Market Pricing of Bank M&As and Efficiency in Europe

Sailesh Tanna[1]
Coventry University, UK

Hodian Urio[2]
Mount Meru University, Arusha, Tanzania

Abstract

This study investigates the impact bank mergers and acquisitions (M&As) on bank efficiency and shareholder value by examining the effect of banks' cost and profit efficiency on shareholder value upon bank merger announcement. We find some supportive evidence that the market takes into account pre-merger efficiency of target and bidder banks in adjusting the bank stock/share price at the time of announcement. Furthermore, in reacting to the announcement, the market also perceives the prospects for future enhancement of bank efficiency as a result of the current event. Thus, post-merger efficiencies are also found, to a degree, to contribute to shareholder value creation. In particular, the study finds evidence suggesting that post-merger profit efficiency has a positive effect on cumulative abnormal returns.

[1] Corresponding author, Email: s.tanna@coventry.ac.uk
[2] Email: hodianurio@yahoo.com

1. Introduction

"Under the semi-strong efficient market hypothesis, stock prices react positively (negatively) to public events and announcements that informed market participants expect will increase (decrease) long-run firm value. However, realized long-run outcomes need not be consistent with short-run market reactions". Gayle Delong and Robert DeYoung (2007).

This paper investigates whether efficiency information is assimilated into a bank's share price on merger announcement. According to the semi-strong form of the Efficient Market Hypothesis (EMH), in a perfect market the share price reflects all available public information and any new information gets instantaneously absorbed into the price. At the same time, in some finance literature the share price is said to reflect the net present value of net future dividend cash flows of the firm. This alludes to a market's awareness of the firm's future earnings potential and therefore its ability to pay dividends. One of the ways in which a market may perceive a firm's performance potential is by evaluating its efficiency record. It may be said that, typically, market participants carry out their activities with future expectations, and that is why risk-taking and speculation exist.

Our analysis of the market's reaction using event windows reveals that a bank merger announcement gives rise to a positive change in shareholder returns of the bidder firms, although in some cases it is not always significant. The increase in shareholder returns may have been as a result of any number of reasons. The focus of this paper is to examine whether the market takes account of bank efficiency in determining share price reaction in response to a merger announcement. Since theory suggests that the share price reflects past, present, and what the market perceives as future information, both pre-merger and post-merger efficiency are investigated to see whether they are priced by the markets.

The study investigates 56 commercial bank mergers that took place in 22 European countries between 2001 and 2007. The event study methodology is used to determine shareholder wealth creation, employing the market model in estimating expected returns. Efficiency is estimated using the parametric stochastic frontier approach. Performance improvement in the combined firm is obtained by comparing post-merger efficiency with pre-merger efficiency, which is the sum of bidder and target efficiencies after weighting them based on their pre-merger total assets. To determine whether efficiency has an effect on shareholder value creation, regression

analysis is then performed using cumulative abnormal returns on efficiency variables after controlling for a number of bank specific, deal specific and environmental factors.

The main finding of this paper is that pre-merger bank efficiency contributes to short-term shareholder value creation upon merger announcement. Some evidence is also found that post-merger bank efficiency has a positive effect on shareholder value creation at announcement time which is associated more with profit efficiency than with cost efficiency. Also, as the study finds statistically significant positive cumulative abnormal returns, the results of this study are supportive of the view that, increasingly, European merger studies that examine post-2000 data find that bank mergers are value-creating even for the bidding firms (De Young et al, 2009; Urio and Tanna, 2011). Evidence that pre-merger bank efficiency has a positive effect on cumulative abnormal returns, and that the market takes into account perceived future bank efficiency on merger announcement, underscores the importance of efficiency as a performance measure. If market reaction to a merger announcement reflects past and future efficiency performance, shareholders, policy makers, and other stakeholders may be able to take that as one of the factors on which they can base their decisions regarding the yet uncompleted merger. They can also use previous efficiency records for predicting short-term and long-term performance of prospective parties to a merger before announcement.

The remainder of this paper is organized as follows. Section 2 provides the background discussion concentrating on relevant prior studies. Section 3 describes the two-step methodology of using stochastic frontier estimation for computation of efficiency scores, both post and pre-merger cost and profit efficiencies. Section 5 presents the regression results and Section 6 finally concludes.

2. Background Discussion

There are many studies that have investigated the efficiency of European banks engaged in mergers in the past fifteen years (e.g. Vander Vennet, 1996; Resti, 1998; Huinzinga et al, 2001; Azofra et al, 2008). While investigating efficiency has been the main focus of most studies (Amel *et al.*, 2004), there are also studies that have examined the market's reaction to merger announcements (Cybo-Ottone and Murgia, 2000; Beitel *et al*., 2004; Campa and Hernando, 2006). However, most studies have examined the impact of mergers on either bank shareholder value or efficiency, and to our knowledge there has been only one prior European study that has

sought to examine whether the market takes into account efficiency when reacting to merger announcements through re-evaluation of the bank's share price (Chronopoulos *et al*., 2010), which investigates bank mergers that took place in the period 1997-2003. In their study, 30 European bank mergers are combined with 70 American bank mergers to examine whether the market integrates post-merger bank efficiency in share prices. The European sub-sample includes only banks from countries in the EU-15 plus Norway and Switzerland.

Chronopoulos *et al*. (2010) find that, overall, European bank mergers earn significant cumulative abnormal returns while US mergers gain near zero returns. European bidders earn positive returns, although not statistically different from zero. Their US counterparts, on the other hand, record losses ranging from - 2.99% to – 3.98%. Meanwhile, unlike the bidders, both European and American targets earn significant cumulative abnormal returns for their shareholders. On the average, US targets earn between 4.7% and 6.3% more than their European counterparts, although the difference between them is not statistically significant. The study also reports that the bidders experience improvement in post-merger efficiency, while cost efficiency declines.

On investigating the association between cumulative abnormal returns and post-merger efficiency, Chronopoulos *et al*. (2010) report that correlation results show that there is a positive relationship between profit efficiency and the bidder's cumulative abnormal returns which is statistically significant. As for cost efficiency, the findings show a negative correlation relationship with cumulative abnormal returns, although the results are not statistically significant. The study also runs univariate regressions which yield results largely supportive of the correlation findings. Based on these results, the authors conclude that financial markets can price post-merger performance in bank efficiency when the merger is announced. However, that pricing is likely to be related more to profit efficiency than to cost efficiency.

There are several differences between our study and that of Chronopoulos *et al*. (2010), including the different periods investigated and composition of sample. In this study, the sample comprises banks from 22 European countries, out of which ten are from the EU-15, and covers the period 2001-2007. Whereas our study uses the stochastic frontier approach (SFA) for estimating efficiency, Chronopoulos *et al*. (2010) uses data envelopment analysis (DEA). Furthermore, although both studies use the event study methodology for calculating abnormal returns, this study employs the market model for estimating normal returns, while the above study uses a modified market adjusted model. Lastly, the major part of this study is performed using panel data regression to examine the influence of efficiency on how the market reacts to

merger announcement, unlike the Chronopoulos *et al*. (2010) study which uses correlation and univariate regression.

In addition to Chronopoulos *et al*. (2010), two US studies using frontier methods of estimating efficiency have previously investigated the market's incorporation of bank efficiency in the stock price upon merger announcement, namely Kohers *et al*. (2000) and Aggarwal *et al*. (2006). Our draws on both of these studies, and conducts multivariate regressions using similar control variables, for example, *relative size* of target to bidder, *cross*-border/domestic differentiation, distinguishing between *cash* and stock payment for mergers, etc. In addition, following De Long and De Young (2007), we allow for learning effects by including *serial* for repeat acquirers and also allow for market *concentration* in the target's market, as used by Aggarwal *et al*. (2006). As for including efficiency effects, following Aggarwal et al (2006), we examine bidder efficiency, target efficiency, peer efficiency less target efficiency, and peer efficiency less the average of bidder and target efficiency. In both Kohers *et al*. (2000) and this study, cost and profit efficiency are analysed, although Aggarwal *et al*. (2006) examine only profit efficiency.

Kohers *et al*. (2000) investigates a sample of 94 mergers involving bank holding companies (BHCs). The study uses both SFA and DEA to estimate efficiency and, using the market model, determines the cumulative abnormal returns that accrue to the bidder's shareholders in the two-day window of announcement day and the next. In order to compare the efficiencies of the merged banks with those of its peers, the study engages as its peers all the BHCs which were not involved in mergers in the years analyzed. Upon estimation of efficiency, Kohers *et al*. (2000) find that merged banks are more profit efficient than their peers pre-merger, but they are less cost efficient than their peers in that period. The study tests the relative efficiency hypothesis that suggests that upon taking over a less efficient bank a bidder will make changes that can improve the efficiency of the target and therefore the combined firm upon merger. Also tested, is the low efficiency hypothesis which proposes that where the targets' pre-merger efficiencies are less than either the bidders' or those of their peers, target efficiency will improve post-merger. The results of the study support both hypotheses. Furthermore, the study finds evidence that the greatest wealth effects accrue to the bidder's shareholders when a bidder takes over a relatively less efficient bank, allowing the former to implement a broad range of changes that generate efficiency improvements in the combined BHC.

Kohers *et al*. (2000) also test whether efficiency has any influence on the market's valuation of bank mergers. This is done by regressing the bidders' cumulative abnormal returns on efficiency

and the three control variables stated above. In general, the study finds evidence that efficiency has an effect on how the market evaluates bank mergers. One indication of this is that the bidder banks' cumulative abnormal returns are negatively associated with targets' cost as well as profit efficiency. The higher these efficiencies are the less the improvements that can be expected after merger. A similar indication is the finding that bidders' cumulative abnormal returns are positively correlated with the difference in peer and target efficiency. This means that the larger the difference between the two, the greater the potential for efficiency improvement post-merger.

Other than that it examines European data, this study differs fundamentally from that of Kohers *et al*. (2000) in that it is focused on examining cumulative abnormal returns for the two-day period combining the day before and the announcement day like the Aggarwal et al. (2006) study, rather than the two-day combined returns of the announcement and the following day. In theory, it is expected that markets will react instantaneously and fully to merger and other news when released. Impact of merger news on stock prices therefore ought to be highest on announcement. Due to market imperfections, highest impact may be delayed, but in the absence of information to the contrary, this study assumes that on the average it is achieved on announcement day. This suggests that it does not matter what window is chosen for analysis as long it includes the announcement day. Chronopoulos *et al*. (2006), for example, choose CAR-2, +2. This is a five-day window which might have an advantage of larger values when CARs are positive and probably produce more desirable results. Since this area has not been extensively researched, no guidelines exist on a suitable window for analysis. Although this study uses CAR-1, 0 in its main analysis following Aggarwal *et al*. (2006), it also examines CAR0, +1 as used by Kohers *et al*. (2000) in order to compare results.

Aggarwal *et al*. (2006) analyze 271 large bank mergers that took place in the period 1986-2001 to find out whether there is an association between profit efficiency and cumulative abnormal returns. The study analyzes three profit efficiency variables, namely, the bidders' pre-merger efficiency, the bidders' post-merger efficiency less the pre-merger efficiency, and the bidders' pre-merger efficiency less the targets' pre-merger efficiency. In its regressions, the study includes as control variables, *deposits* (target's as a percentage of total assets), industry concentration (HHI for target country), relative size, instate, stock, serial, price premium (deal price less target's market value, divided by bidder's market value), and RNeal (for the US Interstate Bank and Branching Efficiency Act).

The Aggarwal *et al*. (2006) study finds that before merger the targets are more profit efficient than the bidders. However, in the three years before the merger, the bidders had gained 6.38 percentage points in profit efficiency, which is far above the targets' 1.36 percentage points. The authors suggest on the basis of this finding that there may have been a strategy by the bidders to improve performance in various ways in preparation for a pre-planned restructuring move. Post-merger efficiency was also found to have improved over the pre-merger performance.

Regression results of cumulative abnormal returns on the various variables stated above show that the market expects that bidder shareholders of highly efficient banks stand a good chance of benefitting from the merger. Market expectations are similar in those cases where there is considerable difference between the bidder's and the target's profit efficiency. In addition, the findings suggest also that the market will react positively for bidder shareholders on merger announcement when the combined bank is likely to improve its profit efficiency after merger. Lastly, the study finds that the market expects bidder banks with prior acquisition experience to generate greater gains for their shareholders

In an earlier US study, Rhoades (1998) uses primarily accounting ratios as well as cost efficiency to examine the effect of efficiency gains on the stock price of a firm in a case study of nine bank mergers. In five of these mergers, results show that cost efficiency and stock price movement at the time of merger announcement are positively associated. With the rather limited sample of only nine mergers, it may not be convincing to generalize from these results about the relationship between efficiency and the market's reaction to bank merger announcement.

3. Methodology

Using event study methodology, bidder cumulative abnormal returns (CARs) are obtained around the announcement date using a market model and a two-day event period, (-1, 0), following Aggarwal *et al*. (2006). The CARs are then regressed on the pre-merger or post-merger cost efficiency and profit efficiency results, together with a number of control variables as discussed below.

3.1 CAR Regression Model

Since our purpose in this paper is to investigate whether the market takes into account bank efficiency upon merger announcement, CAR regression are performed on a number of

efficiency and control variables cited in the literature as having influence on the market's reaction to bank merger announcements and stock price performance in general. The regression model used is of the form:

$$CAR_i = \alpha + \beta_i EFF_i + \beta_2 RSIZE_i + \beta_3 CROSS_i + \beta_4 CASH_i + \beta_5 SERIAL_i + \beta_6 DIVPAY_{it} + \beta_7 CONC_{it} + \varepsilon_i \quad (1)$$

where: CAR_i is the two-day cumulative abnormal return; EFF_i is bank efficiency or bank efficiency difference as discussed below; $RSIZE_i$ is the relative size of target to bidder bank measured in total assets; $CROSS_i$ is 1 when cross-border merger and 0 when domestic; $CASH_i$ is 1 when deal is paid for in cash and 0 when payment is in stock or mixture of cash and stock; $SERIAL_i$ is 1 for bank that has been involved in another acquisition and 0 otherwise; $DIVPAY_{it}$ is dividend payout; $CONC_{it}$ is bank concentration in the target's country; i stands for bank, while t stands for time. The model comprises the efficiency variable, and there are five of them considered in both cost efficiency and profit efficiency analyses, and six control variables.

3.2 Efficiency Estimation

For estimating frontier efficiency, the Batesse and Coelli (1995) method is used. By using that model it was possible for estimation to be done in a single stage, while at the same time controlling for cross-country differences. With regard to cost efficiency, the model can be expressed as:

$$\ln C_{i,t} = C(y_{i,t}, w_{i,t}; \beta) + \mu c_{i,t} + \varepsilon c_{i,t}, \qquad i = 1,2,...,N; t = 1,2,...,T \quad (2)$$

where: $C_{i,t}$ stands for Total Costs of bank i at time t; $y_{i,t}$ represents a vector of outputs; $y_{i,t}$ is a vector of input price values of a suitable functional form; β is a vector of unknown scalar parameters to be estimated; $\varepsilon c_{i,t}$ s are random errors, assumed to be i.i.d. and have N (0, σ_V^2); $\mu c_{i,t}$ s are non-negative inefficiency effects in the model assumed to be independent but not identically distributed, so that $\mu c_{i,t}$ was obtained by truncation at zero of the $N(m_{i,t}, \sigma_u^2)$ distribution where the mean is defined as:

$$m_{i,t} = z_{i,t}\delta \quad (3)$$

with $z_{i,t}$ representing a (1*k)vector of observable explanatory variables that influence the inefficiency of bank i at time t; and δ stands for a (k*1) vector of coefficients that were estimated. In accordance with Batesse and Coelli (1995), the parameters of equations (1) and (2) were estimated in a one-step procedure using maximum likelihood.

