Value Creation in European Banking

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Abstract

This paper empirically investigates the determinants of shareholder value creation in European banking focussing on both listed and non-listed European banks over 1995-2002. We find that bank’s cost and profit efficiency have a positive influence on shareholder value creation. Leverage is also found to be inversely related to shareholder value creation suggesting that highly capitalised banks are more likely to generate value for their owners compared with lowly capitalised counterparts. Other factors that are found to impact positively on value creation include depositor and borrower satisfaction, market concentration and employee costs. We explain the positive relationship between staff costs and value creation as a consequence of higher expenses reflecting better quality or ‘satisfied’ bank employees which in turn results in greater value creation. Finally, substantial variations exist in shareholder value creation across European countries, bank ownership types and also over time.

JEL classification: M41; G14, G21

Keywords: Shareholder value, Efficiency, Customer satisfaction, Market Structure, Operational risk, Credit Risk

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1. Introduction

This paper examines the determinants of shareholder value creation for a large sample of European listed and unlisted banks between 1995 and 2002. There is a substantial literature that focuses on various factors that influence the performance of banks (see Molyneux and Thornton, 1992; Berger, 1995; Berger and Hannan 1997; Berger and Mester 2003; and, Berger and Bonaccorsi di Patti, 2006). Few of these studies, however, use shareholder value creation indicators as measures of bank performance, which is surprising given that creating value for shareholders (generating returns in excess of the cost of capital) has been the main strategic objective of quoted banks over the last decade or so1. A number of studies (Beccalli et al., 2005, Fernandez et al., 2002, Eisenbeis et al. 1999, Chu and Lim, 1998) have sought to link measures of bank productive efficiency to stock returns, generally finding a positive relationship. However these studies do not really tell us much about the determinants of shareholder value creation as cost of capital considerations are, typically, ignored. The link between customer satisfaction and shareholder value creation has also been identified in the theoretical literature (Bauer and Hammerschmidt, 2005) and empirically investigated for non-financial companies (e.g. Van der Wiele et al., 2001) yet only one study (Loveman, 1998) provides evidence about how employee satisfaction and customer loyalty positively influence bank performance (using data from the branches of a large U.S. regional bank). Others have investigated the relationship between operational risk and bank stock price reactions (Cummings et al., 2004) and the role played by corporate risk management in the shareholder value creation process Bartram (2000 and 2002).

1 See Fiodelisi and Molyneux (2006). Note that the literature dealing with shareholder value is substantial, but these studies usually focus on developing and comparing new performance measures (e.g. O’Hanlon and Peasnell 1998, Garvey and Milbourn 2000, Fernández 2002), assessing the value-relevance of different company items such performance measures, accounting information, etc. (e.g. Barth and Beaver, 2001, Holthausen and Watts 2001), modelling the link between market value and accounting values (e.g. Ohlson 1995, Felthman and Ohlson 1995, Morel 1999, Dechow et al. 1999, Lo and Lys 2000, Ahmed et al. 2000, Liu and Ohlson 2000, Biddle et al., 2001, Ota 2002).
Overall, however, it can be seen that the extant empirical literature on the determinants of shareholder value creation in banking is somewhat esoteric and limited.

This paper aims to extend the established literature by examining whether various factors (e.g. market structure, bank efficiency, customer satisfaction, employee satisfaction, financial structure and operational and credit risk) that are believed to impact on shareholder value creation in banking. The contribution of this paper is that it is, as far as we are aware, the first comprehensive study on the determinants of shareholder value creation in banking.

2. Literature & Methodology

The first part of this section outlines the rationale for the choice of variables believed to influence shareholder value creation in banking. The second part outlines the modelling approach which includes the specification of multivariate models.

Among various factors that are believed to have an impact on shareholder value, we focus on the following features: 1) cost and profit efficiency; 2) customer satisfaction; 3) job or employee satisfaction; 4) credit risk; 5) operational risk; 6) financial structure and 7) banking market structure. Regarding the first potential driver of shareholder value creation, cost efficiency expresses the ability of a firm to choose inputs and/or output levels and to mix these to minimise cost, while profit efficiency focuses on profits expressing the bank’s ability to produce at the maximum possible profit given a particular level of input prices and output prices and other variables.2. There are a substantial number of papers dealing with bank efficiency: which focus on methodological issues (e.g. Berger 1993, Altunmas and Chakravarty, 2001),

2 Berger and Mester (1997) develop an “alternative” profit efficiency” concept referring to the bank’s ability of producing at the maximum possible profit given a particular level of output levels, rather than its output prices
compare estimates from different methodologies (e.g. Berger and Mester 1997 and 2003, Bauer et al., 1997), examine bank efficiency focusing on countries and/or financial sectors poorly analysed by previous studies (e.g. Sathye 2001, Green and Segal 2004, Beccalli 2004), and/or assess the source of inefficiency and the role of environmental factors (e.g. Dietsch and Lozano-Vives 2000, Berger and De Young 2001, Chaffai et al., 2001, Carbo and Humphrey, 2004). Following on from Berger (1995) and Berger and Mester (2003) we recognise that efficiency is likely to have an impact on bank performance but we do not have a clear expectation about the relationship between bank efficiency and shareholder value created over a period. One may expect improvements in efficiency (cost and profit) to have a positive influence on present and expected future cash flows (by reducing costs, keeping constant outputs, and/or improving profits, keeping inputs constant). Beccalli et al (2005), for example, find a positive relationship between bank efficiency and stock returns suggesting a positive relationship between efficiency and shareholder value creation. However, high efficiency levels (or efficiency improvements) may result in various externalities that may have a negative influence on expected free cash flow. For example, ‘aggressive’ efficiency programmes may result in reduced customer satisfaction, have an adverse impact on workforce motivation, and increase risk. As such the impact of cost and profit efficiency on shareholder value creation cannot be confidently identified ex-ante. In order to investigate the link between efficiency and shareholder value creation we estimate cost and alternative profit efficiency estimates for a sample of banks using the stochastic frontier approach (details are outlined in the Annex) and these are regressed (together with various other value drivers described below) against our shareholder value performance measure.

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2 Some studies (e.g. Beccalli et al., 2005) note that stock returns may be influenced by efficiency changes across two consecutive periods (e.g. bank j improved its cost or profit efficiency by 40% between period t-1 and t), rather than its efficiency levels (e.g. 30% cost efficiency in t-1 and 70% in t). As such, we run model (2) considering cost and profit efficiency changes (obtained comparing efficiency estimates in two different periods) as independent variables: results are very similar to those discussed for cost and profit efficiency levels in the papers.
The second determinant of shareholder value we consider relates to customer satisfaction. A large number of studies have analysed the importance of customer satisfaction and its contribution to company profitability and various studies have developed a “customer value approach” highlighting the positive link between customer satisfaction (and loyalty) to firm performance, as noted by Dweyer (1997), Berger and Nasr (1998), Bayón et al., (2002), Hogan et al., (2002) and Fader et al., (2005), Chen et al., (2005). In order to empirically investigate the link between customer satisfaction and shareholder value creation, we have to define a measure of customer satisfaction that can be applied to the European banking industry. Since it is problematic to obtain measures of customer satisfaction in banking we adopt two simple proxy measures - depositor and borrower satisfaction. The measures are explained in the Annex and are based on identifying individual bank’s deposit (or loan) growth relative to a country benchmark. The greater a bank’s deposit (or loan) growth relative to the industry benchmark then the greater the depositor (or borrower) satisfaction. The depositor and borrower satisfaction proxy indicators are indexes with zero representing the lowest level of satisfaction and 100% the maximum level of satisfaction – relative to the benchmark.

