock exchange of a EU member country

    c. The deal value of the transaction exceeded EUR 100 million. This to enable better distinction of potential synergistic effects (see Section 2.4.1)

    d. The accounting data required for the performance measures were available for three years prior to and three years following the merger (see Section 1.4)

    e. Both merging firms were public with shares traded on at least one regulated stock exchange during the three years prior to the merger and the merged entity was public with shares traded on at least one regulated stock exchange during the three years following the merger (see Section 1.4 and 2.1)

    f. The transaction resulted in the acquirer's votes held in the target going from maximally a minority share to at least 50% (see Section 1.3)

    g. The target's ABVA represented no less than 20% of the acquirer's ABVA. This also to enable better distinction of potential synergistic effects

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[4] FTSE Industry Classification Benchmark system

h. The acquirer had not completed acquisitions within 3 years prior to and following the merger of a total value exceeding 40% of the deal value. This also to enable better distinction of potential synergistic effects

After a first screening search for public EU mergers and acquisitions completed between 2008-2011 (a.), 14,169 transactions were generated. When excluding transactions outbound (b.), with deal values less than EUR 100 million (c.), and undisclosed deal values (d.), 1,545 remained. As the Mergermarket definition of public not necessarily meant listed, the list was reduced further (e.). Due to the large amount of financial buyers (rather than strategic) involved in the transactions (most often not fulfilling requirements d., e., f., and/or g., nor the definitions in Section 1.5), as well as deals including governments, management buyouts, and spin-offs, the remainder was shortened further to 395 transactions. As we, in accordance with for example Healy et al. (1992), Switzer (1996), and Amel-Zadeh (2009), aimed for a sample size around 50, we decided to relax d. for a few firms (thereby including a few firms that did not show three years of consecutive data). We believe this difficulty of finding a sample primarily can be attributed to the abnormally low M&A activity of our chosen period. Ultimately, the sample totalled 52 mergers.

4.5.2 Collecting the benchmark peer group data

To produce lists on potential peer firms, data on several stock indices were gathered with the help of Datastream. A peer firm needed to fulfill the following requirements:

a. It was a public company with shares traded on at least one regulated stock exchange during three years prior to and following the merger year

b. It shared the country of tax residency and/or stock exchange affiliation with its sample firm. If this requirement did not generate a sufficient amount of firms, then an adjacent country, regarding both geography and accounting standards used, has been accepted.[5] This criterion is the third of the three earlier mentioned research design adjustments introduced by this study (see Section 1.2)

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[5] This requirement was considered necessary for two reasons, both related to the fact that this study compares between several countries. First, because the external factors requiring adjustment differ significantly across Europe, and second, because we want to minimize the effects of differences in IFRS compliance between the member states. According to La Porta et al. (1999), the European accounting standards have generally been categorized in four judicial systems, namely the Common Law System (originating from the U.K.), and the

c. The accounting data required for the performance measures were available for three years prior to and three years following the merger

d. It operated in the same industry as its sample firm. The industry match is made with help of the FTSE Industry Classification Benchmark (ICB) system[6]. Although a large majority of the peer firms are perfect 4-digit matches with their respective sample firm, 3-and 2-digit matches have in som cases been considered sufficient

e. It matched its sample firm in terms of size, measured as adjusted book value of assets (see Section 4.1). The general rule was for it to be within 70%-130% (Barber and Lyon, 1996) of the sample firm's value, but in a few special cases 20%-500% was also accepted

f. It matched its sample firm in pre-merger performance. As a matching based on all of the six performance measures would not be feasible within this study scope, the pre-merger performance criterion was based on EBITDA/ABVA. The general rule was for this metric to be within 70%-130% (Barber and Lyon, 1996) of the sample firm's value and in special cases 20%-500%

First, requirements a. and b. were secured by compiling lists of data on the largest stock index in each of the 13 sample countries, plus a few others. The indices used included for example STOXX600 (Europe), FTSE Allshare (the U.K.), and DAX (Germany). The data gathered included ICB codes (criterion d.), ABVA (criterion e.), and EBITDA/ABVA (criterion f.). Next, groups of 3-5 peer firms best matching the criteria above were selected for each of the 104 sample firms. It should be noted the optimal procedure would imply a specific matching being made for each specific measure and firm (Amel-Zadeh, 2009). As this would require six times as many matchings, it was not considered feasible within the scope of this study.

4.6 Statistical methods

In the study by Barber and Lyon (1996), examining the methodology of measuring operating performance changes, two statistical tests are evaluated. These are the parametric Student's t-test and the nonparametric Wilcoxon Signed Ranks Test. The results show that, for statistical

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German, French, and Scandinavian Civil Law systems. Hence, the geographical match based on either the same or an adjacent country (within the same system) is deemed effective for its purpose
[6] This deviates from the precedent research standard, most often the American Standard Industry Classification (SIC) system. As this study examines the European market, the ICB system was deemed more appropriate

testing of abnormal operating performance, the Wilcoxon test is uniformly more powerful than the t-test. Thus, and bearing in mind that the previous research referred to above has consistently accepted and applied the t-test, both tests will be used wherever applicable in this study.