With regard to profit efficiency, the dependent variable is Profit before Tax (PBT) replacing Total Costs (C), and the inefficiency term is negative (-$\mu c_{i,t}$), so that the profit frontier model is specified in the same way as the cost frontier above with same outputs and input prices. The study estimated the alternative profit efficiency due to its advantages over the standard profit efficiency. For banks in the sample that reported losses (negative profits), PBT, the dependent variable was transformed to ln (PBT + $\left|(PBT)^{\min}\right|$ +1), where $\left|(PBT)^{\min}\right|$ was the minimum absolute value of PBT reported by a bank in the sample.

Using the above frontier estimation approach, five pre-merger efficiency proxies are considered for both cost efficiency and profit efficiency. These are:

Pre-merger bidder efficiency

The market expects that a bank seeking to merge with another will be one with a good record of performance and therefore high efficiency. This efficiency should influence the market to react to a merger announcement by generating positive returns for the bidder's shareholders. The greater the efficiency the larger the CARs should be. High pre-merger bidder efficiency is so important that Aggarwal *et al*. (2006) find that in the three years prior to merger bidder profit efficiency improved considerably, suggesting that the involved firms prepared for the structural change by first improving performance, knowing what it meant for the market's reaction.

Pre-merger target efficiency

The literature suggests that bidders seek out less efficient banks to merge with. It is therefore preferred that the target's efficiency be lower than that of the bidder. The lower the efficiency of the target bank, the more likely that it will be improved after merger. A relatively low efficiency of the target is therefore expected to generate positive wealth gains for the bidder's shareholders, as represented by CARs.

Pre-merger bidder efficiency less Pre-merger target efficiency

With target efficiency is expected to be lower than bidder efficiency, it follows that the difference between pre-merger bidder efficiency and target efficiency should preferably be large in order to generate positive wealth gains for the bidder's shareholders, as reflected in CARs.

Pre-merger Peer efficiency less Pre-merger target efficiency

In this case the argument is again that an efficient bidder can acquire a target with a below par performance and improve its efficiency, in this instance bring it to the level of its peers and preferably exceed that level. The market is expected to reward a bidder that acquires such a target with wealth gains on merger announcement, in anticipation of the desired efficiency improvement after merger. These market expectations will be reflected in the magnitude of the CARs. The larger the difference between peer and target efficiencies the larger the CARs that can be realized.

Pre-merger Peer efficiency less (bidder efficiency + target efficiency)/2}

This is an extension of the above argument to include the bidder. The logic is the same that as long as the rest of the firms in the same industry are performing better than the merging firms, the potential exists for efficiency improvement. The market therefore should reward the bidder's shareholders through wealth gains on merger announcement, by reflecting those expectations in CARs.

Apart from the pre-merger efficiency variables, post-merger bidder cost and profit efficiency measures are similarly calculated for a sub-sample of mergers for which financial data are available for both the year prior to merger and all of the three years after merger, making it possible to estimate post-merger efficiency for each of the three post-merger years. In addition, the average post-merger cost and profit efficiencies over the three years after the mergers are also considered.

3.3 Control Variables

Six control variables that may influence shareholder returns are included in the CAR regression model, as follows:

Relative Size

This is the size of the target in total assets divided by that of the bidder. Experience shows that large firms target smaller institutions. This is done primarily to reduce transaction costs at the time of merger since these may be huge in mergers involving a large target. Similarly, bidders

seek to avoid large integration costs post-merger which result from acquiring a large target. It may also be the case that merging with a large firm may cause the market to take longer to fully impound all relevant information in the share price, leading the market to initially misevaluate a firm, more likely negatively than positively because of the uncertainty over the firm's true valuation. Due to these reasons, it is expected that relative size will have a positive effect on the bidder's CARs upon merger announcement.

Cross

This is a dummy which equals *one* when the merger is cross-border and *zero* when it is domestic. A bank engaged in cross-border expansion faces greater challenges of integration and subsequent operations than one involved in a domestic merger. Therefore, in anticipation of those difficulties, the market is likely to react more negatively to a cross-border merger announcement than to that of a local deal, with less positive or negative CARs realized on merger announcement for the bidder.

Cash

A merger can be paid for by the bidder in cash or by offer of stock to the shareholders of the target bank, or by a combination of the two. Cash is a dummy which equals *one* when the payment is in cash and *zero* when it is by either of the other methods. Often, an offer of payment in stock is interpreted as meaning the bidder's management perceives their firm's stock as overvalued. Upon payment by stock, the stock price will decline, possibly to a more acceptable level. The new shareholders from the target's side will see this as a loss to them, and therefore consider themselves better off receiving cash rather than holding stocks in the combined firm. The bidder's ability to pay cash may also be interpreted positively by the market, as demonstrating its own liquidity and confidence of the benefits anticipated in the merger. For these reasons, payment in cash is expected to lead to positive CARs to the bidder on merger announcement.

Serial

The *serial* dummy is *one* for those mergers involving bidders who have engaged in more than one merger in the past three years and *zero* otherwise. Bidders that have acquired other banks recently are seen as having gained experience in managing the post-merger institution to produce the desired performance. For this reason, the market will react positively to merger announcements involving such firms. On the other hand, if the market is aware that some past mergers associated with those bidders did not go well after the transaction, it will react

negatively to new deals involving those institutions. This will be the case also where the general perception is that the managements of frequent acquirers do so in their own interests rather than that of their shareholders. Therefore, with respect to this variable, the market's reaction may lead to either a rise or a decline in the bidder's stock price and affect the CARs accordingly.

Dividend Payout

The record of a firm's practice with respect to dividend payment has a positive effect on the stock price. In fact, a strand of the finance literature advocates that a firm's stock price reflects the net present value of future earnings paid out as dividends to the shareholders. The dividend payout ratio used in this analysis is that of the bidder for the year immediately before merger. It is hypothesized that it has a positive effect on the stock price and therefore CARs.

Concentration

This refers to bank concentration in the target's country. It has been suggested that concentration is one of the determinants of bank profitability. High concentration lowers the cost of collusion among banks and may lead to higher profitability for all the banks in the market. Recognizing this, the market may react positively to a merger announcement and price the bidder's stock accordingly where the target is in a market with high bank concentration. On the other hand, entry of the new bank through merger may lower concentration and instead generate competition which may lead to higher bank efficiency. The possibility of this improved performance may again be interpreted positively by the market, giving rise to gains in the bidder's stock price and therefore CARs. Also, through the merger the combined bank may acquire such market power that it will be able to exercise control over the process of determining its charges and deciding the services to offer in order to maximize profits. In anticipation of this outcome, the market will react favourably for the bidder. Some studies find that concentration has a positive influence on bank profitability. However, there are other studies as well which find that its influence is either negative or non-existent. To this extent, the market' reaction to a merger announcement may also be the opposite of the expectations suggested in the above discussion.

3.4 Hypotheses of Interest

In the light of the above discussion on efficiency and shareholder returns we consider the following main hypotheses:

Hypothesis 1: Bidder efficiency has a positive effect on CARs.

Hypothesis 2: Target efficiency has a negative effect on CARs.

Hypothesis 3: All efficiencies involving the deduction of target efficiency from either bidder or peer efficiency have a positive effect on CARs.

Hypothesis 4: Both efficiencies involving deduction of the average of bidder and target efficiencies from peer efficiency have a positive effect on CARs.

4. Data and Empirical Analysis

4.1 Data

Relevant data on bank mergers that took place between 2001 and 2007 were obtained from the Reuters Database and from the Acquisitions Monthly[3] magazine. The latter was particularly useful for providing the method of payment used in every merger. Stock prices were obtained from Yahoo Finance (uk.finance.yahoo.com, 2009). The Bankscope database provided financial statement data on the banks selected.

Bank mergers included in the sample had to meet the following criteria:
(i) The merger was announced between 1st January, 2001 and 31st December, 2007 and both the bidder and target were commercial banks headquartered in one of the EU countries, Sweden, Norway, Switzerland, or the three countries aspiring for EU membership, namely, Croatia, Turkey, and the Former Yugoslavia Republic of Montenegro (FYROM).

(ii) Merger is defined as occurring when the bidder acquires more than 50% holding of equity, which may be all at once or at the instance this threshold is reached following previous acquisitions in the target.

(ii) The bidder was listed on a stock exchange, but not necessarily so for the target.

(iii) Only bidders and targets whose income statement and balance sheet data were available for at least one year before the merger were selected.

Starting with an original list of 102 deals the list was reduced to 56 (55%) after eliminating institutions that failed to meet one or more of the above criteria.

[3] Acquisitions Monthly (www.aqm-e.com) is published by Thomson Reuters (ISSN 0952-3618).

Summary characteristics of the sample are shown in Tables 1 and 2.

Table 1: Summary A of Sample Characteristics

				Average Total Assets (Million $)			
Year	Number of Mergers			X-border		Domestic	
	Total	X-border	Domestic	Bidder	Target	Bidder	Target
2001	6	2	4	181,795	97,151	107,456	27,313
2002	6	2	4	116,744	1,046	190,289	51,421
2003	8	5	3	385,837	6,438	138,651	3,234
2004	7	5	2	394,867	66,145	165,670	17,853
2005	9	6	3	394,662	117,377	95,610	8,202
2006	14	11	3	672,797	18,843	256,046	60,275
2007	6	3	3	509,385	73,001	477,644	93,422
Total	56	34	22	-	-	-	-

Note: X-border = Cross-border

Table 1 shows that cross-border bidders are more than a dozen times larger than their targets, when the outliers are excluded. Domestic bidders are just a bit less than a dozen times larger than their targets. And cross-border bidders are around three times as large as domestic bidders, while cross-border targets are three and a half times as large as domestic targets. With bidders so overwhelmingly larger than targets it is expected that post-merger integration will not pose much difficulty to the combined firm. On the other hand, it may mean that the merger may not have much impact in the market.

Table 2, which presents the descriptive statistics, shows that overall domestic mergers were paid for in larger amounts than cross-border mergers. This may also be a reflection of the disparity in size between cross-border bidders and their targets.

Table 2: Summary B of Sample Characteristics

				Deal Values (Thousands $)					
Year				Cross-border			Domestic		
	Total	X-border	Domestic	Mean	Minimum	Maximum	Mean	Minimum	Maximum
2001	6	2	4	411,940	350,000	473,880	2,038,893	73,280	4,124,500
2002	6	2	4	119,195	64,040	174,350	5,269,313	87,158	16,760,570
2003	8	5	3	508,297	128,840	1,298,450	392,287	49,980	1,298,450
2004	7	5	2	3,675,861	132,696	15,925,069	123,555	109,100	138,010
2005	9	6	3	4,498,561	65,189	18,256,500	793,140	68,216	2,157,210
2006	14	11	3	2,046,917	171,587	5,644,700	15,223,256	11,297	37,624,240
2007	6	3	3	5,664,955	279,923	16,297,487	14,326,631	264,780	29,503,133
Total	56	34	22	-	-	-	-	-	-

This study aimed to include banks from as many as possible of the European countries i.e. EU countries plus Norway, Sweden, Switzerland, and three countries aspiring to join the EU, namely Croatia, Turkey, and the Former Yugoslavia Republic of Montenegro (FYROM). The

selection criteria outlined above eliminated most firms from most of the countries. As a result, the sample has only bidder firms from twelve Western European countries, while target firms come from both the Western European and the Central and Eastern European regions. Table 3 shows how the mergers are distributed among the various countries of the two regions.

Table 3: Distribution of Mergers by Country

	Target Nation																		
Bidder Nation	AT	BG	CR	CZ	FL	FR	DE	GR	HU	IE	IT	PL	PT	RO	SL	ES	TR	UK	Total
Austria				2										1	1				4
Belgium		2															2		4
Denmark					1					1									2
France			1			2	1	2			3								9
Germany							2					1							3
Greece		2						1									1		4
Italy	1			1			1		1		13	1			1				19
Holland							1				1								2
Portugal												1	1						2
Spain																2		1	3
Sweden												2							2
UK																1	1		2
Total	1	4	1	3	1	2	5	3	1	1	17	5	1	1	2	3	4	1	56

Note: AT=Austria; BG=Bulgaria; CR=Croatia; CZ=Czech Republic; FL=Finland; FR=France; DE=Germany; GR=Greece; HU= Hungary; IE=Ireland; IT=Italy; PL=Poland; PT=Portugal; RO=Romania; SL=Slovakia; ES=Spain; TR=Turkey; UK=United Kingdom

4.2 Efficiency Analysis

Bank level inputs and outputs for the cost and profit functions were selected using the intermediation approach suggested by Sealey and Lindley (1977), the outputs being loans (y1), other earning assets (y2), and non-interest income (y3); while inputs are the cost of loanable funds (w1), the cost of physical capital (w2), and the cost of labour (w3). To ensure linear homogeneity, the input prices and the dependent variables were normalized by the third input price w3.

Using a translog approximation for the functional form in equation (2) above, the resulting cost frontier model is:

$$\ln\frac{TC}{w3} = \beta_0 + \beta_1\ln(y1) + \beta_2\ln(y2) + \beta_3\ln(y3) + \beta_4\ln\left(\frac{w1}{w3}\right) + \beta_5\ln\left(\frac{w2}{w3}\right) + \beta_6\frac{1}{2}(\ln(y1))^2$$

$$+\beta_7\ln(y1)\ln(y2) + \beta_8\ln(y1)\ln(y3) + \beta_9\frac{1}{2}(\ln(y2))^2 + \beta_{10}\ln(y2)\ln(y3) + \beta_{11}\frac{1}{2}(\ln(y3))^2$$

$$+\beta_{12}\frac{1}{2}\left(\ln\left(\frac{w1}{w3}\right)\right)^2 + \beta_{13}\ln(y1)\ln\left(\frac{w1}{w3}\right) + \beta_{14}\ln(y2)\ln\left(\frac{w1}{w3}\right) + \beta_{15}\ln(y3)\ln\left(\frac{w1}{w3}\right) +$$

$$\beta_{16}\frac{1}{2}\left(\ln\left(\frac{w2}{w3}\right)\right)^2 + \beta_{17}\ln(y1)\ln\left(\frac{w2}{w3}\right) + \beta_{18}\ln(y2)\ln\left(\frac{w2}{w3}\right) + \beta_{19}\ln(y3)\ln\left(\frac{w2}{w3}\right)$$
$$+\beta_{20}\ln\left(\frac{w1}{w3}\right)\ln\left(\frac{w2}{w3}\right) \quad +\beta_{21}\ln(e) + \beta_{22}\frac{1}{2}(\ln(e))^2 + \beta_{23}\ln(e)\ln(y1) + \beta_{24}\ln(e)\ln(y2)$$
$$+\beta_{25}\ln(e)\ln(y3) + \beta_{26}\ln(e)\ln\left(\frac{w1}{w3}\right) + \beta_{27}\ln(e)\ln\left(\frac{w2}{w3}\right) + \beta_{28}t + \beta_{29}t^2 + \beta_{30}\ln(y1)t + \beta_{31}\ln(y2)t$$
$$+\beta_{32}\ln(y3)t + \beta_{33}\ln\left(\frac{w1}{w3}\right)t + \beta_{34}\ln\left(\frac{w2}{w3}\right)t + \beta_{35}\ln(e)t + \ln(\mu c) + \ln(\varepsilon c).$$

A time trend (t=1 for 2001, t=2 for 2002, to t=7 for 2007) was included to allow for technology changes over that time. Consistent with other studies the trend contains both t and t^2 terms since the translog function is a second order approximation. To control for differences in bank capitalization, equity (e) was specified as a fixed input in line with Berger and Mester (1997).