Various studies have noted that bank employee or ‘job’ satisfaction is also expected to impact on value creation in banking. Spinelli and Canavos (2000, p.33), for instance, reports that more than 5000 articles have appeared in academic journals and elsewhere detailing how employee satisfaction is an important factor in influencing firm performance. The argument being that a demoralised staff will have an adverse impact on value creation and vice versa. Ideally, employee satisfaction is best measured through in-house bank’s staff surveys. Since such surveys are not publicly available we have to adopt an indicator from which we can infer whether

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4 For a review of studies dealing with customer satisfaction, see Tan Lu Pheng and Wirtz (2000), and Johnson et al., (2002)

5 Among these papers, see e.g. Community Banker (2001), Eskildsen and Dahlgaard (2000), Koys (2001) and Biff (2001)
job satisfaction has an influence on value creation. For simplicity we take the average cost of labour, measured as personnel expenses over total assets, as a proxy measure of job or employee satisfaction – as staff should be more motivated when they receive higher salaries and rewards. We are aware that the average cost of labour may be an ambiguous proxy for job satisfaction since the latter is likely to be affected by other factors (e.g. non-money rewards, working conditions etc). Also, the wage / non-wage component of staff costs may vary from bank to bank and across countries (e.g. because of pension obligations). Despite these limitations, however, we note that: 1) job satisfaction cannot be easily measured by external observers; 2) the cost of labour is a relevant instrument for increasing job satisfaction and, as such, higher levels of the average cost of labour can be interpreted as a signal of workforce motivation. Finally, if we observe (the somewhat counterintuitive) positive relationship between staff costs and shareholder value creation this would suggest that a costly workforce reflects either a better qualified or more satisfied workforce. As we cannot distinguish between staff ‘quality’ or ‘satisfaction’ such a relationship (if found) can be put down to one, or a combination, of these two factors.

The risk-taking propensity of banks is expected to have a significant influence on the ability to generate returns. Credit risk is the major risk faced by banks engaged in deposit-taking and lending. The number of studies dealing with credit risk is again substantial and deals with a variety of issues including: measurement methodologies (e.g. Duffie 2005, Lucas and Klaassen, 2006 and Galluccio and Roncoroni, 2006); the adequacy of new capital requirements to credit risk management practices in banking (e.g. Jacobson et al., 2006); relationships with other risks (e.g. Zheng 2006 and Jobst et al., 2006) and so on. More recently various studies have focused on operational risk mainly looking at measurement issues (e.g. Scandizzo 2005, De Fontnouvelle et al., 2005). Regarding bank’s exposure to
credit risk, the bulk of the established literature focuses on the estimation of expected credit losses (obtained by the product of the probability of default, loss given default rate and the exposure at default). In the literature there are several methods for estimating expected credit losses and it is reasonable to assume that European banks can accurately forecast expected credit losses. Since these losses are usually taken into account by banks and their impact on bank performance can be assessed relatively easily, our focus is on the non-expected credit losses, i.e. all losses exceeding those expected by the bank. As a proxy for these unexpected losses, we focus on the annual provision to loan loss reserves, i.e. the reserve that covers future unexpected loan losses.

Operational risk is also expected to have an impact on value creation in banking. The Basel Committee on Banking Supervision (2005, p.137) defines operational risk as “the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk”. For measuring the exposure to operational risk, we focus on the first measurement method developed by the Basel Committee on Banking Supervision (2005) for calculating the capital charge (labelled as the “basic indicator approach”) since the other two methods (i.e. the standardised approach and the advanced measurement approaches) would require information that is not publicly available. According to this latter method, banks must hold capital for operational risk equal to the average over the previous three years of a 15% (α) of positive annual gross income (model 1). The regulatory capital charge for operational risk can be calculated as:

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6 Expected loan losses are measured by write-downs on loan.
7 In addition, our sample of European banks mainly comprises small commercial banks, cooperative and saving banks that are likely to employ the basic indicator approach.
8 Basel Committee on Banking Supervision (2005, p.141)
\[
\sum_{i=0}^{n} (\alpha \times GI_i) = \frac{\sum_{i=0}^{n} (\alpha \times GI_i)}{n}
\]

where \( K \) is the capital charge under the basic indicator approach, \( GI \) is the annual gross income [i.e. the sum of all net interest and non-interest income (excluding realised profits/losses from the sale of securities in the banking book and extraordinary or irregular items) gross of any provisions and operating expenses], where positive, over the previous three years, \( n \) is the number of the previous three years for which gross income is positive, \( \alpha \) is 15% (which is set by the Committee, relating the industry wide level of required capital to the industry wide level of the indicator). As such, our proxy for the bank operational risk exposure is the capital charge required under the basic indicator approach. The relationship between shareholder value and operational risk is likely to be negative. However, it is worthwhile to investigate this relationship since: 1) we expect some differences between listed and non-listed banks in managing operational risks; 2) there may be a time delay between the operational risk exposure and its impact on shareholder value; 3) a higher operational risk exposure may be due to strategies aimed at improving bank’s performance, such as improving technical efficiency, so that the operational risk exposure may also have a positive relationship with shareholder value.9

Finally, it has been noted that financial structure can influence bank performance and therefore it may be an important determinant of shareholder value creation. Barth et al., (1998) provide evidence that companies having a bond rating (or the authors’ fitted bond rating) above the S&P investment grade (labelled as financially healthy) tend to have higher

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9 One may note that we do not analyse how market risk impacts on shareholder value. Since our aim is to examine the determinants of shareholder value creation for a large sample of European banks our sample is mainly composed of small banks that we believe have a limited exposure to market risk. Since these banks usually provide brokerage services and only occasionally undertake own dealing activities, these banks are mainly subject to credit risk and operational risk. For analysing the relationship between market risk and shareholder value, it would be appropriate to identify a smaller sample of large banks (e.g. acting as dealer in capital market).
price multiples on net income and lower pricing multiples on book value relative to less healthy firms (i.e. companies having a bond rating below investment grade). Focussing on US banks, Berger and Bonnacorsi di Patti (2006) recently investigate the hypothesis under which high leverage reduces the agency costs of outside equity and increases firm value (since managers tend to act more in the interests of shareholders). The authors find strong evidence that higher leverage (or a lower equity capital ratio) is associated with higher profit efficiency, all else equal. As such, we use a bank leverage measure (as the ratio between the total amount of liabilities and equity capital) to account for financial structure.

So far we have discussed only bank-specific determinants of shareholder value creation however there is a substantial literature\(^{10}\) that suggests that market structure features can impact on firm performance. Typically, the literature seeks to examine whether factors such as industry concentration (a test of the traditional structure-conduct-performance hypothesis) or individual market shares (a test of Berger’s (1995) relative market power hypothesis) impact on bank performance\(^{11}\). In order to examine these features we simply include a bank assets market share variable and Herfindahl (concentration) index\(^{12}\) to account for market structure features.

In order to examine the determinants of shareholder value creation in European banking, we specify a model similar to that proposed in by Molyneux and Thornton (1992), Berger (1995) and Berger and Bonnacorsi di Patti (2006) where bank performance indicators are


\(^{11}\) Note that one can only test for Berger’s (1995) Relative market Power Hypothesis if the influence of bank level efficiency is controlled for.

