QUADERNI


Università degli Studi di Siena
DIPARTIMENTO DI ECONOMIA POLITICA

ANTONIO ROMA

# Common Factors and Balance Sheet Structure of Major European Banks

n. 396 – Settembre 2003

**Abstract** - This paper explores the determinants of returns on listed European banks stocks through the use of a linear multifactor model of stock returns, in which fundamental macroeconomic factors are used, in addition to the market return, as explanatory variables. After specifying and fitting the model, estimating factor loadings on common factors, an effort is made to further understand the stocks fundamental characteristics that lead to the factor loadings estimates we observe. The results seem to indicate that, in the 1999-2002 period, in which the banks considered were traded in Euro, the factor loading against the market factor and against the default spread may be systematically related to banks fundamental characteristics like asset quality indicators (especially reserves for bad loans over loans), to the composition of income (share of interest and commission revenue), and toa general indicator of banks efficiency like the cost-income ratio.

**Jel Classification**: G11, G12, G21

**Antonio Roma**, Dipartimento di Economia Politica, Università degli Studi di Siena

# 1 Introduction

This paper explores the determinants of returns on listed European banks stocks through the use of a linear multifactor model of stock returns, in which fundamental macroeconomic factors are used, in addition to the market return, as explanatory variables. After specifying and fitting the model, estimating factor loadings on common factors, an effort is made to further understand the stocks fundamental characteristics that lead to the factor loadings estimates we observe. The aim is to verify, through a cross-section analysis, if there is any balance sheet characteristic of the banks examined that may account for the size of the factor loading on the fundamental common factors.

Some literature exists on the connection between banks structural characteristics and their market value, however, most of the work on specific factors and balance sheet characteristics which affect bank stock returns relates to US bank stocks.

Flannery and James (1984) find that bank stocks sensitivity to unanticipated changes in interest rates (proxied by holding period returns on short term bonds) may be related to the bank's reported gap between short term assets and liabilities.

Rogers and Sinkey (1999) examine the balance sheet of US banks which earn substantial non interest income, and find that they are generally the larger and safer banks, with low interest margin. Brewer, Jackson, and Mondschean (1996) study the effect on stock return volatility of the diversification of US Saving and Loans associations into different types of loans and mortgages, and find that, for specialized financial institutions, it decreases with investment diversification.

As far as bank loan loss reserves are concerned, some evidence exists that unexpected increases in banks loan loss reserves may have positive implications for bank stock prices (see Whalen (1994)), and that in specific circumstances (loans to Less Developed Countries) provisioning by one bank may have contagion effects for other banks (Grammatikos and Saunders, (1990), Docking, Hirschey, and Jones (1997)).

Brewer, Jackson, and Moser (1996) investigate the relationship between the volatility of returns and fundamental variables for stocks of ninety-nine US Saving and Loans, for the period 1985:3-1989:4. They find the volatility to be significantly related to financial institutions leverage, maturity gap of the fixed income portfolio, liquidity, ratio of operating expenses to total income, as well as to derivative instruments activity.

Cooper, Jackson and Patterson (2003) examine the risk return characteristics of portfolios of US bank stocks sorted according to individual banks fundamental variables, including loan loss reserves and leverage. They conclude that sorting portfolios of bank stocks according to changes in single fundamental variables, like earnings per share, non- interest income, and leverage, produces extra return without any increase in risk. They test for the risk involved in the sorted portfolios by adopting a linear multifactor model of the Fama and French (1992) type. However, according to Fama and French (1992) this risk model is not well suited to analyze risk in the case of financial stocks (which Fama and French exclude from their sample).

We carry out an analysis on European bank stocks listed on different European exchanges. Following the introduction of the Euro in European financial markets in January 1999, these stocks are quoted in the same currency. In addition, freedom of establishment for financial institution within the European Union, and the consequent harmonization of their business, as well as relatively similar accounting standards make the banks considered fairly homogeneous. Nevertheless, a careful analysis of the financial reporting conventions of banks located in different European countries is necessary to assess their fundamental balance sheet characteristics in a consistent way.

In this paper it is argued that a 'macroeconomic' (to follow the definition of Connor (1995)) linear factor model along the lines of Chen Roll, and Ross (1986) (CRR) is more appropriate to examine the risk characteristics of bank stocks. We discuss how the Chen, Roll and Ross factors map directly into banks fundamental variables and balance sheet characteristics. We confirm empirically that the factor loadings of European banks on CRR macro type factors are indeed related to the level of individual banks fundamental variables. Therefore, if banks stocks are sorted according to the level of fundamental variables, as proposed in Fama and French (1992, 1993) and Lakonishok, Schliefer and Vishny (1994), increased exposure of a portfolio to a fundamental balance sheet characteristic will affect the risk of the portfolio in the CRR framework. We discuss possible reasons of the associations between banks factor loadings on CRR factors and banks fundamental characteristics. We also show individual banks characteristics to be fairly stable over time in the case of European banks.