While estimating a global frontier we account for differences in bank-specific risk and country-specific economic factors, by specifying m_{it} in equation (3) as:

$$m_{it} = \delta_0 + \delta_1 EQTA + \delta_2 LONDEP + \delta_3 CONCT + \delta_4 INFL + \delta_5 GDPRT + \delta_6 MACGDP$$
$$+ \delta_7 CLAIMS + \delta_8 CAPRQ$$

where $EQTA$ is abbreviation for the equity to total assets ratio, to control for differences in capital strength; $LONDEP$ is firm loans to deposits ratio, used to show how much of funding is due to borrowing and not equity; $CONCT$ is market concentration as measured by the proportion of total assets of the largest three banks to total bank assets in a country; $INFL$ is annual rate of inflation; $GDPRT$ is GDP growth rate; $MACGDP$ stands for size of a country's stock market as measured by total value of quoted shares (stock market capitalization) divided by GDP; $CLAIMS$ represents how active a country's banking sector is as measured by total banks' claims to the private sector; and $CAPRQ$ is Basel II bank capital adequacy requirements for a country. $EQTA$ and $LONDEP$ were calculated from the banks' financial statements, $INFL$ and $GDPRT$ were obtained from the International Monetary Fund World Economic Outlook (2008), and $CONCT$, $MACGDP$, $CLAIMS$ and $CAPRQ$ were obtained from an updated version of the database constructed by Beck *et al*. (2000).

Bank efficiency is estimated as $CE_{kt} = \exp(uc_i)$ for cost efficiency and $PEF_{kt} = \exp(-uc_i)$ for alternative profit efficiency. The value of CE_{kt} ranges from one to infinity, while that of PEF_{kt}

ranges from zero to one. In order for the results to be comparable, a cost efficiency index was determined from the expression, $CEF_{kt} = 1/CE_{kt}$. This made it possible for cost efficiency, like profit efficiency, to range from zero to one, in both cases a value closer to one meaning higher efficiency.

Table 4 summarizes the input and output data including bank-specific and country-specific variables, with Panel (a) showing the summary statistics bidders and Panel (b) for the targets. As the data reveal, the bidders' total costs and profit before tax are around five times as large as those of the targets. Bidder loans are also about five times those of the target, as is non-interest income. Concentration is about the same for bidders and targets. The GDP growth rate is greater for the targets, consistent with the hypothesis that banks expanding abroad prefer to target countries with a high GDP growth rate. The bidders' Market capitalization and claims to the private sector are both about one and a half times those of the targets. The targets' inflation rate is about twice the bidders'. Finally, the targets have more stringent capital requirements than the bidders.

Table 4(a) Bidder Total Costs, Profit, Inputs, Outputs, and Firm and Country Variables

Variable	Definition	Mean	Minimum	Maximum	Stdev
TC ($)	Total Costs	6,667,066,780	75,923,000	29,955,630,000	6,176,097,830
PBT ($)	Profit Before Tax	2,655,312,270	-2,692,500,000	16,399,040,000	2,967,937,060
Inputs					
w1	Interest Expenses/Total Funds	0.033108392	0.0079900	0.1879767	0.0184657733
w2	Overheads less Personnel Expenses/Fixed Assets	3.649530385	0.0145735	73.0377793	1.02578974
w3	Personnel Expenses/Total Assets	0.008965762	0.0009380	0.0243307	0.0035394060
Outputs					
y1($)	Loans	162,365,010,000	53,759,000	919,685,000,000	155,170,430,000
y2 ($)	Other Earning Assets	181,277,520,000	630,977,000	1,192,810,000,000	197,762,880,000
y3 ($)	Non-interest Income	221,432,900	102,871,000	4,715,360,000	632,423,920
Firm-specific and Country Variables					
EQTA	Equity to Capital	0.05198351	0.0099507	0.2855840	0.0291640607
LONDEP	Loans/Deposits	0.749975493	0.0038135	2.0621441	0.2633679658
CONC	Concentration	0.66962286	0.3046170	1.000000	0.1791681237
INFL	Inflation	2.230942308	0.8200000	5.1100000	0.7409799256
GDPRT	GDP Growth Rate	2.092093407	-0.8100000	5.0500000	1.358739111
MACGDP	Market Capitalization	74.3681318	13.000000	174.00000	32.2488033
CLAIMS	Claims to Private Sector	102.464285	27.000000	186.00000	29.5770244
CAPRQ	Capital Requirements	5.608815427	3.0000000	10.000000	1.48328792

Table 4 (b) Target Total Costs, Profit, Inputs, Outputs, and Firm and Country Variables

Variable	Definition	Mean	Minimum	Maximum	Stdev
TC ($)	Total Costs	1,437,296,090	1,675,000	23,030,423,000	3,074,435,170
PBT ($)	Profit Before Tax	487,877,664	-2,692,500,000	7,964,184,000	1,224,807,340
Inputs					
w1	Interest Expenses/Total Funds	0.035937001	0.0017727	0.2085360	0.0260292624

w2	Overheads less Personnel Expenses/Fixed Assets	3.693017530	0.0441766	326.2575758	22.0138766
w3	Personnel Expenses/Total Assets	0.013994094	0.0009380	0.0748148	0.0078909188
Outputs					
y1 ($)	Loans	31,939,636,000	2,832,000	584,200,400,000	79,645,872,000
y2 ($)	Other Earning Assets	25,208,146,000	419,000	619,883,000,000	67,531,576,000
y3 ($)	Non-interest Income	46,232,000	3,535,000	4,150,140,000	309,026,150,000
Firm-specific and Country Variables					
EQTA	Equity to Capital	0.080591278	0.0227533	0.8756527	0.0554534908
LONDEP	Loans/Deposits	0.955231085	0.0038135	16.8715900	1.19535661
CONC	Concentration	0.630254703	0.3046170	1.0000000	0.1757887354
INFL	Inflation	4.342032967	0.1100000	55.040000	7.32259398
GDPRT	GDP Growth Rate	2.835714286	-5.700000	9.3600000	2.191122693
MACGDP	Market Capitalization	48.5879120	3.000000	241.00000	30.3852303
CLAIMS	Claims to Private Sector	74.2115384	7.000000	182.00000	35.3425859
CAPRQ	Capital Requirements	6.846153846	3.000000	15.000000	2.15730204

The pre-merger efficiencies of bidder and target banks are reported in Table 5, where from Panel A the targets are shown to be more cost efficient than the bidders on average, although the yearly differences in efficiency are not statistically significant. There is a decline in efficiency for several years after 2001 for both the bidders and the targets before it rises again towards the end of the period. For four of the seven years analysed, targets are more cost efficient than bidders, while for three of those years it is the bidders which are more efficient. At 70.19% the average cost efficiency for bidders may be interpreted to mean that those banks waste 29.81% of their resources to produce the same services offered by the best practice bank, while at 71.39% efficiency wasted resources for the targets amount to 28.61%. While the differences are not statistically significant, they are consistent with those reported by studies that find bidding banks are less cost efficient than targets (Resti, 1998; Huizinga *et al*., 2001).

Panel B of Table 5 shows that on average bidders are more profit efficient than targets during the period 2001-07. In most of the seven years, bidders are more profit efficient than targets. The differences, however, are not statistically significant. The results are consistent with the suggestion in the literature that sometimes firms take over others in order to improve their performance through a superior management. The profit efficiency for the bidders may be interpreted to mean that those bidders generate only 55.27% of the profits made by the best practice bank operating under similar conditions, while targets generate only 51.71%. In this case as well there is a decline in efficiency for both bidders and targets for mergers that took place in the several years after 2001 followed by a rise which, however, does not reach the levels of 2001. These results imply support for theory that efficient banks target less efficient

ones and are consistent with those reported by studies that find that bidders are more profit efficient than targets (Beitel *et al*., 2004).

Table 5: Pre-merger Cost and Profit Efficiency of Bidder and Target Banks

Year	Bidder Banks		Target Banks		Difference		
	Mean	Std dev	Mean	Std dev	Mean	t-stat	p-value
Panel A: Summary Statistics for Cost Efficiency							
2001	0.7142	0.0671	0.7724	0.1180	-0.0581	-1.05	0.32
2002	0.7139	0.0825	0.6757	0.0207	0.0383	1.10	0.31
2003	0.6653	0.0091	0.6938	0.0384	-0.0285	-1.77	0.13
2004	0.6732	0.0284	0.7150	0.0490	-0.0418	-1.65	0.15
2005	0.7162	0.1177	0.6903	0.0198	0.0259	0.65	0.53
2006	0.7087	0.0933	0.6950	0.0252	0.0136	0.53	0.61
2007	0.7009	0.0642	0.7925	0.1189	-0.0916	-1.72	0.13
2001-2007	0.7019	0.0786	0.7139	0.0700	-0.0120	-0.82	0.41
Panel B: Summary Statistics for Profit Efficiency							
2001	0.5798	0.0207	0.5276	0.0787	0.0523	1.57	0.17
2002	0.5083	0.0672	0.5631	0.0333	-0.0548	-1.79	0.12
2003	0.5065	0.0705	0.5176	0.0622	-0.0111	-0.29	0.78
2004	0.6225	0.1942	0.5075	0.0645	0.1150	1.26	0.26
2005	0.6017	0.1513	0.5376	0.0714	0.0641	1.15	0.27
2006	0.5462	0.0273	0.5264	0.0966	0.0198	0.74	0.47
2007	0.5001	0.0685	0.4152	0.1320	0.0849	1.40	0.20
2001-2007	0.5527	0.0990	0.5171	0.0889	0.0357	1.93	0.06**

Note: **Significant at the 10% level.

Other pre-merger indicators of efficiency have been calculated, including the difference between bidders and targets average efficiencies and those of peers[4] relative to the combined average of the bidders and targets discussed above. For reasons of space, these detailed results are not reported here but are summarized in Table 6 below. Overall, the pre-merger mean efficiencies indicate that, while bidders are less cost efficient and more profit efficient than targets, the peers are generally more efficient than both, as found in previous studies.

Finally, in an attempt to determine whether efficiency of the combined entity improves after merger, we calculate post-merger cost and profit efficiencies and compare them with the average pre-merger efficiencies of the combined entities for the first, second and third years after merger. Again, for reasons of space, only summary statistics are reported in Table 6. The mean differences indicate that, on average, cost efficiency tends to improve marginally after merger but profit efficiency does not. However, the differences are not statistically significant.

[4] A total of 112 non-merged peers were selected on the basis of bidder and target size.

4. Empirical Results

The summary statistics of all the variables used in regression, including CARs, the efficiency proxies and the control variables are reported in Table 6. Following Aggarwal *et al*. (2006) Kohers *et al*. (2000), we consider two 2-day CARs, the first covering the day before and the day of merger announcement (CAR-1, 0), and the second covering the day of announcement and the next day (CAR0, +1). The other statistics reported are for the various pre- and post merger efficiency proxies, and the common control variables.

Table 6 Summary Statistics for CARs, Efficiency and control variables

Variable	Mean	Median	Maximum	Minimum	Std. Dev
CAR-1,0	0.9049	0.4621	3.9829	-0.5320	1.1582
CAR0, +1	0.5758	0.3762	8.6164	-2.9926	1.7623
BIDCOSEFF	70.1966	66.8260	99.8976	63.7432	7.6413
BIDPFTEFF	55.2735	55.4970	98.7303	41.0688	9.6614
BIDTGTCOSEFF	-1.1977	-1.8022	30.5362	-34.2558	10.6042
BIDTGTPFTEFF	3.5604	0.9247	40.8617	-14.4282	12.4431
TGTCOSEFF	71.3942	69.3563	99.4048	65.3482	5.7841
TGTPFTEFF	51.7131	55.0747	97.9908	27.6701	8.6813
PRTGTCOSEFF	4.8801	2.5338	29.4569	-26.7391	8.8100
PRTGTPFTEFF	21.8752	24.3810	53.5524	-11.6374	18.5217
PRBDTGTCOSEFF	4.8803	1.7271	31.3935	-13.2840	7.7418
PRBDTGTPFTEFF	20.1030	17.6495	49.8726	-11.1697	17.6115

Variable	Mean	Median	Maximum	Minimum	Std. Dev
RSIZE	0.1668	0.0470	1.7914	0.0011	0.3118
CROSS	0.6071	1.0000	1.0000	0.0000	0.4928
CASH	0.5179	1.0000	1.0000	0.0000	0.5042

SERIAL	0.5000	0.5000	1.0000	0.0000	0.5045
DIVPAY	52.1214	52.1150	97.04	0.0000	25.0881
CONC	0.5829	0.6109	0.9828	0.3027	0.1882

Note: The CAR variables have been described above. The other variables are defined as: BIDCOSEFF = bidder cost efficiency; BIDPFTEFF = bidder profit efficiency; BIDTGTCOSEFF = bidder cost efficiency less target cost efficiency; BIDTGTPFTEFF = bidder profit efficiency less target profit efficiency; TGTCOSEFF = target cost efficiency; TGTPFTEFF = target profit efficiency; PRTGTCOSEFF = peer cost efficiency less target cost efficiency; PRTGTPFTEFF = peer profit efficiency less target profit efficiency; PRBDTGTCOSEFF = peer cost efficiency less the average of bidder and target cost efficiency; PRTGTPFTEFF = peer profit efficiency less the average of bidder and target profit efficiency; POSTCOS1EFF = difference between pre-merger cost efficiency and post-merger cost efficiency for the first year; POSTCOS2EFF = difference between pre-merger cost efficiency and post-merger cost efficiency for the second year; POSTCOS3EFF = difference between pre-merger cost efficiency and post-merger cost efficiency for the third year; POSTPFT1EFF = difference between pre-merger profit efficiency and post-merger profit efficiency for the first year; POSTPFT2EFF = difference between pre-merger profit efficiency and post-merger profit efficiency for the second year; POSTPFT3EFF = difference between pre-merger profit efficiency and post-merger profit efficiency for the third year. The control variables are defined as: RSIZE = relative size of target to bidder in total assets; CROSS = 1 when merger is cross-border and 0 when it is domestic; CASH = 1 when deal payment is made in cash and 0 when it is stock or combination of cash and stock; SERIAL = 1 when a bidder has been involved in another acquisition in the past three years and 0 otherwise; DIVPAY = dividend payout ratio calculated as dividend divided by net income; CONC = concentration calculated as assets of the three largest banks in a market divided by total assets of all banks in that market.

4.1 Regression Results on Pre-merger Efficiency

The results of CAR regressions performed to determine the influence of pre-merger efficiency on the market's reaction to a bank merger announcement are presented as (separate) parts of Tables 7 and 8. The results of Table 7 are based on the combined abnormal returns of the day before and the day of merger announcement (CAR -1, 0), while that of Table 8 relate to the sum of two-day abnormal returns, the merger announcement day and the following day (CAR 0, +1).

