

FRENCH BANK MERGERS AND ACQUISITIONS PERFORMANCE

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Abstract

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In this paper, we empirically investigate the impact of mergers and acquisitions on French bank performance. Performance is measured by potential gains in efficiency and value creation. We first analyzed efficiency using the data envelopment analysis (DEA) under input oriented with variable returns to scale to obtain the efficiency scores. Second, we analyzed the impact on French bank value creation following mergers-acquisitions operations of a set of control variables (model 1) and explicative variables measuring strategic similarities between bidders and targets (model 2). The sample studied is composed of French bank mergers-acquisitions happening between 1996 and 2006 and implying one of the 14 greatest French banking groups. Empirical result showed that mergers and acquisitions have been traduced by an improvement in the overall efficiency by 17.82% and a shareholder value reduction by 5.14%.

Keywords: Bank, Mergers-Acquisitions, Efficiency, Value Creation

1. INTRODUCTION

On the last decade, banking sectors worldwide have experienced a restructuration process. The main causes for this unprecedented process are the globalization, deregulation and technological advancement (Ismail and Davidson, 2007; De Young et al., 2009). Such reasons led to accentuate the competition among banks from now searching to cut costs and enhance revenues by expanding size via mergers and acquisitions. Competition has then forced banks to focus on their performance in providing financial services to meet the increasing demand. This requires an assessment of performance in banks which reflects their ability to survive the ongoing wave of mergers and acquisitions. This assessment has important public policy implications since the banking industry is a vital part of any national financial system. Such importance is reflected in the considerable number of studies analyzing the impact of bank mergers and acquisitions on performance.

In terms of methodology, most of studies analyzing the effect of bank mergers and on performance tend to follow two major approaches. The first analyzes the impact of mergers-acquisitions on bank efficiency and the second try to ascertain whether the announcement of a bank merger creates shareholder value.

Bank efficiency is defined as a bank's cost level compared with that of a "best-practices" bank of

similar size, controlled for the type of banking activity and the input prices it faces. Two components of efficiency can be distinguished: technical efficiency, the ability to obtain maximum output from a given set of inputs, and allocative efficiency, the skill to use the inputs in optimal proportions, given their respective prices and the production technology. (Allen and Liu, 2005).

Mergers and acquisitions could allow banks to obtain efficiency gains through cost reductions, revenue increases, and exchange of best practices and/or risk diversification. Cost reductions result from an improved organization of banking production, a better scale and/or a better combination of production factors. The core objective is to extract benefits from cost complementarities and economies of scale and scope. Revenue increases also derive from a better combination of production factors. Improvements in the organization of activities, however, offer benefits from product complementarities which help to enhance revenues (Ayadi and Georges, 2005).

The issue of the impact of bank mergers and acquisitions on efficiency has been well studied in the literature (Focarelli et al, 2002; Campa and Hernando, 2006; Altunbas and Marqués, 2008; Sufian and Habibullah, 2009). To measure the efficiency, two main techniques are commonly used: parametric and non-parametric. Parametric technique includes three major approaches namely the Stochastic Frontier Approach (SFA), the

Distribution Free Approach (DFA), and the Thick Frontier Approach (TFA). Non-parametric technique includes Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH). While both techniques require the specification of a cost or production function or frontier, the former involves the specification and econometric estimation of a statistical or parametric frontier, the later provides a piecewise linear frontier by enveloping the observed data points. The DEA method has been widely preferred in particular if the sample size is small. However, the empirical evidence on the subject is generally ambiguous (Berger and Humphrey, 1992; Rhoades, 1993; Vennet, 1996; Berger, 1998).

The traditional argument that mergers and acquisitions increase shareholder value is based on the assumption that the anticipated value of the entity created by the merger of two groups will exceed, in terms of potential wealth creation, the sum of the respective values of the two separate groups. The strengthening of the shareholders' role, the increasing importance of institutional investors in banking capital (pension funds, mutual funds, private equity and hedge funds), the pressure of value creation have encouraged managers to orient their business objectives towards value-maximization (Ayadi et al, 2013). Indeed, the value creation is the objective of all enterprises wanting to satisfy the present investors and to give a good signal to the potential investors for the good management. So, the enterprise that doesn't communicate on the value creation risks to disappoint financial markets and to have therefore some negative consequences on its stock value. Thus, the value creation is considered among good indicators of enterprise performance.

In this paper, we will study the impact of French bank mergers and acquisitions on efficiency and shareholder value creation. So, our article will be organized as follows:

The first section will present main studies in these subjects. The second will present methodologies used, the third will analyze empirical results and the fourth will conclude.

2. LITERATURE REVIEW

2.1. Bank mergers and acquisitions and efficiency

Two different research methods are usually used in evaluating the success of consolidation transactions. The first is the operational performance approach including studies dealing with the link between mergers and involved banks productive efficiency, either measured through accounting data or cost and profit function estimation. The second includes studies dealing with the impact of merger announcements on the price of publicly listed banks. The former is the most used in bank merger studies.

Earlier evidence of cost efficiency associated with mergers-acquisitions in the U.S. banking industry in the 1980s proved to be insignificant and that the average cost curve had a relatively flat U-shape with medium sized banks being slightly more cost scale efficient than either large or small banks (Berger and Humphrey, 1992; Rhoades, 1993; De Young, 1997). Average costs were usually found to be minimized between about \$100 million and \$10 billion in assets (Berger et al., 1987; Noulas et al.,

1999). However, studies in the 1990s have shown mixed results. Mergers and acquisitions in the 1980s and 1990s did result in the improvement in profit efficiency (Akhavain et al., 1997; Berger, 1998). In addition, results showed that mergers-acquisitions help to improve profitability, not by improvement in efficiency, but rather by a change in the output mix in favor of more loans and fewer securities holdings, (Berger, 2003).

