Predictability in the cross-section of European bank stock returns

Wolfgang Bessler[a], Wolfgang Drobetz[b], Thomas Erdmann[c], and Heinz Zimmermann[d,e]

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Abstract

This paper investigates the impact of individual bank fundamental variables on stock market returns using data from a panel of 235 European banks from 1991 to 2005. The sample period marks a significant transition in the European banking sector, characterized by higher competition, lower profit margins in the traditional interest-related business and increasing non-interest income in terms of fees and commissions. In panel regressions, we relate bank stock returns to fundamental accounting information and use several corrections for the standard errors to control for heteroscedasticity, autocorrelation and spatial correlation. Our results indicate that bank-specific variables exhibit a robust explanatory power across different model specifications. Most important, there is a positive impact of the ratio of loans to total assets, the ratio of non-interest income to total income, and the ratio of off-balance sheet items to total assets on subsequent bank stock returns. In contrast, the ratio of loan-loss-provisions to net interest revenue and the ratio of book value of equity to total assets load negatively on subsequent bank stock returns. Overall, the valuation of bank stocks incorporates both the traditional loan-related side of the banking business and the increasing off-balance sheet activities.

Keywords: Asset pricing, bank stock returns, bank-specific accounting ratios.

JEL Classifications: C14, G12, G14, G21.

[a] Wolfgang Bessler, Center for Finance and Banking, Justus-Liebig-University Giessen, Licher Strasse 74, Giessen, Germany, Phone: +49-641-9922460, Mail: Wolfgang.Bessler@wirtschaft.uni-giessen.de.

[b] Wolfgang Drobetz, Institute of Finance, University of Hamburg, Von-Melle-Park 5, 20146 Hamburg, Germany, Phone: +49-40-42838-5506, Mail: wolfgang.drobetz@wiso.uni-hamburg.de.

[c] Thomas Erdmann, Credit Suisse Group, Gartenstrasse 14, 8002 Zurich, Switzerland, Phone: +41-44-3331946, Mail: thomas.erdmann@credit-suisse.com.

[d] Heinz Zimmermann, Department of Finance, Wirtschaftswissenschaftliches Zentrum (WWZ), University of Basel, Switzerland, Phone: +41-61-2673312, Mail: heinz.zimmermann@unibas.ch.

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1. Introduction

This paper investigates the impact of individual bank fundamental variables on stock market returns using data from an extensive panel of European banks. In the previous literature (e.g., Fama and French, 1992), financial institutions were mostly excluded from asset pricing tests because of their high leverage and the high level of industry regulation due to the negative externalities that might arise from potential bank difficulties.[1] However, because of the special nature of financial institutions in Continental Europe arising from the strong interdependence between banks and the non-financial sector, which is a typical characteristic of bank-based financial systems, important links might exist between bank-specific attributes and the cross-section of bank stock returns.

The financial system in Continental European countries has experienced significant changes during the recent years (e.g., Schmidt, 2004). The 1991-2005 time span of our study covers a significant transition period in the European banking industry characterized by a strong increase in competition, lower margins in the traditional interest-related banking business, and increasing non-interest income in terms of fees and commissions. The most important forces driving these developments have been the harmonisation of the regulatory framework, the launch of the European Union Single Market in 1998 as well as the introduction of a single European currency in 1999, and the emergence of cross-border mergers, leading to strong acquisition and consolidation activities within the European financial sector. In addition, competition in the European banking industry has increased sharply due to the market entrance of global competitors and institutional investors. In this process, the share of earnings from asset management, securities and derivatives trading, and investment banking activities drastically increased over the past years, whereas the classical interest margin business has been diminishing (e.g., Goddard et al., 2001; Schure et al., 2004).

Given these developments in the European banking sector, we estimate and compare the impact of fundamental variables from traditional and non-traditional financial intermediation activities on bank profitability, as measured by stock returns subsequent to the release of relevant accounting figures. For example, our fundamental variables include the ratio of loans to total assets or loan-loss provisions to net interest revenue. In addition, we include traditional asset pricing factors (e.g., the book-to-market ratio) into our model. This approach is in contrast to numerous studies that explore the influence of macroeconomic developments on

[1] Exceptions are Barber and Lyon (1997) as well as Petkova (2006), who document that the standard fundamental factors (e.g., the book-to-market ratio) exhibit explanatory power for a cross-section of bank stock returns.

banks' operations and performance but neglect bank-specific variables (e.g., Choi et al., 1992; Bessler and Booth, 1994; Oertmann et al. 2000; Bessler and Murtagh, 2004). With respect to the econometric methodology, we run panel regressions and apply alternative corrections for the estimated standard errors to control for heteroscedasticity, autocorrelation and spatial correlation (firm effects) that are present in our data.

Overall, our results suggest that the valuation of bank stocks incorporates both the classical loan-related side of banking activities and the growing off-balance activities. Specifically, the ratio of loans to total assets, the ratio of non-interest income to total income, and the ratio of off-balance sheet items to total assets all have a positive impact on bank stock returns. In contrast, the ratio of loan-loss provisions to net-interest income and the ratio of equity to total assets have a negative impact on bank stock returns. These findings have important implications for shareholder wealth creation in the banking sector. For example, the capital market still incorporates the classical side of business when valuing banks. At the same time, however, the growth of non-interest income has had a positive impact on bank stock returns. These findings are robust for different estimation periods and assumptions regarding the length of the impact of accounting information.

Some of our empirical results are in contrast to previous studies. For example, Leledakis and Staikouras (2004) also look at a panel of European banks from 1997 to 2004, but their results indicate that only the book to market ratio and the loan quality are important in explaining the cross-section of bank stock returns. Using a large sample of US banks from 1986 to 1999, Cooper et al. (2003) observe that the changes in the share of non-interest income and the changes in financial leverage are relevant predictors for the cross-section of stock returns.[2] A crucial question is whether their results obtained for the US stock market can be generalized to European markets. In contrast to the results in Leledakis and Staikouras (2004), we identify several fundamental variables which have explanatory power for the cross-section of European bank stock returns. However, in several instances the direction of their influence on subsequent stock returns is different from the US findings in Cooper et al. (2003).

The remainder of the paper is organized as follows. Section 2 introduces our model setup and provides a general discussion of the bank-specific fundamental variables we use in our asset

[2] Other studies that investigate the impact of fundamental bank-specific variables on bank performance are Beccalli et al. (2006), who report a positive relationship between efficiency as measured by input-output models and value creation, or Saunders and Schuhmacher (2000), who focus on interest rate margins. Other papers investigate the concentration process and the impact on competition in the banking sector (e.g., Staikouras and Koutsomanoli-Fillipaki, 2006).

pricing tests. Section 3 continues with a data description and explains our methodology to construct time series of accounting variables with changing accounting standards. Section 4 starts with a discussion of estimation efficiency in alternative panel regression models, shows our main estimation results, and provides results of robustness tests with respect to the timing of accounting information and the length of the impact of accounting information. Finally, section 5 summarizes our results.

2. Fundamental variables and data analysis

2.1. Measurement and timing of bank performance

Ball and Brown (1968) were the first to analyze the empirical relationship between accounting information and capital markets. Facilitating the prediction of a firm's future cash flow and helping investors to assess the risk-return characteristics of a security, accounting figures will supposedly provide investors with relevant information for their investment decisions. In fact, a growing strand of the empirical literature provides evidence for a relationship between stock returns and accounting measures. In contrast to the classical event study approach, these studies analyse the relationship between stock returns and accounting numbers over a longer period of time. While event studies posit a causal connection between accounting figures and stock returns, long-run performance studies do not assume that market participants use accounting data in their valuation process. Nevertheless, if accounting data are good summary measures of the events incorporated in security prices, they will be value relevant because their use provides a value of the firm that is close to its market value.[3]

This study investigates the role of specific fundamental accounting variables in explaining the cross-section of expected bank stock returns in Europe. To capture the heterogeneity of banks, we use a set of bank-specific variables that reflect differences in a bank's risk exposure and its production function as the explanatory variables. As the dependent variable, we use total monthly bank stock returns in excess of the risk free interest rate in our regressions.[4] The risk free interest rate is proxied by the one-month Euro Interbank Offered Rate (EURIBOR). In a banking context, numerous performance measures other than total shareholder return have been suggested, such as different versions of residual income measures and Economic Value Added (EVA) concepts, more banking specific measures like return on equity (ROE), return on assets (ROA), return on risk adjusted capital (RORAC), as well as interest (or intermedia-

[3] Dumontier and Raffournier (2002) provide a survey of related studies with European data.
[4] Returns are calculated using Euro as the base currency.

tion) margins.[5] Compared to these alternative performance measures, the total stock return is independent of accounting rules, requires no further assumptions (e.g., the cost of capital for EVA), is available on a short-term basis, and measures the actual value creation from the investor's standpoint. In addition, using accounting measures as dependent variables, such as ROE or ROA, will only reveal the mechanics of bank accounting rather than value generation.[6] Margin-based measures are also ruled out as a performance measure because they are used as explanatory variables in our regressions. Moreover, one hypothesis is that traditional margin-based activities loose importance and, hence, they might not be sufficient to fully capture bank performance.