\(^{12}\) The Herfindahl index is a measure of industry concentration and is calculated as the sum of the squares of the market shares of each individual firm. An index close to 10,000 (i.e. 100*100) shows a monopolistic producer, while a low index provide evidence of a poorly concentrated market
regressed against a number of potential determinants. We estimate the following model using the Full Feasible Generalized Least-Squares (FGLS) so as to deal with the panel dimensions of our dataset:

\[
\psi_{it} = \hat{\beta} + \sum_{k=1}^{3} \alpha_k T_k + \sum_{j=0}^{3} \beta_j D S_{ij-1} + \sum_{j=0}^{3} \gamma_j B S_{ij-1} + \sum_{j=0}^{3} \delta OR_{ij-1} + \sum_{j=0}^{3} \theta_j C R_{ij-1} + \sum_{j=0}^{3} \phi_j C N C_{ij-1} + \\
+ \sum_{j=0}^{3} \phi_j X - \epsilon_{ij-1} + \sum_{j=0}^{3} \eta_j \pi - \epsilon_{ij-1} + \sum_{j=0}^{3} \omega_j L E V_{ij-1} + \sum_{j=0}^{3} \tau_j M S_{ij-1} + \sum_{j=0}^{3} \kappa_j C N C_{ij-1} + \\
+ \sum_{j=0}^{3} \kappa_j Z_k + \sum_{j=0}^{3} \nu_j R_{i-k} + \mu L + \sum_{j=0}^{3} \nu_j L * D S_{ij-1} + \sum_{j=0}^{3} \nu_j L * B S_{ij-1} + \sum_{j=0}^{3} \sigma_j L * O R_{ij-1} + \\
+ \sum_{j=0}^{3} \sigma_j L * C R_{ij-1} + \sum_{j=0}^{3} \sigma_j L * S C_{ij-1} + \sum_{j=0}^{3} \sigma_j L * \pi - \epsilon_{ij-1} + \sum_{j=0}^{3} \sigma_j L * X + \sum_{j=0}^{3} \sigma_j L * \pi - \epsilon_{ij-1} + \\
+ \sum_{j=0}^{3} \sigma_j L * L E V_{ij-1} + \sum_{j=0}^{3} \sigma_j L * M S_{ij-1} + \sum_{j=0}^{3} \sigma_j L * C N C_{ij-1} + \theta_{i,1}
\]

Where:

\(\psi_{it}\) is a variable representing shareholder value created over the period \(t\) (measured by the ratio between Economic Value Added (EVA), calculated using a procedure accounting for banking peculiarities\) and invested capital at time \(t-1\) for bank \(i\) in market \(j\);

\(\hat{\beta}\) is a constant (to capture missing variables);

\(T_{1,2,3}\) are dummy variables for the year 2000, 2001 and 2002 (respectively),

\(D S_{0,1,2}\) are depositor satisfaction proxies at time \(t\), \(t-1\) and \(t-2\) (respectively) for bank \(i\) in market \(j\);

\(B S_{0,1,2}\) are borrower satisfaction proxies at time \(t\), \(t-1\) and \(t-2\) (respectively) for bank \(i\) in market \(j\);

\(13\) We employ the Full Feasible Generalized Least-Squares (FGLS), estimated using the Prais-Winsten estimator, since we observe a first-order autoregressive process in the OLS estimation (see Greene, 1997). In addition, as our independent variables do not suffer from scale effects there is no need to deflate independent variables.

\(14\) Economic Value Added created between period \(t-1\) and \(t\) is estimated using a procedure accounting for banking peculiarities (EVA\(bkg\)). This is calculated as follows: \(E V A_{bkg}(t-1, t) = N O P A T_{t-1, t} - (C I_{t-1} * K_{t-1, t})\), where \(N O P A T\) is Net Operating Profits After Tax, \(C I\) is capital invested, \(K\) is the estimated cost of equity capital. We undertake seven adjustments specific for banks in calculating NOPAT and Capital invested to move the book value of banks closer to their economic value\(14\). These adjustments concern: 1) loan loss provisions and loan loss reserves; 2) taxes; 3) restructuring charges; 4) security accounting; 5) general risk reserves; 6) R&D expenses and 7) operating lease expenses. For further details, see Fiordelisi and Molyneux (2006)
OR_{0,1,2} are operational risk proxies at time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

CR_{0,1,2} are credit risk proxies at time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

SC_{0,1,2} are staff costs / total assets at time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

\( x\text{-eff}_{0,1,2} \) are cost efficiency estimates at time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

\( \pi\text{-eff}_{0,1,2} \) are alternative profit efficiency estimates at time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

SIZE_{0,1,2} are bank total assets at the end of time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

LEV_{0,1,2} are bank financial leverage at time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

MS_{0,1,2} are assets market share at time t, t-1 and t-2 (respectively) for bank \( i \) in market \( j \);

CONC_{0,1,2} are domestic banking industry concentration estimates at time t, t-1 and t-2 (respectively) in market \( j \);

\( Z_{1,2,3} \) are dummy variables for Italian commercial, cooperative and savings banks (respectively);

\( Z_{4,5,6} \) are a dummy variables for French commercial, cooperative and savings banks (respectively);

\( Z_{7,8,9} \) are a dummy variables for German commercial, cooperative and savings banks (respectively);

\( R \) is bank net income at time t standardised by total asset at time t-1 for bank \( i \) in market \( j \) (this term is included to control for the problem of self-selection bias, i.e. banks of good performance are more likely to invest in projects that aim to improve the shareholder value drivers analysed);

\( L \) is a dummy variable for publicly listed banks.
In general, the model specification seeks to examine whether depositor (DS) and borrower satisfaction (BS), operational and credit risk (OR and CR), staff expenses (SC), cost or profit efficiency (x-eff and π-eff), leverage (LEV), market share (MS), industry concentration (CONC), ownership type (Z dummies for commercial, co-operative or savings bank) or whether having a public listing (L) matters in determining shareholder value creation in European banking. R is included to control for selection bias and the bank assets size variable is included to control for possible size effects. The interactive terms (L*DS, L*BS to L*CONC) identify whether the determinants of shareholder value creation differ for publicly listed banks. Also note that because many of the relationships being investigated are unlikely to be contemporaneous we include up to two period (yearly) lags for all variables.

3. Data and Results

Our data set consists of commercial, cooperative and savings banks from France, Germany, Italy and U.K. between 1995 and 2002 with financial information obtained from Bankscope and (to identify quoted banks) Datastream databases. Details of the number of banks in the sample are shown in Table 1.

Bank level data is used to derive our measures of borrower and depositor satisfaction, as well as cost and profit efficiency (estimation details of which are provided in the Annex). The descriptive statistics of the sample are shown in the top-half of Table 2 which shows that European banks destroyed shareholder value (around 1.1%) over the period analysed. Cost efficiency estimates display superior mean levels than profit estimates: this result is common in the
bank efficiency literature\textsuperscript{15}. European banks are found to have lost around one-third of their potential profits through inefficiency, whereas cost inefficiencies (although substantial at around 25\%) are lower. The equity capital required by regulators to cover bank’s operational risk exposure is, on average, 0.01\% of total assets, while the mean credit risk exposure (measured by annual provision of loan loss reserve) is around 0.4\% of total loans. Although not reported in the table, the German banking system has the lowest level of industry concentration, while the UK market is found to be the most concentrated among the four banking systems analysed. The bottom half of Table 2 illustrates correlation coefficients and shows that few variables are highly correlated – although there is a moderate level of correlation between staff expenses and operational risk.