More recently, Mehdian et al. (2007) studied a sample of 131 small and 131 large banks in the USA between 1990 and 2003. The study used descriptive statistics and non-parametric tests. Statistical evidence shows that large banks are generally more efficient than small banks for most efficiency indices. The results suggest that the mergers did not seem to enhance the productive efficiency of banks as they do not indicate any significant difference.

Concerning European studies, results have been mixed. French studies have shown little variation in cost and profit efficiency scores in function of bank size (Burkart et al., 1999). Empirical results concluded in the absence of any size effect on cost and profit efficiency. Resti (1998) and Haynes and Thompson (1999) concluded that mergers and acquisitions allowed Italian and British banks to enhance efficiency. The same result has been found by Focarelli et al., (2002) for Italian banks. The efficiency has been enhanced following the decrease in bad loans. For most of cases, authors concluded for an enhancement of the profitability following the merger. This enhancement is due to the more efficient use of capital. Labor market rigidity in Europe reduces the capacity of cost reduction, notably in case of horizontal domestic mergers and acquisitions. Results are mixed too in German bank market. While some studies have concluded in a cost efficiency of 80% (Altunbas et al., 1997 and 2001), Lang and Welzel (1999) have concluded in the absence of any efficiency gain following studying mergers of 283 cooperative banks. Studies of Greece bank sector started with Noulas (1999) and their results were mixed too. Pasiouras and Sifodaskalakis (2007) used Malmquist index to examine cooperative banks productivity between 2000 and 2005. Authors estimated two models whose one is based on intermediary approach and other on production approach. While the former concluded in little total factor productivity diminution of 3%, the latter concluded in an enhancement of 66%. Mertens and Urga (2001) studied Ukraine commercial bank efficiency. They concluded that small banks were more efficient in terms of cost, but less efficient in terms of profit and that big banks present significant scale diseconomies. Same results were concluded by Hasan and Marton (2003) following a study of Hungarian bank sector. These scale diseconomies were found by Isik and Hassan (2002) in a study of Turkish bank cost and profit efficiency. Foreign and private banks were more efficient.

Liu and Tripe (2002) employed accounting ratios and two DEA models to explore the efficiency of 6 bank mergers in New Zealand between 1989 and 1998. They found that the acquiring banks tend to be generally larger than their targets, although they were not consistently more efficient. They found that five of the six merged banks had efficiency gains based on the financial ratios while another only achieved a slight improvement in operating

expenses to average total income. Based on the DEA analysis, they found that only some banks were more efficient than the target banks pre-merger. The results suggest that four banks had obvious efficiency gains post-merger. However, they could not decisively conclude on possible benefits of the mergers on public benefits.

Using DEA with three inputs and two outputs, Chu and Lim (1998) evaluated the relative cost and profit efficiency of a panel of six Singapore listed banks during the period 1992 - 1996. They found that during the period the six Singapore listed banks have exhibit higher overall efficiency of 95.3% compared to profit efficiency of 82.6%. They also found that large Singapore banks have reported higher efficiency of 99.0% compared to the 92.0% for the small banks. They also suggest that scale inefficiency dominates pure technical inefficiency during the period of study. Rezvanian and Mehdiian (2002) employed both the translog cost function and a nonparametric approach to examine the production performance and cost structure of a sample of 10 fully licensed Singaporean commercial banks during the period 1991 to 1997. They found that the average cost curve is U-shaped for these banks and there are economies of scale for banks of small and medium size. However, authors found economies of scope in all banks regardless of size. Hence, the joint production of outputs is less costly than producing each output separately. The results from the non-parametric analysis suggested that the Singapore banking groups could have produced the same amount of outputs by employing only 57% of the inputs it uses. Their findings suggested then that banks' cost inefficiency was caused almost equally by allocative and technical inefficiencies. Randhawa and Lim (2005) found that the seven domestic incorporated Singapore banks have exhibit an average overall efficiency score of 80.4% under the intermediation approach and 97.2% under the production approach. They also suggest that pre technical inefficiency dominates scale inefficiency under both approaches during the period of study.

Sufian and Habibullah (2009) studied efficiency of a sample of 22 banks in Malaysia between 1997 and 2003. The analysis consists of two stages. The first used the Data Envelopment Approach to calculate the technical, pure technical and scale efficiency of individual banks. The second used a series of parametric and nonparametric tests to examine changes in the efficiency of the Malaysian banking sector during the pre and post periods. The result suggests that, although was popular, perceived by the market as impractical and controversial, the merger program among Malaysia was driven by economic reasons.

Kaur and Kaur (2010) studied public and private bank mergers accruing in India between 1991 and 2008. The study used non parametric Data Envelopment Analysis. The result suggests that to same extent merger program has been successful in the Indian banking industry.

2.2. Bank mergers and acquisitions and value creation

Concerning the United States, studies of 1980 years showed that the bank mergers are traduced by a negative effect for bidders, meaningfully positive

for targets and hopeless for the new group constituted following the transaction. Studies of 1990 years showed that the effect on the target is meaningfully positive (Hawawini and Swary, 1990; Houston and Ryngaert, 1994; Madura and Wiant, 1994; Hudgins and Seifert, 1996). Results for bidders don't seem to be clear: most studies showed some weak effects on the value (Hawawini and Swary, 1990; Houston and Ryngaert, 1994; Madura and Wiant, 1994) or didn't find any effects (Hudgins and Seifert, 1996).

In a survey on the financial globalization and the transnational fusions, Shepherd et al. (2000) tested the hypothesis of the domestic advantage and the hypothesis of the total advantage. They concluded that, in some countries, it appears that the domestic banks stay to detain an advantage resulting in a profit and an efficiency cost more elevated on the foreign banks. In the same year, Becher (2000) examined effects of valorization of 558 American bank mergers on the period 1980-1997. His results indicated that these operations create wealth. On average, on an event window of 36 days (-30, +5), targets won more that 22%, bidders achieved neither gain nor loss and the whole group won 3%. Results also showed that mergers of 90 years had some positive effects. In these years, targets won meaningfully, bidders won more than those of the 80 years and the combined groups won meaningfully. In 2003, Cornett et al. found an abnormal return meaningfully negative for the transfrontier operations but not for the national operations for bidders in a set of 423 American bank acquisitions on the period 1988-1995.