Monthly stock returns are related to yearly accounting data using various panel methodologies. Any model with monthly return data on the left hand side and yearly accounting data on the right hand side requires defining an appropriate matching criterion. In fact, it is a common approach in financial econometrics to regress return observations with a high frequency on explanatory variables with lower frequencies (e.g., see Daniel and Titman, 2006). This methodology, however, requires correcting for potential biases that result from the persistence of the explanatory variables combined with a potential serial correlation of the dependent variable and/or the residuals (see section 4). In our main model, denoted as M3, we condition the monthly returns from April to June of year t+1 on annual report data from the previous year t. The lag of three months is chosen to avoid a possible look-ahead bias by ensuring that accounting information is publicly known.[7] In robustness tests, we also explore two alternative setups, using return data from April until September (M6) and December (M9), respectively. We do not test a model with a full twelve month period to avoid including returns that are likely to be influenced by expectations about the accounting data in the subsequent year t+2.

2.2. Fundamental variables construction

We use specific fundamental accounting variables in explaining the cross-section of expected bank stock returns in Europe. All variables except market capitalisation are designed as ratios.

[5] See Fiordelisi et al. (2005) for a discussion of shareholder value measures in the banking context.
[6] Decomposing the elements of either ROA or ROE using a value driver tree leads to the accounting factors that we use as dependent variables and are described in section 2.2 (e.g., see Koch and MacDonald, 2000).
[7] Several choices exist regarding the length of the publication lag, each being to some extent arbitrary. However, using a lag of three months seems consistent with the standard publication practices of European banks and also corresponds to the approach in previous studies (e.g., Wang et al., 2005).

This eliminates currency effects and allows easier comparisons between banks.[8] Contrary to Cooper et al. (2003), we use untransformed and unsmoothed accounting ratios as explanatory variables. They condition bank stock returns on quarterly financial statements, whereas only annual accounting data are available in Europe (at least on a broad basis). Given the high data frequency in their US panel, one could argue that changes of ratios contain the relevant information, whereas the use of yearly accounting data makes the use of levels more feasible. The underlying notion is that changes of ratios are priced by the market on a timely basis, while their levels also contain value relevant information, but with a slower dispersion. The main issue, therefore, is to what extent the information conveyed by accounting figures is consistent with that reflected in stock prices (e.g., Dumontier and Raffournier, 2002).

We assume that bank performance depends on the strategic choice of a bank's activities and its operational efficiency as well a risk management practices. Therefore, we construct seven bank-specific variables that contain fundamental (and supposedly value relevant) information: (1) book value of equity to total assets (EQ_TA), (2) loans to total assets (L_TA), (3) total earning assets to total non-earning assets (E_NEA), (4) loan loss provisions to net interest revenue (LLP_IR) (5) nominal value of off-balance sheet items to total assets (OB_TA), (6) non-interest income to total operating income (NI_TI) and (7) cost to income ratio (CIR).

In addition to the bank-specific variables, we add control variables which have been used in previous asset pricing tests (e.g., Fama and French, 1992): (8) price earnings ratio (PE), (9) book value of equity to market value of equity (BM) and (10) market capitalisation (MCAP). Unlike all other factors, market capitalization is lagged by only one month instead of three months because this information is available to investors on a timely basis (i.e., we use market value figures from March, April, and May in year t+1 to condition bank returns).

(1) Book value of equity to total assets

We include a leverage variable, which is constructed as the ratio of the book value of common equity to total assets and labelled EQ_TA, to analyse if the capital structure contains information for bank stock returns. The equity-to-assets ratio measures the overall capital strength and supposedly captures the general safety and soundness of the bank. An increase in debt financing of the bank's total assets (holding total assets constant) and/or a decline in its total assets (holding debt financing constant) will lead to a deterioration of the bank's equity-to-assets

[8] Clearly, comparability is limited by accounting policies such as conservative versus aggressive presentation of financial statements and other bank specific differences.

ratio. In both cases, therefore, the bank's risk increases, which in turn implies higher expected stock returns. In the standard textbook case, a higher use of debt (and a lower equity-to-assets ratio) will increase the firm's cost of capital due to increased shareholder return volatility.

Leverage is important in explaining stock market performance of banks. For example, Brewer et al. (1996a, 1996b) document that leverage can explain financial institutions' risk and return characteristics. The results in Cantor and Johnson (1992) suggest a positive relationship between improving capital ratios and stock market performance for bank holding companies. Among the methods to increase capital ratios, increases in earnings are associated with the largest stock price increases. However, these results are based on data from a time period when US banks in general were characterized by weak financial strength, presumably indicating that the market was evaluating capital ratios in the context of the prevailing risk situation. In contrast, Berger and Di Patti (2006) analyze data over the later period from 1990 to 1995 and document that in their sample of US commercial banks higher leverage is positively related to profitability. They interpret this result as support for the existence of agency conflicts and the disciplining effect of debt. Sironi (1999) points out that substituting equity with less expensive sources of funds like subordinated debt is one way to decrease a bank's cost of capital and to improve its overall profitability.

(2) Loans to total assets

Loans represent the major portion of the asset side of a bank's balance sheet. We therefore use the ratio of net loans to total assets, denoted as L_TA, as an explanatory variable.[9] While the nature of this ratio is complex, it is generally assumed that loans to total assets indicate the future health of a bank, and it is often used as a proxy for measuring liquidity risk. Loans are difficult to trade in the secondary market, hence, they are the least liquid asset in the bank's balance sheet (after fixed assets). A bank with a high ratio of loans to total assets is relatively illiquid, whereas a low ratio implies that the bank has some excess lending capacity. The ratio of loans to total assets, therefore, proxies for the utilisation of a bank's balance sheet and may be an indicator for more or less profitable business models in terms of shareholder returns.

Diamond (1984, 1991) and Fama (1985), among others, develop models in which banks collect and process information about loan customers and continue to acquire private information through subsequent monitoring activities. However, shareholders' bank claims are unlikely to

[9] Net loans are gross loans minus loan loss reserves. The loans positions also contain leases and mortgages.

fully reflect the information impounded in the bank's loan portfolio due to confidentiality of the bank-borrower relationship and limited disclosure about lending agreements, implying that marking bank loans to the market is difficult (O'Hara, 1993; Slovin et al., 1992). Private information forms the foundation for a loan portfolio and, therefore, the structure (and changes) of the loan-asset mix are difficult to interpret by outsiders.

(3) Total earning assets to total non-earning assets

The ratio of total earning assets to total non-earning assets, labelled E_NEA, is closely related to the ratio of loans to total assets, but it captures a broader range of activities on the asset side of a bank's balance sheet. In addition to loans, earning assets include the various deposits due from other banks, discounts, as well as bond and equity securities held by the bank. In contrast, non-earning assets include required reserves held on deposits, cash balances needed for check clearing or other operational needs, and fixed assets. A high ratio of total earning assets to total non-earning assets may indicate a stronger focus on the core business, combined with a low percentage of assets that do not contribute to value generation. Presumably, a bank that has a substantial part of its assets tied up in non-earning assets faces a weaker competitive position. In this case, either the average return on total assets will be lower or the level of risk of the earning assets would have to be increased to compensate for the lack of cash flows from non-earning assets.

(4) Loan-loss provisions to net interest revenue

Thakor (1987) suggests that the level of loan-loss provisions is an indication of the bank's asset quality and signals changes in the future performance. We construct the ratio of loan-loss provisions to net interest revenue, denoted as LLP_IR, and interpret it as a proxy for asset quality. Even if their portfolios exhibit a different level of risk, this ratio is comparable across banks, because higher margins will compensate for higher exposure.[10] Loan-loss provisions are the traditional approach for banks to manage their credit risk, including the possibility to smooth earnings (Roger and Sinkey, 1999). In some instances, however, credit derivatives could be a superior substitute to loan-loss provisions (Moser, 1998). Therefore, a decrease in loan-loss provisions relative to interest revenue can be interpreted either as an indicator of improving quality of the bank's loan portfolio and/or an increase in the use of more sophisti-

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[10] Because loan-loss provisions represent a flow variable and loan-loss reserves the corresponding stock variable, their information content is similar. Nevertheless, loan-loss provisions are more appropriate to capture the management's current view about the risk exposure of their assets, while loan-loss reserves are assumed to represent accumulations from the past.

cated risk management tools. In both cases, one would expect to observe a negative relationship between loan-loss provisions. Miller and Noulas (1997) suggest that declines in loan-loss provisions are in many instances the primary catalyst for increases in profit margins.