Our factors are similar to those adopted by CRR except that, working with daily data, some of the macroeconomic variables that are released with monthly (or lower) frequency could not be used. We find that a factor that significantly affects all bank stock returns, in addition to the return on the market, is the default spread (difference in holding period return between

investment grade European corporate bonds and Treasuries). Such variable was used by CRR as a proxy for the risk premium used to discount a company future cash flows to price, and therefore capable of affecting the price of all stocks (see also Fama and French, (1993)). However, in the case of banks, the default spread may have a more direct effect on the stock return, as it directly proxies the relative variation of the value of the bank main assets, a portfolio of risky loans, over the constant value of the liabilities, mainly bank deposits. According to this view, we might expect that the greater the risk in the loans portfolio the greater the variation of the stock price associated with the default spread variation, and the greater the factor loading on the default spread. In our data, we see some evidence consistent with this hypothesis. Also the banks factor loadings on the market factor appear to be associated with specific banks fundamental characteristics.

Moreover, this approach illustrates the methodological point that, in designing and testing multifactor models of stock returns, it is highly desirable to understand the mechanism through which each factor impacts on the stock valuation. Such mechanism may be stock or industry sector specific. However, understanding such mechanism is important in order to assess the effect on different stocks prices of a variation in factor values.

The plan of the paper is as follows: in Section 2 we first specify and estimate a multifactor model for the bank industry sector. In Section 3 we estimate the same model for individual banks. We then carry out, in Section 4, a preliminary cross-section analysis of the correlation between estimated factor loadings and banks fundamental characteristics. In Section 5 we sort banks into portfolios according to univariate fundamental characteristics, and test whether the sorted portfolios have significantly different factor loadings on the CRR factors. Section 6 concludes the paper.

# 2 Basic Model and Explanatory Variables

## 2.1 Theory

Consider a stock return model in which the return $r_{it}$ on day $t$ on the $i^{th}$ stock (or portfolio of stocks) is determined by a number of (ideally uncorrelated) factors ($F_{kt}$), and includes a specific disturbance $\varepsilon_t$:

$$r_{it} = \alpha_i + \sum_{k=1}^{K} \beta_i^k F_{kt} + \varepsilon_t. \tag{1}$$

One of the common factors $F_k$ may be the return on the market as a whole. However, we assume (and test) that additional factors may explain stock returns. There is an extensive literature on the nature of the additional factors $F_k$. CRR argued that the nature of factors affecting stock returns may be derived from a stylized discounted dividend model in which the stock price, $P$, is given by the discounted value of future expected dividends (or earnings, or cash flows):

$$P = \frac{E(d)}{k}. \tag{2}$$

Once linearized, model (2) gives a guideline for factors in model (1). Variation in stock prices is due to variation in the expected dividend $E(d)$ and in the discount factor $k$. In CRR variation in $E(d)$, is proxied by real economic growth as far as the real component is concerned and by inflation, as well as by variables that affect the state of the economy, like for example the oil price. Variation in the discount rate is proxied by (i) variation in market return, (ii) variation in the default premium, and (iii) variation in the term premium. However, in the case of banks, the earnings themselves (or dividends, or cash flows) will be directly function of the factors (i), (ii), and (iii) rather than being a function of real production and inflation.[1] Banks earnings and equity are obviously subject to default risk and term structure risk, as they issue liabilities with certain values (deposit) to invest in risky credits and in general fixed income assets with longer maturity. Hence the variation in their equity (the difference between assets and liabilities) may be proxied to a large extent by the default spread factor and term spread factor. Also, the market factor in addition to exerting a general influence of on all stock valuations, may directly impact banks profitability through the commission income. The commissions that banks earn for their asset management/administration services will be a function of market trends, as in declining markets asset management services will be less appealing to bank customers (although in bear markets structured products may be sold). The CRR factors are clearly relevant for banks but, in addition to the impact on the discount factor $k$, which will be very similar for all banks, factors (i), (ii), and (iii) will also have a specific impact on individual banks earnings. Therefore in the case of bank stocks, differences in estimated factor loadings for the model (1) may be

[1] An explanatory analysis of the correlation of bank returns with production and inflation was carried out with monthly data, and confirmed that production and inflation are not important in explaining bank returns.

tied to the different impact of these factors on earnings. We try to associate our findings on the statistical significance and size of estimated factor loadings for model (1) to some structural characteristics of the banking business.