In Europe, Cybbo-Ottone and Murgia (1996) studied 26 mergers-acquisitions achieved between financial institutions between 1988 and 1995 in 13 European markets. They found that the average abnormal returns of targets are positive and those of bidders are essentially hopeless, demonstrating a transfer of wealth from bidders to targets. In 2000, these two authors studied a sample of 54 mergers-acquisitions from 1988 to 1997 and found meaningfully effects to the combined group at the date of the transaction announcement.

Tourani and Van Beek (1999) examined the transfrontier consolidation operations in the European banking sector in terms of their effects on the wealth of shareholders. They found that shareholders of target banks showed some positive and meaningful abnormal returns, whereas the abnormal returns of bidder banks shareholders were not meaningful. More again, results supposed that returns of bidder banks shareholders are positive when the bidder is bigger and more efficient. The transfrontier mergers were not more effective than the domestic mergers.

Beitel and Schiereck (2001) examined effects on the value of 98 big domestic and transfrontier mergers-acquisitions of European bidder banks. Authors found that shareholders of targets received a considerable and meaningfully positive revalorization of their actions. Effects on bidders were, for most banks, not meaningful. In 2004, these authors studied 98 European mergers-acquisitions between 1987 and 2000. Their results showed that the transnational transactions appeared to increase the accumulated abnormal returns of the target banks whereas bidders created

the value in the domestic transactions. For the combined entity, the geography is not an important factor of value creation.

Concerning studies analyzing the strategic similarity impact on bank mergers-acquisitions value creation, Harrison et al. (1991) concluded that for mergers and acquisitions in the US in the 70's and 80's dissimilarities in resource allocation may provide unique and valuable synergy and thus increase performance.

Ramaswamy (1997) concluded that strategic similarities in the US banking industry in the 80s had positive influence on post-M&A performance.

A similar study was conducted for mergers and acquisitions in the EU in the 90's where it was found that dissimilarities in some resource allocations have positive effect on performance whilst for other resource allocations similarities increase performance (Ritterfeldt and Trygg, 2008). Differences in those two researches could be explained by different time periods or different corporate governance systems between the US and EU. The 70s and the 80s can be considered as a rather conservative time in M&A activity whilst during the 90s an M&A wave was peaking, especially in certain industries like banking, health care and technology (University of Torino, 2012).

Altunbas and Marqués (2008) based their research on Ramaswamy's model to examine the strategic similarity impact on mergers-acquisitions performance of 262 banks of the European Union. 207 transactions were domestic and 55 transfrontier. The performance has been measured by the value creation (ROE).

Their results were more in line with those of Ritterfeldt and Trygg (2008). On average, the bank mergers resulted in an improved performance, and that, for the domestic transactions, the consolidation of banks with different strategies in terms of credit, deposits and cost can be very expensive. For the transfrontier transactions, differences between merged banks in terms of strategies of credits and credit risk can lead in a more improved performance whereas the differences in terms of capital structure and cost have a negative impact on the performance.

3. METHODOLOGY

3.1. Efficiency

To study efficiency effects of bank mergers and acquisitions, the DEA is the used technique. Before estimating model, we must define inputs and outputs. In fact, efficiency measure follows two different orientations such the input orientation and the output orientation. To determine what constitutes inputs and outputs of banks, we should first decide on the nature of banking technology. In the banking theory literature, there are two main approaches competing with each other in this regard: the production and intermediation approaches (Sealey and Lindley, 1977). Under the production approach, a financial institution is defined as a producer of services for account holders, that is, they perform transactions on deposit accounts and process documents such as loans. Hence, for this approach, the output is well measured by the number of accounts or their

related transactions. The inputs considered are the number of employees and physical capital. Sherman and Gold (1985), Ferrier and Lovell (1990), and Fried et al., (1993) followed this approach. Under the intermediation

approach, financial intermediaries are institutions that convert and transfer financial assets between units with surplus and units with deficit. According to this approach, the output is defined as the value of deposits and loans. Inputs include labour, fixed assets and equipment and loanable funds. Charnes et al., (1990) and Sathye (2001) adopted intermediation approach. To measure bank efficiency, this study uses the intermediation approach such it has been found to be more relevant for financial institutions as it is inclusive of interest expenses which often account for one-half to two-thirds of total costs (Berger and Humphrey, 1997). Therefore, banks can be seen as intermediating funds between savers and investors. In this case, funds and interest expenses they generate can be seen as a main input variable. The inputs are capital (operational expenses net of personnel expenses) and labor (personnel expenses) and purchased funds (X3). The outputs are classified into four groups, such real estate loans (Y1), commercial and industrial loans (Y2), consumer loans (Y3) and all other loans (Y4). This selection of inputs and outputs follows the study of Aly et al., (1990). In this study, we will use the DEA approach under intermediation approach, in the case of input orientation and under variable returns to scale. The linear program will be specified as follows:

$$\begin{aligned} \text{Min } \theta \\ \text{S/C : } -y_1 + \sum_j \lambda_j y_j &= 0 \\ \theta x_1 - \sum_j \lambda_j x_j &= 0 \\ \sum_j \lambda_j &= 1 \\ \lambda_j &\geq 0 \end{aligned} \quad (1)$$

Where θ : Efficiency score

y_j : Quantities of outputs of the bank of which we measure efficiency

y_j : Quantities of outputs of the « j » bank (bank of reference)

x_j : Quantities of inputs of the bank of which we measure efficiency

x_j : Quantities of inputs of the "j" bank (bank of reference)

λ_j : Weighted coefficients

3.2. Value creation

To study the impact of mergers and acquisitions on bank value creation, we build on the model suggested by Ramaswamy (1997) analyzing the impact of mergers-acquisitions in the American banking sector on performance depending on the strategic similarities between targets and bidders. We relate changes in performance following merger to a set of controlling (model 1) and strategic variables (model 2).