CAR (-1, 0) Regression Results on Pre-merger Efficiency

Tables 7.1 to 7.10 present regression results for CAR (-1, 0) followed by a brief summary commenting on the efficiency variable and those of the control variables with significant results.

Table 7.1 Regression Results for CAR on Pre-merger Bidder Cost Efficiency

Dependent Variable: CAR-1, 0
Method: Panel Least Squares
Sample: 2001 2007
Periods included: 7
Total Panel (unbalanced) observations: 56
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-statistic	Prob.

C	-0.4660	2.3728	-0.1964	0.8454
BIDCOSEFF	0.0191	0.0222	0.8587	0.3964
RSIZE	0.1650	0.3306	0.4992	0.6207
CROSS	-0.6500	0.2403	-2.7053	0.0105**
CASH	0.4207	0.2351	1.7892	0.0822*
SERIAL	-0.8273	0.4882	-1.6945	0.0991*
DIVPAY	0.0117	0.0059	1.9643	0.0575*
CONC	-0.0326	1.1709	-0.0279	0.9779
R-squared	0.4331	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1092	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.0899	Durbin- Watson Statistic		2.5357
F-statistic	1.3370	Prob. (F-statistic)		0.2205

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

Table 7.1 results show that pre-merger bidder cost efficiency has a positive influence on the market's reaction to merger announcement, in conformity with Hypothesis 1 above. This is what is desired as the bidder bank's pre-merger performance should contribute positively to its shareholders' wealth creation. However, the bidder cost efficiency's coefficient is not statistically significant. The control variable with the most positive influence on the CAR is CASH with the largest coefficient, and it is also statistically significant at 10%. Since the coefficient has a positive sign, in conformity with Hypothesis 6, it means that the market is confident that those combined banks formed out of payment in cash will be able to achieve the anticipated outcomes of the merger. The CROSS variable is negative as expected Hypothesis 5 and statistically significant at the 5%. This is a strong indication of the market's perception that cross-border mergers will face more difficulty than domestic deals in realizing their post-merger performance expectations. SERIAL is also negative as assumed in Hypothesis 7, and statistically significant at the 10% level. This is an indication that the market does not view the serial acquisitions involving firms included in the sample as having been undertaken in the interest of the bidders' shareholders. DIVPAY is positive as conceived in Hypothesis 6 and statistically significant at the 10% level. This suggests the market recognizes the potential for improving performance post-merger those firms with a good previous record of profitability that enabled them to pay dividends.

Table 7.2 Regression Results for CAR on Pre-merger Bidder Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.7586	0.8326	0.9111	0.3685
BIDPFTEFF	0.0129	0.0041	3.1510	0.0033**

RSIZE	0.0409	0.3719	0.1101	0.9130
CROSS	-0.6341	0.2475	-2.5623	0.0149**
CASH	0.4111	0.2207	1.8624	0.0709*
SERIAL	-0.9536	0.6467	-1.4747	0.1492
DIVPAY	0.0105	0.0055	1.9080	0.0646*
CONC	-0.8172	0.7659	-1.0670	0.2933
R-squared	0.4202	Mean of Dependent Variable		0.9050
Adj. R-squared	0.0889	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.1023	Durbin- Watson Statistic		2.7147
F-statistic	1.2684	Prob. (F-statistic)		0.2624

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

In Table 7.2 the results show that pre-merger bidder profit efficiency has a positive effect on cumulative abnormal returns which is statistically significant. This is expected since the market takes account of a firm's previous performance in reacting to a merger announcement, and is in conformity with Hypothesis 1. Of the control variables, CASH has the highest positive coefficient, which is also statistically significant at the 10% level. Positive results are as expected in Hypothesis 6, with the market favoring in its valuation those mergers where payment is made in cash rather than stock. CROSS is negative as expected according to Hypothesis 5, as cross-border mergers are viewed as more likely than domestic deals to experience serious challenges of achieving their post-merger forecasts. The result is also statistically significant. The DIVPAY variable is positive as assumed in Hypothesis H6, and statistically significant at 10%. This suggests that the market recognizes that those firms with a good history of meeting their dividend payment obligations are likely to achieve their post-merger objectives, on account of their previous performance.

Table 7.3 Regression Results for CAR on Pre-merger Bidder-Target Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.2898	0.8184	1.5761	0.1240
BIDTGTCOSEFF	0.0224	0.0152	1.4697	0.1506
RSIZE	0.1729	0.4147	0.4169	0.6793
CROSS	-0.5311	0.2345	-2.2646	0.0298**
CASH	0.4477	0.1875	2.3979	0.0225**
SERIAL	-0.8643	0.6751	-1.2802	0.2089
DIVPAY	0.0089	0.0050	1.7753	0.0845*
CONC	-0.5758	0.9116	-0.6316	0.5317
R-squared	0.4424	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1238	Std. Dev of Dependent Variable		1.1548

S.E. of regression	1.0810	Durbin- Watson Statistic	2.5253
F-statistic	1.3884	Prob. (F-statistic)	0.1930

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

Table 7.3 results show that the difference in pre-merger bidder cost efficiency and target cost efficiency has a positive influence on CARs as assumed in Hypothesis 1. However, this outcome does not meet the main criterion for a positive result because pre-merger the targets are more cost efficient than bidders, leaving little room for cost efficiency improvement on the target side of the combined firm. Nevertheless, since the difference in pre-merger cost efficiency is small, the market may perceive improvement in performance in the combined firm that is not necessarily in conformity with theory. It is to be noted, however, that the result is not statistically significant. The control variable with the most influence on CARs which is also positive in conformity with Hypothesis 6 is CASH. The result is also statistically significant at 5%. This is a strong reaction from the market suggesting a perception that combined firms formed from mergers paid for in cash stood a good chance of performing better than those firms resulting from stock-paid mergers. CROSS, as expected in Hypothesis 5 is negatively associated with CARs, and the result is statistically significant at 5%. This result reinforces the view that cross-border mergers may not perform as well as domestic deals post-merger, due to the challenges of integrating and managing a firm that operates in two or more overseas locations. The DIVPAY variable is positive as presumed in Hypothesis 7 and statistically significant at 10%. The market's reaction in this case is consistent with the view that as a general rule firms that pay dividends are better than those that do not, and can therefore be expected to produce a good post-merger performance.

Table 7.4 Regression Results for CAR on Pre-merger Bidder-Target Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.1987	0.7554	1.5867	0.1216
BIDTGTPFTEFF	0.0149	0.0075	1.9987	0.0535*
RSIZE	0.0329	0.3832	0.0859	0.9320
CROSS	-0.6429	0.2751	-2.3372	0.0253**
CASH	0.3830	0.2159	1.7740	0.0848*
SERIAL	-0.9302	0.6357	-1.4633	0.1523
DIVPAY	0.0121	0.0057	2.1036	0.0427**
CONC	-0.5477	0.7812	0.7011	0.4879
R-squared	0.4289	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1026	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.0939	Durbin- Watson Statistic		2.7666

F-statistic	1.3145	Prob. (F-statistic)	0.2336

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

In Table 7.4 the results show as expected in Hypothesis 1 that the difference between pre-merger bidder profit efficiency and target profit efficiency has a positive influence on CARs. The result is also statistically significant at the 5% level. A view is conveyed by the market here that there is room for post-merger performance improvement that can be beneficial to the combined firm's shareholders. CASH has the highest coefficient among the control variables which, as suggested in Hypothesis 6, is positive. It is also statistically significant at 10%. As we have seen above, this is an indication of the market's perception that mergers paid for in cash give rise to institutions that outperform those arising from stock-paid mergers. The CROSS variable has a negative sign as presumed in Hypothesis 5 and is statistically significant at 5%. This is a strong reaction from the market confirming what theory suggests that, compared to domestic mergers, cross-border deals face many obstacles post-merger that may restrain or delay post-merger performance expectations. DIVPAY, as expected in Hypothesis 6 has a positive sign and is statistically significant at 5%. In its evaluation of a firm's stock, a market takes its performance with regard to dividend payment as an indication of interest in the shareholders as owners of the firm, and historical dividend payments as a predictor of future performance.

Table 7.5 Regression Results for CAR on Pre-merger Target Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	4.6025	1.1632	3.9568	0.0004**
TGTCOSEFF	-0.0437	0.0133	-3.2717	0.0024**
RSIZE	0.0941	0.3633	0.2589	0.7972
CROSS	-0.4990	0.2117	-2.3569	0.0241**
CASH	0.3609	0.1618	2.2308	0.0322**
SERIAL	-0.8291	0.6741	-1.2300	0.2269
DIVPAY	0.0081	0.0046	1.7499	0.0889*
CONC	-0.8470	0.9623	-.8802	0.3848
R-squared	0.4593	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1504	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.0645	Durbin- Watson Statistic		2.5783
F-statistic	1.4868	Prob. (F-statistic)		0.1486

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

The results presented in Table 7.5 show that target cost efficiency has a negative influence on CARs and that it is statistically significant. This result conforms to Hypothesis 2. It is to be noted, however, that theory does not provide any guidelines on the influence of the absolute value of

target cost efficiency or profit efficiency on CARs. In fact it is unnecessary to do so since importance is attached to the differences between target efficiencies and those of bidders and peers, with the target efficiencies theorized to be lower in both cases in order to realize post-merger improvements. On that account, by implication, where the targets' values exceed those of the bidders, it is to be expected that the market's reaction to mergers involving such targets would be negative. The above result is therefore consistent with what is implied by theory. That the result is statistically significant at the 5% level emphasizes the market's perception that mergers involving targets with cost efficiency larger than those of bidders may experience repressed or delayed post-merger performance improvements. At face value, CASH is the control variable with the most influence on CARs, which is positive as expected in Hypothesis 6. Its statistical significance at 5% suggests that the market has a strong view that cash-paid as opposed to stock-paid merger deals will result in combined firms that produce superior post-merger performance. As expected, CROSS has a negative influence on CARs in conformity with Hypothesis 5. It is also statistically significant at 5%. The perception of the market in this case, as before, is that combined firms formed from cross-border merger deals will experience obstacles post-merger that may inhibit or delay the realization of post-merger performance improvements, unlike their counterparts borne out of domestic deals.

Table 7.6 Regression Results for CAR on Pre-merger Target Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.1610	0.4529	2.5631	0.0148**
TGTPFTEFF	0.0073	0.0173	0.4216	0.6759
RSIZE	0.0705	0.3567	0.1977	0.8444
CROSS	-0.5355	0.2194	-2.4402	0.0199**
CASH	0.4070	0.1851	2.1989	0.0346**
SERIAL	-0.8739	0.6892	-1.2679	0.2132
DIVPAY	0.0078	0.0059	1.3365	0.1900
CONC	-0.8771	1.2559	-0.6983	0.4896
R-squared	0.4143	Mean of Dependent Variable		0.9050
Adj. R-squared	0.0796	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.1079	Durbin- Watson Statistic		2.6419
F-statistic	1.2377	Prob. (F-statistic)		0.2830

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

In Table 7.6 the results show that target efficiency has a positive influence on CARs, although it is not statistically significant. The result does not conform to Hypothesis 2. As explained above, theory does not offer any guidelines on what the influence of the absolute value of target profit

efficiency on bidder CARs should be. It makes sense, however, to assume that, with theory suggesting that the greater the difference between bidder profit efficiency and target profit efficiency the greater the chances of post-merger performance improvements, target profit efficiency should be smaller than bidder profit efficiency. In this case, target profit efficiency is indeed lower than the bidders'. The result of positive influence on CARs is consistent with that of negative influence by target cost efficiency reported in Table 7.5 above, where target cost efficiency was greater than bidder cost efficiency. CASH has the most influence on CARs at face value among the control variables. It is also positive as expected in Hypothesis 6, and statistically significant at 5%. As in previous results discussed above, the market views cash-paid merger deals as leading to combined firms that are more likely to succeed post-merger than those formed from stock-paid mergers. This perception is reinforced by the strong statistical significance of the result at 5%. CROSS has a negative effect on CARs as expected in Hypothesis 5 and is also statistically significant at 5%. This conveys the information that the market considers cross-border mergers as susceptible to integration and other challenges that can stall the realization of post-merger performance improvements.

Table 7.7 Regression Results for CAR on Pre-merger Peer-Target Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.3821	0.7624	1.8128	0.0784*
PRTGTCOSEFF	0.0476	0.0097	4.9250	0.0000**
RSIZE	0.0526	0.3693	0.1424	0.8875
CROSS	-0.3917	0.2330	-1.6811	0.1016
CASH	0.3651	0.1519	2.4026	0.0217**
SERIAL	-0.8388	0.6821	-1.2298	0.2270
DIVPAY	0.0072	0.0049	1.4688	0.1508
CONC	-0.8301	0.8997	-0.9226	0.3625
R-squared	0.4710	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1688	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.0529	Durbin- Watson Statistic		2.5509
F-statistic	1.5584	Prob. (F-statistic)		0.1224

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

Table 7.7 reports results that show that the difference between peer cost efficiency and target cost efficiency has a positive influence on CARs, and is also statistically significant at 5%. This result conforms to Hypothesis 3 and is consistent with the theory in that where the target lags behind its peers in efficiency there is potential for the combined firm to implement improvements that can raise the level of efficiency of the target part of the new institution to that of peers and

above. The only control variable with a significant result is CASH. Its influence on CARs is positive as expected in Hypothesis 6 and it is significant at the 5% level. This supports the theory that, post-merger, firms created from cash-paid mergers will outperform those formed from stock-paid deals.

Table 7.8 Regression Results for CAR on Pre-merger Peer-Target Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.8364	1.0290	1.7846	0.0830*
PRTGTPFTEFF	-0.0108	0.0107	-1.0114	0.3188
RSIZE	0.1561	0.3854	0.4051	0.6878
CROSS	-0.6639	0.2719	-2.4420	0.0198**
CASH	0.4204	0.1858	2.2623	0.0300**
SERIAL	-0.9361	0.6497	-1.4407	0.1586
DIVPAY	0.0068	0.0064	1.0589	0.2969
CONC	-0.7208	0.7492	-0.9620	0.3426
R-squared	0.4309	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1056	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.0921	Durbin- Watson Statistic		2.5615
F-statistic	1.3248	Prob. (F-statistic)		0.2275

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

In Table 7.8 the results show that, contrary to Hypothesis 3, the difference between peer profit efficiency and target profit efficiency has a negative effect on CARs. This is also not the expected result, as according to theory the greater the difference between peer efficiency and bidder or target efficiency the greater the likelihood of post-merger performance improvement. Kohers *et al*. (2000, p.103) state with respect to peer efficiency that “the lower the frontier efficiency level of either or both the bidder and the target, the greater the potential for value enhancement”. This unexpected result can be explained by the huge difference between peer profit efficiency and target profit efficiency as seen from Table 6.1 above. Theory does not cover cases of extreme differences in efficiency. In this particular case, maybe even the most optimistic market will consider it unreasonable to expect the combined firm to raise the level of target efficiency to peer level in the short-term, while not risking prediction in the long-term. Of the control variables, CASH has the largest coefficient which, as expected in Hypothesis 6, is positive. The result is also statistically significant at the 5% level, suggesting confidence of the market in cash-paid mergers giving rise to combined firms that will out-perform counterparts borne out of stock-paid mergers. CROSS has the expected negative sign according to Hypothesis 5, and is also statistically significant at 5%. With this result, the market is conveying

the information that cross-border mergers are more likely than domestic mergers to produce firms that may experience delays in achieving post-merger performance improvements envisaged at the time of merger.