### 2.2 Factor Specification

To construct empirically the factors $F_k$, we considered the following basic variables:

- ER44: Merrill Lynch -Total return index, EMU Corporates, BBB Rated, 7-10 Yr;
- EUG4TR: Bloomberg/EFFAS -Total return index, Euro Gov. Bonds, 7-10 Yr;
- IL0001M: Euro 1m libor;
- EUCRBRD: European dated Brent Crude Oil spot price, mid, US dollar;
- EUR: US$/Euro Exchange rate, mid;
- SX5E: Dow Jones Euro Stoxx 50 Price Index;
- SX7P: Dow Jones Euro Stoxx Banks Price Index.

Daily data for the above variables for the period January 4, 1999 to April 30, 2003 were obtained. To put the sample period considered into perspective, Figure 1 shows the time series behavior of the SX5E (Stoxx) index. The year 1999 was characterized by a sharp market rally towards the end of the year, which started to fade in 2000, to get into the economic downturn and market crashes of 2001 and downtrend of 2002.

In particular, the year 2001 was characterized by a pronounced variation of all factors. Stock markets variability was high (the Stoxx annualized volatility was 28%), with the burst of the "new economy bubble" early in the year, and the dramatic crash and subsequent recovery of the markets following the September 11 attack. Monetary policy reaction during the year caused the 1-month interest rate to drop from 4.84% at the beginning of the year to 3.32% at the end of the year, and to 2.89% at the end of 2002. The oil price also moved substantially, especially in the last quarter of 2002, in view of the political fears about a potential Middle East crisis. The Euro weakened throughout the period against the US Dollar. However, as Figure 2 also clearly demonstrates, the default spread volatility was also highest in 2001, with flights to quality

following every stock market drop. The high variation in all the variables may have provided the optimal sample from the econometric point of view to test the linear model. The sharp market drops of 2001 and 2002 raised concerns about banks profitability, and represent an interesting and extreme period to test whether banks individual characteristics affected their stock return.

From the above basic variables, the following fundamental factors were constructed:

- TERMSPRE=[(EUG4TR(t)-EUG4TR(t-1))/EUG4TR(t-1)]*100-IL0001M(t-1)/360;
- DEFSPRE=[(ER44(t)-ER44(t-1))/ER44(t-1)]*100-TERMSPRE- IL0001M(t-1)/360;
- OIL=[(EUCRBRD(t)- EUCRBRD(t-1))/ EUCRBRD(t-1)]*100;
- ER=[(EUR(t)-EUR(t-1))/EUR(t-1)]*100;
- STOXX=[(SX5E(t)-SX5E(t-1))/SX5E(t-1)]*100;
- BANKS=[(SX7P(t)-SX7P(t-1))/SX7P(t-1)]*100.

In summary, TERMSPRE represents the difference between the holding period return on a long term Government bond and the risk free rate; DEFSPRSE represents the difference between the holding period return on a long term Corporate bond and on a long term Government bond; OIL is the percentage variation in the oil price; ER is is the percentage variation in the US$/Euro exchange rate; STOXX is the percentage variation in the Stoxx index; BANKS is the percentage variation in the Stoxx Banks index.

### 2.3 Statistical Analysis of Factors and of the Bank Sector Index

The time series behavior of the chosen factors and their relationship with the banks sector index return (BANKS) was preliminarily investigated for the sample period January 4, 1999 to December 31, 2002 (1006 daily observations). The use of daily data restricts the use of factors to those for which daily observations are available. This eliminates from our analysis the industrial production and inflation variables used by CRR. Results are reported in Table 1. In the Table, Panel A reports the correlation among the factors. The term structure (TERMSPRE), default spread (DEFSPRE), and exchange rate variable (ER) are significantly correlated with the market index (STOXX) over the sample period. TERMSPRE is also significantly correlated with DEFSPRE (as expected given that the definition of DEFSPRE includes TERMSPRE), and with the exchange rate variable.

In order to soften the effect of collinearity between the market index variable STOXX and the other factors, a new market variable, MK, was defined (following McElroy and Burmeister, (1988)) as the residuals of a regression of STOXX on the other four factors. The market factor so defined summarizes all the market forces that cannot be explained by macro factors.