The concept of strategic similarity used in this paper assumes that the major aspects of an organization's strategic direction can be seen in the resource allocation decisions that its management makes. Hence it is considered that if two firms show similar resource allocation patterns, measured from their balance-sheet data, across a variety of

strategically relevant characteristics, they could be broadly considered strategically similar (Harrison et al., 1991). The strategic similarity of merged banks is measured by an indicator including the financial features for each strategic variable and each merger:

$$SI_{i,k} = \sqrt{(X_{B,I,K} - X_{T,I,K})^2} \quad (2)$$

Where: $SI_{i,k}$: The similarity index for the k_{th} variable for the i_{th} merger

$X_{B,I,K}$ and $X_{T,I,K}$: The scores of the bidder and the target for the k_{th} variable respectively).

Harrison et al. (1991) suggest that dissimilarities between the acquiring company and the target company allows the companies to learn from each other and therefore create greater synergies and better performance compared to similarities.

To define the strategic similarities of banks involved in mergers and acquisitions in France, we use a variety of financial indicators, such as liquidity, efficiency, capitalization, asset and liability composition, risk exposure, diversity earnings, off-balance sheet activities and other expenses. We are going to use two controlling variables of control (X_{ij}), which are the relative size (RSIZE) and the ex-ante performance of the bidder (BID-ROE).

The dependent variable in our model is the variation of value creation (ΔROE) measured by the difference between the average of ROE of banks merged three years after the fusion and the one of

three years before the fusion (See table 1. So, the model to estimate is the next one:

$$\sum_{i=1}^{10} \Delta ROE_i = \sum_{i=1}^{10} \sum_{j=1}^9 X_{i,j} + \sum_{i=1}^{10} \sum_{j=1}^9 SI_{i,k} \quad (3)$$

The level of the bidder's pre-merger performance (BID-ROE), measured as its return on capital, can influence post-merger performance of the combined entity (ΔROE). If a bidder creates value before the merger, it is more likely that the value of the new institution will be destructed in the short term due to the merger process. Alternatively, bidder with a lower level of performance will manage to create value after the consolidation operation. As a consequence, a negative relationship between bidder's pre-merger value creation and ΔROE is expected (Vennet and Gropp, 2003).

The influence of the relative size of target and bidder (RSIZE) and performance (ΔROE) is an ambiguous (Amaro de Matos, 2001) and depends on whether the operation in domestic or cross-border. The smaller the size of the targets compared to the bidders (i.e. the lower is the RSIZE ratio), the easier the integration can realize cost savings opportunities. For that reason, a negative relationship between the relative size (RSIZE) and performance (ΔROE) is expected, particularly in the case of domestic mergers in which cost improvement has traditionally been a major driving force for consolidation.

Table 1. Definition of control and strategic variables

Definition	Symbol	Formula
Dependent Variable Value creation	ΔROE	Weighted Return on equity (post-merger) - weighted return on equity (premerger)
Control Variables Bidder performance Relative size	BID-ROE RSIZE	Return on equity of the bidder (pre-merger) Total assets of target/Total assets of bidder
Strategic Variables Liquidity Efficiency Capitalization Loan to assets Credit risk Diversity earnings Off-balance sheet activities Loans to deposits Other expenses	LIQ COST/INC CA/TA LOAN/TA BADL/NET INT INC OOR/TA OBS/TA LOANS/DEP TECH	Liquid assets/Total deposits Total cost/ Total revenues Total capital/ Total assets Loans/Total assets Loan loss provision/Net interest revenues Other operational revenues/ total assets Off-balance-sheet items/ total assets Customer loans/ Customer deposits Other expenses/ Total assets

However, in the case of cross-border mergers, the goal of the bidders cannot be the rapid cost economies achievements, but the other benefits derived from synergies with firms abroad. As a consequence, for cross-border mergers, a positive relationship between RSIZE and ΔROE is anticipated: the larger the target compared to the bidders (in other words, the higher the RSIZE ratio) the better is expected to be a firm's performance.

The liquidity risk strategy is measured by the ratio of liquid assets to customer and short-term funding (LIQ). Since the maintenance of an important liquidity ratio is expensive, the different strategies of liquidity management can imply that merged bank can improve its management of

liquidity following the merger and realize thus a better performance.

The relation between the value creation (ΔROE) and efficiency (COST/INC) is supposed to be negative. In fact, a bank competing on the basis of low-cost and operating efficiency is expected to benefit from merging with another bank with similar competencies (Bollenbacher, 1995), as a result of economies of scale and scope deriving from combination of similar skills. However, when banks characterized by different cost controlling strategies merge, they may realize a worse performance (Altunbas et al., 1997).

The level of adequacy of the capital is measured by the ratio equity on total assets

(CA/TA). This ratio shows banks' strategy regarding their capital structure. The effect of the change of this ratio on the creation of value depends on the theory of the banking firm. According to the signaling hypothesis, commercial banks specialize in lending information to problematic borrowers (Berger et al., 1995). Since bank managers usually have a stake in the capital of the bank, it will prove less costly for a good bank to signal better quality through increased capital than for a bad bank. Therefore, banks can signal favorable information by merging with banks with larger capital ratio suggesting a positive relationship between capital structure differences and performance (Berger, 1995). Alternatively, Ross (1977) argues that of weaker capital ratios signal positive information, since the signaling of the good quality through a big indebtedness can be less expensive for a "good" bank than for a "bad" bank.