<< INSERT TABLE 2 >>

Table 3 reports the results obtained from estimating our model which shows that depositor satisfaction (as proxied by our index measure of relative deposit growth) in previous periods has a positive influence on shareholder value creation as do staffing costs in previous periods (which we interpret as a reflection of higher quality staff or/and higher job satisfaction) and profit efficiency (contemporaneously and in period t minus 2). Cost efficiency is also shown to have a positive contemporaneous influence on value creation that is consistent with results obtained by Beccalli et al., (2005). Leverage in previous periods appears to have a negative influence on value creation, although the contemporaneous relationship is positive. This latter result confirms the findings of Berger and Bonaccorsi di Patti (2006). Bank’s market share in previous periods is also found to

\textsuperscript{15} See Goddard et al (2001) and Berger and Mester (1997)
have a positive influence on value although in contrast the industry concentration has a positive influence on value at time t. The results also generally suggest that risk (whether credit or operational) has a negative influence on value creation – and this takes two years to feed through – namely, increases in credit and operational risk seem to negatively influence value creation after two years. This is a somewhat surprising finding as one perhaps would expect increases in risk to feed through into greater returns and therefore enhanced value for shareholders. Also our measure of borrower satisfaction (an index of loan growth benchmarked against the industry) seems to have no influence on our performance measure. It is also surprising to find that the influence of the drivers of shareholder value rarely have the same influence over time. For example, depositor satisfaction in periods t-1 and t-2 have a positive influence on value but have no contemporaneous influence. Similarly, profit efficiency in period t and t-2 positively influences shareholder value creation, but not in period t-1. The lack of consistent relationships over time between the drivers of shareholder value is therefore a key finding of our study. The results also show that publicly listed banks (L) do not appear to be significantly different to non-listed banks in their ability to create shareholder value for their owners. However, terms interacted with the listing dummy do suggest that credit risk for listed banks impacts adversely on value creation (where it was found to have no influence for all banks). The other results for the interacted variables suggest similar findings reported for the whole sample.

<< INSERT TABLE 3>>
If we consider the market structure variable (CONC) there is evidence that contemporaneous industry concentration has a positive impact on value creation (although the market structure in previous periods has no influence on value creation). In contrast, bank market share in period t-1 and t-2 is positively related to value creation. The former result suggests that there is evidence of the traditional structure-conduct-performance (SCP) paradigm in European banking, as well as the relative market power hypothesis (as market shares are positively related to value creation while controlling for bank level efficiency via cost and alternative profit efficiency estimates).16

Finally, the estimates reported in Table 3 reveal that there are significant differences in shareholder value creation between different bank ownership types across countries – namely commercial, co-operative and savings banks. While having a public listing doesn’t appear to result in a significantly different ability to generate shareholder value, other differences in ownership structure across countries appear to be important.

4. Conclusions

This paper examines the determinants of shareholder value creation in European banking between 1995 and 2002. It extends the established literature by examining whether various factors (e.g., market structure, bank efficiency, customer satisfaction, employee satisfaction, financial structure and operational and credit risk) impact on shareholder value creation in banking. We investigate whether there are differences in shareholder value creation between publicly quoted and unlisted banks, and also between banks of different ownership type (commercial, savings and co-operative banks), across countries and over time. We also

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16 We also estimated various models to test for the ‘Quiet Life’ as in Berger and Hannan (1998) and found little evidence that this holds, apart from some cases where leverage decreased in more concentrated markets. These results are available from the authors on request.
develop simple (but novel) indicators of depositor and borrower satisfaction (which we use as proxy indicators for customer satisfaction). Overall, we find that bank’s cost and profit efficiency have a positive influence on shareholder value creation. Leverage is also found to be inversely related to shareholder value creation suggesting that highly capitalised banks are more likely to generate value for their owners compared with lowly capitalised counterparts. Other factors that are found to impact positively on value creation include depositor satisfaction, industry concentration, bank market share and employee costs. We explain the positive relationship between staff costs and value creation as a consequence of higher expenses reflecting better quality bank employees (and presumably higher job satisfaction) which in turn results in greater value creation. It is also interesting to find that the influence of the drivers of shareholder value rarely have the same influence over time. We also find that quoted banks do no better at creating shareholder value than their non-quoted counterparts, although we find substantial variations in shareholder value creation across European countries and bank ownership types over time.
References


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Table 1 – Number of banks in samples used for estimating shareholder value drivers in European banking

<table>
<thead>
<tr>
<th>Region</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
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<td>Cooperative banks</td>
<td>95</td>
<td>97</td>
<td>101</td>
<td>100</td>
<td>111</td>
<td>98</td>
<td>602</td>
</tr>
<tr>
<td>Savings banks</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>29</td>
<td>31</td>
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<td>947</td>
</tr>
<tr>
<td>Cooperative banks</td>
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<td>1102</td>
<td>1220</td>
<td>1371</td>
<td>1381</td>
<td>6836</td>
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<tr>
<td>Savings banks</td>
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<td>587</td>
<td>600</td>
<td>609</td>
<td>616</td>
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<tr>
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<td>1853</td>
<td>1996</td>
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<tr>
<td>Commercial banks</td>
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<td>117</td>
<td>127</td>
<td>132</td>
<td>144</td>
<td>713</td>
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<td>Cooperative banks</td>
<td>132</td>
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<td>386</td>
<td>464</td>
<td>505</td>
<td>520</td>
<td>2269</td>
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<tr>
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<td>64</td>
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<td>64</td>
<td>66</td>
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<td>Total</td>
<td>282</td>
<td>432</td>
<td>567</td>
<td>657</td>
<td>701</td>
<td>730</td>
<td>3369</td>
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<td>U.K.</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Commercial banks</td>
<td>68</td>
<td>76</td>
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<td>85</td>
<td>88</td>
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<td>486</td>
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<tr>
<td>Cooperative banks</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Savings banks</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>76</td>
<td>84</td>
<td>85</td>
<td>88</td>
<td>85</td>
<td>486</td>
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<tr>
<td>Listed banks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial banks</td>
<td>44</td>
<td>51</td>
<td>58</td>
<td>68</td>
<td>73</td>
<td>70</td>
<td>364</td>
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</table>

Source of data: Bankscope
Table 2 Descriptive statistics of variables used to analyse the sample of European listed and non-listed banks over the period 1999-2002 (6714 observations)

### Panel A – Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVA on Invested capital</td>
<td>-0.1339</td>
<td>0.1363</td>
<td>-0.0110</td>
<td>0.0281</td>
</tr>
<tr>
<td>Cost efficiency</td>
<td>0.0459</td>
<td>1.0000</td>
<td>0.7690</td>
<td>0.1015</td>
</tr>
<tr>
<td>Profit efficiency</td>
<td>0.0010</td>
<td>1.0000</td>
<td>0.6468</td>
<td>0.1627</td>
</tr>
<tr>
<td>Depositor satisfaction</td>
<td>0.0032</td>
<td>1.0000</td>
<td>0.5019</td>
<td>0.2265</td>
</tr>
<tr>
<td>Borrower satisfaction</td>
<td>0.0037</td>
<td>1.0000</td>
<td>0.5019</td>
<td>0.2135</td>
</tr>
<tr>
<td>Average cost of labour per person</td>
<td>0.0121</td>
<td>0.9632</td>
<td>0.0286</td>
<td>0.0756</td>
</tr>
<tr>
<td>Operational risk over total assets</td>
<td>0.0000</td>
<td>0.0109</td>
<td>0.0013</td>
<td>0.0003</td>
</tr>
<tr>
<td>Credit risk over total loans</td>
<td>-0.0047</td>
<td>3.1902</td>
<td>0.0044</td>
<td>0.1112</td>
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<tr>
<td>Financial Leverage</td>
<td>0.0930</td>
<td>123.1460</td>
<td>18.8930</td>
<td>7.0595</td>
</tr>
<tr>
<td>Market share</td>
<td>0.0001</td>
<td>0.2408</td>
<td>0.0023</td>
<td>0.0122</td>
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<tr>
<td>Concentration</td>
<td>0.0007</td>
<td>0.1530</td>
<td>0.0237</td>
<td>0.0359</td>
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**Source of data:** Bankscope