Although a bank's management has significant discretion over timing and size of the changes in reserves, increases (decreases) in loan-loss reserves provides new information on the deterioration (improvement) of its loan portfolio. Strong and Meyer (1987) as well as Musumeci and Sinkey (1990) suggest that investors exploit information on loan-loss provisions to revise their performance expectations. Empirical studies document the impact of loan-loss reserves on bank stock returns. While Grammatikos and Saunders (1990) find a weak overall effect of loan-loss provisions on bank stock returns, Madura and Zarruk (1992) document a negative share price response when an increase in loan-loss reserves is related to bad real estate loans. Lancaster et al. (1993) and Docking et al. (1997) report a negative share price reaction upon announcement of an unexpected increase in loan-loss reserves. Wahlen (1994) examines the information content in non-performing loans, loan-loss provisions, and loan charge-offs and documents that all three components are important for explaining bank stock returns and future cash flows.

(5) Nominal value of off-balance sheet items to total assets

With increasing competition in recent years, one of the most important developments in the banking sector is the surge in the volume of derivatives, options and structured products like swaps, letters of credit, loan commitments, and credit default swaps. Although these instruments are diverse, they all fall into the group of off-balance sheet activities, i.e., unlike traditional interest business they do not have a direct effect on the bank's balance sheet. Therefore, an additional explanatory variable is the aggregate position of the notional amount of off-balance sheet items divided by total assets, labelled OB_TA. For example, Casu and Girardone (2005) document that off-balance sheet activities measured by this ratio are important in explaining the productivity levels of European banks. Cooper et al. (2003) use unused loan commitments, standby letters of credit and interest rate swaps as distinct explanatory variables, but the data for such a detailed split are not available for European banks on a broader basis.

Clearly, this definition has drawbacks. First, net exposure might differ substantially from the aggregate gross position. Second, it is unclear whether banks use off-balance sheet instruments to hedge risk or to acquire additional risk exposure. Avery and Berger (1991) argue that loan commitments increase a bank's risk exposure by obligating it to issue future loans under terms that may no longer be acceptable. In contrast, Boot and Thakor (1991) suggest that loan commitments are incentives to constrain the risk-taking behaviour of a bank's management. Using a sample of US banks, Brewer et al. (2000) document a positive relationship between a bank's loan volume and its use of interest derivative instruments, indicating that off-balance sheet activities tend to complement rather than substitute the traditional business. This result could also be interpreted as suggesting that off-balance sheet instruments are used as a hedge rather than to acquire additional risk exposure. For example, Brewer and Koppenhaver (1992) observe that issuances of letters of credit affect the systematic risk and the total risk of bank stock returns, although less significantly than traditional balance sheet lending. Carter and Sinkey (1998) document a weakly positive relationship between the use of interest rate derivatives and interest rate risk. More recent results in Wang et al. (2005) suggest that the disclosure of the nominal value of off-balance sheet items of US banks is value relevant. The evidence for incremental information content is even robust to the inclusion of fair value data.

(6) Non-interest income to total operating income

The changing banking landscape throughout Europe has led to an erosion of traditional income sources. Many banks are rapidly expanding their range of business activities to maintain growth in revenues and to diversify away from their stagnating (or even declining) traditional business. Therefore, activities that generate non-interest income are becoming increasingly important as indicators for the financial health of banks. We use the ratio of non-interest income to total operating income, denoted as NI_TI, to asses the impact on bank stock returns.[11] The European Central Bank (2000) documents that the share of non-interest income to total income increased from 30% to 41% between 1995 and 1998, while it was below 20% in 1990. The composition of European banks' non-interest income is rather heterogeneous. In 1998, fees and commissions accounted for 54% of total non-interest income, and profit from financial operations and income from securities made up 19% and 17%, respectively.[12] Overall, the growth of non-interest income seems to have had a positive effect on bank profitability.

[11] Clark and Siems (2002) use this variable as an alternative measure for off-balance sheet activities and document that the ratios OB_TA and NI_TI are highly correlated. We therefore check for the possibility of multicollinearity of these variables in the empirical section.

[12] Figures are based on the year 1998; the remaining 10% consist of "other operating income".

While interest margins are highly dependent on interest-rate movements and economic cycles, fee income provides diversification and greater stability for bank profits. The diversification effect reduces the expected costs of financial distress and, therefore, presumably will have an impact on the valuation of banks. Grammatikos et al. (1986) document that US banks are able reduce their risk by engaging in off-balance sheet activities that generate non-interest income. Canals (1993) concludes that the revenues generated from new business units have significantly contributed to improve bank performance. Saunders and Walter (1994) argue that the expansion of bank activities reduces risk, and the main risk reduction gains arise from insurance rather than securities activities. Gallo et al. (1996) document that a high proportion of mutual fund assets managed relative to total assets of bank holding companies is associated with both increased profitability and risk reduction. Similarly, Rogers and Sinkey (1999) observe that banks with a larger portion of new sources of income exhibit less risk because they can better diversify their income streams and have better access to the capital markets. The European Central Bank (2000) concludes that higher non-interest-income relative to traditional income is not associated with an increase in bank stock return volatility.

In contrast, DeYoung and Roland (2001) suggest that more non-interest income could be associated with higher levels of risk. They argue that traditional streams of income from intermediation activities are less volatile than income from fee-based activities and propose three explanations for their findings. First, in contrast to fee-based activities, most bank loans in continental Europe are relationship-based and associated with high switching cost (lock-in effect). Interest income from loans, therefore, may be less volatile than non-interest income, despite credit risk and interest rate risk. Second, the main input for an ongoing lending relationship is variable, while new fee-based products will generally trigger fixed expenses (e.g., labor expenses). Fee-based revenues, therefore, are associated with greater operating leverage than lending activities. Finally, most fee-based activities do not require banks to hold additional regulatory capital, leading to greater financial leverage than the traditional lending business. Both changes in operating and financial leverage supposedly induce additional volatility in bank earnings.

(7) Cost to income ratio

Due to slower growth in revenues, cost efficiency has become a key strategic target for bank management in recent years. Many banks have introduced tremendous cost-saving efforts including organizational changes (e.g., outsourcing), reduction in their branch network as well as the number of employees, and concentration on their core business. Next to the return on equity (ROE), the cost to income ratio is the most prominent benchmark measure in the banking industry. Therefore, we measure the operating efficiency by computing the cost to income ratio, labelled CIR, as the ratio of overhead costs to total operating income.

Prior studies from the banking efficiency literature often use non-parametric modelling techniques (e.g., see Beccalli et al., 2006).[13] Nevertheless, several studies also document the relevance of simple accounting ratios for bank profitability. For example, using US data, Vander Vennet (2002) observes that the cost to income ratio is important in explaining bank profitability. Peristiani (1997) concludes that more complex efficiency measures are strongly correlated with simple accounting ratios. Schure et al. (2004) examine differences between efficient and inefficient European banks. In addition to generating higher profits, efficient banks are more often involved in off-balance sheet activities and fee generating activities than inefficient banks. Their results further indicate that the cost to income ratio provides information about the underlying business portfolio. Banks that have successfully transformed their activities towards new income streams tend to display lower cost to income ratios than banks where the traditional business model still prevails.

(8) Price earnings ratio

The price earning ratio (PE) is one of the key performance measures frequently observed by analysts and investors. Previous studies link changes in earnings to future stock returns. For example, a well documented phenomenon is the "post earnings announcement drift", where stock prices underreact subsequent to earnings announcements (Ball and Brown, 1968; Bernard and Thomas, 1990; Hew et al., 1996). Among other fundamental valuation ratios, Lakonishok et al. (1994) as well as Fama and French (1998) classify stocks according to the price earnings ratio and document that stocks with low price earnings ratios (value stocks) outperform stocks with high price earnings ratios (growth stocks). To construct earnings per share, we use earnings that reflect profits after taxes, minority interest, and preferred dividends. The number of shares is based only on ordinary shares, except when preference shares participate in the profits, and stock prices in the nominator are year-end values.

Earnings per share are not a measure that is unique to banks. However, as noted by Cooper et al. (2003), fluctuations of banks' earnings should be less pronounced than those of non-

[13] Efficiency studies are mostly based on Data Envelopment Analysis or Stochastic Frontier Approaches.

financial firms because banks have some discretion in reporting their earnings (e.g., through adjusted loan-loss provisions). To some extent, therefore, banks should be able to insulate earnings against external shocks. If banks smooth their earnings, changes in earnings per share will have an impact on future bank stock returns because they reveal inside information (signalling).