Table 7.9 Regression Results for CAR on Pre-merger Peer- (Bidder + Target)1/2 Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.4977	0.7132	2.0998	0.0430**
PRBDTGTCOSEFF	0.0520	0.0203	2.5574	0.0150**
RSIZE	-0.0219	0.3332	-0.0659	0.9478
CROSS	-0.3395	0.2881	-1.1784	0.2466
CASH	0.4173	0.1695	2.4620	0.0189**
SERIAL	-0.8403	0.6933	-1.2120	0.2336
DIVPAY	0.0055	0.0051	1.0767	0.2890
CONC	-1.0049	0.8022	-1.2526	0.2186
R-squared	0.4535	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1413	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.0702	Durbin- Watson Statistic		2.6195
F-statistic	1.4523	Prob. (F-statistic)		0.1630

Note: **Significant at the 5% level. Variables are as defined in Tables 6.1 and 6.2.

In Table 7.9 we note that the difference between peer cost efficiency and the average of bidder cost efficiency plus target cost efficiency has a positive effect on the market's reaction to merger announcement as expected as expected in Hypothesis 4. The result is also statistically significant at 5%. Theory suggests that where the bidder or target or both have lower efficiency than their peers then the chances of realizing post-merger performance improvements increase. The above result is consistent with the market's recognition of this possibility. CASH is the only control variable with a significant result at 5%, and it has the expected positive effect on CARs as predicted in Hypothesis 6. This suggests that the market perceives that cash-paid mergers are more likely than stock-paid deals to produce combined firms that can accomplish post-merger performance improvements predicted at the time of merger.

Table 7.10 Regression Results for CAR on Pre-merger Peer- (Bidder + Target)1/2 Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.7384	0.9281	1.8731	0.0694*
PRBDTGTPFTEFF	-0.0109	0.0108	-1.0102	0.3193
RSIZE	0.1543	0.3801	0.4061	0.6872
CROSS	-0.6826	0.3049	-2.2388	0.0316**
CASH	-0.4059	0.1798	2.2569	0.0304**
SERIAL	-0.9368	0.6532	-1.4343	0.1604

DIVPAY	0.0079	0.0053	1.4801	0.1478
CONC	-0.6481	0.6899	-0.9395	0.3539
R-squared	0.4299	Mean of Dependent Variable		0.9050
Adj. R-squared	0.1041	Std. Dev of Dependent Variable		1.1548
S.E. of regression	1.0930	Durbin- Watson Statistic		2.5942
F-statistic	1.3197	Prob. (F-statistic)		0.2305

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.1 and 6.2.

Table 7.10 presents results that show that the difference between peer profit efficiency and the average of bidder profit efficiency plus target profit efficiency has a negative effect on the market's reaction to merger announcement. This result is not in conformity with Hypothesis 4. However, the result is not statistically significant. That notwithstanding, the negative effect is the opposite of what is suggested by theory. A possible reason for this outcome is the same as that pointed out in the discussion on Table 7.8 results that the difference between peer profit efficiency and target profit efficiency is rather large. Therefore the explanation is similar to that provided earlier that on account of that difference, the market perceives that it will take considerable time for the combined firm to realize the desired post-merger improvements. Surprisingly, CASH also has a negative effect on the CARs which, in addition, is statistically significant. This is contrary to Hypothesis 6 expectations. It is possible for a result like this to happen, but only in very rare occasions. One possible explanation for this possibility may be considered. If a firm has very few profitable investment opportunities, it will accumulate cash. Such cash may be used in two main ways, the obvious one being paying it out as dividends to shareholders. This is sometimes difficult to do because it may offset an established level of dividend pay-out that the firm wishes to adhere to for consistency and stability. The other way for outlaying the cash is by buying another firm, especially when there is a merger wave, as it is the case in this example. In some cases, where a part of the management's remuneration is pegged on the size of the firm, the management will prefer this option. A market with this information may consider a firm with few investment opportunities taking over another with a rather low profit efficiency compared to its peers as unlikely to be able to improve post-merger performance early enough for the reaction to merger announcement to be positive. Hence, the result obtained. CROSS has a negative effect on CARs as expected in Hypothesis 5, and the result is significant at 5%. This shows a strong perception by the market that, unlike their domestic counterparts, combined firms borne out of cross-border mergers will experience considerable difficulties post-merger that may delay the realization of performance improvements predicted at the time of merger.

$CAR_{0,+1}$ Regression Results on Pre-merger Efficiency

Tables 8.1 to 8.10 present regression results for the two-day CARs pertaining to the merger announcement day and the following day. A brief summary of the results is given under each table, commenting selectively on the efficiency variable and those of the control variables with significant results.

Table 8.1 Regression Results for CAR on Pre-merger Bidder Cost Efficiency

Dependent Variable: $CAR_{0,+1}$

Method: Panel Least Squares

Sample: 2001 2007

Periods included: 7

Total Panel (unbalanced) observations: 56

White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	1.7020	2.4654	0.6904	0.4945
BIDCOSEFF	-0.0209	0.0229	-0.9132	0.3673
RSIZE	-0.5208	0.4764	-1.0933	0.2817
CROSS	0.5015	0.9300	0.5392	0.5931
CASH	0.6247	0.1589	3.9318	0.0004**
SERIAL	-0.7124	0.5106	-1.3951	0.1718
DIVPAY	0.0051	0.0055	0.9316	0.3579
CONC	-0.1769	2.0918	-0.0846	0.9331
R-squared	0.4108	Mean of Dependent Variable		0.5758
Adj. R-squared	0.0741	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.6958	Durbin- Watson Statistic		2.5372
F-statistic	1.2201	Prob. (F-statistic)		0.2954

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

In Table 8.1 the results show that, contrary to Hypothesis 1 prediction, bidder cost efficiency has a negative influence on the CARs, although the result is not statistically significant. This is an unexpected result, as previous bidder performance is expected to be of a level that will lead to the market reacting positively to the announcement of a merger in which it is involved. It will be noted that in Table 7.1 above, bidder cost efficiency has a positive effect on CARs, even if it is not statistically significant. It is obvious that since, except for the CARs, all the other variables used in the two analyses are the same the reason for the different results may lie in the CARs. Also, it may be noted from Table 6 that the mean of CAR-1, 0 is about one and a half times that of CAR0, +1 and yet the maximum value of the latter is almost twice that of the former. Also, the minimum absolute value of CAR0, +1 is about six times as large as the minimum absolute value

of CAR-1, 0, both values being negative. Lastly, the standard deviation of CAR0, +1 is about one and a half times that of CAR-1, 0. It can be observed from this that there are much more fluctuations in CAR0, +1 than in CAR-1, 0. These differences may have led to the unexpected results of BIDCOSEFF. CASH is the only control variable that is statistically significant, at 5%, and it has the expected positive effect on CARs in accordance with Hypothesis 6. Through this result the market conveys the perception that combined firms that evolve from deals paid for in cash are more likely to experience post-merger performance improvements quicker than institutions borne out of stock-paid mergers.

Table 8.2 Regression Results for CAR on Pre-merger Bidder Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-2.1910	1.6121	-1.3591	0.1828
BIDPFTEFF	0.0286	0.0201	1.4229	0.1636
RSIZE	0.1620	0.4055	0.3997	0.6918
CROSS	0.7485	0.7076	1.0579	0.2973
CASH	0.8784	0.3217	2.7103	0.0098**
SERIAL	-1.0116	0.5816	-1.7393	0.0908*
DIVPAY	0.0126	0.0106	1.1958	0.2398
CONC	0.1775	1.1497	0.1544	0.8782
R-squared	0.4994	Mean of Dependent Variable		0.5758
Adj. R-squared	0.2133	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5631	Durbin- Watson Statistic		2.5619
F-statistic	1.7456	Prob. (F-statistic)		0.0728*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

In Table 8.2 the results show that the effect of bidder profit efficiency on CARs is positive as expected in Hypothesis 1. The pre-merger performance of the bidder should have a positive influence on the market's reaction in any merger where the bidder wishes to demonstrate ability to improve on previous profitability in post-merger performance and therefore wealth creation for the combined firm's shareholders. The result is therefore consistent with theory, although it is not statistically significant. In Table 7.2 bidder profit efficiency was also reported to have a positive effect on CARs and was in addition statistically significant at 5%. Of the two control variables with significant results, CASH has a positive effect on CARs in conformity with Hypothesis 6, and is also statistically significant at 5%. This result reflects the market's positive view that achieving post-merger performance improvements is more assured and quicker for combined firms borne out of cash-paid mergers than for those that evolve from stock-paid deals. As expected in Hypothesis 7, SERIAL is shown to have a negative effect on the market's

reaction to merger announcement which is also statistically significant at 10%. The market's reaction is based on the perception that serial acquisitions were not undertaken in the interest of the shareholders but of management. A positive reaction would have meant that the market viewed serial acquirers as capable of using their acquisition experience to achieve the main merger goals regarding post-event performance.

Table 8.3 Regression Results for CAR on Pre-merger Bidder-Target Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.8448	0.9717	-0.8694	0.3905
BIDTGTCOSEFF	0.0176	0.0289	0.6088	0.5466
RSIZE	0.3054	0.5078	0.6014	0.5515
CROSS	0.9353	0.6550	1.4279	0.1622
CASH	0.9192	0.3884	2.3665	0.0236**
SERIAL	-0.8005	0.4825	-1.6589	0.1061
DIVPAY	0.0083	0.0069	1.1864	0.2435
CONC	0.5301	1.3309	0.3983	0.6928
R-squared	0.4913	Mean of Dependent Variable		0.5758
Adj. R-squared	0.2007	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5756	Durbin- Watson Statistic		2.5992
F-statistic	1.6903	Prob. (F-statistic)		0.0849*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

Table 8.3 shows that, as expected in Hypothesis 3, the difference between bidder cost efficiency and target cost efficiency has a positive effect on CARs. Theory posits that where an efficient firm takes over a less efficient one, the bidder may implement changes in various areas of the combined firm that may lead to post-merger performance improvements. The result is therefore consistent with theory, although it is not statistically significant. Also, the result is similar to that of the same variable obtained using CAR-1, 0 in Table 7.3. CASH, the only control variable with a significant result, has a positive effect on CARs according to Hypothesis 6 which is statistically significant at 5%. Through this result, the market is conveying its perception that cash-paid mergers are more likely than stock-paid deals to give rise to combined firms that are more assured of achieving post-merger performance improvements quicker.

Table 8.4 Regression Results for CAR on Pre-merger Bidder-Target Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.9017	1.0741	-0.8394	0.4069
BIDTGTPFTEFF	0.0107	0.0176	0.6096	0.5460
RSIZE	0.1976	0.4172	0.4737	0.6387

CROSS	0.8530	0.6929	1.2310	0.2265
CASH	0.8708	0.3609	2.4122	0.0212**
SERIAL	-0.8471	0.5313	-1.5942	0.1199
DIVPAY	0.0105	0.0109	0.9656	0.3409
CONC	0.5416	1.2491	0.4336	0.6673
R-squared	0.4870	Mean of Dependent Variable		0.5758
Adj. R-squared	0.1939	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5823	Durbin- Watson Statistic		2.5576
F-statistic	1.6614	Prob. (F-statistic)		0.0921*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

Table 8.4 reports results which show, as expected in Hypothesis 3, that the difference between bidder profit efficiency and target profit efficiency has a positive effect on the market's reaction to merger announcement. The same theory on bidder and target efficiencies discussed immediately above is relevant in this case as well. The result is not statistically significant, and it differs in that respect from the result for the same variable obtained using CAR-1, 0 reported in Table 7.4. CASH is the only control variable with a significant result and it not only has a positive effect on CARs as expected in Hypothesis 6 but it is also statistically significant at 5%. Once more, by this result the market conveys a message of confidence in the ability of cash-paid mergers to evolve into institutions that, more likely than those borne out of stock-paid mergers, can deliver to their shareholders the post-merger performance improvements promised at merger.

Table 8.5 Regression Results for CAR on Pre-merger Target Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	2.4516	2.2654	1.0822	0.2866
TGTCOSEFF	-0.0438	0.0345	-1.2713	0.2120
RSIZE	0.2487	0.4242	0.5863	0.5614
CROSS	0.9736	0.6863	1.4186	0.1649
CASH	0.8382	0.3472	2.4144	0.0211**
SERIAL	-0.7674	0.4999	-1.5349	0.1338
DIVPAY	0.0076	0.0058	1.2984	0.2026
CONC	0.2853	1.2158	0.2346	0.8159
R-squared	0.5036	Mean of Dependent Variable		0.5758
Adj. R-squared	0.2199	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5565	Durbin- Watson Statistic		2.4769
F-statistic	1.7755	Prob. (F-statistic)		0.0669*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.1 and 6.2.

Table 8.5 presents results that show that target cost efficiency has a negative effect on the market's reaction to merger announcement as predicted in Hypothesis 2. In the discussion on Table 7.5 results where a similar result is reported for the same variable, an observation was made that theory does not address target efficiencies directly but is focused instead on their differences with those of bidders and peers. However, a target efficiency which is lower than that of bidder or peer would be expected to have a positive effect on CARs, while if it were larger than that of bidder or peer, it would be expected to have the opposite effect. Since, as reported earlier, target cost efficiency is larger than bidder cost efficiency the above result is consistent with what the theory implies. It will be noted, however, that the result is not statistically significant. The only control variable with a significant result, CASH, has a positive effect on CARs as expected in Hypothesis 6, and it is also statistically significant at 5%. Information conveyed by the market in this respect suggests that shareholders may rely on cash-paid mergers more than stock-paid deals to result in combined firms that can deliver the improved post-merger performances promised at merger.

Table 8.6 Regression Results for CAR on Pre-merger Target Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-1.5220	0.9102	-1.6723	0.1034
TGTPFTEFF	0.0223	0.0260	0.8546	0.3986
RSIZE	0.2286	0.3574	0.6396	0.5266
CROSS	0.9856	0.7001	1.4078	0.1680
CASH	0.8587	0.3759	2.2842	0.0285**
SERIAL	-0.8532	0.5095	-1.6744	0.1030
DIVPAY	0.0062	0.0068	0.9139	0.3670
CONC	-0.1029	1.6618	-0.0619	0.9509
R-squared	0.4903	Mean of Dependent Variable		0.5758
Adj. R-squared	0.1991	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5771	Durbin- Watson Statistic		2.4861
F-statistic	1.6837	Prob. (F-statistic)		0.0865*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

In Table 8.6 the results show that target profit efficiency has a positive effect on CARs, contrary to what is predicted in Hypothesis 2. As in the previous discussion regarding target cost efficiency, theory does not address the absolute value of target efficiency but rather the differences with bidder and target efficiency. Unlike the above outcome, this result has a positive effect on CARs because target profit efficiency is lower and not higher than cost efficiency. However, the result is not statistically significant. Also, it is similar to that of the same

variable reported in Table 7.6. As before, CASH, the only variable with a significant result, has a positive effect on CARS as predicted in Hypothesis 6. In addition, the result is statistically significant at 5%. This is evidence of the market's confidence in those mergers paid for in cash to give rise to combined firms that are more likely than those that evolve from stock-paid mergers to experience post-merger performance improvements quicker.