For the purpose of statistically testing the various regressions, t-tests will be used in combination with F-tests. While the t-tests are used for testing whether each dependent variable's coefficient is significantly different from zero, the F-tests assess the significance of each regression in its entirety. Further, several standard methods are applied for testing the multiple regressions for normal distribution of residuals, heteroskedasticity, multicollinearity, and autocorrelation, as described in more detail in Appendix C.

All test statistics presented in the study were derived from groups of observations from which major outliers had been removed. The removal of such was carried out in accordance with statistical theory, defining them as observation values lower than $Q1 - 3 * (Q3 - Q1)$ or higher than $Q3 + 3 * (Q3 - Q1)$, with Q denoting quartile.

5.   Data Descriptives

As presented in Table 2, the 52 mergers are relatively evenly distributed between the years studied. In 2008, a total of 16 transactions fulfilling our criteria were completed, representing 0.4% of the total European deal frequency. The sample mergers that year also represented the period's highest total deal value, amounting to EUR 42.2 billion, which corresponded to 6.0% of the total European deal value. The highest share of total deal value (11.6%) was obtained from transactions completed in 2009, whereas the lowest share (1.1%) was from 2010. Studying the ratio deal value to deal frequency, we also find that our sample represents only 0.4% of deal frequencies, but 5.3% of deal values, indicating that we have selected a sample of large transactions, well above average in size.

Although the sample's share of the total population might appear low, we find it is not. Considering that previously published research have been based on samples much smaller in periods of much larger M&A activity, the relative size is considered sufficient. Moreover, as

significant results have been generated by samples as small as 30 observations, nor are we worried about inadequate robustness of results due to small sample size.

Table 2: Sample distributions on deal frequency and deal value[1]

Completion year	Deal frequency				Deal value (EURbn)		
	Sample	Europe[2]	%		Sample	Europe[3]	%
2008	16	4 150	0.4		42.2	702.9	6.0
2009	11	2 746	0.4		38.8	334.6	11.6
2010	11	3 464	0.3		5.5	482.8	1.1
2011	14	3 809	0.4		22.3	521.0	4.3
Total	52	14 169	0.4		108.8	2 041.4	5.3

1) The sum paid by the acquirer for the equity stake in the target plus the value of the net debt in the target, where applicable

2) Source: www.mergermarket.com

3) Source: www.statista.com

Regarding geography, the 104 firms involved in the sample mergers is a relatively diversified group. In total, they are based in 13 different EU member countries. Of these, the highest frequencies are found in the UK (31.7%), France (13.5%), Netherlands (11.5%), together representing more than half of the sample, see Table 3 below. The uneven distribution among EU member states, with almost a third of the sample firms being British, will of course have to be taken into account when interpreting the result. Still it may be noted that the sample of Martynova et al. (2006) was even more biased with 45 % of the firms being British.

Looking at the industrial distribution, presented in the same table, it displays a slightly more varied picture looking at the total figures. Of the 12 industries included in the sample, the most frequently represented ones were Industrial goods (21.2%) and Industrial services (12.5%), followed by Financial services (11.5%), Consumer goods and services (11.5%), and Technology (11.5%). Hence, concerning the acquirer/target ratios, industrial distributions were significantly more balanced than the geographical.

Table 3: Sample distributions on geography and industry

	Acquirers	Targets	Total	%
Panel A: Geography[1]				
UK	16	17	33	31.7
France	7	7	14	13.5
Netherlands	8	4	12	11.5
Germany	6	4	10	9.6
Italy	4	4	8	7.7
Sweden	3	3	6	5.8
Belgium	2	3	5	4.8
Spain	1	3	4	3.8
Other	5	7	12	11.5
Panel B: Industry[2]				
Industrial goods	12	12	24	23.1
Industrial services	6	7	13	12.5
Financial services	6	6	12	11.5
Consumer goods & services	6	6	12	11.5
Technology	6	6	12	11.5
Utilities	4	4	8	7.7
Real estate	4	4	8	7.7
Other	8	7	15	14.4

1) The country in which a sample firm's operations are centered and their shares are listed on a stock exchange

2) Here a combination of 1- and 2-digit ICB codes, for simplicity reasons

In Table 4, distributions of three transaction characteristics are displayed. Considering method of payment, cash represented 55.8%, stock 26.9%, and a mix of the two 17.3%. It can also be seen that 65.4% of the mergers were domestic, i.e. acquirer and target firms were from the same country, with the remaining 34.6% involving cross-border mergers. As to acquirer leverage, a majority of 57.7% had a debt/assets ratio of less than 0.33. Further, 38.5% had a level between 0.33 and 0.67 and only 3.8% had more than 0.67. As declared, in Section 4.4, all these three characteristics will be introduced as independent variables in the multivariate regression analysis.