The ratio Net loans on total assets (NL/TA) takes into account the prominence of loans in terms of its weight on the overall portfolio. In general, it can be argued that when banks with very different asset quality and overall portfolio strategies merge, value destruction may be expected. Since the scale returns and the cost integration is an essential goal of a great number of domestic mergers, conflicts arising from managerial disparities on critical decisions, such as asset quality or the overall portfolio strategy, may be an obstacle to creating such synergies. Then, the greater the difference among merged bank strategies, the lower the performance after merging is initially expected to be. The opposite may happen in cross-border mergers as one of the goals of these operations may be to improve revenues derived from including new portfolio strategies or reduce the risk profile of one of the merging partners (Demsetz and Strahan, 1997).

The strategy followed by the bank regarding its asset quality profile is measured as the level of loan loss provisions divided by interest revenues. Earning diversification strategy referred to the emphasis on other sources of income deriving from potential new revenues, diversification and access to financial innovation possibilities from producing new products and services. Maximization of non-interest revenue as a general strategy is measured by the ratio of other operational revenue to total assets (OOR/TA). Differences in other operational revenue to total assets may enhance the value creation following merger. So a positive relation is expected between this ratio and the value creation.

The off-balance-sheet activities are measured as the ratio of off-balance-sheet activity to total assets (OBS/TA). Dissimilarities in off-balance-sheet activities are expected to enhance post-merger

performance (Δ ROE) as they could help spreading access to financial innovation and new sources of revenues (Gande et al., 1997). This positive relationship is expected to be particularly strong in the case of domestic mergers where homogeneity among merging entities tends to be higher and the difficulties associated with the integration of the new products are normally lower than in the case of cross-border mergers (Harrison et al., 1991). The total loans to total customer deposits ratio (L/D) provides a proxy for the use of relatively low-cost deposits in relation to the amount of loans. Finally, banks' strategy in terms of technology and innovation is measured as other expenses as a proportion of total assets used for investment in technology and innovation (TECH). Dissimilarities in investments in technology among bidders and targets are expected to produce better performance as each of the merging partners may benefit from returns to scale and scope derived from the investments made by their merging counterpart. However, these differences may lead to a drop in performance in the case of cross-border mergers, due to the risk of incompatibility among technologies across borders (Harrison and 1993).

4. EMPIRICAL FINDINGS

4.1. Efficiency

Descriptive statistics of different variables (inputs and outputs) used in the DEA model on the pre- and post-merger periods are presented in tables 2 and 3. Such statistics concerned the variable average and median, minimal, maximal, Skewness and Kurtosis values. Comparison of different variable values indicates that all of the outputs (Y1, Y2, Y3, and Y4) have enhanced a lot their averages following mergers-acquisitions operations by 102.934%, 380.637%, 665.234% and 210.903%, respectively. This great improvement is enforced by an improvement of median values by 3.4%, 40.016%, 86.735% and 40.388%, respectively. Maximal values of all the outputs have enhanced while the three first output minimal values have diminished and those of the fourth has enhanced by 36.363%. The comparison indicates also that labor (X1), capital (X2) and purchased funds (X3) have all enhanced their average values by 42.24%, 180.71% and 425.12%, respectively. This enhancement is enforced by an improvement of their medians by respectively 5.5%, 20.48% and 9.64%. For minimal values, the mergers and acquisitions impact was benefic for X1 which have enhanced by 7.81%. For X2 and X3, values have diminished.

Table 2. Descriptive statistics of DEA model variables (inputs and outputs) in pre-merger period (in m€)

<i>Variables</i>	<i>Average</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Standard Deviation</i>	<i>Skewness</i>	<i>Kurtosis</i>
Outputs							
Y1	5337.311	2368	72.000	53470	10070.21	3.285	14.199
Y2	73229.24	19618	68.000	686935	163504.5	3.265	12.139
Y3	274366.6	49784	314.000	28427290	659702.2	3.244	12.209
Y4	148061.1	23748	11.000	2796280	452627.9	4.814	27.621
Inputs							
X1	30684.44	26578	2355.000	109780	25032.85	1.315	4.775
X2	21467.84	26578	2400.000	145282	26352.39	2.673	12.301
X3	525624.1	177965	2236.000	5521348	1180189.	3.234	12.422

Table 3. Descriptive statistics of DEA model variables (inputs and outputs) in post-merger period (in m€)

<i>Variables</i>	<i>Average</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Standard Deviation</i>	<i>Skewness</i>	<i>Kurtosis</i>
Outputs							
Y1	10831.24	2248.500	19.000	73246.00	18923.70	2.047	5.895
Y2	351966.6	27468.50	7.000	4447710	1081690.	3.323	12.145
Y3	2099548.	92964.50	194.000	29407469	7246261.	3.337	12.172
Y4	460327.3	33339.50	15.000	6750569	1387553.	3.522	14.371
Inputs							
X1	43646.31	28053.00	2539.000	201700.0	45599.10	1.926	6.597
X2	60263.60	32023.50	27.000	334197.0	84146.93	2.138	6.94
X3	2760157.	195135.0	15.000	38185913	9173961	3.346	12.266

For maximal values, the impact for maximal values was totally benefic such as it was traduced by an enhancement for all the inputs. This enhancement was the most clear for the third input (501.60%).

Then, all of the observations were not been equitably retorted, although a coefficient value diminution for Y1, Y4, X1 and X2 and an improvement of this value for Y2, Y3 and X3 following consolidation operations. Kurtosis coefficient was been higher than 3 for the pre- and post-merger periods, indicating the presence of thick tails. Hence, values move away a lot from the average. The variables were been leptokurtic. This coefficient have diminished for Y1, Y3, Y4, X2 and X3 and enhanced for Y2 and X1 in comparison with the pre-merger period.

These operations were benefic for bank merged financial resources enforcement. It was less benefic for resources in terms of labor (83.73%) and capital (130.03%). Skewness coefficient has been higher than 1 for all inputs and outputs on the pre-and post-merger periods. This indicates the satisfying symmetry absence.

Empirical results of estimated model state also that, on the year before the consolidation deals, Caisses d'Épargne, CFF, Sovac, Crédit Mutuel and CIC were been efficient. BNP Paribas was been inefficient. Hence, six banks of eighteen were been efficient. Banques Populaires realized the worst efficiency score.