### Panel B – Pearson Correlation Coefficient

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cost efficiency</th>
<th>Profit efficiency</th>
<th>Depositor satisfaction</th>
<th>Borrower satisfaction</th>
<th>Average cost of labour per person</th>
<th>Operational risk</th>
<th>Credit risk</th>
<th>Financial Leverage</th>
<th>Market share</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost efficiency</td>
<td>1.000</td>
<td>0.109(*)</td>
<td>-0.026(*)</td>
<td>0.023</td>
<td>0.079(**)</td>
<td>-0.008</td>
<td>-0.184(**)</td>
<td>-0.035(**)</td>
<td>-0.029(*)</td>
<td></td>
</tr>
<tr>
<td>Profit efficiency</td>
<td>0.109(**)</td>
<td>1.000</td>
<td>-0.049(**)</td>
<td>-0.036(**)</td>
<td>0.031(*)</td>
<td>0.005</td>
<td>0.079(**)</td>
<td>0.135(**)</td>
<td>-0.006</td>
<td>0.057(**)</td>
</tr>
<tr>
<td>Depositor satisfaction</td>
<td>-0.026(*)</td>
<td>-0.049(**)</td>
<td>1.000</td>
<td>0.548(**)</td>
<td>-0.054(**)</td>
<td>0.000</td>
<td>-0.079(**)</td>
<td>0.061(**)</td>
<td>0.080(**)</td>
<td></td>
</tr>
<tr>
<td>Borrower satisfaction</td>
<td>0.023</td>
<td>-0.036(**)</td>
<td>0.548(**)</td>
<td>1.000</td>
<td>-0.127(**)</td>
<td>-0.068(**)</td>
<td>-0.099(**)</td>
<td>0.071(**)</td>
<td>0.114(**)</td>
<td>0.023</td>
</tr>
<tr>
<td>Average cost of labour per person</td>
<td>0.079(**)</td>
<td>0.031(*)</td>
<td>-0.054(**)</td>
<td>-0.127(**)</td>
<td>1.000</td>
<td>0.503(**)</td>
<td>0.089(**)</td>
<td>-0.436(**)</td>
<td>-0.293(**)</td>
<td>0.171(**)</td>
</tr>
<tr>
<td>Operational risk</td>
<td>-0.008</td>
<td>0.005</td>
<td>0.000</td>
<td>-0.068(**)</td>
<td>0.503(**)</td>
<td>1.000</td>
<td>0.160(**)</td>
<td>-0.294(**)</td>
<td>-0.200(**)</td>
<td>0.069(**)</td>
</tr>
<tr>
<td>Credit risk</td>
<td>-0.184(**)</td>
<td>0.079(**)</td>
<td>-0.079(**)</td>
<td>-0.099(**)</td>
<td>0.089(**)</td>
<td>0.160(**)</td>
<td>1.000</td>
<td>-0.008</td>
<td>-0.060(**)</td>
<td>0.014</td>
</tr>
<tr>
<td>Financial Leverage</td>
<td>-0.035(**)</td>
<td>0.135(**)</td>
<td>0.061(**)</td>
<td>0.071(**)</td>
<td>-0.436(**)</td>
<td>-0.294(**)</td>
<td>-0.008</td>
<td>1.000</td>
<td>0.185(**)</td>
<td>-0.339(**)</td>
</tr>
<tr>
<td>Market share</td>
<td>-0.055(**)</td>
<td>-0.006</td>
<td>0.080(**)</td>
<td>0.114(**)</td>
<td>-0.293(**)</td>
<td>-0.200(**)</td>
<td>-0.060(**)</td>
<td>0.185(**)</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>-0.029(*)</td>
<td>0.057(**)</td>
<td>0.040(**)</td>
<td>0.023</td>
<td>0.171(**)</td>
<td>0.069(**)</td>
<td>0.014</td>
<td>-0.339(**)</td>
<td>0.108(**)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Table 3—The multiple-variable relationship between shareholder value and its determinants in European banking. [The dependent variable ($\psi$) is the ratio between $EVA_{bkg}$ and the invested capital at time $t-1$.]