Table 4: Sample distributions on method of payment, geographic affiliation, and acquirer leverage

	Mergers	%
Panel A: Method of payment		
100% Cash	29	55.8
100% Stock	14	26.9
Mixed	9	17.3
Panel B: Geographical affiliation		
Domestic	34	65.4
Cross-border	18	34.6
Panel C: Distribution of acquirer leverage[1]		
< 0.33	30	57.7
0.33 - 0.67	20	38.5
> 0.67	2	3.8

1) Total debt divided by the book value of total assets at the end of the fiscal year prior to merger completion

6. Results and Analysis

In this section, the results of the study will be presented and discussed in a context of how well they help us reach conclusions regarding our hypotheses. First, the results provide some evidence for concluding that mergers improve operating performance of merging firms. They also imply that the main driver of these improvements is rather better cost and/or pricing management than asset utilization. Finally, we find strong evidence suggesting that mergers fully paid by stock perform worse than transactions paid by cash or a mix of cash and stock, and some evidence that mergers where the aquirer and target are from the same country, and where the acquirer is heavily leveraged, perform better than their respective opposites.

6.1 H_1: Mergers improve operating performance of merging firms

6.1.1 *The change model*

When applying the change model methodology to our sample, all six measures examined show improved operating performance as a consequence of mergers. As demonstrated in Panel C of Table 5, the changes in mean abnormal performance ΔMAP range from +0.8% to +3.4% for the different measures. However, the statistical significances of these results vary across measures and test types. After applying Student's t-tests (two-tailed), three of the improvements prove statistically significant. These are EBITDA/AIC by 3.4% and EBITDA/ABVA by 2.0%, significant at the 10% level, and EBITDA/Sales by 3.2%,

significant at the 1% level. However, none of the performance increases proved robust after tests with the nonparametric Wilcoxon Signed Ranks Test. Hence, according to Barber and Lyon's (1996) strongest test, the results are not reliable. Nevertheless, according to the research field's most commonly used test (Student's t-test), we have three robust increases of recognizable size. These results are well in line with e.g. Healy et al. (1992), Ghosh (2001), and Powell and Stark (2005), but contradict e.g. Kruse et al. (2002), Knapp et al. (2005), and Amel-Zadeh (2009).

Interestingly, while all of the measures using EBITDA as a numerator proved significant, none of those with FCFO did. If first analyzing this with a mathematical approach, one can observe three variables included in the calculation of t-statistics (sample size, mean, and standard deviation). Whereas sample size differs insignificantly across all measures, standard deviations are slightly higher, and means significantly higher, for measures including EBITDA than for measures including FCFO. This implies that the higher means is the reason behind the EBITDA measures' higher statistical significance.

To resolve whether these larger means are reliable, or rather effects of distorting accounting attributes, we review chapter 2 and 4. As demonstrated in Section 4.1.1, this matter has been frequently discussed in previous research. According to Powell and Stark (2005), the use of what they present as accrual cash flow measures (such as EBITDA, derived from the income statement) is often associated with larger improvements than pure cash flow measures (such as FCFO, derived from the cash flow statement). Amel-Zadeh (2009) builds on to Powell and Stark's reasoning by providing empirical evidence of several types of biases induced due to the choice of numerator. We find that two of these biases are likely to have contributed to the higher values of ΔMAP for EBITDA than FCFO found in this study. The first is an upward bias caused by ignoring accrual accounting. Although EBITDA, Amel-Zadeh argues, accounts for depreciation and amortization, it neglects many other forms of accrual accounting. For instance, whereas R&D immediately expensed will be captured by EBITDA, capitalized expenditure will not. FCFO on the other hand, is better adjusted for accrual accounting. Another bias is one induced by not capturing changes in working capital in the numerator. As FCFO accounts for these, while EBITDA does not, Amel-Zadeh argues that

EBITDA is, again, biased upwards. Hence, we conclude that the seemingly robust increases of our EBITDA measures should be interpreted with care.

Next, we will assess our results in light of another study examining operating performance impact from cross-sectional samples of European mergers. If comparing four of our measures with corresponding measures in the study by Martynova et al. (2006), some interesting observations can be made. First, where their industry-, size-, and performance-adjusted measure (ISPA) $(EBITDA/Sales)^{ISPA}$ experiences a 0.16% increase, ours increases by 3.20%. Further, while their $(EBITDA/BVA)^{ISPA}$ decreases by 0.01%, our $EBITDA/ABVA$ increases by 2.00%, and where their $((EBITDA - \Delta WC)/Sales)^{ISPA}$ increases by 0.15%, our $AFCF/Sales$ increases with 1.20%. Finally, while their $((EBITDA - \Delta WC)/BVA)^{ISPA}$ decreases by 0.62%, our $AFCF/ABVA$ increases by 0.80%. Thus, when both studies measure performance with sales as denominator, they both find positive changes. In contrast, when they both use the book value of assets, they differ.