Next, the relationship between the factors and bank sector index returns, BANKS, was investigated using regression analysis. Panel B of Table 1 reports the results. With the exception of OIL, all the factors are significant in explaining BANKS. However, the adjusted $R^2$ improves only marginally when using other factors in addition to the market. Nevertheless maintaining the five factors structure allows more structural insight as it allows to attribute properly explanatory power to the factors underlying the behavior of the stock market index. For example, it is well known that banks have a high beta on the market. However, once the effect of the default spread is disentangled from the market factor, it appears that a good part of the variability of bank stocks with respect to the market can be traced back to their exposure to the default spread.

## 3 Individual Banks

The factor model was then estimated on individual banks stock returns. The sample of banks consists in 27 banks listed on the main markets of the Euro zone (Germany, France, Italy, Spain, Portugal, Belgium, Holland), i.e. with shares traded in Euro. These banks are well covered by analysts at main global brokers in Europe (this was the criteria for selecting them), and their fundamentals are well know in the market. The names and description of these banks appear in Table 2. Daily data on these stocks for the period January 4 1999 to April 30 2003 were considered.[2]

Individual stock returns were regressed on the five common factors (using the variable MK as market factor) for the four-year period 1999-2002, and separately for each calendar year. Table 3 summarizes the results. In the Table, Panel A summarizes, for each estimation period, the number of factor loadings that are statistically significant at the 5% level. While the market factor (MK) is statistically significant at the 5% level in each year and in the entire 1999-2002 sample, the number of statistically significant coefficients for the other factors varies across the years. However, the DEFSPRE coefficient is significant for all banks but one in the entire period

[2] As each national market observes different holidays, for each stock daily data on the fundamental factors were aligned with that of the stock, resulting in slightly different samples that differ by the few differences in holidays.

1999-2002, and it significant for almost all banks for the years 2001 and 2002. It is likely that the strong significance of this variable for the entire sample 1999-2002 depends on the behavior in the subsamples 2001 and 2002.

On the other hand, the number of significant coefficients for the other factors vary considerably across the five different samples. In 1999 and in 2000 also the significance of factors other than the market factor is scattered and cannot be generalized.

Next the size and cross sectional variation of the estimated factor loadings were examined. Given the strong association of the DEFSPRE variable with stock returns and its low variability compared to the MK, significant factor loadings on DEFSPRE are expected to be larger than factor loadings on MK. In the samples in which the default spread is significant for almost all banks (1999-2002, 2001 and 2002), the cross sectional variation in the DEFSPRE coefficient is high. For the entire sample 1999-2002, this factor loading has values between 0.16 and 2.97 (0.24 to 1.09 for MK). This variation is greater than the cross section variation of the MK factor loadings. Factor loadings on TERMSPRE, when significant, are generally negative, while no clear sign pattern emerges for factor loadings on OIL and ER.

The significance of the default spread is not at all surprising given that banks equity variation will be strongly associated with this variable. However, banks are also subject to term structure risk, but this effect does not show up systematically in the cross section of factor loadings. Part of the reason may be due to the negative correlation between TERMSPRE and DEFSPRE, which decreases their significance (especially in the case of the weaker explanatory variable TERMSPRE). However, if we consider the impact of term structure effects on bank stock price resulting from the variation of banks equity, we realize this is very limited. In fact, for the major banks examined, quantitative assessment of this risk (following the Basle I directive) seems to have been implemented and this risk appears very much under control. All the banks examined emphasize in their annual report their approach to risk management, including all market risk. They all mention the use of quantitative approaches, and often report average Value at Risk (VAR) of their securities portfolio. Usually the bulk of market risk is interest rate risk, which is subject to some kind of Asset Liability Management approach. The reported VAR numbers are generally reassuring.

This is not to say that banks are not subject to significant interest rate risk. However, interest rate risk may be related in a more cyclical fashion to (short and long) interest rate fluctuations. Interest rates are in fact a typical business cycle variable, and their variation

affects banks' earnings both at the top line level (interest rate margin is affected by interest rate variation via the different stickiness of lending and deposit rates at different interest rate levels), and at the provisions level via the effect on bad loans. Typically banks cannot compress deposit rates at low levels of interest rate, while at the same time lending rates decrease, and interest margin is compressed. To the contrary, with increasing interest rate, lending rates increase faster and interest rate margin increases. These will be "slow" effects, that build up over the bank reporting period, and will not be easy to detect on daily share price variation. On the other hand, if the amount of term structure risk (and generally market risk) on the bank books could be quantified, the impact on share price could in principle be marked to market. Of course, without access to a bank internal information, it is not really possible to asses accurately day by day the amount of term structure (and market) risk that is borne. However, the message that comes from the annual reports of the banks examined is that such risks are under control and therefore should not be very important in explaining the high frequency variation of market price of their equity. Table 4 summarizes the information available on market risk from the 2001 consolidated annual reports of the banks examined. Although trading portfolios (mainly fixed income securities) are well larger than banks equity, daily VaR represents on average less than 0.25% of equity.