Observation of empirical results shows also that, on the post-merger period (table 3), French banks have, in average, enhanced their total efficiency by 17.82% to realize an efficiency score of 70.67%. This enhancement is due to an improvement in the technical efficiency of 13.63% and in the allocative efficiency of 9.22%. Although this

improvement, French banks remained, in average, inefficient. Hence, the operations of mergers and acquisitions have been traduced by a little enhancement of the bank cost efficiency. These results supported those found by the most of American studies (Peristiani, 1997; Rhoades, 1998; Berger, 1998), by Burkart et al., (1999) following a study of French bank sector, by Athanasoglou and Brissimis (2004) following a study of Greece bank sector, by Sufian and AbdulMajid (2007) employing DEA approach and some financial ratios and studying Singaporean sector. While financial ratio results concluded that mergers were not traduced in a more high profitability and that this can be attributed to engaged high costs, mergers were traduced by a high average total efficiency. These results are contradictory with those found by Vennet and Gropp (2003) following a study of 52 European horizontal mergers happened between 1994 and 1998 and by Isik and Hassan (2002) estimating Turkish cost and profit efficiency. Empirical result analysis shows also that, on the first year of post-merger period, only three banks were totally efficient. These banks are Caisses d'Épargne, CFF and Sovac. Hence, these banks succeeded in keeping their overall efficiencies for the first year ex-post. This year were characterized by deterioration of efficiency scores of Crédit Mutuel and CIC which came inefficient.

We assist too in creation of a recent bank group named from now on BNP Paribas, resulting from the merger in 1999 between Paribas by BNP. This group realized an efficiency score of 61.8%. This inefficiency can be attributed at most equally to technical efficiency (78.2%) and allocative inefficiency (79.1%). Hence, this acquisition didn't succeed in creation of an overall efficient entity.

Table 4. Pre-merger efficiency scores of French banks (in percentage)

Banks	First year			Second year			Third year		
	T.E	A.E	C.E	T.E	A.E	C.E	T.E	A.E	C.E
Crédit Agricole	79.1	72.6	57.4	71.2	69.5	49.5	52.8	72.5	38.3
Crédit Lyonnais	35.2	59.4	20.9	30.5	69.6	21.3	73.4	87.2	64.0
Caisses d'épargne	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
CFF	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BNP	87.7	93.5	81.9	73.8	85.7	63.3	26.0	72.2	18.8
Paribas	57.3	53.9	30.9	51.0	52.6	26.8	45.7	53.8	24.6
Société Générale	47.5	84.3	40.0	47.3	83.9	39.7	58.0	84.9	49.3
Crédit du Nord	77.7	43.9	34.1	79.3	43.6	34.6	82.7	43.5	36.0
Crédit Mutuel	100.0	100.0	100.0	100.0	81.1	81.1	100.0	100.0	100.0
CIC	70.2	94.9	66.6	68.1	91.7	62.5	100.0	100.0	100.0
Banques Populaires	23.4	65.2	15.3	21.7	52.4	11.4	20.0	51.0	10.2
Natexis	100.0	53.7	53.7	100.0	43.1	43.1	90.2	38.7	34.9
Banque Worms	58.4	67.1	39.2	57.8	67.2	38.8	55.0	64.1	35.3
Sovac	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BNP Paribas	100.0	99.0	99.0	100.0	100.0	100.0	53.1	88.6	47.0

T.E= Technical efficiency; A.E= Allocative efficiency; C.E= Cost efficiency = T.E*A.E

Table 5. Post-merger efficiency scores of French banks (in percentage)

Banks	First year			Second year			Third year		
	T.E	A.T	C.E	T.E	A.E	C.E	T.E	A.E	C.E
Crédit Agricole	50.2	76.5	38.4	100.0	100.0	100.0	100.0	89.8	89.8
Crédit Lyonnais	62.5	92.7	58.4	100.0	100.0	100.0	74.0	88.5	65.5
Caisses d'épargne	100.0	100.0	100.0	100.0	98.6	98.6	100.0	100.0	100.0
CFF	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BNP Paribas	78.2	79.1	61.8	84.7	79.7	67.5	83.4	80.7	67.3
Société Générale	70.1	76.8	53.8	64.2	73.2	47.0	67.9	60.9	41.3
Crédit du Nord	100.0	54.7	54.7	100.0	100.0	100.0	100.0	100.0	100.0
Crédit Mutuel	57.7	72.7	41.9	53.4	82.1	43.8	57.8	81.1	46.8
CIC	62.9	62.9	58.2	57.7	82.2	47.5	56.0	78.6	44.0
Banques Populaires	43.5	78.4	34.1	38.9	80.9	31.4	44.0	84.3	37.1
Natexis	100.0	65.5	65.5	100.0	66.0	66.0	100.0	83.5	83.5
Banque Worms	71.6	69.9	50.0	85.0	81.0	68.8	100.0	100.0	100.0
Sovac	100.0	100.0	100.0	83.0	90.9	75.4	90.2	88.2	79.6
BNP Paribas (acq)	91.9	97.1	89.2	100.0	100.0	100.0	97.3	63.5	61.8

T.E= Technical efficiency; A.E= Allocative efficiency; C.E= Cost efficiency= ET*EA

Crédit du Nord became technically efficient with an improvement in its overall efficiency coming 54.7%. This inefficiency is due to allocative inefficiency. Its acquisition by Société Générale was benefic on the technical side.