Again, to resolve these inconsistencies, we review Sections 2 and 4. As discussed in Section 4.1.2, we have chosen to deflate our performance measures with book values rather than market values. Using book values as deflators is, like with the numerators, also associated with several risks of biases in the resulting abnormal performance changes. In accordance with Amel-Zadeh's (2009) empirically supported recommendations, the book value of assets has been adjusted by deducting the amount revalued from the sample firms' consolidated entities in the post-merger years. As Martynova et al. (2006) do not make any such adjustment they neglect the effect of merger revaluations. Hence, their ΔMAP values will be biased downward when deflating with BVA, which may at least partially explain the decreasing operating performance. Based on the above we conclude that Martynova et al.'s results based on BVA measures are less reliable than the ones based on Sales measures.

Considering the AIC deflator, the accounting measure introduced by this study, we note that it generates one significant result $(EBITDA/AIC)$, corroborating the improved performances displayed by the other measures. Thus, although obviously not comparable to previous research, we conclude it is a tool contributing to the analysis of our results. Further, compared

with measures including other numerators, we also note that the AIC observations have higher standard deviations. This confirms the expectations expressed in Section 4.2.2.

6.1.2 *The intercept model*

When applying simple regression analysis to calculate ΔMAP, we achieve results as displayed in Table 7, Appendix C, in model 1, 3, 5, 7, 9, and 11. In comparison with change model results, the values generated by the intercept model are more ambiguous. Whereas three values are positive, two are negative and one is neutral. The largest abnormal performance increase is found in model 11 for the measure FCFO/Sales (+1.7%) and the largest decrease in model 9 for EBITDA/Sales (-0.5%). As none of the intercepts prove statistically significant, however, the intercept model does not supply any reliable evidence of changes in operating performance resulting from mergers. Nevertheless, they do contrast the empirical results of Martynova et al. (2006), who find the intercept model generating stronger positive performance changes than the change model.

To summarize, whereas our results from the change model are unanimously positive and partially significant, those of the intercept model results are ambigous and insignificant. Although the significant results consistently indicate improved performance, it is debatable whether they are reliable or in fact an effect of distortions induced by attributes of the accounting measures chosen. Comparing with the results of the closest benchmark study, it is also found that our performance improvements appear to be coherent with them, (although insignificant results of Martynova et al., 2006). However, it is again debatable whether this observation is an effect of accounting distortions. Still, on balance, we find support to conclude that European mergers improve operating performance.

Table 5: Mean abnormal performance results from the change model

	EBITDA/AIC	FCFO/AIC	EBITDA/ABVA	FCFO/ABVA	EBITDA/Sales	FCFO/Sales
Panel A: Pre-merger years (t-3, t-2, and t-1)						
Mean	-0.034	-0.040	-0.028	-0.018	-0.040	-0.041
Max	0.254	0.146	0.109	0.072	0.442	0.115
Median	-0.012	-0.003	-0.021	-0.008	-0.018	-0.012
Min	-0.473	-0.506	-0.473	-0.322	-1.027	-0.463
St. deviation	0.143	0.136	0.082	0.064	0.183	0.118
Panel B: Post-merger years (t+1, t+2, and t+3)						
Mean	0.001	-0.020	-0.007	-0.010	-0.007	-0.029
Max	0.302	0.209	0.146	0.092	0.700	0.116
Median	-0.002	-0.009	-0.004	-0.002	0.005	-0.007
Min	-0.407	-0.360	-0.194	-0.230	-1.041	-0.534
St. deviation	0.126	0.120	0.061	0.058	0.207	0.114
Panel C: Change in abnormal performance						
Mean	0.034	0.020	0.020	0.008	0.032	0.012
Max	0.476	0.360	0.280	0.151	0.258	0.176
Median	0.023	0.024	0.009	0.007	0.011	0.005
Min	-0.149	-0.367	-0.113	-0.127	-0.084	-0.123
St. deviation	0.136	0.118	0.073	0.051	0.085	0.051
t-statistic[1]	1.774*	1.203	1.968*	1.085	2.684***	1.529
Z-statistic[2]	-0.751	-1.597	-1.298	-1.038	-1.547	-0.969
n[3]	49	49	50	50	50	44

The table reports descriptive statistics for mean abnormal performances for each of the six accounting measures. Operating performance is computed by dividing a certain numerator with a certain deflator for each of the six studied years. The abnormal performance (AP) is then generated by deducting each merger's respective peer group's weighted pro forma operating performance from the acquirer and target's pro forma performance. Pre-merger AP for a merger pair is the mean AP of the 3 years prior to the transaction and post-merger AP for the 3 years following the transaction. The change in abnormal performance is computed by deducting the pre-merger AP from the post-merger AP. Pro forma performances of two peer groups are computed by aggregating the data for the acquirer's peer group and the target's peer group as if they were combined from 3 years before the merger completion date. Pro forma pre-merger returns for the sample firms are computed by similarly aggregating the data for acquirer and target.