3. Data description

Most of our data are taken from the databases of Bureau van Dijk. In particular, financial accounting data has been retrieved from Bankscope, and information on delisted firms and industry classification is from Osiris. Stock market data is from Datastream. We use yearly consolidated accounting data for a large sample of European banks from the financial statements contained in the Bankscope database over the time period from 1991 to 2005.[14] In most instances, Bankscope does not provide a single unique statement per bank over the entire sample period.[15] Major changes in the accounting practices, e.g., the switch to consolidated financial statements, are accompanied by the introduction of a new separate time series for an entity. Therefore, several different financial statements per entity may be available for a given reporting period, e.g., each representing a different basis of consolidation. This requires defining rules for selecting and merging these statements to obtain one unique time series per bank entity. Our time series are constructed as follows:

- The primary statement we use is labeled "Institution" by Bankscope, i.e., the most aggregated statement as of year-end 2005. In general, this is a consolidated statement (C1, C2), and only in the few cases where a bank does not publish annual reports on a consolidated basis we use an unconsolidated version (U1).[16]
- For the years before 2005, we choose the statement at the highest level available. If both consolidated and unconsolidated statements have been filed in a given year, the consolidated statement is considered as the more aggregate version.

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[14] Quarterly or half-year reports are only available for a few European banks over a very short period of time.
[15] See Micco et al. (2004) for a discussion about the use of Bankscope data.
[16] Bankscope has six codes for consolidation (C2, C1, C* and U2, U1, U*), where C indicates a consolidated and U denotes an unconsolidated statement. The extension "2" indicates that both a consolidated and an unconsolidated statement exist for a bank (codes C2 and U2) at some point of time. Accordingly, the codes C1 and U1 indicate that no companion statement exists. C* and U* indicate that additional statements have been filed. This leads to the following seniority ranking of statements filed (assuming that consolidated statements represent the most senior information available): C2/C1 > C* > U1 > U* > U2.

- If in given year (e.g., during the early sample years) or over the entire sample period only unconsolidated statements are available, we assume that they represent the most senior information available.

The underlying rationale for our classification is that if several statements exist for a bank in a given year, then the consolidated version incorporates all information necessary to model fundamental changes in bank value. In contrast, unconsolidated statements only track the performance of the parent company and do not take into account the effects that subsidiaries have on the entity value.[17] Once the most senior statement per year has been identified, the corresponding time series are merged. The accounting data for the old and new reports overlap because firms are required to present a restatement for the previous year when a change to a new standard occurs. In this case, the figures from the old report are used rather than the restated figures from the following year. This procedure guarantees that no information is considered prior to publication and avoids a look-ahead bias.

To be included in our sample, banks must be contained in the Bankscope database with location in one of the 15 European countries forming the pre-2004 European Union, Switzerland or Norway. In addition, banks are required to be listed on a stock exchange or to have been delisted at some point in time during the sample period from 1991 to 2005. Accordingly, our sample is free from any survivorship biases. In addition, the corresponding monthly stock returns must be available in the Datastream database. The full list of firms is broad and contains several types of entities that do not match the definition of a credit institution. The Bankscope classification is to some extent arbitrary, and therefore our sample contains all entities that are currently classified as "Banks" based on the Industry Classification Benchmark (ICB) published by FTSE and Dow Jones. The ICB category "Banks" contains traditional commercial banks and universal banks, but it excludes specialized entities that are classified as "Investment Services" or "Asset Managers". Based on this ICB sample of banks, entities are excluded if the fiscal-year end is not December 31 and/or the respective fiscal year covers less than twelve months. These steps result in a sample of 300 banks. The European banking industry is strongly dominated by the five countries where the major players are located: the United Kingdom, Germany, France, Switzerland and Italy. Table 1 reveals that the relevance of individual countries steeply declines from the top to the bottom of the ranking. Independent

[17] See Abad et al. (2000) for a discussion of the value relevance of consolidated and unconsolidated accounting information.

of the measure applied the top five countries make up two-thirds or more of the total of the respective item.

[Insert table 1 here]

In an additional step, our sample has been cleaned by applying the Bankscope independence index in combination with the Datastream item for the percentage of free float.[18] Banks with a shareholder owning more than 50% of the outstanding shares (i.e., banks classified as C or D) and/or a free-float below 10% during the 2002-2005 period were dropped from the sample, reducing our initial sample from 300 to 265 banks.

Finally, the accounting data have been cleaned for obvious outliers and data irregularities. In the first step, observations have been removed where negative values for data items are not sensible (e.g., common equity) or where items exceed logical bounds (e.g., if loans exceed total assets). In the second step, obvious outliers in the accounting ratios have been deleted (e.g., limiting the ratio of non-interest income to total income to lie in the range between 0 and 1).[19] To capture sufficient time series information, we further require that a bank has been in existence for at least 4 years. Our final sample contains 235 banks over the period from 1991 to 2005, with an average of 8 years of data per entity. By conditioning the returns over 3 months on prior (yearly) accounting data (see section 2), our unbalanced panel contains over 6000 firm-month observations.[20]

Fama and French (1992, 1993) suggest that – in addition to the market portfolio – the market value of equity (as a proxy for firm size) and the ratio of book value of equity to market value of equity are sufficient to explain the cross-sectional variation in stock returns. We therefore include both variables as controls in our regression analysis in addition to the bank-specific variables (see section 2). The book-to-market ratio (BM) is computed by dividing the book value of a bank's equity by its market value (year-end values). Common equity corresponds

[18] The ratings of the independence index indicate ownership structures as follows: No recorded shareholder with ownership over 25% (A), no recorded shareholder with ownership over 50% (B), total (direct and indirect, e.g., via pyramiding) ownership over 50% (C), and total direct ownership over 50% (D).

[19] Extreme or implausible values have been deleted from our sample. In most instances, we only deleted the 1% outliers. However, because complete data on all items per observation are required, the number of firm-year observations reduces from 6610 to 6014, which corresponds to a reduction by roughly 9%.

[20] Due to the nature of European banks, we do not work with more detailed subsamples of banks. The leading European banks are universal banks (e.g., Barclays, UBS, HSBC, Deutsche Bank), and the remaining entities are predominantly retail banks. Some specialized asset managers are based in the UK, but the majority of these entities are located in the United States. Another important segment in European banking is wealth management, but these banks are mostly not traded on stock exchanges.

to total shareholders' equity less treasury stocks and components of preferred equity. Market capitalisation (MV) is the market price at the end of a year multiplied by the number of common shares outstanding. If several types of shares exist, we use aggregate values. The book-to-market ratio is matched with stock returns in the same way as all other accounting variables. In contrast, assuming that the information is readily available to investors, we take market capitalization in logarithmic form and allow for a time lag of only one month.

Table 2 shows the descriptive statistics, and table 3 displays the correlations between our explanatory variables. The average monthly stock return (total return to shareholders, TRS) over the sample period is 1.5%, while the median is only 0.5%. Average stock market capitalization amounts to €4.2 billions, and the average value of the price earnings ratio is 11.12. As could be expected, loans are the major asset components of banks, representing 62% of the balance sheet aggregates. This figure is consistent with the high ratio of total earning assets to total non-earning assets (roughly 26 times). Loan-loss provisions amount to 20% of annual net interest revenue. Non-interest income represents 33% of total operating income. The ratio of off-balance sheet items to total assets is 26%, indicating that off-balance sheet penetration is lower in Europe (with the exception of the very large banks) than in the US. Finally, the equity to assets ratio and the cost-to-income ratio are 8% and 63%, respectively.

[Insert tables 2 and 3 here]

4. Empirical results

4.1. Specification tests and comparison of standard errors

In our main model, denoted as M3, we use the monthly returns from April to June of year t+1 and condition them on annual report data from the previous year t. The lag of three months is chosen to avoid a possible look-ahead bias by ensuring that accounting information is publicly known. Cooper et al. (2003) base their empirical analysis on the cross-sectional time series methodology developed by Fama and MacBeth (1973). The basic logic behind the Fama-MacBeth approach is to run T cross-sectional regressions for each time period in the sample and then calculate the point estimates of coefficients as simple means over all T equations.[21] Although this methodology is often applied in financial econometrics, current research emphasizes that it might be inappropriate in many instances. In the presence of a time effect (spatial dependence), Fama-MacBeth produces unbiased standard errors and correctly sized

[21] T represents the number of corresponding time intervals in the sample.

confidence intervals. Therefore, the Fama-MacBeth approach can be used if the observations for different entities (firms) within the same period are correlated, but the observations for the same firm in different periods are uncorrelated. In contrast, if serial correlation is present in either the independent variables or the residuals (or both), the Fama-MacBeth standard errors (SE) are biased in the same way as the ordinary least square (OLS) standard errors. Peterson (2006) shows that Fama-Macbeth standard errors are biased in the presence of firm effects. The magnitude of the (downward) bias is a function of the serial correlation of both the independent variable and the residual within a cluster and the number of time periods per firm.[22]

Given the structure of our data, we a priori suspect that there are both forms of dependencies. On the one hand, the dependent variable consists of monthly bank stock returns, which supposedly exhibit (weak) serial correlation. Our independent (yearly) accounting variables will be persistent; in fact, serial correlation of these variables is large and dies away only slowly as the lag between observations increases. Moreover, we cannot rule out autocorrelation in the residuals. On the other hand, as only a single industry (banks) in the same geographic region (Europe) is analyzed, the yearly reporting figures are presumably affected by common shocks. Therefore, with both firm effects and time effects, we test several alternative panel estimators to identify possible biases in the standard errors.