Given these numbers, it is not surprising that the term spread variable does not significantly explain, in most of the cases, bank stock returns. On the other hand, credit risk, which is the bulk of banks operating risk, is of a completely different order of magnitude and not yet subject to detailed quantitative measurement. From our time series analysis, the effect on bank stocks of credit risk, as proxied by the default spread, is clearly quite pronounced.[3]

# 4 Cross-Section Variation of the Factor Loadings

In this section, we try to understand what are the key drivers of the different size and significance of the factor loading of the European banks considered. In the literature a number of fundamental characteristics which affect banks stock returns have been identified (see Section 1). In our model(1) and (2) any characteristic that affects banks expected earnings will also

[3]VaR, on a daily basis, is on average well below 0.25% of banks equity. Due to active portfolio management and stop losses, it is unlikely that this measure can be annualized in a linear fashion. The stock of credit risk, as measured by Loan Loss Reserves, is of the same order of magnitude of banks equity.

affect the estimated factor loadings on the CRR factors, which proxy for earnings. We focus on the relationship between the factors considered and banks earnings, that is the numerator of (2) and investigate whether any specific characteristic of the banks examined may account for the size of the estimated factor loadings on the systematically significant factors. The set of characteristics considered are those that capture the main items of the operating margin (interest income, commission income, loan losses provisions, administrative expenses) and of the balance sheet (leverage, reserves for loan losses). [4]

Although banks financial results will be simultaneously influenced by the state of the economy, we could expect their structure (percentage incidence of Profit and Loss items on operating margin, or on Balance Sheet) to be relatively constant in the short term. We test below the hypothesis that some key ratios are stable over time. These could then be considered, following the original idea of Rosenberg (1974), as structural characteristics through which the factors considered affect banks stocks, i.e. as proxy of factor loadings. We try to discuss further the mechanism through which the chosen factors impact on banks profitability and equity an whether fundamental characteristics are useful in explaining the effects of CRR-like factors. Intuitively, the term structure factor will be associated with interest income, the market factor may be associated with commission income, the default spread will be associated with provisions.

In order to describe banks fundamental characteristics, a large set of fundamental indicators was initially used, including most of the indicators considered in the previous literature, but the focus was narrowed down to the most meaningful ones. For example, a number of different measures of asset quality were considered, but some indicators were eliminated from the analysis being strongly correlated with others (namely Non Performing Loans to Total Loans, coverage ratio, loans to total assets, see the Appendix).[5]

[4]The starting point is a stylized bank Profit and Loss financial statement in which the key elements of operative profit are:

\+ Net Interest Income
\+ Commission Income
\+ Trading Income
\- Loan Loss Provisions
\- Administrative Expenses

However, as discussed previously, daily trading income will have very small variation.

[5]We focused on the components of the operating margin and eliminated from the analysis indicators, like earning per share, which are highly influenced by extraordinary items. Also, for European banks, it is difficult to

For each of the banks considered and for each year the following indicators were computed (from the consolidated financial statement):

**Asset Quality Indicators**

| | |
|---|---|
| NII = | $\frac{\text{Net Interest Income}}{\text{Total Income}}$ |
| COM = | $\frac{\text{Commission Income}}{\text{Total Income}}$ |
| Tier1 = | Tier 1 ratio, as reported by each bank |
| I4 = | $\frac{\text{Reserve for Loan Losses}}{\text{Total Loans}} \times 100$ |
| I5 = | $\frac{\text{Provision for Loan Losses}}{\text{Average Total Loans}} \times 100$ |
| CI = | $\frac{\text{Cost}}{\text{Income}}$ |

The definitions of the fundamental accounting indicators was standardized as far as possible across the different European banks. The Appendix describes in detail the calculations.

These asset quality indicators appear to be fairly stable over time. Table 6 reports a transition matrix analysis, in which after ranking an indicator in a particular year as High, Medium or Low (three quantiles, H,M,L), the probability of the indicator being in the same quantile the following year is reported. As it can be seen, the probability of a bank that ranks H, M or L according to a fundamental indicator will continue to have the same rank the following year is very high.