* Significantly different from zero at the 10% level, using a two-tailed test 1) From the Student's t-test
** Significantly different from zero at the 5% level, using a two-tailed test 2) From the Wilcoxon Signed Ranks Test
*** Significantly different from zero at the 1% level, using a two-tailed test 3) Sample size after removing major outliers: observations
with values below Q1 - 3(Q3-Q1) or above Q3 + 3(Q3-Q1

6.2 H₂: Asset turnover, rather than operating margin, is the main driver of operating performance changes induced by a merger

The results from our DuPont analysis are presented in Table 6. As shown, the *MAP* increases by 3.2% for operating margin EBITDA/Sales, and with 1.0% for the capital turnover rate Sales/ABVA. This indicates that the operating performance increases presented above are effects from increased operational efficiency in both measures examined. However, only the increase in operating margin is statistically significant. This implies that there is evidence to

suggest that improved performance depends more on better cost and/or pricing management than on asset utilization. These results contradict Switzer (1996) and Healy et al. (1992) who both instead find asset productivity to be the main driver of merger-related performance.

The analysis of the underlying nature of the observed change in operating performance thus leads us to the conclusion that we do not find support for improved asset productivity, but for improved margins. Hence Hypothesis 2 must be rejected. The underlying operating improvements could be attributable to cost reductions, such as layoffs or closing down redundant divisions, and/or they could be obtained by revenue enhancements, such as new business opportunities resulting from new distribution networks, due to the merger. Delving deeper into these issues would be an interesting topic for future research.

Table 6: DuPont analysis of mean abnormal performance

	Pre-merger	Post-merger	Difference
Panel A: Operating margin			
EBITDA/Sales	-0.040	-0.007	0.032***
Panel B: Asset turnovers			
Sales/ABVA	0.020	0.030	0.010
Sales/AIC	0.192	0.400	0.208

The table reports medians for mean abnormal performance for pre-merger years, post-merger years, and their difference. The DuPont variable operating margin is represented by numerator EBITDA deflated by sales. Asset turnover is represented by sales deflated by ABVA and AIC, respectively. Only the changes have been tested for significance, using a two-tailed t-test.

*   Significantly different from zero at the 10% level, using a two-tailed test
**   Significantly different from zero at the 5% level, using a two-tailed test
*** Significantly different from zero at the 1% level, using a two-tailed test

6.3 $H_3 – H_7$: Multivariate analysis

In the multivariate regression analyses we examine if certain characteristics has any explanatory value for post-merger performance. We test to see if post-merger performance varies across deals of different sizes, types of payment, industry-relatedness, acquiring firms' leverage, and geographical scope (whether the merger is domestic or cross-border). The results are summarized in Table 7, Appendix C.

Doing so, the control variable pre-merger performance is found to be significant on the 1% level for all measures but one FCFO/AIC, implying that positive post-merger abnormal performance is generally associated with positive pre-merger abnormal performance. These results corroborate the findings of Amel-Zadeh (2009) and Switzer (1996). The intercepts are not found to be significant for any measure, again consistent with most earlier research. (Amel-Zadeh, 2009; Martynova et al., 2006; Powells and Stark, 2005; Moeller and Schlingemann, 2004; Linn and Switzer, 2001; Switzer, 1996)

All regressions presented in this section have been tested for normally distributed residuals, multicollinearity, autocorrelation, and heteroscedasticity, and have passed these tests unless stated otherwise.

6.3.1 *Test of H₃: A larger transaction implies larger positive changes in post-merger operating performance*

The size of the transaction, measured as the natural logaritm of the deal value (see Section 1.3) to normalize the range of different deal sizes (Switzer, 1996), does not seem to influence post-merger performance. The coefficient for ln(SIZE) is slightly positive for four of the six measures, although insignificant.

As mentioned earlier, according to Healy et al. (1992) and Switzer (1996), a larger merger should have the potential of realizing more synergies than a smaller one, due to its larger scope for efficiency gains. While our results contradict Switzer (1996), who finds significantly positive coefficients when controlling for size, there are also a number of papers that do not obtain significant results (Amel-Zadeh, 2009; Martynova et al., 2006, Powell and Stark, 2005; Moeller and Schlingemann, 2003). These contradictory results could at least partly be due to the fact that larger mergers could also entail increased difficulties in achieving synergies (Martynova et al., 2006). Larger organizations are more unwieldy and can have more established ways of doing business, and it could arguably be more difficult to integrate two similarly sized firms, than to incorporate a smaller firm into a larger one.

Varying results could also be due to different ways of measuring the size factor. For example, several studies have used some kind of relative size of the target, to that of the acquirer (Powell and Stark, 2005; Linn and Switzer, 2001), and have then divided the sample into different quartiles (Martynova et al., 2006). We, on the other hand, have followed Switzer (1996), and measured size continuously through ln(SIZE). Interestingly, our results corroborate the studies using other measurement techniques, but not the study using the same technique.

6.3.2 *Test of H₄: Cash transactions lead to improved post-merger performance relative to stock transactions*

As seen in Table 7, there seems to be evidence that the method of payment is correlated with post-merger operating performance. We thus find some significant results suggesting that mergers paid with stock perform worse relative to those paid with cash or a mix of cash and stock. For two measures, FCFO/ABVA and FCFO/AIC this finding is significant on the 1% level, whearas for EBITDA/AIC, EBITDA/ABVA and EBITDA/Sales this it is significant only on the 10% level.