In a first step, we asses whether a fixed effects or a random effects model is appropriate using the Hausman (1978) specification test output. This is an important issue in our setup because stock returns as the dependent variable vary from month to month between April to June of year t+1, while the independent variables are annual accounting figures from the previous year t and remain constant by construction. The annual data reduce the variability of the independent accounting variables, implying potential correlation with the fixed effects and exaggerated significance levels. Given that the Hausman test has very demanding assumptions, we implement the artificial regression version of the test proposed by Wooldridge (2002).[23] The results strongly suggest that the assumptions of a random effects model are not met by our data. Although the value of the Hausman test statistic decreases when adjusting for disturbances in the error terms, the rejection of the random effects model (as the null hypothesis) is always highly significant. To check whether our main model is correctly specified, we also report the results from an alternative setup where we condition the cumulative 3-months re-

[22] See also Ibragimov and Müller (2006).

[23] See Wooldridge (2002), p. 290. This version of the test uses robust or cluster corrected standard errors.

turn from April to June in year t+1 on the annual accounting data from the previous year t. A Hausman test again indicates that the fixed effects model is the correct specification. This result seems intuitive, because the selection of banks in our sample is assumed to represent a comprehensive description of the European banking industry rather than a randomly drawn sample. As shown in the next subsection, although this alternative approach reduces the number of observations to roughly a third, the results remain qualitatively the same.

In a second step, we test alternative corrections of standard errors in order to generate conservative results. As suggested by Petersen (2006), table 4 compares the standard errors across estimation methods over the same fixed effects model. We do not report the corresponding point estimates because they are equal to those reported in model (1) in table 5 in section 4.2. Column (1) reports the robust standard errors calculated according to White (1980). Columns (2) and (3) contain clustered standard errors according to Roger (1993), which are White standard errors adjusted to account for possible correlation within a cluster. Column (4) displays Driscoll and Kraay (1998) standard errors, which are an extension of Newey and West's (1987) non-parametric estimator.[24] Robust standard errors are valid if only heteroscedasticity is present in the data. In contrast, standard errors with clusters either across companies (id) or years (yr) adjust for firm effects and time effects, respectively. Finally, Driscoll-Kraay standard errors are corrected for both firm effects and spatial dependence.[25] An inspection of columns (5) to (7) reveals that both the clustered and the Driscoll-Kraay standard errors are up to two times larger in magnitude than the simple robust standard errors. We interpret this result as indicating that the Driscoll-Kraay standard errors should be used to derive conservative results. Finally, we also implement a test for spatial dependence using Pesaran's (2004) test for cross-sectional dependence.[26] As expected, time effects and/or cross-sectional dependence are detected in all model setups.

[Insert table 4 here]

[24] Driscoll and Kraay (1998) standard errors have been implemented in Stata by Hoechle (2006).
[25] See Höchle (2006), p. 4.
[26] See De Hoyos and Sarafidis (2006) for an implementation of Pesaran's (2004) test in Stata. The null hypothesis holds that the residuals are independent and identically distributed over time and across cross-sectional units. Under the alternative, the residuals may be correlated across cross-sections, but the assumption of no serial correlation remains. The test statistic converges to a standard normal distribution under the null hypothesis. The test values are above 80 in all cases, indicating that the null hypothesis of cross-sectional independence can soundly be rejected at the 1% level.

In summary, both firm effects and time effects are present in our data, and the random effects model can be rejected based on the Hausman (1978) specification test. In our empirical analysis, therefore, we use a fixed effects model combined with Driscoll and Kraay (1998) standard errors. Standard errors are corrected for heteroscedasticity, autocorrelation, and spatial correlation, thereby avoiding inflated *t*-statistics and producing conservative significance levels.

4.2. Main empirical findings

Our main findings are presented in table 5.[27] Examining our baseline regression model with all ten explanatory variables in column (1) indicates that most of our explanatory variables are estimated significantly. The results are largely consistent with the theories introduced in section 2. Moreover, the coefficient of determination of the fixed effects regressions (the within R^2) is about 0.02, which is very low but in line with related predictability studies.[28]

[Insert table 5 here]

Looking at the explanatory variables in more detail, the coefficient on the ratio of loans to total assets (L_TA) is significantly positive. This finding indicates that a large loan portfolio is still value relevant, although the importance of lending activities in the overall bank portfolio is generally decreasing. It is also consistent with the notion that the variable L_TA proxies for the utilisation of a bank's balance sheet, with a high ratio being an indicator for a more profitable business model. The positive (although insignificant) coefficient on the ratio of total earning assets to total non-earning assets (labelled E_NEA) has a similar interpretation, as both variables (L_TA and E_NEA) capture the activities on a bank's asset side and measure the percentage of assets that contribute to value generation.

As expected, the ratio of loan-loss provisions to net interest revenue (LLP_IR) is negatively related to bank stock returns. This ratio could be interpreted as a proxy for the ability of banks to balance risk and return, and increasing loan-loss reserves are presumably associated with a deteriorating quality of a bank's loan portfolio and a subsequent decrease in profitability. The positive impact of a higher ratio of non-interest income to total income (NI_TI) on bank stock returns documents that the market rewards banks that are less dependent on the traditional lending business. This observation supports the hypothesis that fee income provides diversification benefits for a bank and reduces its earnings volatility, thereby decreasing the expected

[27] To make the output easier to interpret, ratios are regressed on monthly returns expressed in percentage points.
[28] For example, see Dell'Aquila and Ronchetti (2006).

costs of financial distress and the future cost of equity capital. The positive coefficient on the ratio of off-balance sheet items to total assets (OB_TA) further reinforces this notion. In fact, the results suggest that off-balance sheet activities create shareholder value rather than build up an uncompensated risk exposure.

Consistent with economic intuition, the equity to assets ratio (EQ_TA) exhibits a negative estimate, indicating that the stock market rewarded higher leverage with higher returns. However, the corresponding coefficient is only close to significance at the 10 percent level. To gain additional insight, it would be interesting to use the regulatory measures Tier 1 Ratio (T1R) and Total Capital Ratio (TCR) in our regressions, as defined by the Basle accord.[29] In contrast to the equity to assets ratio, they represent risk-weighted measures. However, the data for the two ratios are not broadly available in the Bankscope database. Using available data, we compute the correlation of EQ_TA with both risk weighted measures. The correlation coefficients between EQ_TA and T1R as well as TCR are 0.91 and 0.45, respectively. Overall, the findings suggest that higher leverage translates into higher levels of ROE and ROA. Presumably, these ratios are closely followed by all investors, and a tight management of equity capital will be associated with superior bank performance.[30]

The positive impact of the cost to income ratio (CIR) on bank stock returns is against the economic intuition, suggesting that lower profitability translates into underperformance in terms of total shareholder returns. A possible explanation is that overhead costs in the numerator of the ratio may be distorted by different accounting policies with respect to the cost components included. A closer look at the data reveals that different groups of banks seem to have systematically lower cost to income ratios. However, any classification seems difficult because the ratios change significantly over time even for individual banks. An ad hoc hypothesis could be that banks that report a very low cost to income ratio do not provide a transparent view of their real cost structure. These banks obscure their real performance in the short run by discretionary calculation, and market participants impose a penalty on banks with accounting practices that lead to unduly low cost to income ratios.

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[29] The Tier 1 Ratio consists of shareholders' funds plus perpetual non-cumulative preference shares expressed as a percentage of risk weighted assets and off-balance sheet risks. The Total Capital Ratio consists of Tier 1 and Tier 2 Capital expressed as percentage of risk weighted assets and off-balance sheet risks. Tier 2 Capital includes subordinated debt, hybrid capital, loan loss reserves, and valuation reserves.

[30] Looking at the equity to total assets ratio of individual banks reveals that institutions like UBS, Svenska Handelsbanken, or Deutsche Bank all display values in the lowest ranges. Therefore, it seems that well managed and highly profitable banks fall into this group, further strengthening the evidence that our results are not spurious.

The coefficients on the non-banking control factors in our regressions are as expected. The coefficient on the price earnings ratio is positive, albeit insignificant. The coefficients on the natural logarithm of market capitalization (lnMCAP) and the book to market ratio (BM) indicate that smaller banks outperform larger banks and value outperforms growth. Although the coefficient on the book to market ratio is again insignificant, the results here together with the results for the robustness tests in table 6 to some extent confirm the findings in Barber and Lyon (1997) and Petkova (2006) that the standard fundamental factors do not loose all their explanatory power in a banking context.

4.3. Robustness tests

In this section, we report the results from robustness tests. In a first step, in columns (2)-(6) of table 5 we test various specifications of our main model. Additional explanatory variables are included according to their significance levels in the complete model in column (1). Our results are robust to the exclusion of the least significant explanatory variables and, hence, it can be assumed that no distorting cross-relationships are present. As a minor change of the model setup, we replace the ratio of off-balance sheet assets to total assets (OB_TA) with the natural logarithm of the notional amount of off-balance sheet assets. In results not reported here, the point estimate becomes smaller but remains significant at the 5% level.