\[
\psi_{it} = \hat{\beta} + \sum_{j=0}^{2} \alpha_j T_i + \sum_{j=0}^{2} \beta_j DS_{it-j} + \sum_{j=0}^{2} \gamma_j BS_{it-j} + \sum_{j=0}^{2} \delta_j OR_{it-j} + \sum_{j=0}^{2} \phi_j CR_{it-j} + \sum_{j=0}^{2} \psi_j SC_{it-j} +
+ \sum_{j=0}^{2} \eta_j x - eff_{it-j} + \sum_{j=0}^{2} \eta_j \pi - eff_{it-j} + \sum_{j=0}^{2} \phi_j LEV_{it-j} + \sum_{j=0}^{2} \phi_j MS_{it-j} + \sum_{j=0}^{2} \phi_j CONC_{it-j} +
+ \sum_{j=0}^{2} \lambda_j Z_t + \sum_{j=0}^{2} \omega_j R_{it-j} + \mu L + \sum_{j=0}^{2} \nu_j L \ast DS_{it-j} + \sum_{j=0}^{2} \sigma_j L \ast BS_{it-j} + \sum_{j=0}^{2} \sigma_j L \ast OR_{it-j} +
+ \sum_{j=0}^{2} \theta_j L \ast CR_{it-j} + \sum_{j=0}^{2} \theta_j L \ast SC_{it-j} + \sum_{j=0}^{2} \gamma_j L \ast x - eff_{it-j} + \sum_{j=0}^{2} \gamma_j L \ast \pi - eff_{it-j} +
+ \sum_{j=0}^{2} \zeta_j L \ast LEV_{it-j} + \sum_{j=0}^{2} \zeta_j L \ast MS_{it-j} + \sum_{j=0}^{2} \zeta_j L \ast CONC_{it-j} + \epsilon_{it},
\]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated coefficient</th>
<th>t-stat</th>
</tr>
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<tbody>
<tr>
<td>(Constant)</td>
<td>$\hat{\beta}$</td>
<td>-0.101***</td>
</tr>
<tr>
<td>Dummy variable for the year 2000 (T1)</td>
<td>$\alpha_1$</td>
<td>-0.053***</td>
</tr>
<tr>
<td>Dummy variable for the year 2001 (T2)</td>
<td>$\alpha_2$</td>
<td>-0.140***</td>
</tr>
<tr>
<td>Dummy variable for the year 2002 (T3)</td>
<td>$\alpha_3$</td>
<td>0.032***</td>
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<tr>
<td>Depositor satisfaction proxy at time t (DS$i$)</td>
<td>$\beta_0$</td>
<td>-0.009</td>
</tr>
<tr>
<td>Depositor satisfaction proxy at time t-1 (DS$i-1$)</td>
<td>$\beta_1$</td>
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<tr>
<td>Depositor satisfaction proxy at time t-2 (DS$i-2$)</td>
<td>$\beta_2$</td>
<td>0.026**</td>
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<tr>
<td>Borrower satisfaction proxy at time t (BS$i$)</td>
<td>$\chi_0$</td>
<td>0.016</td>
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<tr>
<td>Borrower satisfaction proxy at time t-1 (BS$i-1$)</td>
<td>$\chi_1$</td>
<td>-0.009</td>
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<td>Borrower satisfaction proxy at time t-2 (BS$i-2$)</td>
<td>$\chi_2$</td>
<td>-0.012</td>
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<td>Operational risk exposure at time t (OR$i$)</td>
<td>$\delta_0$</td>
<td>0.078</td>
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<td>-0.011</td>
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<td>Credit risk exposure at time t-2 (CR$i-2$)</td>
<td>$\phi_2$</td>
<td>-0.190**</td>
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<td>Staff cost at time t (SC$i$)</td>
<td>$\psi_0$</td>
<td>-0.084**</td>
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<td>$\psi_1$</td>
<td>0.199***</td>
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<td>Staff cost at time t-2 (SC$i-2$)</td>
<td>$\psi_2$</td>
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<tr>
<td>Cost efficiency estimates at time t ($x$-eff$i$)</td>
<td>$\gamma_0$</td>
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<td>0.027**</td>
</tr>
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<td>Bank’s financial leverage at time t (LEV$i$)</td>
<td>$\omega_0$</td>
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</tr>
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<td>$\omega_1$</td>
<td>-0.205***</td>
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<tr>
<td>Bank’s financial leverage at time t-2 (LEV$i-2$)</td>
<td>$\omega_2$</td>
<td>-0.162***</td>
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<tr>
<td>Bank’s market share at time t (MS$i$)</td>
<td>$\upsilon_0$</td>
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<tr>
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<td>$\upsilon_1$</td>
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<tr>
<td>Bank’s market share at time t-2 (MS$i-2$)</td>
<td>$\upsilon_2$</td>
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</tr>
<tr>
<td>Domestic market concentration at time t (CONC$i$)</td>
<td>$\kappa_0$</td>
<td>0.349**</td>
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<tr>
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<td>$\kappa_1$</td>
<td>-0.333</td>
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<tr>
<td>Domestic market concentration at time t-2 (CONC$i-2$)</td>
<td>$\kappa_2$</td>
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<tr>
<td>Dummy variable for Italian commercial banks ($Z_2$)</td>
<td>$\lambda_2$</td>
<td>0.528***</td>
</tr>
<tr>
<td>Dummy variable for Italian cooperative banks ($Z_3$)</td>
<td>$\lambda_3$</td>
<td>0.444***</td>
</tr>
</tbody>
</table>
Dummy variable for Italian savings banks (Z3) \( \lambda_3 \) 0.466***  22.102
Dummy variable for French commercial banks (Z4) \( \lambda_4 \) 0.419***  18.424
Dummy variable for French cooperative banks (Z5) \( \lambda_5 \) 0.383***  17.697
Dummy variable for French savings banks (Z6) \( \lambda_6 \) 0.257***  18.209
Dummy variable for German commercial banks (Z7) \( \lambda_7 \) 0.457***  20.132
Dummy variable for German cooperative banks (Z8) \( \lambda_8 \) 1.339***  21.621
Dummy variable for German savings banks (Z9) \( \lambda_9 \) 1.205***  20.412
Net income at time t on total asset at time t-1 \( \psi_0 \) 0.019 0.822
Net income at time t-1 on total asset at time t-2 \( \psi_1 \) 0.678***  49.401
Dummy variable for publicly listed banks (L) \( \mu \) 0.000 0.005
Depositor satisfaction proxy at time t for listed banks (L*DS) \( \nu_0 \) 0.072 1.598
Depositor satisfaction proxy at time t-1 for listed banks (L*DS\(_t-1\)) \( \nu_1 \) -0.044 -1.001
Depositor satisfaction proxy at time t-2 for listed banks (L*DS\(_t-2\)) \( \nu_2 \) -0.047 -1.129
Borrower satisfaction proxy at time t for listed banks (L*B) \( \omega_0 \) 0.083**  1.963
Borrower satisfaction proxy at time t-1 for listed banks (L*B\(_t-1\)) \( \omega_1 \) -0.022 -0.386
Borrower satisfaction proxy at time t-2 for listed banks (L*B\(_t-2\)) \( \omega_2 \) 0.022 0.432
Operational risk exposure at time t for listed banks (L*OR) \( \theta_0 \) -0.090 -1.504
Operational risk exposure at time t-1 for listed banks (L*OR\(_t-1\)) \( \theta_1 \) -0.164** -1.974
Operational risk exposure at time t-2 for listed banks (L*OR\(_t-2\)) \( \theta_2 \) 0.054 0.670
Credit risk exposure at time t for listed banks (L*CR) \( \theta_0 \) -1.579*** -2.869
Credit risk exposure at time t-1 for listed banks (L*CR\(_t-1\)) \( \theta_1 \) -1.139** -2.046
Credit risk exposure at time t-2 for listed banks (L*CR\(_t-2\)) \( \theta_2 \) 0.485 1.218
Staff costs at time t for listed banks (L*SC) \( \delta_0 \) -0.060 -1.118
Staff costs at time t-1 for listed banks (L*SC\(_t-1\)) \( \delta_1 \) 0.048***  2.663
Staff cost at time t-2 for listed banks (L*SC\(_t-2\)) \( \delta_2 \) -0.049 -0.958
Cost efficiency estimates at time t for listed banks (L*eff) \( \rho_0 \) -0.099** -2.417
Cost efficiency estimates at time t-1 for listed banks (L*eff\(_t-1\)) \( \rho_1 \) 0.007 0.159
Cost efficiency estimates at time t-2 for listed banks (L*eff\(_t-2\)) \( \rho_2 \) 0.017 0.353
Profit efficiency estimates at time t for listed banks (L*eff) \( \sigma_0 \) 0.090***  2.628
Profit efficiency estimates at time t-1 for listed banks (L*eff\(_t-1\)) \( \sigma_1 \) 0.034 1.005
Profit efficiency estimates at time t-2 for listed banks (L*eff\(_t-2\)) \( \sigma_2 \) 0.071 1.733
Bank’s financial leverage at time t for listed banks (L*LEV) \( \zeta_0 \) -0.087* -1.653
Bank’s financial leverage at time t-1 for listed banks (L*LEV\(_t-1\)) \( \zeta_1 \) 0.070 1.164
Bank’s financial leverage at time t-2 for listed banks (L*LEV\(_t-2\)) \( \zeta_2 \) -0.062 -1.075
Bank’s market share at time t for listed banks (L*MS) \( \xi_0 \) -0.137** -2.370
Bank’s market share at time t-1 for listed banks (L*MS\(_t-1\)) \( \xi_1 \) 0.345***  3.378
Bank’s market share at time t-2 for listed banks (L*MS\(_t-2\)) \( \xi_2 \) N/A N/A
Domestic market concentration at time t for listed banks (L*CONC) \( \tau_0 \) 0.583 1.043
Domestic market concentration at time t-1 for listed banks (L*CONC\(_t-1\)) \( \tau_1 \) -0.418 -0.750
Domestic market concentration at time t-2 for listed banks (L*CONC\(_t-2\)) \( \tau_2 \) N/A N/A
Adjusted R-square \( \text{Adj-} R^2 \) 0.541

Where:

* *** indicate that estimated coefficients are statistically significance at the 10%, 5%, and 1% significance level, respectively.

+ The variable was excluded because of collinearity problems.