These results corroborate the findings of Moeller and Schlingemann (2004), Ghosh (2001), Linn and Switzer (2001), that cash transactions generally lead to improved post-merger performance over those based on stock transactions. There are a number of plausible explanations to these results. It could be argued that cash transactions are associated with tender offers to a larger degree, which are in turn also more frequently associated with hostile takeovers (Switzer, 1996). While it is beyond the scope of this paper to include proxies for these extensions, these types of takeovers could be associated with better post-merger performance. Another explanation could be that cash transactions more often lead to the replacement of target management. Moreover, cash transactions are frequently financed with debt (Ghosh and Jain, 2000; Martynova and Renneboog, 2006), and this could put a restraint on engaging in unprofitable investments.

6.3.3 *Test of H₅: Mergers within the same industry generate better post-merger performance than cross-industry mergers*

Industry-relatedness is not found to be significantly associated with changes in post-merger abnormal performance for any of our measure. These results are in line with the findings of Amel-Zadeh (2009), Martynova et al. (2006) Powell and Stark (2005) Linn and Switzer (2001) and Switzer (1996). The findings could be the result of the opposite effects of intra-industry versus cross-sectional mergers working against each other, leading to insignificant results. Intra-industry mergers have the advantage of allowing the acquirer to be well acquainted with the target and its business, presumably facilitating the integration, and making it easier to identify and realize synergies (Heron and Lie, 2002; Healy et al., 1992). On the other hand, cross-sectional mergers can also be assumed to be associated with synergies as this allows for economies of scope and product expansion, as found by Ghosh (2001).

6.3.4 *Test of H₆: Relatively more leveraged acquirers experience better post-merger performance than less leveraged acquirers*

The coefficients for the leverage of the acquirer are generally found to be insignificant for all of our performance measures, except for FCFO/Sales, significant at the 1% level. Our findings are generally in line with studies made both on the U.S. and on Europe (Martynova et al., 2006; Linn and Switzer, 2001; Switzer, 1996) who also find insignificant relation between leverage of the acquirer and post-merger abnormal returns.

There is some empirical evidence suggesting that we would expect higher leverage to imply more careful investments and thus relatively stronger post-merger performance (Ghosh and Jain, 2000; Harford, 1999). Evidently, this is also found for one of our measures, as well as theoretically supported in the form of the free cash flow hypothesis (Jensen, 1986).

6.3.5 *Test of H₇: Domestic transactions lead to superior post-merger performance compared to cross-border transactions*

We only find evidence suggesting any difference between domestic and cross-border transactions for one measure, namely FCFO/AIC, which is positive in favor of domestic mergers at the 10% level.

These results imply that, for the most part, there is little evidence of any difference between national and international mergers in the European sample, which in turn could be seen as evidence that the European Single Market is working. Little difference between domestic and cross-border transactions would be the desired effects of creating the Single Market in the EU, as this implies that economic imperfections have been eliminated. Our results are consistent with the ones of the few studies with European samples (Gmelich, 2011; Martynova et al., 2006), but at odds with a number of studies on U.S. and other international samples (Moeller and Schlingemann, 2003; Gugler et al., 2003; Schoenberg, 1999), generally finding a statistically significant difference between domestic and cross-border mergers.

Our insignificant results may also be due to opposing driving forces working against each other. While cross-border transactions can benefit from market imperfections across countries, there are also substantial cultural, organizational and legal differences between countries that make it more challenging to achieve synergies in cross-border transactions.

7.   Conclusion

This study contributes to existing research with its geographical emphasis on EU, expanding the very limited existing literature studying M&A performance in the region. We conclude that there is evidence to suggest some improvements of operating performance following mergers, that these are mainly attributable to better cost and/or pricing management rather than to asset utilization, and that transactions paid by stock perform relatively worse compared to those paid by cash.

The overarching conclusion of these results is that our study has produced some support for the notion that mergers create value by improving the operating performance of the participating companies, but that these results are less clear and consistent than most of the previous, mainly US- or UK-centered, studies on this issue from Healy et al. (1992) and onwards (summarized in Amel-Zadeh's survey, 2009). Yet the design of the study, including

the formulation of research questions, data compilation and statistical analysis methods, closely resembles that of those earlier studies. How should this be interpreted?

One possible interpretation is of course that our results actually reflect a reality, i.e. that European mergers do in fact generally produce less performance improvements than their U.S. counterparts. Explanations of such a conclusion may be sought e.g. in the much longer tradition of an active market of mergers and acquisitions in the U.S. than in Europe. However, with the notable exception of the U.K., whose capital markets have more similarity with the US than with Continental Europe. It seems reasonable to assume that this long tradition may have developed a better ability of US and UK boards and managements to conceive mergers with good synergy prospects and to realize these in the merged unit. A factor seemingly supporting such a conclusion is that one of the few published studies on European markets, i.e. Martynova et al. (2006), also finds less clear results than studies on Anglo-Saxon countries.