In our main model (M3), stock returns as the dependent variable vary from month to month between April to June of year t+1, while the independent variables are (constant) accounting figures from the previous year t. Although a Hausman test indicates that a fixed effects model is the correct specification, the low variability of the independent accounting variables could lead to inflated significance levels. In a second step, therefore, column (7) of table 5 reports the results from an alternative setup where the cumulative 3-months return from April to June in year t+1 is conditioned on annual accounting data from the previous year t. This approach reduces the sample to 1962 firm-year observations (i.e., to roughly a third of our main model). The results are robust, confirming that our main model in column (1) is correctly specified.

In a third step, we divide the sample period into two subperiods, the first from 1991 to 1998 and the second from 1999 to 2005. As shown in columns (1)-(3) in table 6, our results again remain qualitatively robust, although the statistical significance is substantially lower in both subperiods compared to the full sample period (possibly due to the lower number of observations). Although the Discroll and Kraay (1998) standard errors are used, we also include additional year dummies into the model to make sure our findings are not based on spurious spatial dependencies. As reported in columns (4)-(6) in table 6, our results remain robust.

[Insert table 6 here]

We relate monthly bank stock returns to yearly accounting figures. In theory, therefore, a variety of matching options exists, and it seems important to gain additional insights about the stability of our results when we use a longer return period. We assume a time lag of three months for the annual report to be published. In our baseline regression model, therefore, the banks' stock returns during the months April, May and June of year t+1 are conditioned on accounting data of the previous fiscal year t. Based on the regulatory requirements in which they operate, the banks in our sample have some discretion over their timing and will differ in their publication habits. In general, capital market oriented countries tend to encourage faster publication habits than bank-based countries. Another aspect, however, relates to the changes over time. Increasing performance pressure and corporate governance initiatives have led to a significant speeding up of the reporting process in most countries. For example, upon request investor relations of Deutsche Bank provided information on the publication dates of its annual report. The publication date of the final report remained unchanged over time. However, the preliminary publication of the bank's key figures gradually shifted forward by two months from end of March in 1993 to beginning of February in 2006.

As another robustness check, in table 7 we test alternative timing specifications. The model in column (2), denoted as March-M3, conditions bank stock returns starting one month earlier compared to the baseline regression model (which is restated in column (1) for convenience), i.e., the model relates bank stock returns during the months March, April, and May of year t+1 to accounting numbers of year t. Compared to the baseline regression model, the model in column (3), labelled March-M4, also starts one month earlier but incorporates the four monthly returns from March to June of year t+1. The remaining two models, denoted as February-M3 and February-M4 in columns (4) and (5), respectively, are set up in the same way.

Comparing the regression results in columns (1)-(5) in table 7, the ratio of loan-loss provisions to net interest revenue (LLP_IR) and the ratio of non-interest income to total operating income (NI_TI) emerge as those factors that are stable over all alternative model specifications. Overall, while the significance levels remain high in the March-M3/M4 regression setups, they drop sharply in the February-M3/M4 models. However, with only a few exceptions the signs of the estimated coefficients remain unchanged.

[Insert table 7 here]

The last two columns in table 7 contain yet two other possibilities to condition bank stock returns. The model in column (6), denoted as M6, starts in April of year t+1, but uses the returns from the following 6 months and relates them with the accounting information from the previous year t. The model in column (7), denoted as M9, uses the returns from the following 9 months. We choose not to test a model with 12 monthly returns to avoid including returns that might be influenced by expectations or the actual publication of accounting data in year t+2. Intuitively, these specifications address the potential trade-off between capturing the full valuation effects of the information contained in our explanatory variables against including too much "noise" and/or stock returns that are already conditioned on a different information set. The results are very robust, but a closer inspection reveals that the magnitude of the estimated coefficients tends to decrease if longer return periods are used. This finding indicates that the effect of fundamental banking data on stock returns is strongest close to the publication date of the annual report and then gradually fades out. A second observation is that the coefficient on the book-to-market ratio is now significant. Overall, we conclude that a three month publication lag in our baseline regression seems to be a reasonable choice that matches the publication habits and of the banks in our sample.

Any regression model is prone to misspecification due to the effect of outliers. Although our sample has already been cleaned for unrealistic values in the data gathering process, as a final robustness test we now censor our explanatory variables to investigate whether our results are driven by extreme values. The results are shown in table 8, where column (1) again shows the results form our baseline regression model. Columns (2) and (3) contain the results when we censor the data at the 1% and 5% level, respectively. Censoring the data leads to a loss in data points substantially exceeding the corresponding tail values, because for each firm-month observation complete data on all variables must be available. In fact, our full sample is sharply reduced by 12% in column (2) and even roughly cut in half in column (3). Nevertheless, although the significance levels decrease with shrinking sample sizes, the results in table 8 indicate that our findings are not driven by extreme value in the data.

[Insert table 8 here]

5. Conclusion

In this paper, we investigate the impact of individual bank fundamental variables on stock returns using data from a sample of 235 listed and delisted European banks from 1991 to 2005. This is an interesting time period for the European banking industry because it marks a significant transition period, characterized by an overall increase in competition throughout the sector, lower profit margins in the traditional interest-related business, and increasing non-interest income in terms of fees and commissions. We investigate the impact of traditional and non-traditional financial intermediation activities on banks' profitability, as measured by stock returns subsequent to the release of relevant accounting figures. Our valuation model contains seven bank specific variables and three traditional asset pricing factors. The underlying assumption is that the information contained in the fundamental variables predicts bank stock returns for a longer time span because of their close connection to the value creation process of a bank.

We estimate panel regressions and implement different corrections for the standard errors to control for heteroscedasticity, autocorrelation, and spatial correlation. Our results reveal that bank-specific variables exhibit a robust explanatory power for bank stock returns across the different model specifications:

- The ratio of loans to total assets has a positive impact on bank stock returns, indicating that capital markets still incorporate the classical side of business when they value banks;
- the ratio of non-interest income to total income has a positive impact, implying that lower dependence on the classical lending business is an indicator for a bank's financial health;
- the ratio of off-balance sheet items to total assets also has a positive impact, suggesting that banks create shareholder value when they engage in this fast growing business area;
- the ratio of loan-loss provisions to net-interest income has a negative impact, confirming the notion that banks balance the level of risk relative to their cash flow generating assets;
- the ratio of equity to total assets also has a negative impact, implying that tight capital management is necessary for banks because excessive equity cushion makes it hard to earn a competitive return on funds.

Overall, the valuation of bank stocks incorporates both the classical loan-related side of banking activities and the growing off-balance activities. Moreover, both Fama-French asset pricing factors, the book to market ratio and market capitalisation, are significant in several of our regression specification. This result confirms prior findings by Barber and Lyon (1997) that the standard fundamental factors maintain their explanatory power in a banking context, albeit significance is not strongly pronounced in our sample.

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Table 1: The European banking universe

Country	Total assets	Equity	Net Income	Market Cap.
United Kingdom	21.2%	25.1%	26.5%	30.0%
Germany	16.2%	9.1%	2.1%	6.4%
France	14.9%	13.2%	12.2%	9.8%
Switzerland	10.1%	9.0%	18.7%	8.5%
Italy	8.3%	11.9%	7.0%	10.6%
Belgium	7.1%	5.9%	5.8%	5.0%
Spain	5.4%	7.7%	6.5%	9.5%
Netherlands	3.7%	5.5%	7.8%	6.2%
Sweden	3.2%	2.8%	3.4%	3.7%
Ireland	2.4%	2.0%	2.5%	2.5%
Austria	2.0%	2.0%	1.5%	1.6%
Denmark	1.7%	1.3%	1.6%	1.5%
Greece	1.1%	1.3%	1.1%	2.1%
Portugal	0.9%	1.2%	0.9%	0.9%
Luxembourg	0.8%	0.8%	0.6%	0.3%
Norway	0.8%	0.9%	1.4%	0.9%
Finland	0.3%	0.4%	0.7%	0.5%
Total	100.0%	100.0%	100.0%	100.0%

This table provides a description of the European banking sector. The numbers indicate the percentages of the respective items combined from all banks in a particular country and are based on 2004 data from the Bankscope database. Countries are sorted by their share of total assets.