We then tried to assess whether the different sensitivity of the main European banks stock price to the common factors, may be due to the different value of their fundamental characteristics indicators.

As a first exploratory analysis, we regressed cross sectionally the estimated factor loadings on common factors of all the banks on the fundamental indicators. This gives a first indication as to whether the fundamental characteristics of European banks influence their sensitivity to movements in the key factors.[6] As some of the indicators are very highly correlated (see Table 5) in the cross section, and therefore provide the same type of information (and given the very small sample), in the end a parsimonious regression specification was adopted in which factor loadings for each factor were regressed in turn against a single fundamental indicator. The factor

gather consistent data on off balance sheet commitments. With these qualifications, we looked at essentially all the fundamental indicators previously considered in the literature.

[6] A Cross-section regression like those used here was employed by Flannery and James (1984) to assess whether banks factor loading on short term bond holding period returns was related to the balance sheet mismatch between short term assets and liabilities.

loadings of all banks against each factor were regressed on each of the asset quality indicators for each year and for the 1999-2002 period.

Given the strong persistence of fundamental indicators evidenced by Table 6, the contemporaneous value of the fundamental indicators was used as explanatory variable in these regressions, i.e. the fundamental characteristics of each bank as of 31.12.99 were correlated to the factor loadings estimated with 1999 daily data. This may be justified not only because of the strong stability of the ranking of banks according to these indicators, but especially because of the heavy coverage of these banks by financial analysts at major brokerage houses, which results in their balance sheet items being quite well anticipated by the market. For the 1999-2002 period the average value of each indicator across four years was used. A general caveat is in order as these exploratory regressions are carried out on very few observations and the dependent variables are potentially very noisy estimates of factor loadings.

This results in 30 regressions for each estimation period (5 factors on 6 asset quality indicators).

If the entire 1999-2002 period is considered (Table 7), banks factor loadings on TERMSPRE show some empirical (positive) association with interest income (NII), commission income (COM) and cost income ratio (CI) (negative). Factor loadings on DEFSPRE are (positively) associated with asset quality indicators (I4 and I5) and (positively) with the cost income ratio. OIL factor loadings, (which are almost never significant, see Table 3) are not associated with any fundamental characteristics. Factor loadings on ER are marginally associated with asset quality, while factor loadings on the market are associated with interest income and cost income ratio.

The cost income ratio appears however, also from the correlation matrix in Table 5, as a sort of "catch all" indicator, correlated with all the others. That is, a bank with high cost income ratio is in general a lower quality bank, which also has high provisions for bad loans, low Tier 1 capital, and low interest income. Moreover, the factors TERMSPRE and DEFSPRE being negatively correlated (see Table 1), factor loadings on these two factors tend to have opposite sign, and therefore in these cross section regressions the coefficients on these factor loadings on fundamental indicators also tend to have opposite sign. In addition, interest income and commission income shares of total income tend to be negatively correlated, again generating coefficients of opposite sign in these cross-section regressions.

When looking at individual years, some significant association between factor loadings and asset quality can be detected for the years 2002, 2001, and, marginally, for 2000, while no

association is found for 1999. In particular, for 2001 the result show that the balance sheet indicator I4 (reserves for loan losses over loans)and I5 (Provisions for loan losses over Loans) do have explanatory power for the size of the banks beta on the default spread and the market. The association between the I4 indicator and the default spread factor loading is remarkable (see Figure 3). It is interesting that the measure of "bad loans risk" more strongly associated with market behavior is based on Balance Sheet stock variable (total stock of bad loans) rather than on the same year provision against new bad loans. Also, the high responsiveness of "bad banks" stock return to default spread seems to kick in at a time of a sharp economic and stock market downturn, when investors start to be highly concerned about the downside risk of their equity investment.

To understand why asset quality should affect the value of banks recall that majority of bank assets are loans. In normal times, the provisions against loan losses set aside in the accounting period (charge in the Profit and Loss account) should approximately cover the amount of loans going bad in the year. In bad years, the incidence of the provisions for loan losses over loans will increase. However, in catastrophic times such provisions may not be sufficient, and the probability that reserves already accumulated in the balance sheet will be burned increases. Therefore, a bank with worst asset quality indicators will be riskier, and this may be reflected in a higher sensitivity to the relevant factors.

As discussed earlier, the asset quality characteristics of banks change slowly over the sample period, so the same credit quality does not appear to have been a great concern for market valuation during the years 1999 and 2000, to become an important variable in explaining stock return in 2001 and 2002.