Despite it was traduced by an enhancement in its two efficiency components, Banques Populaires didn't succeed in being efficient following its acquisition of Natexis in 1999. For target, the efficiency score was enhanced. Its inefficiency is due to the allocative inefficiency. Hence, it didn't succeed in choosing in adequate manner the combinations of its used production factors or services. We can conclude also that the acquisition of Banque Nazionale Del lavoro by BNP Paribas succeeded in enhancing acquiring bank overall efficiency. This enhancement is due to technical and allocative efficiency enhancement. On the second year, we observed a growth in the number of efficient banks from three to five. These banks are Crédit Agricole, Crédit Lyonnais, CFF, Crédit du Nord and BNP Paribas. Hence, only CFF succeeded in keeping its overall efficiency on this year. Crédit du Nord, which was technical efficient has improved its allocative efficiency to become totally efficient. Then, his acquisition by Société Générale in 1997 was benefic on this year. Was benefic on this year too the acquisition in 2002 of Crédit Lyonnais by Crédit Agricole for two partners which succeeded in becoming efficient. Improvement of efficiency was

clearer for the acquiring bank than for the target bank. On this second year, Caisses d'Épargne kept only its technical efficiency. Natexis succeeded in keeping its technical efficiency and improving its allocative efficiency, improving by the way its overall efficiency. Here, acquisition was benefic for the target bank (Natexis) but no for the acquiring bank Banques Populaires) which kept the worse efficiency score (31.4%). On the third year post-merger, only four banks on a total of fourteen were efficient. These banks are Caisses d'Épargne, CFF, Crédit du Nord and Banque Worms. So we can conclude that Caisses d'Épargne regained its allocative efficiency and become, in consequence, totally efficient. CFF and Crédit du Nord succeeded in maintaining its overall efficiency, then, a capacity of better choosing what it must do (allocative efficiency) and of better doing and in better scale what it must do (technical efficiency). In contrary, Crédit Agricole, Crédit Lyonnais and BNP Paribas (acquiring bank of BNL), which were overall efficient, lost from their efficiencies and realized, then, the worse efficiency scores. On this year, BNP Paribas (resulting from acquisition by BNP of Paribas), Société Générale and CIC lost from their overall efficiencies while Crédit Mutuel, Banques Populaires, Natexis, Sovac and BNP Paribas (acquiring bank of BNL) improved their efficiencies.

If we want recapitulate our empirical findings, we can say that, in comparison with the pre-merger

period, the total efficiency of merger French banks have, in average, improved by 21.06% to become 71.82% (59.32% for the pre-merger period). This improvement was more attributed to the technical efficiency improvement (11.43%) than to the allocative efficiency improvement (3.66%). Hence, merged French banks succeeded in improving its capacity of avoiding the waste more than combining inputs and outputs in optimal proportions, taking into account available prices. However, these transactions didn't succeed in making French banks overall efficient, and its impact differs widely from a bank to another: for Crédit Agricole, for example, its acquisition of Crédit Lyonnais was benefic since it was traduced by an enhancement in efficiency scores due to an enhancement in technical and allocative components (Table 5).

This enhancement became clearer since the second year after operation. For Caisses d'Épargne/CFF operation, it was more benefic for the target bank which became efficient since the first year post-merger than for the acquiring bank which realized a little allocative inefficiency of 1.4% on the second year. BNP Paribas (resulting from BNP and Paribas merger) didn't succeed in being efficient. This can be explicated by the fact that two banks were inefficient before merger.

Acquisition by Société Générale of Crédit du Nord was benefic for the target bank which became efficient since the second year post-merger. For acquiring bank, although operation succeeded in improving efficiency after consolidation transaction, it can't make it efficient. For Crédit Mutuel/CIC operation, it was harmful for two partners since it

was traduced by deterioration in efficiency scores on the whole ex-post period. For acquisition by Banques Populaires of Natexis, we observed an improvement in efficiency scores for two partners. This improvement was clearer in the case of target, notably in capacity of combining inputs and outputs in optimal proportions, taking into account available prices. Following its acquisition by Deutsche Bank AG, bank Worms succeeded in being totally efficient on the third year of operation. Sovac deteriorated its efficiency scores since second year of its acquisition by the American GE Capital. Following its acquisition of Banca Nazionale Del lavoro, BNP Paribas enhanced its efficiency scores on the first and second years post-merger. On the third year, this group deteriorated its efficiency. This deterioration is more attributed to allocative efficiency deterioration (63.5%) than to technical efficiency deterioration (97.3%).

4.2. Value creation

At first blush, the statistics indicate a destruction in French bank post-merger value (Δ ROE) following mergers of around 5.14% on their return on capital, although a median increase in returns of around 2.018%. For control variables, the increase of mean had been supported by an increase of median, but with a less elevated rhythm. For strategic variables, they knew some more or less important increases in means, supported by increases of medians for the ones and in spite of decreases of medians for the others.

Table 6. Descriptive statistics of the main determinants of value creation

<i>Definition</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>St. Deviation</i>
Dependent Variable Value creation	-5.142	2.018	-54.4500	7.0093	18.9093
Control Variables Bidder performance	10.615	8.996	3.9200	21.7870	5.448068
Relative size	56.4358	19.381	4.1540	107.9480	107.9480
Strategic Variables Liquidity	15.6119	16.353	0.7703	41.3630	13.8642
Efficiency	37.1209	35.703	2.0130	92.3580	28.7587
Capitalization	10.0056	3.771	0.4230	49.8660	14.8876
Loan to assets	14.4222	14.166	1.5030	30.3300	9.3511
Credit risk	9.1721	0.483	0.055	85.9834	26.9964
Diversity earnings	39.9835	32.400	10.540	95.2430	23.2202
Off-balance sheet activities	40.8321	23.215	8.3334	117.043	40.0563
Loans to deposits	16.6649	13.704	1.2300	43.024	14.2006
Other expenses	2.4479	1.095	0.0825	14.287	4.2468

Note: The strategic variables report the values of the similarity index for each variable

Table 4 illustrates the responsiveness of French bank post-merger value creation to control variables (Model 1) and a set of variables measuring strategic similarities between merged banks (Model 2). The signs of the coefficients of the explanatory variables indicate whether similarities or dissimilarities in resource allocation, in the given variable, generate a positive effect on the post-mergers and acquisitions performance, Δ ROE. Negative coefficients imply that similarities generate positive change in Δ ROA while positive coefficients imply that dissimilarities in resource allocation positively affect post-M&A Δ ROA.