Table 2: Sample characteristics

	Mean	Std. dev.	Q25	Median	Q75
L_TA	0.620	0.166	0.521	0.622	0.739
E_NEA	26.689	18.384	12.577	21.081	33.896
LLP_IR	0.200	0.190	0.096	0.157	0.236
NI_TI	0.330	0.140	0.237	0.322	0.408
OB_TA	0.262	0.311	0.085	0.178	0.317
EQ_TA	0.079	0.039	0.052	0.068	0.098
CIR	0.630	0.117	0.560	0.626	0.696
PE	11.116	21.758	1.415	10.412	16.339
MCAP	4.165	12.313	0.062	0.244	1.679
BM	1.005	0.642	0.585	0.893	1.235
TRS	0.015	0.083	-0.023	0.005	0.043

This table provides a data description based on 235 European banks over the period from 1991 to 2005 taken from the Bankscope database. The following bank-specific variables are used: L_TA denotes the ratio of loans to total assets, E_NEA the ratio of total earning assets to total non-earning assets, LLP_IR the ratio of loan loss provisions to net interest revenue, NI_TI the ratio of non-interest income to total operating income, OB_TA the ratio of the nominal value of off-balance sheet items to total assets, EQ_TA the ratio of book value of equity to total assets, and CIR the cost to income ratio. The asset pricing variables are as follows: PE is the price earnings ratio, MCAP the market capitalization (given in billions of Euro), and BM the ratio of book value of equity to market value of equity. TRS denotes the total return to shareholders on a monthly basis. The construction principles of the variables are described in section 2. Q 25 and Q75 are the 25% and 75% quintiles of the distribution, respectively.

Table 3: Correlation coefficients of explanatory variables

	L_TA	E_NEA	LLP_IR	NI_TI	OB_TA	EQ_TA	CIR	PE	MCAP	BM
L_TA	1.000									
E_NEA	0.308	1.000								
LLP_IR	0.041	0.085	1.000							
NI_TI	-0.331	-0.315	0.016	1.000						
OB_TA	-0.161	-0.094	0.081	0.075	1.000					
EQ_TA	0.102	0.115	-0.163	-0.209	0.098	1.000				
CIR	-0.279	-0.184	0.065	0.143	0.038	-0.220	1.000			
PE	-0.088	-0.082	-0.064	0.143	-0.054	-0.135	0.054	1.000		
MCAP	-0.242	-0.217	-0.064	0.321	0.014	-0.237	0.008	0.139	1.000	
BM	0.260	0.148	0.105	-0.312	-0.079	0.181	0.043	-0.180	-0.262	1.000

This table provides the matrix of correlation coefficients of the variables used to predict bank stock returns based on 235 European banks over the period from 1991 to 2005 taken from the Bankscope database. The following bank-specific variables are used: L_TA denotes the ratio of loans to total assets, E_NEA the ratio of total earning assets to total non-earning assets, LLP_IR the ratio of loan loss provisions to net interest revenue, NI_TI the ratio of non-interest income to total operating income, OB_TA the ratio of the nominal value of off-balance sheet items to total assets, EQ_TA the ratio of book value of equity to total assets, and CIR the cost to income ratio. The asset pricing variables are as follows: PE is the price earnings ratio, MCAP the market capitalization (given in billions of Euro), and BM the ratio of book value of equity to market value of equity. The construction principles of the variables are described in section 2.

Table 4: Comparison of standard errors of alternative panel regression estimators

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	robust	cluster(id)	cluster(yr)	D-K	(2)÷(1)	(3)÷(1)	(4)÷(1)
L_TA	1.92	1.66	2.75	2.78	0.87	1.43	1.45
E_NEA	0.01	0.01	0.01	0.01	1.09	0.91	0.82
LLP_IR	0.79	0.88	0.91	0.84	1.11	1.14	1.07
NI_TI	1.57	1.67	2.15	2.03	1.06	1.37	1.30
OB_TA	0.61	0.82	0.80	0.72	1.34	1.30	1.18
EQ_TA	8.20	9.90	10.57	10.16	1.21	1.29	1.24
CIR	1.90	1.74	2.27	1.91	0.92	1.19	1.01
PE	0.01	0.01	0.01	0.01	1.00	1.13	1.00
Ln(MCAP)	0.29	0.37	0.55	0.59	1.29	1.90	2.05
BM	0.32	0.33	0.50	0.50	1.04	1.57	1.60
C	3.77	4.87	6.89	8.00	1.29	1.83	2.13

This table compares the standard errors based on different estimators. The underlying model corresponds to the regression specification in column (1) in table 6 and, hence, the point estimates are the same in all columns. Column (1) reports robust standard errors based on the White (1980) variance-covariance matrix. Column (2) and (3) present the clustered standard errors based on Roger (1993), where clusters are across firms (id) and years (yr), respectively. The standard errors in column (4) are based on the Driscoll and Kraay (1998) methodology, controlling for both firm effects and spatial dependence. Columns (5) to (7) present different ratios, where the robust standard errors from column (1) are in the denominator and the alternatives standard errors reported in column (2) to (4) are in the nominator. All variables are described in section 2, C denotes the intercept term.

Table 5: Main panel regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L_TA	9.308	5.787	9.407	9.307	8.878	8.864	32.306
	0.001 ***	0.065 *	0.001 ***	0.001 ***	0.002 ***	0.001 ***	0.000 ***
E_NEA	0.008						0.018
	0.323						0.572
LLP_IR	-4.068	-2.305	-3.537	-4.019	-3.634	-4.196	-13.851
	0.000 ***	0.007 ***	0.000 ***	0.000 ***	0.000 ***	0.000 ***	0.000 ***
NI_TI	7.839	3.029	7.517	7.534	6.578	6.717	33.338
	0.000 ***	0.125	0.001 ***	0.001 ***	0.007 ***	0.005 ***	0.003 ***
OB_TA	1.318			1.372		1.421	5.772
	0.070 *			0.059 *		0.060 *	0.000 ***
EQ_TA	-16.525			-15.905		-20.585	-84.456
	0.105			0.111		0.050 *	0.137
CIR	5.256	6.797	5.863	5.316			24.077
	0.006 ***	0.000 ***	0.003 ***	0.007 ***			0.000 ***
PE	0.002						0.037
	0.845						0.420
ln(MCAP)	-1.214		-1.338	-1.333	-1.406	-1.387	-7.148
	0.041 **		0.020 **	0.020 **	0.013 **	0.013 ***	0.074 *
BM	0.424						-1.144
	0.401						0.572
C	6.025	-7.297	6.868	8.189	12.084	13.172	56.744
	0.452	0.008 ***	0.378	0.293	0.082 *	0.054 *	0.265
R2 (within)	0.020	0.009	0.018	0.020	0.015	0.018	0.065
N	6014	6014	6014	6014	6014	6014	1962
# groups	235	235	235	235	235	235	235

Columns (1)-(6) of this table present the results of our main regression model (M3) with different combinations of the explanatory variables. Bank stock returns on a monthly basis between April and June of year t+1 are conditioned on (constant) accounting data from year t. The bank-specific variables are: L_TA denotes the ratio of loans to total assets, E_NEA the ratio of total earning assets to total non-earning assets, LLP_IR the ratio of loan loss provisions to net interest revenue, NI_TI the ratio of non-interest income to total operating income, OB_TA the ratio of the nominal value of off-balance sheet items to total assets, EQ_TA the ratio of book value of equity to total assets, and CIR the cost to income ratio. The asset pricing variables are: PE is the price earnings ratio, MCAP the market capitalization (given in billions of Euro), and BM the ratio of book value of equity to market value of equity. C represents the regression constant. The construction principles of the variables are described in section 2. All regressions are specified as fixed effects models with Driscoll and Kraay (1998) standard errors. The sample is based on 235 European banks over the period from 1991 to 2005 taken from the Bankscope database with 6014 firm-month observations. To check whether a fixed effects model is the correct specification, column (7) reports the results from an alternative setup where we condition the cumulative 3-months return from April to June in year t+1 on annual report data from the previous year t. This approach reduces the sample to 1962 firm-year observations. The figures underneath the estimate are the corresponding p-values. R2 refers to the within estimator. Significance levels are indicated by */**/*** on the 10%/5%/1% level.