Still it appears that the model for 2001 may not be fully specified. As it appears from Figure 3, some outliers (like BKR.SM, CL.FP) hint that something else was going on in some cases. There is a discrepancy in these cases between the size of the factor loading on the default spread (as measured by the DEFSPRE factor) and the asset quality indicator I4. It is possible that, in the case of these outliers, the DEFSPRE variable does not reflect the amount of default risk in the bank portfolio. Recall that DEFSPRE measure the default spread for European Corporates. Some European banks did have some non European exposure in the US and Latin America.

The 1999 and 2000 years were characterized by an expanding US and European economy and by a bullish stock market. In good times, it may be plausible that the risk valuation focus shifts away from credit quality concerns.

It is interesting to see that, for individual years, the factor loadings on the market factor is positively associated with alternative income, i.e. a larger share of income coming from commissions (COM), and negatively associated with interest income share (NII).

## 5 Portfolio Analysis

In order to test the association of fundamental banks characteristics with the factor loadings on common factors, the model (1) was also estimated on portfolios of bank stocks sorted according to fundamental characteristics. For each indicator, the 27 stocks were sorted, at the beginning of each year, into three portfolios containing stocks with Low, Medium, and High value of the indicator. The time series of equally weighted daily returns for each portfolio was then calculated. At the end of the year, the three portfolios were rebalanced according to the next year values of the fundamental indicator. Given the strong stability of the rankings according to the fundamental indicators, rebalancing was almost marginal.[7] Next, for each indicator, the return of the portfolio with Low, Medium, and High value of the fundamental characteristic was regressed on the common factors. This exercise was carried out for the entire 1999-2002 period and for each of the subperiods. The idea is to see whether the size of the loadings on common factors is related to the level of the fundamental characteristics in a systematic way, as the exploratory regressions of the previous section would suggest. The factor loadings of the three portfolios will be estimated with higher precision and therefore any pattern in the estimated loading as a function of fundamental characteristics will be detected in a more robust way. Table 12 shows the estimated factor loadings on the common factors of portfolios with Low, Medium, and High value of each fundamental indicator. The Table shows that, for the 1999-2002 period, patterns similar to those detected in the exploratory analysis are found. From the DEFSPRE column of Table 12, it is evident for example that the size of the factor loading on DEFSPRE increases as portfolios with higher values of Loan Loss Reserves to loans are considered, however, the same pattern can be found for the loading on the market factor (MK column). Moreover, the factor loading on the market factor increases systematically with the

[7] Time series of daily returns were also calculated with portfolios of bank stocks sorted according to the value of the indicators lagged by 16 months, so that the value of the indicator is precisely known, form the preceeding year company annual report, at the time of portfolio construction and rebalancing. In this way, the initial 16 months of return data were lost, but data until April 30 2003 were also used. However, the results of the subsequent analysis were almost unchanged, so sorting according to contemporaneous indicators in the end was adopted.

share level of commission income and decreases with interest income. The patterns are also similar for the individual periods, with the exception of the 1999 period.

Table 13 tests the hypothesis that the factor loadings of the three sorted portfolios on a common factor are equal. This hypothesis can never be rejected for 1999, but is practically always rejected in all the other periods as far as the loading of on the market variable is concerned, although in many cases in Table 12 the pattern of the factor loadings size was not monotonic across the three portfolios. For the factor loading on the DEFSPRE variable, we can also reject the hypothesis that in recent years and in the entire period the factor loadings is the same for portfolios with different exposure to bad loans. Factor loadings on TERMSPRE also appear to be different, especially in 2002 and in the entire period, as a function of the exposure to various indicators. These results suggest that, if banks stocks are sorted into portfolios according to the level (and not the change in) of bank specific fundamental indicators, the factor loadings on risk factors of the sorted portfolios are systematically affected. As a consequence, the risk of these portfolios might be influenced. However, if average returns of the sorted portfolios is considered (see Table 14), we cannot find significant differences in the average return of portfolios sorted in a univariate way according to each indicator. That is, portfolios that contain stocks with value of one fundamental indicator in the L, M, or H quantile do not have a significantly different average return.