The combined dummy effects for 1999 and UK commercial banks are incorporated in the constant term. Because of the two period lag, only dummy variables for 2000 to 2002 are included in the reported estimates.
Annex

The annex briefly describes methods used to estimate: 1) cost efficiency; 2) profit efficiency, 3) depositor and borrower satisfaction.

1. Cost efficiency

Cost efficiency is measured using the Stochastic Frontier (SF) analysis and, namely, the Battese and Coelli’s (1995) stochastic frontier model:

\[ \ln TC_i = x_i \beta + (V_i + U_i) \]  

where \( \ln TC_i \) is the logarithm of the cost of production of the \( i \)-th bank, \( x_i \) is a \( k \times 1 \) vector of standardised input prices and output of the \( i \)-th bank, \( \beta \) is a vector of unknown parameters, \( V_i \) are random variables which are assumed to be i.i.d. \( N(0, \sigma_v^2) \) and independent of \( U_i \), \( U_i \) are non-negative random variables which are assumed to account for the cost inefficiency in production and are assumed to be i.i.d. \( N(m_i, \sigma_U^2) \), \( m_i \) is defined as \( m_i = z_i \delta \), \( z_i \) is a \( p \times 1 \) vector of variables which may influence the efficiency of a bank, \( \delta \) is an \( p \times 1 \) vector of parameters to be estimated. Since our sample is composed of different type of banks (namely, commercial, cooperative and savings banks) and data from a eight year period, the Battese and Coelli (1995) model enables us to control whether a particular time period influences bank efficiency. We use the standard translog functional form and our cost function is the following\(^{17}\):

\(^{17}\) The choice of the use of translog is motivated by two reasons. First, Altunbas and Chakravraty (2001) identified some problems associated with using the Fourier functional form, especially when dealing with heterogenous data sets. Secondly, Berger and Mester (1997) observe that the translog functional form and Fourier-flexible form are substantially equivalent from an economic viewpoint and both rank individual bank efficiency in almost the same order.
\[
\ln TC = \alpha_0 + \sum_{i=1}^{3} \alpha_i \ln y_i + \sum_{j=1}^{3} \beta_j \ln w_j + \\
\frac{1}{2} \left[ \sum_{i=1}^{3} \sum_{j=1}^{3} \delta_{ij} \ln y_i \ln y_j + \sum_{i=1}^{3} \sum_{j=1}^{3} \gamma_{ij} \ln w_i \ln w_j \right] + \\
+ \sum_{i=1}^{3} \sum_{j=1}^{3} \rho_{ij} \ln y_i \ln w_j + \sum_{i=1}^{3} Z_i + \ln u_c + \ln \varepsilon_c 
\]

(4)

where \( TC \) is the logarithm of the cost of production, \( y_i \) (\( i = 1, 2, 3 \)) are output quantities, \( w_j \) (\( j = 1, 2, 3 \)) are input prices, \( Z_i \) \((i = 1, 2, \ldots, 7)\) are dummy variables used to control for the influence of a specific time period over cost efficiency. In order guarantee the linear homogeneity in factor prices (i.e. \( \sum_{j=1}^{3} \beta_j = 1; \sum_{i=1}^{3} \gamma_{ij} = 0 \) and \( \sum_{j=1}^{3} \rho_{ij} = 0 \)), it is necessary (and sufficient) to apply the following restrictions: 1) the standard symmetry: according with this restriction, it is assumed that \( \delta_{ij} = \delta_{ji} \) and \( \gamma_{ij} = \gamma_{ji} \); 2) linear restriction of the cost function (model 6). In addition, the factor share equations (embbodying restrictions imposed by Shephard’s Lemma or Hotelling’s Lemma) are excluded since these would impose the undesirable assumption of no allocative inefficiencies [see, for example, Berger and Mester (1997 and 2003)].

2. Alternative profit efficiency

Profit efficiency is estimated using the alternative profit function since prices are often inaccurately measured in banking\(^{18}\). We use the standard translog functional form\(^{19}\):

\(^{18}\) Berger and Mester (1997, p. 904) notes that “if prices are inaccurately measured –as is likely, given the available banking data – the predicted part of the standard profit function would explain less of the variance of profits and yield more error in the estimation of the efficiency terms \( \ln u_c \). In this event, it may be appropriate to try specifying other variables in the profit function that might yield a better fit, such as the output quantity vector, \( y \), as in the alternative profit function”.

\(^{19}\) Following the Berger and Mester (1997) findings and considering our research aims, the translog functional form is preferred to the Fourier-flexible since it is substantially equivalent on an economic viewpoint and both rank of individual efficiency banks in almost the same order.
\[
\ln(\pi + \theta) = \alpha_0 + \sum_{i=1}^{3} \alpha_i \ln y_i + \sum_{j=1}^{3} \beta_j \ln w_j + \\
+ \frac{1}{2} \left[ \sum_{i=1}^{3} \sum_{j=1}^{3} \delta_{ij} \ln y_i \ln y_j + \sum_{i=1}^{3} \gamma_i \ln w_i \ln w_j \right] + \\
+ \sum_{i=1}^{3} \sum_{j=1}^{3} \rho_{ij} \ln y_i \ln w_j + \sum_{i=1}^{7} Z_i + \ln u_c + \ln \varepsilon_c
\]

(5)

where \( y_i \) (i=1, 2, 3) are output quantities, \( w_j \) (j=1, 2, 3) are input prices, \( Z_i \) (i=1, 2, ..., 7) are dummy variables used to control for the influence of a specific time period over cost efficiency. The dependent variable for the profit function replaces the normalised \( \ln(\text{TC}) \) (used to estimate cost efficiency) with \( \ln((\pi + \theta)) \), where \( \pi \) is published bank’s net income standardised by the average cost of capital (\( w_3 \)) and \( \theta \) is a constant, defined by adding 1 to the absolute value of the lowest (\( \pi/w_3 \)) in the sample [i.e. \( \theta = \left( \frac{PT}{w_3} \right)^{min} + 1 \)], in order to make positive the natural log of bank’s profits.

The standard Stochastic Frontier (SF) analysis is employed to estimate alternative profit efficiency for each bank: the Battese and Coelli (1995) model of a stochastic frontier function has been adopted since this model enable us to control for different types of bank affects profit efficiency estimates\(^\text{20}\).

In the frontier estimation of cost and profit efficiency, bank inputs and outputs are defined according to the value-added approach, originally proposed by Berger and Humphrey (1992). We posit\(^\text{21}\) that labour (measured as personnel expenses), physical capital (expressed as the average value of fixed-tangible assets) and financial capital (measured as loanable funds) are inputs, whereas demand deposits, total loans and other earning assets are outputs. In detail:

\(^{20}\)For further details, see Coelli et al., (1997)
\(^{21}\)This selection of inputs and outputs follows the studies by Sathye (2001) and Dietzch and Lozano (2000), Aly et al. (1990) and Hancock (1986), wherein the author develops a methodology based on user costs to determine the outputs and inputs of a banking firm.
For estimating, cost and profit efficiency, we use a cross-section sample by year\textsuperscript{22} and country\textsuperscript{23} as this is preferred to a panel data set or an international sample\textsuperscript{24}. We defined bank inputs and outputs according to the value-added approach, originally proposed by Berger and Humphrey (1992), and we posit\textsuperscript{25} that labour (measured as personnel expenses), physical capital (expressed as the average value of fixed-tangible assets) and financial capital (measured as loanable funds) are inputs, whereas demand deposits, total loans and other earning assets are outputs.