Empirical results show that the two control variables (differences of size between partners and

bidder pre-merger performance) are not meaningful. This result is contradictory with Altunbas and Marqués (2008) result supposing that a relatively elevated level of bidder pre-merger performance tends to affect negatively the level of post-merger performance of merged banks. According these authors too, differences of size between merged banks play a major role in the influence of the performance, but that this influence differs extensively depending on whether the operation is domestic or transnational. For the first, more the target is bigger than the bidder, more the ex-post performance will be worse, due to difficulties to assimilate some bigger institutions. On the contrary,

for the second, more the size of the target is big in comparison with the bidder, more the ex-post performance will be better. It is explained by the authors by the fact that for the cross-border operations the bidder's goal is not to achieve fast cost savings but rather to win profits coming from other synergisms.

The nine strategic variables explain 98% of the variance in the change of the creation of value following mergers.

The relation between differences in efficiency levels measured as the cost to income ratio and value creation is positive. This result doesn't support the banking theory suggesting that difficulties in integrating banks with very different cost structure, particularly in the short-term will influence negatively the value creation following merger (Altunbas and al., 1997).

A positive relation also existed between differences in capital structure and value creation. On the contrary, Altunbas and Marqués (2008) found that the impact of this strategic variable on the value creation varies depending on whether the operation is domestic or transnational. This impact is positive for the first and negative for the second. The negative effect is explained by the two authors by

the fact that, since the capital is sometimes used by banks to signal the good quality of assets, it decorated to be more difficult for the transnational operations to integrate institutions to different structures of capital, seen that asymmetries of information between the merged parts are raised more than those in the domestic operations.

Differences in terms of loan-to-assets ratio among merged banks affect positively the ex-post value creation. This result doesn't validate the hypothesis according to which the value is supposed to deteriorate when merge banks with big differences in terms of quality of assets. Since returns of scale and the cost integration costs are the essential goals of number of domestic mergers, conflicts are born from managerial disparities concerning the critical decisions, as the quality of assets. These conflicts can constitute an obstacle to the value creation. Thus, the more different the bidder's type of business compared to the target, the worse the post-merger performance. In cross-border mergers, the larger the differences in loan-to assets strategy, the better the improvement on performance. Improved revenues derived from scope returns and broad complementarities are one of the major drivers of cross-border mergers.

Table 7. Results of regression analysis of change in value creation on strategic and control variables

<i>Variables</i>	<i>Model 1</i>	<i>Model 2</i>
Control Variables		
Bidder performance	-0.3278 (0.5716)	
Relative size	0.00805 (0.0581)	
Strategic Variables		
Liquidity		-0.2203 (0.1395)
Efficiency		2.1052 ** (0.2108)
Capitalization		2.6818 ** (0.3747)
Loan to assets		-4.7378** (0.414)
Credit risk		1.3719* (0.1042)
Diversity earnings		2.3588** (0.3123)
Off-balance sheet activities		-1.9275** (0.2744)
Loans to deposits		-1.8226 (0.3543)
Other expenses		-14.7838** (1.7921)
R ² -Adj	-0.169	0.98
Durbin Watson	2.5091	0.968

Note: Model 1 includes the control variables only. Model 2 is the complete model, which includes both the control and strategy variables.

*, ** indicate significance at the 5% and 10% levels, respectively The standard errors of the coefficients are in parenthesis.

Our empirical results also showed a positive relation between differences in strategies among merged banks in terms of credit risk and the creation of value. This result supports those of Altunbas and Marqués (2008) in the case of cross-border transactions where improved revenues derived from scope returns and broad complementarities among merging institutions are one of the major drivers. For domestic deals, it could be quite costly to integrate heterogeneous institutions in terms of loan strategies. In other words, the more different the bidder's type of business compared to the target, the worse the post-merger performance.

Dissimilarities in diversity earnings had a positive relation on value creation ex-post. This result is consisting with the theoretical hypothesis stipulating that these differences are able to improve the value creation since they can help to

reach the financial innovation and the new sources of income.

Dissimilarities in off-balance-sheet activities affect negatively the ex-post value creation. This result is contradictory with the hypothesis suggesting that these dissimilarities will enhance post-merger performance as they could help spreading access to financial innovation and new sources of revenues. The differences in other expenses strategy among merged partners affect negatively the potential of post-merger value creation. Interpretation of this result differs depending on whether the operation is domestic or cross-border. In the first case, these differences strategy are supposed to create the value. In the second case, these differences are able to destroy the value due to the risk of incompatibility among technologies strategies.

Differences in terms of the deposit strategies of merging partners have any impact on post-merger value creation. This result is contradictory with those of Altunbas and Marqués (2008) suggesting a positive relation both for the domestic and cross-border mergers, with the effects being stronger for cross-country mergers, which are normally more difficult to integrate. Differences in liquidity strategies of merging partners are not meaningful too. It is contradictory to our hypothesis stipulating that different strategies of liquidity management can imply that one of the two merged banks can improve its management of liquidity after the merger and enhance thus its performance.

5. CONCLUSIONS

Our first ambition in this paper was to study the impact of mergers and acquisitions on French bank efficiency and value creation. It was about knowing if the merged banks may improve efficiency and create shareholder value. Then, we had two questions to answer.

To study the impact of consolidation operations on bank efficiency, we used the DEA model under intermediation approach, input orientation and variable scale yield. Our empirical findings showed that, in comparison with the pre-merger period, the overall efficiency of merged French banks was, on average, improved by 17.82% to become 70.67%. Such improvement was more attributed to technical component (13.63%) than to allocative component (9.22%). Hence, following these operations, French banks succeeded in enhancing their avoiding waste capacities more than combining inputs and outputs in optimal proportions, taking into account available prices, capacities.

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