Seen in this light there may also be other factors distinguishing Continental Europe from the US and UK markets. One such example is the stricter labor market regulations on European continental markets, making major restructurings and organizational changes in order to realize synergies more diffcult and time-consuming. This, in turn, may have led to such improvements falling outside of the post-merger time span of this study.

However, the relative lack of very clear results of this study may also be a result of certain features of the research design. Our benchmark construction differs from most other studies, as we use peer groups for our acquirer and target firms, instead of industry medians or a single pair of peers. Compared to other studies on international samples (Martynova et al. 2006; Gmelich, 2011), we have, as far as possible, matched our sample firms with peers from the same country. This should arguably improve the measuring precision of the model, as discussed in Section 4. Another possibility is that most studies use one measure, often earnings-based, that in our regard does not sufficiently account for certain important elements, such as capital expenditure and changes in working capital. Using several measures should improve the validity of the results, but perhaps at the cost of clear-cut results. Moreover, the introduction of adjusted invested capital as a denominator could arguably improve the quality

of the results, since, in theory, the comparability of performance across firms and industries increases compared to total assets.

One notable issue of reliability may be the time period studied. We chose to focus our study on mergers taking place in the years 2008-2011. An obvious problem with this period is that it largely coincided with the recent financial crisis, which, in combination with the cyclical trend, led to a decrease in merger activity and a drawn-out recession on most EU markets. Most earlier studies have chosen periods of high M&A activity in order to be able to select a sample of large mergers with reliable accounting data. As explained in Section 2, we had to ease on some of our restrictions to find a large enough sample.

Another problem associated with the research design may be the consistency of our accounting data. In an attempt to control for differences in accounting standards we decided to collect accounting data only after 2005, when IFRS was introduced as the required accounting standard for listed companies throughout the EU. Although empirical evidence imply a positive trend of adaptation (Pownall and Wieczynska, 2012), compliance is not yet total, which in turn means risks that our accounting data were not in fact as standarized throughout the sample as desired.

Finally it may be interesting to reflect on the capacity of broad statistical studies of the research field's tradition to provide relevant insights into the multitude and complexity of factors influencing the outcome of a merger. Unavoidably such studies are limited by the availability and quality of the required data, both in terms of the number and type of variables that can be included in such analysis models and their consistency across companies and markets. Perhaps a more fruitful research approach might be to examine a smaller number of cases in much greater detail and over longer periods of time in order to obtain deeper insights into the mechanisms behind the outcome of mergers. Based on such findings it may be possible to formulate more precise and relevant hypotheses, which can then be tested for broader significance and representativeness in large statistical studies of the kind of this study. Perhaps such an approach would be a more efficient road towards a better understanding of the elusive factors underlying success or failure of company mergers.

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Appendices

Appendix A – Adjusting for revaluations attributable to the merger

Analogous to adjusting for market reactions (Healy et al., 1992), we follow Powell & Stark (2005) and adjust the book value of assets for the combined firms in post merger years by the revaluations to fair value of the target's assets triggered when consolidating the entities (e.g. goodwill and intangibles). This is calculated as the deal consideration minus net assets of the target prior to the transaction. The amount revalued is then deducted from the asset base of the consolidated entity's assets in the post merger years. This is important, as a bias would otherwise exist against the sample firms simply due to a larger asset base. For instance, say the acquirer has earnings of 40 and book value of assets of 400 and the target has earnings of 10 and book value of assets of 100. The pro forma performance prior to the merger then is 10%. Say that the merger leads to goodwill of 50 is taken up and earnings stay constant. The combined entity now has earnings of 50 (40+10) and assets of 550 (400+100+50), yielding a return of 9%. This implies a decrease in returns without any real change in operations, and thus has to be adjusted for to properly measure any changes in operating performance.

Appendix B – The change model

To analyze the change in abnormal performance (ΔMAP) of our sample firms before and after the merger we create a pro forma combined entity of our sample firms for the three years measured before the merger and compare this to the performance of the combined entity three years after the merger. The preacquisition performance is calculated as a portfolio of the acquirer's and target's performance (Linn and Switzer, 2001):

$$P_i = \frac{NUM_{A,i} + NUM_{T,i}}{DEF_{A,i} + DEF_{T,i}}$$

where $NUM_{A,i}$ and $NUM_{T,i}$ are the chosen numerators for the acquirer and target, respectively. In our study, these numerators are either EBITDA or FCFO. These are then scaled by the appropriate denominators $DEF_{A,i}$ and $DEF_{T,i}$, representing adjusted book value of assets, adjusted book value of invested capital or sales in our study. All accounting data is

retrieved from Datastream, and the asset and sales bases are calculated from the financial reports each year.