Table 6: Panel regressions for sub-periods with optional year dummies

	(1)	(2)	(3)	(4)	(5)	(6)
	1991-2005 M3_base	1991 - 1998 M3_I	1999 - 2005 M3_II	1991-2005 M3_yd	1991 - 1998 M3_I_yd	1999 - 2005 M3_II_yd
L_TA	9.308 0.001 ***	2.903 0.487	10.554 0.002 ***	3.198 0.080 *	-1.876 0.595	7.093 0.000 ***
E_NEA	0.008 0.323	0.007 0.571	0.024 0.103	0.020 0.011 **	0.008 0.512	0.022 0.093
LLP_IR	-4.068 0.000 ***	-3.500 0.012 **	-0.626 0.415	-2.641 0.000 ***	-1.869 0.068 *	-1.400 0.090 *
NI_TI	7.839 0.000 ***	4.317 0.143	2.686 0.488	5.544 0.001 ***	2.051 0.265	6.993 0.012 **
OB_TA	1.318 0.070 *	1.782 0.161	3.269 0.075 *	1.428 0.022 **	2.424 0.049 **	1.686 0.278
EQ_TA	-16.525 0.105	-8.401 0.518	-37.349 0.059 *	-25.915 0.009 ***	-20.112 0.129	-42.001 0.019 **
CIR	5.256 0.006 ***	5.974 0.005 ***	1.305 0.586	-1.069 0.428	-3.247 0.212	0.447 0.870
PE	0.002 0.845	0.026 0.114	-0.005 0.296	0.008 0.334	0.031 0.079 *	0.001 0.839
ln(MCAP)	-1.214 0.041 **	-0.654 0.352	-2.915 0.106	-2.878 0.000 ***	-2.620 0.001 ***	-5.079 0.024 **
BM	0.424 0.401	1.072 0.19	-0.518 0.382	-0.057 0.891	0.323 0.699	-1.483 0.015 **
C	6.025 0.452	1.355 0.878	33.101 0.155	30.686 0.000 ***	32.094 0.003 ***	64.297 0.035 **
R2 (within)	0.020	0.016	0.032	0.087	0.058	0.111
N	6014	2829	3185	6014	2829	3185
# groups	235	187	220	235	187	220

This table presents the results of robustness tests. Column (1) shows the results from our baseline regression model, where monthly bank stock returns from April to June of year t+1 are conditioned on accounting data from year t (M3_base). The bank-specific variables are: L_TA denotes the ratio of loans to total assets, E_NEA the ratio of total earning assets to total non-earning assets, LLP_IR the ratio of loan loss provisions to net interest revenue, NI_TI the ratio of non-interest income to total operating income, OB_TA the ratio of the nominal value of off-balance sheet items to total assets, EQ_TA the ratio of book value of equity to total assets, and CIR the cost to income ratio. The asset pricing variables are: PE is the price earnings ratio, MCAP the market capitalization (given in billions of Euro), and BM the ratio of book value of equity to market value of equity. C represents the regression constant. The construction principles of the variables are described in section 2. Columns (2) and (3) report the results from subperiods 1991-1998 (M3_I) and 1999-2005 (M3_II), respectively. All regressions are specified as fixed effects models with Driscoll and Kraay (1998) standard errors. In columns (4) to (6) additional year dummies are used for the total sample period (M3_yd) as well as the two subperiods (M3_I_yd and M3_II_yd). The total sample is based on 235 European banks over the period from 1991 to 2005 taken from the Bankscope database with 6014 firm-month observations. The figures underneath the estimate are the corresponding p-values. R2 refers to the within estimator. Significance levels are indicated by */**/*** on the 10%/5%/1% level.

Table 7: Panel regressions with alternative timing specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	M3_base	March M3	March M4	February M3	February M4	M6	M9
L_TA	9.308	5.116	6.425	1.349	3.424	5.004	4.084
	0.001 ***	0.061 *	0.012 **	0.576	0.137	0.021 **	0.018 **
E_NEA	0.008	0.011	0.008	0.016	0.010	0.003	0.001
	0.323	0.241	0.312	0.098 *	0.246	0.685	0.830
LLP_IR	-4.068	-4.102	-4.062	-3.875	-3.917	-2.534	-2.315
	0.000 ***	0.000 ***	0.000 ***	0.002 ***	0.000 ***	0.002 ***	0.000 ***
NI_TI	7.839	6.636	6.923	5.571	6.270	4.928	5.101
	0.000 ***	0.002 ***	0.001 ***	0.017 **	0.001 ***	0.029 **	0.003 ***
OB_TA	1.318	1.493	1.129	0.590	0.99	0.218	0.411
	0.070 *	0.083 *	0.106	0.547	0.221	0.715	0.378
EQ_TA	-16.525	-10.888	-14.205	-10.235	-9.549	-13.59	-13.149
	0.105	0.256	0.087 *	0.269	0.276	0.051 *	0.019 **
CIR	5.256	3.288	3.498	0.868	1.237	2.508	2.896
	0.006 ***	0.094 *	0.032 **	0.674	0.465	0.221	0.071 *
PE	0.002	0.011	0.004	0.004	0.004	-0.002	0.001
	0.845	0.275	0.65	0.592	0.583	0.721	0.767
ln(MCAP)	-1.214	-1.029	-0.964	-0.738	-0.913	-0.648	-0.532
	0.041 **	0.040 **	0.055 *	0.152	0.047 **	0.17	0.165
BM	0.424	0.447	0.203	0.277	0.397	1.039	0.846
	0.401	0.533	0.711	0.733	0.520	0.031 **	0.012 **
C	6.025	7.456	6.098	8.344	8.555	2.908	2.130
	0.452	0.345	0.402	0.282	0.225	0.660	0.690
R2 (within)	0.020	0.015	0.013	0.009	0.011	0.008	0.006
N	6014	6020	8027	6024	8034	12016	17901
# groups	235	235	235	235	235	235	235

This table presents the results of additional robustness tests. Column (1) shows the results from our baseline regression model, where monthly bank stock returns from April to June of year t+1 are conditioned on accounting data from year t (M3_base). The bank-specific variables are: L_TA denotes the ratio of loans to total assets, E_NEA the ratio of total earning assets to total non-earning assets, LLP_IR the ratio of loan loss provisions to net interest revenue, NI_TI the ratio of non-interest income to total operating income, OB_TA the ratio of the nominal value of off-balance sheet items to total assets, EQ_TA the ratio of book value of equity to total assets, and CIR the cost to income ratio. The asset pricing variables are: PE is the price earnings ratio, MCAP the market capitalization (given in billions of Euro), and BM the ratio of book value of equity to market value of equity. C represents the regression constant. The construction principles of the variables are described in section 2. The model in column (2), denoted as March-M3, conditions bank stock returns starting one month earlier compared to the baseline regression model, i.e., the model relates bank stock returns during the months March, April, and May of year t+1 to accounting numbers of year t. The model in column (3), labelled March-M4, also starts one month earlier but incorporates the four monthly returns from March to June of year t+1. The remaining two models, denoted as February-M3 and February-M4 in columns (4) and (5), respectively, are set up in the same way. The model in column (6) starts in April of year t+1, but uses the returns from the following 6 months and relates them with the accounting information from the previous year t (M6). The model in column (7) uses the returns from the following 9 months (M9). All regressions are specified as fixed effects models with Driscoll and Kraay (1998) standard errors. The total sample is based on 235 European banks over the period from 1991 to 2005 taken from the Bankscope database with 6014 firm-month observations. The figures underneath the estimate are the corresponding p-values. R2 refers to the within estimator. Significance levels are indicated by */**/*** on the 10%/5%/1% level.

Table 8: Panel regressions with censored explanatory variables

	(1)	(2)	(3)
	Base	Censor_1%	Censor_5%
L_TA	9.308	8.020	6.345
	0.001 ***	0.015 **	0.061 *
E_NEA	0.008	-0.003	-0.006
	0.323	0.775	0.651
LLP_IR	-4.068	-3.856	-3.127
	0.000 ***	0.001 ***	0.176
NI_TI	7.839	7.938	6.333
	0.000 ***	0.000 ***	0.083 *
OB_TA	1.318	2.430	-0.689
	0.070 *	0.056 *	0.747
EQ_TA	-16.525	-14.426	-1.005
	0.105	0.116	0.928
CIR	5.256	5.318	8.308
	0.006 ***	0.056 *	0.067 *
PE	0.002	-0.002	-0.102
	0.845	0.957	0.010 ***
ln(MCAP)	-1.214	-0.777	0.426
	0.041 **	0.152	0.478
BM	0.424	0.844	1.432
	0.401	0.171	0.255
C	6.025	0.634	-14.753
	0.452	0.935	0.095 *
R2 (within)	0.020	0.016	0.013
N	6014	5293	2993
# groups	235	224	172

This table presents the results of additional robustness tests. Column (1) shows the results from our baseline regression model, where monthly bank stock returns from April to June of year t+1 are conditioned on accounting data from year t (Base). The bank-specific variables are: L_TA denotes the ratio of loans to total assets, E_NEA the ratio of total earning assets to total non-earning assets, LLP_IR the ratio of loan loss provisions to net interest revenue, NI_TI the ratio of non-interest income to total operating income, OB_TA the ratio of the nominal value of off-balance sheet items to total assets, EQ_TA the ratio of book value of equity to total assets, and CIR the cost to income ratio. The asset pricing variables are: PE is the price earnings ratio, MCAP the market capitalization (given in billions of Euro), and BM the ratio of book value of equity to market value of equity. C represents the regression constant. The construction principles of the variables are described in section 2. Columns (2) and (3) contain the results when we censor the data at the 1% (Censor_1%) and 5% (Censor_5%) level, respectively. All regressions are specified as fixed effects models with Driscoll and Kraay (1998) standard errors. The total sample is based on 235 European banks over the period from 1991 to 2005 taken from the Bankscope database with 6014 firm-month observations. Censoring the data leads to a loss in data points substantially exceeding the corresponding tail values, because for each firm-month observation complete data on all variables must be available. The figures underneath the estimate are the corresponding p-values. R2 refers to the within estimator. Significance levels are indicated by */**/*** on the 10%/5%/1% level.