Table 8.7 Regression Results for CAR on Pre-merger Peer-Target Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.7751	0.9358	-0.8283	0.4131
PRTGTCOSEFF	0.0417	0.0383	1.0889	0.2836
RSIZE	0.2092	0.4076	0.5132	0.6111
CROSS	1.0599	0.7459	1.4209	0.1642
CASH	0.8493	0.3525	2.4092	0.0214**
SERIAL	-0.7791	0.5005	-1.5565	0.1286
DIVPAY	0.0069	0.0056	1.2201	0.2306
CONC	0.3185	1.2085	0.2636	0.7937
R-squared	0.5027	Mean of Dependent Variable		0.5758
Adj. R-squared	0.2185	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5579	Durbin- Watson Statistic		2.4804
F-statistic	1.7688	Prob. (F-statistic)		0.0682*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.1 and 6.2.

The results presented in Table 8.7 show that the difference between peer cost efficiency and target cost efficiency has a positive effect on CARs as expected in Hypothesis 3. According to theory, the difference between peer and target efficiency signifies existence of potential for improvement of target efficiency to the level of its peers and beyond. However, the result is not statistically significant. This result is only partly similar to that of the same variable reported in Table 7.7 which in that case was found to be statistically significant. CASH, the only variable with a significant result, has a positive effect on CARs in conformity with Hypothesis 6, which is also statistically significant at 5%. Cash-paid mergers are perceived to be more likely than stock-paid mergers to lead to combined firms that can achieve earliest the predicted post-merger performance improvements.

Table 8.8 Regression Results for CAR on Pre-merger Peer-Target Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.2727	1.0379	-0.2628	0.7943
PRTGTPFTEFF	-0.0122	0.0185	-0.6584	0.5146
RSIZE	0.3216	0.4051	0.7937	0.4327

CROSS	0.7956	0.6495	1.2248	0.2288
CASH	0.8979	0.3401	2.6401	0.0123**
SERIAL	-0.8846	0.6399	-1.3825	0.1756
DIVPAY	0.0061	0.0057	1.0724	0.2909
CONC	0.4097	1.1732	0.3492	0.7290
R-squared	0.4933	Mean of Dependent Variable		0.5758
Adj. R-squared	0.2038	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5725	Durbin- Watson Statistic		2.4919
F-statistic	1.7038	Prob. (F-statistic)		0.0818*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.1 and 6.2.

Table 8.8 reports results which show that the difference between peer profit efficiency and target profit efficiency has a negative effect on CARs which is inconsistent with theory and the prediction of Hypothesis 3. The explanation offered in the discussion on Table 7.8 results can also be given here since the variable is the same, as well as the result. As before, the result can be attributed to the very large difference between the peer and target efficiencies, leading the market to consider it unlikely that the targets' efficiency level can be brought to that of the peers as quickly as desirable. It is to be noted that the result is not statistically significant. The only control variable with a significant result is CASH, which, as expected in Hypothesis 6 has a positive effect on the market's reaction to merger announcement. It is also statistically significant at 5%. The market is conveying a perception consistent with the expectation that combined firms formed out of cash-paid mergers will out-perform those institutions that evolved from stock-paid deals in the post-merger period.

Table 8.9 Regression Results for CAR on Pre-merger Peer- (Bidder + Target)1/2 Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.7228	0.8609	-0.8396	0.4068
PRBDTGTCOSEFF	0.0146	0.0423	0.3456	0.7317
RSIZE	0.1979	0.3614	0.5476	0.5874
CROSS	0.9749	0.7966	1.2239	0.2292
CASH	0.8964	0.3649	2.4567	0.0191**
SERIAL	-0.7885	0.4888	-1.6129	0.1157
DIVPAY	0.0071	0.0050	1.4039	0.1692
CONC	0.3454	1.0811	0.3195	0.7512
R-squared	0.4848	Mean of Dependent Variable		0.5758
Adj. R-squared	0.1903	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5857	Durbin- Watson Statistic		2.5449
F-statistic	1.6465	Prob. (F-statistic)		0.0959*

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.1 and 6.2.

Table 8.9 presents results which show that the difference in peer cost efficiency and the average of bidder and target cost efficiency has a positive influence on CARs as expected in Hypothesis 4, although the result is not statistically significant. The result is consistent with theory, which suggests that where that difference exists it represents potential for improvement to peer-level efficiency and beyond, and the market recognizes that. As before cash is positive, and statistically significant at 5%, for the same theoretical reasons suggested earlier.

Table 8.10 Regression Results for CAR on Pre-merger Peer- (Bidder + Target)1/2 Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.2872	0.9281	-0.3094	0.7588
PRBDTGTPFTEFF	-0.0155	0.0221	-0.7006	0.4882
RSIZE	0.3448	0.4441	0.7766	0.4426
CROSS	0.7379	0.6389	1.5448	0.2560
CASH	0.8776	0.3357	2.6146	0.0131**
SERIAL	-0.9100	0.6591	-1.3806	0.1762
DIVPAY	0.0072	0.0062	1.1655	0.2517
CONC	0.5074	1.2062	0.4207	0.6766
R-squared	0.4984	Mean of Dependent Variable		0.5758
Adj. R-squared	0.2118	Std. Dev of Dependent Variable		1.7623
S.E. of regression	1.5646	Durbin- Watson Statistic		2.4859
F-statistic	1.7391	Prob. (F-statistic)		0.0741*

Note: **Significant at the 5% level. *Significant at the 10% level. Variables are as defined in Tables 6.1 and 6.2.

In r10, the difference between peer profit efficiency and the average of bidder plus target profit efficiency is reported to have a negative effect on CAR, which is not what is predicted in Hypothesis 4. This result is the opposite of theory. However, it is possible that the market would react as it did in the light of the large difference between peer efficiency and target efficiency. This viewpoint was considered in the discussion on the results presented in Table 7.10 above. It should be noted, however, that the result is not statistically significant. CASH, once again is positive as expected according to Hypothesis 6 and statistically significant at 5%. The interpretation of this result is the same as before.

Summary of Results

$CAR_{-1,0}$ Results

With regard to $CAR_{-1,0}$, the results reveal that in the sample examined, overall the level of target cost efficiency had the most notable influence on the bidders' CARs, either when examined as the difference with peer cost efficiency, or as the difference between peer cost efficiency and

the average of bidder plus target cost efficiency. This result can be associated with the findings of those studies that have suggested that post-merger European banks pursue cost-cutting strategies while seeking to enhance efficiency (Hagendorff and Keasey, 2009). It is possible that bidders aim to combine with firms that may make such strategies easier to achieve. Peer efficiency and how it differs with both bidder and target efficiency is shown to be influential on the market's reaction to merger announcement. It can be inferred from the above results that the potential for post-merger improvements in efficiency is associated with, in addition to other variables, how large peer efficiency is compared to that of target or both bidder and target. This finding is consistent with the results reported by Kohers *et al*. (2000). Bidder profit efficiency, standing alone, or included in the difference between itself and target profit efficiency, represents another notable influence on the bidders' CARs. From Table 6.1 it can be seen that bidders are more profit efficient than targets while the reverse is the case for cost efficiency. It is therefore possible that bidders in the sample under investigation are good at making profits but poor at controlling costs and presume that by combining with firms that are good at the latter they can enhance their profitability. Aggarwal *et al*. (2006) also find that bidder profit efficiency is positively associated with CARs, and that the relationship is statistically significant.

Of the control variables, CROSS and CASH have the most influence on the market's reaction to bank merger announcements which is also statistically significant. The market perceives combined firms formed out of cross-border mergers as less likely than those from domestic deals to achieve timely their post-merger performance improvement objectives. This is because of the challenges of integrating with an overseas institution and managing operations from a distance with many obstacles to surmount, especially in the years immediately following merger. Similarly, the market demonstrates confidence in the ability of institutions resulting from cash-paid mergers to achieve quicker and sometimes greater post-merger performance goals compared to their counterparts created out of stock-paid deals. Other control variables with a significant influence on CARs are DIVPAY (5% and 10%), RSIZE (5%), and SERIAL (10%).

$CAR_{0,+1}$ Results

As for $CAR_{0,+1}$, none of the efficiency variables has a significant result. This is an unusual outcome, particularly because it is the analysis with the highest number of a significant result (at 10%) of the F-statistic, demonstrating to some extent the suitability of the model for use in the regressions performed. What this result seems to suggest is that findings in such a study may differ substantially depending on which window's CARs are used as dependent variable. Since this is a topic which is yet to be researched, this being only the third study, and the first in

Europe conducted along the lines of the two done using US data, no guidelines exist on a most informative window for investigation.

Regarding control variables, CASH is statistically significant at 5% in all the ten regressions, while SERIAL is statistically significant at 10% in one regression.

4.2 Regression Results on Post-merger Efficiency

Having examined the effect of pre-merger efficiency on CARs, this study also investigated post-merger efficiency and how it is associated with the market's reaction to merger announcement. The analysis of post-merger efficiency is based on two basic assumptions found in the finance literature. The first of these is grounded in the efficient market hypothesis, the semi-strong form of which posits that even information not publicly available is perceived by the market. Markets exist which are efficient in the semi-strong form, as implied by DeLong and DeYoung (2007) in the quotation at the beginning of this paper. In a market that is efficient in the semi-strong form, it is likely that market participants, some of them with insider information, would influence the market through their trading. This possibility culminates in markets being able to predict a firm's future performance, one indicator of which is efficiency, as it is the case in this investigation. The second assumption is that the stock price reflects future earnings performance of the firm. And price affects the abnormal returns.

The set of Tables 9 present regression results for CAR-1, 0, while Tables 10 present results for CAR0, +1. Regressions are performed using the difference between pre-merger efficiency of the combined firm and the post-merger efficiency. Results are presented for each year individually for the first three post-merger years and the average of those three years. As reported above, pre-merger efficiency was obtained by adding up bidder and target efficiency after weighting them on the basis of their total assets.

$CAR_{-1,0}$ Regression Results on Post-merger Efficiency

Tables 9.1 to 9.8 present regression results for the two-day CARs pertaining to the day before and the merger announcement day. A brief summary of the results is given under each table, commenting selectively on the efficiency variable and those of the control variables with significant results.

Table 9.1 Regression Results for CAR on Post-merger Cost Efficiency Year One

Dependent Variable: CAR-1, 0				
Method: Panel Least Squares				
Sample: 2001 2003				
Periods included: 3				
Total Panel (unbalanced) observations: 20				
White cross-section standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	5.1416	1.8274	2.8137	0.0374**
POSTCOS1EFF	0.2664	5.4046	0.0493	0.9626
RSIZE	1.2048	0.9921	1.2144	0.2788
CROSS	0.1626	0.0623	2.6113	0.0476**
CASH	-0.3399	0.5423	-0.6267	0.5583
SERIAL	-2.3363	0.5895	-3.9631	0.0107**
DIVPAY	0.0097	0.0048	2.0196	0.0994*
CONC	-5.3242	1.9373	-2.7483	0.0404**
R-squared	0.7525	Mean of Dependent Variable		1.1119
Adj. R-squared	0.0593	Std. Dev of Dependent Variable		1.3274
S.E. of regression	1.2875	Durbin- Watson Statistic		3.3063
F-statistic	1.0856	Prob. (F-statistic)		0.5042

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

According to the results presented in Table 9.1, post-merger cost efficiency of the combined firm for the first year has a positive effect on CARs. This prediction is not consistent with the result obtained in Table 5 where cost efficiency declines in the first year for mergers that took place in 2001, 2002, and 2003. It will be noted, however, that the result is not statistically significant. Regarding the control variables, CROSS is shown to have a positive rather than negative effect on CARs which is statistically significant. This suggests cross-border mergers will perform better than domestic deals, presumably on account of cross-border bidders having had previous experience overseas, or because in the first year they can continue with a profitability trend that started before the merger before the effects of merging with a cross-border firm are felt. SERIAL has a negative effect on CARs which is statistically significant. It implies that serial acquisitions were carried out for the benefit of the managements of the firms involved and not in the interest of the shareholders. DIVPAY has a positive effect on CARs as expected, for a previous good performance is implied when an ability to pay dividends is demonstrated. The result is also statistically significant. CONC has a negative effect on CARs which is statistically significant. This implies that entering the already concentrated market will not result in immediate improved performance for the combined firm, maybe because the concentration is at a level where

enhanced performance has to be earned through competition, rather than by collusion among banks or the exercise of market power.

Table 9.2 Regression Results for CAR on Post-merger Cost Efficiency Year Two

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	3.0703	3.1699	0.9686	0.3772
POSTCOS2EFF	-10.4550	6.5259	-1.6021	0.1700
RSIZE	0.3374	0.6201	0.5442	0.6097
CROSS	0.4769	0.3591	1.3281	0.2415
CASH	-1.0048	1.0606	-0.9474	0.3869
SERIAL	-1.3786	0.9019	-1.5284	0.1870
DIVPAY	0.0058	0.0053	1.1069	0.3187
CONC	-2.2485	3.6820	-0.6107	0.0581*
R-squared	0.7863	Mean of Dependent Variable		1.1119
Adj. R-squared	0.1881	Std. Dev of Dependent Variable		1.3274
S.E. of regression	1.1961	Durbin- Watson Statistic		3.6522
F-statistic	1.3145	Prob. (F-statistic)		0.4073

Note: *Significant at the 10% level. Variables are as defined in Tables 6.

Table 9.2 presents results that show that post-merger cost efficiency for the second year has a negative effect on CARs which is also statistically significant. This outcome is consistent with the SFA results obtained in Table 5 where cost efficiency of the combined firm was found to have declined in the second year for mergers that took place in 2001, 2002, and 2003 However, the above result is not statistically significant. CONC is negative and statistically significant, and the result may be explained in the same way as it was done for the Table 9.1 result.

Table 9.3 Regression Results for CAR on Post-merger Cost Efficiency Year Three

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	5.4733	1.9870	2.7545	0.0401**
POSTCOS3EFF	1.3409	1.5417	0.8697	0.4242
RSIZE	1.3413	0.8751	1.5327	0.1859
CROSS	0.0801	0.0886	0.9040	0.4074
CASH	-0.2381	0.7978	-0.2985	0.7773
SERIAL	-2.4780	0.6573	-3.7702	0.0130**
DIVPAY	0.0095	0.0068	1.3932	0.2223
CONC	-5.7011	2.1994	-2.5921	0.0487**
R-squared	0.7532	Mean of Dependent Variable		1.1119
Adj. R-squared	0.0623	Std. Dev of Dependent Variable		1.3274
S.E. of regression	1.2854	Durbin- Watson Statistic		3.3109

F-statistic	1.0901	Prob. (F-statistic)	0.5021

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

In Table 9.3, post-merger efficiency of the combined firm for the third year is predicted to have a positive effect on the CARs. This is an unexpected result if one considers the decline in post-merger cost efficiency for mergers that took place in 2001 and 2002 as reported in Table 5. However, there was a gain in post-merger cost efficiency for mergers that took place in 2003. Presumably, the market reacted to this possibility to predict the positive effect. It will be noted, however, that the result is not statistically significant. Both SERIAL and CONC have a negative effect on CARs which is statistically significant. The results may be interpreted the same way as it was done for the Table 9.1 results.