For each combination of acquirer and target firms a separate benchmark portfolio of peer firms is constructed for both the acquirer and target. These peers are selected on the basis of industry, size and pre-merger performance, as discussed in Section 4.5. The benchmark performance is calculated as:

$$E(P)_i = \left(\frac{Def_{A,i}}{Def_{A,i} + Def_{T,i}}\right)\frac{Num_{Peers\,A,i}}{Def_{Peers\,A,i}} + \left(\frac{Def_{T,i}}{Def_{A,i} + Def_{T,i}}\right)\frac{Num_{Peers\,T,i}}{Def_{Peers\,T,i}}$$

where $NUM_{Peers\,A,i}$ and $NUM_{Peers\,T,i}$ are the averages of numerators for the peer groups of the acquirer and target respectively, and $DEF_{Peers\,A,i}$ and $DEF_{Peers\,T,i}$ are the averages of deflators. The DEF weights adjust for the relative size of the acquirer and target in the combined entity.

The abnormal performance in any pre-merger year is the benchmark adjusted performance of the pro forma-calculated portfolio of the acquirer and target:

$$AP_{pre,i} = P_i - E(P)_i$$

The post-merger performance of acquirer and target is the performance of the combined entity created in the merger. The peer group benchmark for the postacquisition years is calculated in the same way as the pre-merger years, and the DEF weights are the relative sizes of the acquirer and target in the year preceding the merger. The resulting abnormal performance is denoted $AP_{post,i}$.

Appendix C – Regression results

Table 7: OLS regressions of post-merger abnormal performance of combined acquirer and target

Independent variables	EBITDA/AIC		FCFO/AIC		EBITDA/ABVA		FCFO/ABVA		EBITDA/Sales		FCFO/Sales	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
α	0.0070 (0.350)	0.05 (0.474)	0.0010 (-0.0350)	0.022 (0.307)	0.0000 (-0.034)	0.002 (0.045)	-0.0010 (-0.205)	0.022 (0.678)	-0.0050 (-0.340)	0.051 (0.644)	0.0170 (0.877)	0.021 (0.283)
$\beta(ABR\ PRE)$	0.546*** (4.422)	0.520*** (3.593)	0.193 (1.208)	-0.011 (-0.060)	0.361*** (4.086)	0.338*** (3.522)	0.586*** (5.948)	0.528*** (5.018)	0.352** (2.039)	0.440** (2.421)	0.878*** (8.533)	0.920*** (9.170)
$\beta(ln(SIZE))$		0.007 (0.567)		-0.005 (-0.543)		0.002 (0.350)		-0.003 (-0.691)		-0.002 (-0.258)		-0.008 (-0.731)
$\beta(LEV)$		0.073 (0.685)		-0.019 (-0.228)		0.038 (0.350)		0.013 (0.345)		0.090 (0.973)		0.324*** (3.160)
$\beta(STOCK)$		-0.085* (-1.757)		-0.115*** (-2.967)		-0.036* (-1.884)		-0.044*** (-2.841)		-0.066* (-1.785)		-0.007 (-0.152)
$\beta(MIX)$		0.025 (0.448)		-0.019 (-0.449)		0.009 (0.435)		0.013 (0.741)		0.047 (1.218)		0.060 (1.224)
$\beta(IND)$		-0.079 (-0.949)		0.004 (0.061)		-0.014 (-0.410)		-0.009 (-0.351)		-0.055 (-0.892)		-0.094 (-1.202)
$\beta(DOM)$		-0.024 (-0.594)		0.055* (1.773)		-0.006 (-0.376)		0.010 (0.716)		-0.012 (-0.370)		-0.026 (-0.660)
F-statistic	19.555***	3.882***	1.460	1.900*	16.692***	3.186***	35.380***	7.461***	4.157**	1.772	72.807***	16.095***
P-value	0.000	0.002	0.233	0.097	0.000	0.009	0.000	0.000	0.047	0.120	0.000	0.000
Adj. R^2	0.279	0.296	0.010	0.123	0.243	0.238	0.412	0.480	0.063	0.103	0.585	0.640
n^1	49	49	46	46	50	50	50	50	48	48	45	45

The table reports OLS regression results of post-merger abnormal performance on 2 different numerators and 3 deflators against various independent variables. α represents the constant and intercept in each equation. The independent variable PRE is the equivalent pre-merger average abnormal performance to the dependent variables. ln(SIZE) is the deal size measured as the natural logarithm of the euro deal value of the transaction. LEV is another continuous variable measuring the the acquirer's total debt divided by total book value of assets reported the fiscal year prior to transaction completion. STOCK is a dummy variable for the method of payment, equalling 1 for all-share transactions and 0 cash-only and mixed payment acquisitions. MIX is a corresponding dummy variable for mixed payment transactions. IND is a dummy variable reflecting the relatedness in businesses of the acquirer and target. The classification is made using 2-digit digit ICB codes, where the value 1 implies the same 2-digit ICB code and 0 different. DOM is a dummy variable where the value 1 implies a domestic transaction and 0 cross-border. The t-values for the regression estimates are given in parentheses.

*   Significantly different from zero at the 10% level, using a two-tailed test
**   Significantly different from zero at the 5% level, using a two-tailed test
*** Significantly different from zero at the 1% level, using a two-tailed test

1) Sample size after removing major outliers: observations with values below Q1 - 3(Q3-Q1) or above Q3 + 3(Q3-Q1