3) Borrower and depositor satisfaction proxy

Following the value added approach for defining bank inputs and outputs, we identify two kinds of bank customers: depositors and borrowers. In order to select an appropriate measure of sales for assessing depositor and borrower satisfaction, we define two different measures of customer satisfaction in banking that relate to total amount of demand deposits and the overall amount of loans.

\[
\text{total amount of outstanding loans at time } t = f(\text{borrowers satisfaction})
\]

\[
\text{total amount of outstanding demand deposits at time } t = f(\text{depositors satisfaction})
\]

The second step is to standardise our indicator to better capture the customer satisfaction concept: since customer satisfaction generates a variation of a company’s sales, customers satisfaction is

\textsuperscript{22} We use a cross-section sample by year since many bank observations would have been lost selecting a balanced panel data set.

\textsuperscript{23} We prefer to use a sample of domestic banks for estimating the cost efficiency frontier since banks in the same country are more homogeneous (and comparable) than banks working in different countries.

\textsuperscript{24} The descriptive statistics are available from the authors on request.

\textsuperscript{25} This selection of inputs and outputs follows the studies by Sathye (2001) and Dietsch and Lozano (2000), Aly et al. (1990) and Hancock (1986), wherein the author develops a methodology based on user costs to determine the outputs and inputs of a banking firm.
better investigated by considering the rate of change of deposits (D) and of loans (L), rather than
the total amount outstanding at a given moment of time.

\[
\frac{L_t - L_{t-1}}{L_{t-1}} = f (\text{Borrowers satisfaction})
\]

\[
\frac{D_t - D_{t-1}}{D_{t-1}} = f (\text{Depositors satisfaction})
\]

(7)

The third step aims to isolate (at least reduce) the impact of other economic factors on the
relationship between sales and customer satisfaction. In order to eliminate the impact due to
general banking industry trends, we consider an “adjusted” rate of change of deposits and of loans
by comparing this to an appropriate benchmark. As such, customer satisfaction is measured
focussing on the difference between the rate of change of deposits (and of loans) and the rate of
change of deposit (loans, respectively) measured at the industry level (i.e. France, Germany, Italy
and United Kingdom): in other words, the level of customer satisfaction is inferred looking at the
difference between the bank deposit (respectively, loans) rate of change and the industry average
rate of change.

\[
\frac{L_B^t - L_B^{t-1}}{L_B^{t-1}} - \frac{L_I^t - L_I^{t-1}}{L_I^{t-1}} = f (\text{Borrowers satisfaction})
\]

\[
\frac{D_B^t - D_B^{t-1}}{D_B^{t-1}} - \frac{D_I^t - D_I^{t-1}}{D_I^{t-1}} = f (\text{Depositors satisfaction})
\]

(8)

where \(D_B^t\) is the total amount of outstanding deposits of the bank at time \(t\), \(D_I^t\) is the total amount
of outstanding deposits at the industry level at time \(t\), \(L_B^t\) is the total amount of outstanding loans
of the bank at time \(t\) and \(L_I^t\) is the total amount of outstanding loans at the industry level at time \(t\)
In addition, to isolate the impact due to different banking business types, we also adopt a larger set of specific benchmarks (of the mean rate of change of deposits/loans) according to the various types of banks (i.e. commercial banks, cooperative banks and savings banks).

\[
\frac{L_{B_t} - L_{B_{t-1}}}{L_{B_{t-1}}} - \frac{L_{SB_t} - L_{SB_{t-1}}}{L_{SB_{t-1}}} = f \text{ (Borrowers satisfaction)}
\]

\[
\frac{D_{B_t} - D_{B_{t-1}}}{D_{B_{t-1}}} - \frac{D_{SB_t} - D_{SB_{t-1}}}{D_{SB_{t-1}}} = f \text{ (Customers satisfaction)}
\]

(9)

where \(D_{B_t}\) is the total amount of outstanding deposit of the bank at time \(t\), \(D_{SB_t}\) is the total amount of outstanding deposit for a specific type of bank (i.e. commercial/saving/cooperative banks for each country) at time \(t\), \(L_{B_t}\) is the total amount of outstanding loan of the bank at time \(t\) and \(L_{SB_t}\) is the total amount of outstanding loan for a specific type of bank (i.e. commercial/saving/cooperative banks) at time \(t\).

In order to measure the growth in deposits and loans relative to the industry benchmark (i.e. the bank rate of change of deposits and of loans minus the industry rate of change of deposits and of loans), we use a sample slightly different from that used in previous sections for estimating cost and profit efficiency since we consider a shorter time period\(^{26}\): 1997-2002. We select various sub-samples according to the country (namely, France, Germany, Italy and United Kingdom), to the year (namely, from 1997 to 2002) and for the type of bank.

Once we estimated the “net” growth rate, we have to modify this measure to assess customer satisfaction because the relationship between depositors/borrowers satisfaction and deposits/loans “net” growth rate of change is not time coincident. As discussed earlier, banks deposit and loan growth depends on customer satisfaction over a previous period of time. As such, deposits and

\(^{26}\) Since data availability covers the period 1995-2002 and our customer satisfaction proxy is estimated using a two years lag, the first available measurement of customer satisfaction regards 1997 (i.e. rate of change 1996-97 and 1995-96). In order to further increase the samples’ homogeneity, foreign banks branches and subsidiaries have been excluded from the sample. To face the risk of including outliers in samples, all data were censored to \(\pm 3\) standard deviation from the media.
loans net growth rates cannot be considered as a proxy for customer satisfaction in the same period. Since the true level of customer satisfaction is unknown and direct measures of customer satisfaction are not publicly available, it is impossible to undertake any statistical test for assessing a proper lag between these two variables or, in other words, how long the period of time is in order that the variation of customer satisfaction determines a variation in bank’s sales. For this reason, we assume that customer satisfaction is constant over a three year window\textsuperscript{27} over the period considered (i.e. 1995-2002). As a result, customer satisfaction measures are obtained for the period (1997-2002) by using six windows: e.g. depositors (borrowers) satisfaction for bank \(j\) in 1997 is measured as the adjusted rate of change of deposits (loans, respectively) for bank \(j\) over the period 1995-97, etc. Once having defined the length of the windows, it is necessary to define a procedure for transforming annual adjusted deposits (loans) rate of change to measures of depositors (borrowers, respectively) satisfaction. As such, the indicator of depositor (respectively, borrowers) satisfaction for bank \(j\) uses the following procedure: 1) rank (from the lowest to the highest) the annual adjusted deposits (loans) rate of change for every year; 2) transform the rank into a percentage rank: e.g. if bank \(j\) is ranked 48 over 200 banks, its percentage rank is 24\% (i.e. 48/200); 3) customer satisfaction is simply the mean of the two percentage rank scores obtained by bank \(j\) in every year of the window: this value varies between 0 [if the bank achieved constantly the lowest annual adjusted deposits (loans) rate of change for every year] and 100\% [if the bank achieved constantly the highest annual adjusted deposits (loans) rate of change for every year]. In this way, we obtain a proxy for customer satisfaction based as a percentage (i.e. 0 is the lowest satisfaction and 100\% maximum satisfaction) that takes account of bank type and other broad trends affecting the European banking industry.

\textsuperscript{27} Since there is no theoretical foundation for selecting the length of the window, this is selected as a medium period of time (three years). For example, the customer satisfaction for a bank \(j\) at time \(t\) is considered looking at the annual rate of change over the period \((t-2;t):\) this implies to consider two rate of changes \([t-2;t-1]\) and \((t-1;t)].