Table 9.4 Regression Results for CAR on Post-merger Profit Efficiency Year One

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	4.9893	2.1142	2.3599	0.0648*
POSTPFT1EFF	2.6480	3.7029	0.7151	0.5065
RSIZE	0.8955	0.9265	0.9665	0.3782
CROSS	-0.4383	0.9251	-0.4738	0.6556
CASH	0.1987	0.8907	0.2231	0.8323
SERIAL	-2.6677	0.6081	-4.3871	0.0071**
DIVPAY	0.0134	0.0066	2.0315	0.0979*
CONC	-5.1298	2.5614	-2.0027	0.1016
R-squared	0.7596	Mean of Dependent Variable		1.1119
Adj. R-squared	0.0864	Std. Dev of Dependent Variable		1.3274
S.E. of regression	1.2688	Durbin- Watson Statistic		3.2559
F-statistic	1.1283	Prob. (F-statistic)		0.4843

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 1 and 2.

Table 9.4 results show that post-merger profit efficiency of the combined firm for the first year is predicted to have a positive effect on CARs. This is an unexpected if one considers only the 2001 mergers as profit efficiency declines according to Table 5 results. However, the market appears to have taken into consideration the fact that profit efficiency improves in the first year for mergers that took place in 2002 and 2003. The results are not statistically significant. SERIAL has a negative effect while DIVPAY has a positive effect, both of them as expected, and the results are statistically significant. The interpretation of these results is like that given for the Table 9.1 results.

Table 9.5 Regression Results for CAR on Post- merger Profit Efficiency Year Two

Variable	Coefficient	Std. Error	t-statistic	Prob.

C	5.1444	1.2922	3.9813	0.0105**
POSTPFT2EFF	11.2556	3.9975	2.8156	0.0373**
RSIZE	3.5743	0.8594	4.1589	0.0088**
CROSS	0.1196	0.2245	0.5329	0.6169
CASH	0.3794	0.5421	0.6998	0.5153
SERIAL	-2.1229	0.4866	-4.3627	0.0073**
DIVPAY	0.0001	0.0097	0.0112	0.9915
CONC	-6.0882	1.0786	-5.6446	0.0024**
R-squared	0.8424	Mean of Dependent Variable		1.1119
Adj. R-squared	0.4010	Std. Dev of Dependent Variable		1.3274
S.E. of regression	1.0273	Durbin- Watson Statistic		3.6160
F-statistic	1.9089	Prob. (F-statistic)		0.2455

Note: **Significant at the 5% level. Variables are as defined in Tables 1 and 2.

Results presented in Table 9.5 show that post-merger profit efficiency of the combined firm for the second year has a positive effect on CARs which is also statistically significant. This is not surprising as, while for the mergers that took place in 2001 profit efficiency declined in the second year, it improved for mergers that were carried out in 2002 and 2003. Both SERIAL and CONC have a negative effect as expected, and statistically significant. The results may be interpreted as done for the Table 9.1 results. RSIZE has a positive effect on CARs, which is not expected, and the result is also statistically significant. Before merger, the size of the target is considered to pose a major cost challenge in the integration process. However, it has been found that deals involving “equals” can sometimes lead to very successful mergers. At the same time, the size of the merger might be a challenge only at the beginning but prove a major benefit after the initial difficulties have been overcome. The positive effect of RSIZE is therefore not necessarily unpredictable.

Table 9.6 Regression Results for CAR on Post-merger Profit Efficiency Year Three

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	4.8367	1.1188	4.3231	0.0075**
POSTPFT3EFF	4.2704	3.4222	1.2479	0.2673
RSIZE	1.3379	0.7978	1.6769	0.1544
CROSS	-0.0256	0.1686	-0.1516	0.8855
CASH	0.0898	0.9532	0.0942	0.9286
SERIAL	-2.3557	0.3549	-6.6375	0.0012**
DIVPAY	0.0064	0.0099	0.6402	0.5502
CONC	-4.8658	0.7622	-6.3835	0.0014**
R-squared	0.7841	Mean of Dependent Variable		1.1119
Adj. R-squared	0.1795	Std. Dev of Dependent Variable		1.3274

S.E. of regression	1.2024	Durbin- Watson Statistic	3.3203
F-statistic	1.2969	Prob. (F-statistic)	0.4139

Note: **Significant at the 5% level. Variables are as defined in Tables 1 and 2.

In Table 9.6 post-merger profit efficiency of the combined firm for the third year is shown to have a positive effect on CARs. This result is not unexpected since, except for the 2001 mergers which led to a decline in profit efficiency in the third year after merger, the 2002 and 2003 mergers resulted in profit efficiency improvements. Once again SERIAL and CONC have a negative effect on CARs which is statistically significant, and the results can be interpreted as before.

Three-Year Average Results

Tables 9.7 and 9.8 present results based on the averages of cost efficiency and profit efficiency over the three post-merger years considered. Since the sample being examined is so small, analysis using these averages may offer a better depiction of how the market predicts the future performance of merging firms.

Table 9.7 Regression Results for CAR on Average Post-merger Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	4.5099	2.1797	2.0691	0.0934*
POSTCOSAVGEFF	-3.8679	0.7754	-4.9882	0.0041**
RSIZE	0.8779	0.6217	1.4122	0.2170
CROSS	0.2919	0.1403	2.0804	0.0920*
CASH	-0.6137	0.7886	-0.7781	0.4717
SERIAL	-2.0815	0.5796	-3.5913	0.0157**
DIVPAY	0.0102	0.0078	1.3014	0.2498
CONC	-4.5215	2.2229	-2.0341	0.0976*
R-squared	0.7558	Mean of Dependent Variable		1.1119
Adj. R-squared	0.0721	Std. Dev of Dependent Variable		1.3274
S.E. of regression	1.2787	Durbin- Watson Statistic		3.3151
F-statistic	1.1055	Prob. (F-statistic)		0.4948

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 1 and 2.

In Table 9.7, the average of post-merger cost efficiency is shown to have a negative effect on CARs. This is akin to the market predicting a decline in cost efficiency after merger. The result is predictable on account of the mostly declined cost efficiency in all the years for all the mergers considered, except for the 2003 mergers whose cost efficiency improved in the third year after merger. This is consistent the results reported in Table 5. CROSS has a positive effect on

CARs, while both SERIAL and CONC have a negative effect, and all the three have statistically significant results. The results may be interpreted as the Table 9.1 results were.

Table 9.8 Regression Results for CAR on Average Post-merger Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	4.4904	0.3935	11.4114	0.0001**
POSTPFTAVGEFF	15.7184	6.2236	2.5256	0.0528*
RSIZE	1.8945	0.4867	3.8923	0.0115**
CROSS	-1.2817	0.5787	-2.2148	0.0776*
CASH	1.6253	1.2839	1.2659	0.2613
SERIAL	-2.9167	0.4583	-6.3642	0.0014**
DIVPAY	0.0083	0.0065	1.2696	0.2601
CONC	-4.7573	0.1932	-24.6188	0.0000**
R-squared	0.8472	Mean of Dependent Variable		1.1119
Adj. R-squared	0.4194	Std. Dev of Dependent Variable		1.3274
S.E. of regression	1.0115	Durbin- Watson Statistic		3.0627
F-statistic	1.9804	Prob. (F-statistic)		0.2321

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 1 and 2.

In Table 9.8, the results show that average post-merger profit efficiency has a positive effect on CARs which is statistically significant. This is akin to the market predicting improvement in profit efficiency after merger. The result is expected as, while for the 2001 mergers profit efficiency did not improve in any of the first three years after merger, it did in all the three years for the mergers that took place in 2002 and 2003. These results are consistent with those reported in Table 5. RSIZE has a positive effect on CARs, which is not expected, and it is statistically significant. As pointed out in discussing the Table 6.29 result of the same variable, the size of the target may turn out to be beneficial in the combined firm after overcoming the challenges of integration which typically last only a few years. CROSS has a negative effect on CARs as expected, and is statistically significant. Cross-border mergers pose more integration challenges than domestic mergers as discussed in the earlier part of this analysis that considered pre-merger efficiency. Both SERIAL and CONC have a negative effect on CARs and are statistically significant. Interpretation of these results is the same as the one offered for similar results reported in Table 6.25.

$CAR_{0,+1}$ Regression Results on Post-merger Efficiency

Tables 10.1 to 10.8 present regression results for the two-day CARs pertaining to the merger announcement day and the following day. A brief summary of the results is given under each

table, commenting selectively on the efficiency variable and those of the control variables with significant results.

Table 10.1 Regression Results for CAR on Post-merger Cost Efficiency Year One

Dependent Variable: CAR0, +1

Method: Panel Least Squares

Sample: 2001 2003

Periods included: 3

Total Panel (unbalanced) observations: 20

White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-4.6922	3.3299	-1.4091	0.2178
POSTCOS1EFF	-20.6559	28.4722	-0.7255	0.5007
RSIZE	0.1438	2.9339	0.0490	0.9628
CROSS	1.6636	0.3530	4.7126	0.0053**
CASH	0.9854	1.6894	0.5833	0.5850
SERIAL	-1.3769	1.2241	-1.1249	0.3117
DIVPAY	0.0022	0.0352	0.0635	0.9518
CONC	7.4389	6.0675	1.2260	0.2748
R-squared	0.7713	Mean of Dependent Variable		1.1602
Adj. R-squared	0.1308	Std. Dev of Dependent Variable		2.2592
S.E. of regression	2.1063	Durbin- Watson Statistic		2.8404
F-statistic	1.2042	Prob. (F-statistic)		0.4509

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

In Table 10.1 post-merger cost efficiency of the combined firm one year after merger, is shown to have a negative effect on CARs. This is predictable on account of the decline in cost efficiency in the first three years after merger for the mergers that took place in 2001, 2002 and 2003, as reported in Table 5. However, the result is not statistically significant. CROSS has an unexpected positive effect on CARs which is statistically significant. This implies the market foresees, against theory, that cross-border mergers will perform better post-merger than domestic mergers. It is possible for this to happen where on account of previous experience bidders are not expected to face serious integration challenges after merger, or due to a good record of top performance pre-merger, the market predicts that trend to continue despite the merger.

Table 10.2 Regression Results for CAR on Post-merger Cost Efficiency Year Two

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-7.9835	1.4117	-5.6554	0.0024**

POSTCOS2EFF	-20.0609	18.5658	-1.0805	0.3292
RSIZE	-0.4673	2.4514	-0.1906	0.8563
CROSS	2.1339	0.7507	2.8426	0.0361**
CASH	0.8269	1.1613	0.7120	0.5083
SERIAL	0.4555	1.4472	0.3148	0.7656
DIVPAY	-0.0143	0.0156	-0.9164	0.4015
CONC	12.6151	1.5363	8.2112	0.0004**
R-squared	0.7906	Mean of Dependent Variable		1.1602
Adj. R-squared	0.2043	Std. Dev of Dependent Variable		2.2592
S.E. of regression	2.0153	Durbin- Watson Statistic		2.5127
F-statistic	1.3484	Prob. (F-statistic)		0.3949

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

According to Table 10.2, post-merger cost efficiency of the combined firm in the second year has a negative effect on CARs. These results are consistent with the results in Table 5 where it is reported that cost efficiency declines in the second year post-merger for all the mergers that took place in 2001, 2002, and 2003. However, the result is not statistically significant. CROSS has a positive effect on CARs and is statistically significant. The same interpretation offered in discussing the Table 9.2 results applies here. CONC has a positive effect on CARs and statistically significant. This suggests that the combined firm may benefit through collusion with other banks or exercise of market power or through enhanced efficiency emanating from increased competition.

Table 10.3 Regression Results for CAR on Post-merger Cost Efficiency Year Three

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-8.6480	4.4192	-1.9569	0.1077
POSTCOS3EFF	-18.2157	12.7416	-1.4296	0.2122
RSIZE	-0.8636	2.6069	-0.3313	0.7539
CROSS	2.6781	0.9519	2.8135	0.0374**
CASH	0.5023	0.9380	0.5355	0.6153
SERIAL	0.5444	0.5438	1.0010	0.3628
DIVPAY	-0.0021	0.0254	-0.0844	0.9360
CONC	11.9757	5.6395	2.1236	0.0871*
R-squared	0.7973	Mean of Dependent Variable		1.1602
Adj. R-squared	0.2298	Std. Dev of Dependent Variable		2.2592
S.E. of regression	1.9828	Durbin- Watson Statistic		2.7935
F-statistic	1.4049	Prob. (F-statistic)		0.3754

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

Table 10.3 reports that the post-merger cost efficiency of the combined firm for the third year after merger has a negative effect on CARs. This market's prediction might be based on the decline in cost efficiency reported in Table 5 for the third year in mergers that took place in 2001 and 2002. Otherwise, there was improvement in third year cost efficiency for the mergers that took place in 2003. However, the result is not statistically significant. Both CROSS and CONC have a positive effect on CARs and are statistically significant. The interpretation offered for the two variables in the discussion on Table 9.3 results applies here as well.

Table 10.4 Regression Results for CAR on Post-merger Profit Efficiency Year One

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-4.4148	3.0203	-1.4617	0.2037
POSTPFT1EFF	7.1709	2.6527	2.7032	0.0426**
RSIZE	0.3698	1.2419	0.2978	0.7778
CROSS	-0.0978	0.3157	-0.3097	0.7692
CASH	3.5723	0.3924	9.1033	0.0003**
SERIAL	-2.2797	0.7877	-2.8943	0.0340**
DIVPAY	0.0003	0.0151	0.2094	0.8424
CONC	7.2327	4.9462	1.4623	0.2035
R-squared	0.7655	Mean of Dependent Variable		1.1602
Adj. R-squared	0.1090	Std. Dev of Dependent Variable		2.2592
S.E. of regression	2.1325	Durbin- Watson Statistic		2.3495
F-statistic	1.1661	Prob. (F-statistic)		0.4673

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

The results in Table 10.4 show that post-merger profit efficiency of the combined firm for the first year after merger has a positive effect on CARs which is statistically significant. This is predictable on account of the gain in profit efficiency in the first year for the mergers that took place in 2002 and 2003, although for 2001 mergers profit efficiency declined. CASH has a positive effect on CARs as expected, which is statistically significant. And SERIAL has a negative effect on CARs, as expected, which is also statistically significant. The results may be interpreted as they were for similar variables when pre-merger efficiency results were discussed above.

Table 10.5 Regression Results for CAR on Post- merger Profit Efficiency Year Two

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-4.0406	1.6737	-2.4142	0.0606*
POSTPFT2EFF	-14.8135	8.8175	-1.6800	0.1538
RSIZE	-1.9645	2.2735	-0.8641	0.4270

CROSS	1.5928	0.4209	3.7838	0.0128**
CASH	1.1107	1.4516	0.7652	0.4787
SERIAL	-1.6627	0.3589	-4.6330	0.0057**
DIVPAY	0.0061	0.0163	0.3721	0.7251
CONC	7.7487	3.6219	2.1394	0.0854*
R-squared	0.8013	Mean of Dependent Variable		1.1602
Adj. R-squared	0.2449	Std. Dev of Dependent Variable		2.2592
S.E. of regression	1.9632	Durbin- Watson Statistic		2.2833
F-statistic	1.4401	Prob. (F-statistic)		0.3637

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

The results presented in Table 10.5 show that the post-merger profit efficiency of the combined firm for the second year has a negative effect on CARs. This is not predictable as profit efficiency improved in the second year for both 2002 and 2003 mergers against a decline for only the 2001 mergers. For some reason the market seems to base its prediction on the latter result. It will be noted, however, that the result id not statistically significant. CROSS has a positive effect on CARs which is not expected, and the result is statistically significant. SERIAL has the expected negative effect on CARs, and the result is also statistically significant. Finally, CONC has a positive effect on CARs which is statistically significant. These results may be interpreted along the same lines as it was done for similar variables in the foregoing discussions.

Table 10.6 Regression Results for CAR on Post-merger Profit Efficiency Year Three

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-2.8588	1.8865	-1.5154	0.1901
POSTPFT3EFF	-16.8142	0.7169	-23.4555	0.0000**
RSIZE	0.5953	1.0990	0.5416	0.6113
CROSS	2.2815	0.2566	8.8916	0.0003**
CASH	0.3287	0.5775	0.5691	0.5939
SERIAL	-1.3054	0.7289	-1.7908	0.1333
DIVPAY	0.0069	0.0148	0.4631	0.6628
CONC	4.9622	3.0871	1.6074	0.1689
R-squared	0.9168	Mean of Dependent Variable		1.1602
Adj. R-squared	0.6838	Std. Dev of Dependent Variable		2.2592
S.E. of regression	1.2705	Durbin- Watson Statistic		3.0997
F-statistic	3.9343	Prob. (F-statistic)		0.0693

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

Table 10.6 results show that post-merger profit efficiency of the combined firm for the third year after merger has a negative effect on CARs which is statistically significant. This result is not

predictable as profit efficiency improved in the third year for both the 2002 and 2003 mergers, while it declined for only the 2001 mergers. Again, the market seems to have preferred to base its prediction on the one-year decline coming earlier after merger, rather than the two-year gain realized later. CROSS has a positive effect on CARs which is statistically significant, and the result may be interpreted as it was done in the preceding paragraphs.

Three-Year Average Results

Tables 10.7 and 10.8 present results based on the averages of cost efficiency and profit efficiency over the three post-merger years considered. Since the sample being examined is so small, analysis using these averages may offer a better depiction of how the market predicts the future performance of merging firms.

Table 10.7 Regression Results for CAR on Average Post-merger Cost Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-8.1872	3.8409	-2.1316	0.0862*
POSTCOSAVGEFF	-25.8311	19.5376	-1.3221	0.2434
RSIZE	-0.9222	2.8673	-0.3216	0.7607
CROSS	2.3863	0.8663	2.7545	0.0401**
CASH	0.3415	1.1938	0.2860	0.7863
SERIAL	0.3194	0.6968	0.4597	0.6650
DIVPAY	-0.0041	0.0245	-0.1669	0.8740
CONC	12.0307	5.3074	2.2668	0.0727*
R-squared	0.7994	Mean of Dependent Variable		1.1602
Adj. R-squared	0.2379	Std. Dev of Dependent Variable		2.2592
S.E. of regression	1.9772	Durbin- Watson Statistic		2.8403
F-statistic	1.4236	Prob. (F-statistic)		0.3691

Note: **Significant at the 5% level; *Significant at the 10% level. Variables are as defined in Tables 6.

In Table 10.7, the results report that the three-year average of post-merger cost efficiency of the combined firm has a negative effect on CARs. This is a predictable result if the yearly results reported in Table 5 are considered. In those results, cost efficiency is shown to decline in all the three post-merger years for mergers that took place in 2001 and 2002. Cost efficiency also declines in the first two years following merger for the mergers that occurred in 2003, improving only in the third year. It is to be noted, however, that the results are not statistically significant. Both CROSS and CONC have a positive effect on CARs which is statistically significant. The results may be interpreted as done previously in the above discussions.

Table 10.8 Regression Results for CAR on Average Post-merger Profit Efficiency

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-2.8747	2.0384	-1.4103	0.2175
POSTPFTAVGEFF	-28.1494	8.7398	-3.2208	0.0234**
RSIZE	-0.0875	0.9585	-0.0913	0.9308
CROSS	4.1237	0.7415	5.5611	0.0026**
CASH	-1.4687	1.0137	-1.4489	0.2070
SERIAL	-0.3425	0.5038	-0.6799	0.5268
DIVPAY	-0.0039	0.0216	-0.1820	0.8627
CONC	5.7323	3.3585	1.7068	0.1486
R-squared	0.8524	Mean of Dependent Variable		1.1602
Adj. R-squared	0.4393	Std. Dev of Dependent Variable		2.2592
S.E. of regression	1.6918	Durbin- Watson Statistic		2.9076
F-statistic	2.0630	Prob. (F-statistic)		0.2179

Note: **Significant at the 5% level. Variables are as defined in Tables 6.

In Table 10.8, the three-year average of the post-merger efficiency of the combined firm is shown to have a negative effect on CARs. This result is unpredictable because, reading the results reported in Table 5, whereas profit efficiency declines for all the three post-merger years for mergers that took place in 2001, it improves in all the three years for the mergers that took place in 2002 and 2003. For some reason, the market seems to base its prediction on the performance of the 2001 mergers alone. It is to be noted that the result is also statistically significant. CROSS has a positive effect on CARs which is also statistically significant, and the result may be interpreted as done in previous discussions.

Summary of Results

$CAR_{-1,0}$ Results

The results presented in Tables 9.1-9.8 show that the market's perception of future profit efficiency influences its reaction to merger announcement more than its discernment of future cost efficiency. Second year profit efficiency is statistically significant at the 5% level, as well as average profit efficiency over the three years after merger, and both of them have a positive effect on CARs.

Ignoring their effect on CARs, whether positive or negative, all the control variables, except cash, are statistically significant at either 5% or 10% or both, indicating the market's recognition of their impact on post-merger performance. The SERIAL variable makes the most contribution to the market's perception of future performance, presumably acknowledging the serial acquirer's ability to use previous acquisition experience to ensure that post-merger goals are

attained. The market makes a similar evaluation of the CONC variable's importance, perhaps with an awareness of how bank concentration in the target's market can be exploited by the combined bank to achieve the desired post-merger performance. The other variables with significant results are CROSS (at 5% and 10%), RSIZE (at 5% and 10%), and DIVPAY (at 10%).

$CAR_{0,+1}$ Results

From Tables 10.1-10.8 it can be seen again that profit efficiency overshadows cost efficiency in the market's perception of the effect of future performance on value creation through CARs at the time of merger announcement. First year profit efficiency, with a positive effect on CARs, is statistically significant at the 5% level. Third year and three-year average efficiencies with a negative effect on CARs are also similarly statistically significant.

As for control variables, ignoring effect on CARs, whether positive or not, CROSS is the dominant variable, with seven out of eight results significant at the 5% level. Other variables with significant results are SERIAL (at 5%), CONC (at 5% and 10%) and CASH (at 5%).

5. Conclusion

This study has investigated the reaction of the market to merger announcements made with respect to 56 bank mergers that took place in Europe between 2001 and 2007. Cumulative abnormal returns (CARs) were analyzed for the bidder banks and reported for various windows within the event period. Using Stochastic Frontier Analysis, pre-merger cost and profit efficiencies of both bidder and target banks were also estimated, as well as post-merger efficiencies for the combined firm. Our aim was to examine whether bank efficiency is taken into account by the market in evaluating a proposed merger, which it does by adjusting the involved banks' stock prices on merger announcement.

Positive CARs that result from a merger announcement constitute value creation for the shareholders of the merging banks. On the other hand, negative CARs are value-destroying. This information is an early indication of mergers that can be expected to improve performance post-merger and those that may not, at least in the foreseeable future. It is important information for the shareholders, as well as for other stakeholders, including policy makers. If upon announcement a merger is perceived as value-destroying by the market and key stakeholders, it might end up not taking place. The primary purpose of the investigation carried out in this

paper, therefore, was to find out whether pre-merger bank efficiency has a contribution in value creation at the time of merger announcement. At the same time, since to the market past bank performance is important for evaluating the bank's likely future overall performance, the market's current valuation may also be used as an indication of future performance. In other words, if bank efficiency, for example, has a positive effect on CARs it will be a signal that the market foresees improved efficiency post-merger. If this is stretched further, it means that the market may be reacting to future bank efficiency simultaneously as it does with past efficiency. This analogy is consistent with the suggestion by the semi-strong form of the Efficient Market Hypothesis that in an efficient market a stock price is determined from all information including information not necessarily available to the public.

The main finding of the investigation is that pre-merger target cost efficiency has an important influence on how the market reacts to merger announcement and therefore on value creation for the bidders' shareholders. This is demonstrated by significant results that are obtained when CARs are regressed on the difference between peer cost efficiency and target cost efficiency, and when regressed on the difference between peer cost efficiency and the average of bidder cost efficiency plus target cost efficiency. Even with the analysis performed using CAR0, +1, which was carried out for comparison purposes, target cost efficiency demonstrates its importance by producing a significant result when its difference with peer cost efficiency is used in the regression. Bidder profit efficiency is also important as it yields a significant result when included in the regression alone or as difference between it and target profit efficiency.

What the results obtained in this paper suggest is that CARs are affected positively by the difference between target efficiency and either bidder or peer efficiency. These results are consistent with theory in that the potential for post-merger performance improvement lies in there being a difference in the efficiencies of the bidder and target or peers and the target. That potential exists also where the average of bidder efficiency plus target efficiency is less than peer efficiency. However, where target efficiency is too low compared to that of bidder or peers, the study finds that the market reacts negatively to merger announcement. Presumably, the market perceives a merger where that is the case as unlikely to lead to post-merger improvements for a while due the difficulty of raising a very low target efficiency to bidder or peer level.

The findings of this study are largely supportive of both theories of the Inefficient Market Hypothesis. As Kohers *et al*. (2000) point out, the first theory, the Relative Efficiency

Hypothesis, suggests that where an efficient firm takes over a less efficient institution, the bidder may carry out efficiency-enhancing changes that can raise the efficiency of that part of the new firm that was originally the target. The second theory, the Low Efficiency Hypothesis, applies where the target's efficiency is less than that of its peers, or both the target's and bidder's efficiencies are less than those of their peers. Theory suggests that in either case, potential for ex-post improvements exist, and that the larger the difference in efficiency the greater the post-event improvements that can be expected (Berger *et al.,* 1999). In the results reported above, all efficiency difference variables have a positive effect on CARs, some of them statistically significant, except for those involving target profit efficiency. As already pointed out, target profit efficiency was so low that the market might have considered it unlikely that desired improvements would be realized in the desired time after merger; hence the negative effect on CARs.

Post-merger efficiency results reported in Table 5 show that there is greater profit efficiency improvement than cost efficiency in the first three years after merger. This was to be expected since target profit efficiency having been so low pre-merger it offered the greatest potential for improvement, despite the market's skepticism as suggested in the preceding paragraph. It is to be noted, however, that the improvement was from a low figure of the combined firm to a higher low figure, without comparison with peers whose profit efficiency remained higher in that period. In the analysis of post-merger performance performed in this paper, the market seems to react more and positively to profit efficiency than to cost efficiency. Also, from the negative effect of SERIAL on CARs, the market seems to perceive serial acquirers as engaging in mergers in the interest of the management and not that of shareholders.

Overall, the results are consistent with the findings of the two previous studies that have done a similar investigation using US data (Kohers *et al*. 2000, Aggarwal *et al*., 2006). As mentioned earlier, this study uses European data and has examined the effect of bank efficiency on cumulative abnormal returns in more or less the same manner as the US studies.

REFERENCES

Aggarwal, R., Akhigbe, A., and McNulty, J. E. (2006) 'Are differences between acquiring bank profit efficiency priced in financial markets?' *Journal of Financial Services Research* 30 (3), 265-286.

Amel, D., Barnes, C., Panetta, F., and Salleo, C. (2004) 'Consolidation and efficiency in the financial sector: a review of the international evidence'. *Journal of Banking and Finance* 28 (10), 2493–2519.

Azofra, S. S., Olalla, M. G., and Olmo, B. T. (2008) 'Size, target performance and European bank mergers and acquisitions'. *American Journal of Business* 23 (1), 53-63.

Battese, G. E. and Coelli, T. J. (1995) 'A Model for technical inefficiency effects in a stochastic frontier production function for panel data'. *Empirical Economics* 20 (2), 325-332.

Beitel, P., Schiereck, D., and Wahrenburg, M. (2004) 'Explaining M&As Success in European Banks'. *European Financial Management* 10 (1), 109-139.

Beck, T., Demirgüç-Kunt, A., and Levine, R. (2000) 'A New Database on Financial Development and Structure'. *World Bank Economic Review* 14 (3), 597-605.

Berger, A. N., Demsetz, R. S., and Strahan, P. E., (1999) 'The consolidation of the financial services industry: Causes, consequences, and implications for the future'. *Journal of Banking and Finance* 23 (2–4), 135–194.

Berger, A. N. and Mester, L. J. (1997) 'Inside the Black Box: What explains the differences in the efficiencies of financial institutions?' *Journal of Banking and Finance* 21 (7), 895-947.

Campa J. M. and Hernando, I. (2006) 'M&A performance in the European financial industry'. *Journal of Banking and Finance* 30 (12), 3367–3392.

Chronopoulos, D. K., Girardone, C., and Nankervis, J. C. (2010) 'Post-merger bank efficiency and stock market reaction: the case of the US versus Europe'. in *New Issues in Financial Institutions Management*. ed. by Fiordelisi, F., Molyneux, P., and Previati, D. Eastbourne: Palgrave Macmillan.

Cybo-Ottone, A. and Murgia, M. (2000) 'Mergers and shareholder wealth in European banking'. *Journal of Banking and Finance* 24 (6), 831–859.

DeLong, G. L. and DeYoung, R. (2007) 'Learning by observing: Information spillovers in the execution and valuation of commercial bank M&As'. *Journal of Finance* 62 (1), 181–216.

DeYoung, R., Evanoff, D. D., and Molyneux, P. (2009) 'Mergers and Acquisitions of Financial Institutions: A Review of the Post-2000 Literature'. *Journal of Financial Services Research* 36 (2-3), 87-110.

Hagendorff, J. and Keasey, K. (2009) 'Post-merger strategy and performance: evidence from the US and European banking industries'. *Accounting and Finance* 49 (4), 725-751.

Huizinga, H. P., Nelissen, J. H. M., and Vander Vennet, R. (2001) 'Efficiency effects of bank mergers and acquisitions in Europe', Ghent University. Working Paper No. 106.

Kohers, T., Huang, M. and Kohers, N. (2000), 'Market perceptions of efficiency in bank holding company mergers: The roles of the DEA and SFA models in capturing merger potential'. *Review of Financial Economics* 9 (2), 101-120.

Resti, A. (1998) 'Can Mergers Foster Efficiency? The Italian Case'. *Journal of Economics and Business* 50 (2), 157-169.

Rhoades, S. A. (1998) 'The efficiency effects of bank mergers: an overview of case studies of nine mergers'. *Journal of Banking and Finance* 22 (3), 273–291.

Sealey, C. and Lindley, J. T. (1977) 'Inputs, outputs and a theory of production and cost at depository financial institutions'. *Journal of Finance* 32 (4), 1251-1266.

Vander Vennet, R. (1996) 'The effect of mergers and acquisition on the efficiency and profitability of EC credit institutions'. *Journal of Banking and Finance* 20 (9), 1531-1558.

Urio, H. and Tanna, S (2012) 'Consolidation and Performance in the European Banking Industry: A survey', Chapter 1 in M. Fethi et al (ed), *Financial Services: Efficiency and Risk Management*, Nova Science Publishers, p. 1-40.