# 6 Conclusions

In this paper an attempt was made to determine whether a CRR type model of stock returns may be appropriate for European banks and whether European banks fundamental characteristics may account for the size of the factor loadings estimated for individual banks on these factors. The results seem to indicate that, in the 1999-2002 period, in which the banks considered were traded in Euro, the factor loading against the market factor and against the default spread may be systematically related to banks fundamental characteristics like asset quality indicators (especially reserves for bad loans over loans), to the composition of income (share of interest and commission revenue), and to a general indicator of banks efficiency like the cost-income ratio. The patterns detected are clearly evident for the years 2000, 2001, and 2002, and instead could not be detected for 1999. It is possible that some of these regularities are associated with a declining business cycle, in which investor concerns about banks bad loans, operations and

efficiency are sharper and therefore more precisely reflected in market quotes. These findings may be useful to construct conditional estimators for the factor loadings, along the lines of Rosenberg and McKibben (1973). Moreover, to the extent that CRR factors are priced, i.e. exposure to a factor must be compensated by appropriate expected return (as CRR find), bank stock risk may be related to balance sheet characteristics. It is possible though, in a multifactor model, that exposure to different factors may be mutually offsetting, leaving expected return unchanged. The issue of the pricing of common factor risk and expected return on bank stocks as a function of fundamental characteristics appears to be a promising area of research. Moreover, this analysis may help establishing better links between stocks fundamental research, usually carried out through balance sheet (actual and forecasted) analysis, and market valuation.

## Appendix

In collecting balance sheet data for European banks, the most difficult task was trying to be as consistent as possible in choosing the underlying values that we used to calculate fundamental indicators. This task was complicated by the fact that the Financial Statements of these banks are subject to different accounting standards and regulations from their respective central bank. The resulting ratios give a fair idea of the quality of the banks' assets and more significantly of the evolution of their asset quality, however they are not completely comparable, especially when comparing banks from two different countries. All inputs have been extracted from the original audited Consolidated Financial Statements of the year in consideration, but it was often necessary to refer to the Notes of the Balance Sheet and the Income statement to obtain more precise information. The definitions of the components for different ratios are listed below:[8]

**Net Interest Income**: Used for the NII ratio. Calculated by subtracting interest expenses from interest income as stated on the Income statement. Dividends from participations are not included.

**Commission Income**: Used for COM ratio. Commission income minus fees, as stated on Profit and Loss statement.

**Trading Income**: Used for TRA ratio. Net Trading Income as stated on the Income statement.

**Total Income**: Used for NII, COM, TRA, and CI ratio. This is the sum of "Net Interest Income", "Net Commission Income", "Net Trading Income", "Net Insurance Income" (when applicable), "Dividend Income", "Gains/Losses on participating interest" and "Other operating Income". The item "Gains/Losses on participating interest" is sometimes included under the heading "Revenues from securities and participating interest" (ex: ABN), which also includes dividend income, or "Securities available for sale" (ex: BNP-Paribas). In some cases, when the impact on the P&L is significant and if they can be separated from other items, these gains have been excluded from Total Income in order to smoothen revenues (ex: DB). Note that this item does not include revenue from group transactions, revenue from equity accounted investments and non-recurring income.

**Total Loans**: This item is used in the assets quality ratios I2 and I4. In this study, total loans refer to the loans made to customers. At the exception of Deutsche Bank, which reports under

[8]Initially, 6 asset quality indicators were constructed, denominated I1-I6, but in the end only I4 and I5 were used in the analysis.

US GAAP, the total loans to customers includes the carrying value of reverse repo agreements and securities borrowing arrangements. Also note that we use the gross loans, i.e. before the subtraction of allowances for specific loan loss risk. Interbank loans are not included in the study, as we consider them to be "risk free".

**Non-performing loans**: Used for the I1, I2, I3, and I6 ratio. This is the item that makes comparisons between banks most difficult, as it is a subjective measure of the loans that are at risk in the portfolio. In addition, not all banks actually publish an NPL figure. When that is the case, the proxy for this figure can be one of the following, whichever is published in the Annual Report: Overdue loans $\geq$ 90 days (ex: BCP), Loans on a non-accrual basis (ex: CBK), Doubtful loans (SocGen) or Impaired loans (ex: DB).

**Total Assets**: Used for I1 ratio. Total assets as on Balance sheet.

**Reserve for loan losses**: Used for I3, I4 and I6 ratios. This figure reflects the total provisions that have been made specifically for credit loss risk on customer loans for the period in consideration. It does not include general risk allowances or any allowances that appear on the liability side of the balance sheet. It corresponds to the difference between Total loans and net loans, as it is directly deducted from the loans account on the balance sheet.

**Provision for loan losses**: Used for I5 ratio. This is the provision that is allocated to the reserve for loan losses for specific credit risk on customer loans. It is usually equivalent to the corresponding item on the Income statement, although it was often corrected for provisions for bank loans or financial investment risk. These were usually minor changes however.

**Average total loans**: Used in I5 ratio. This is computed by taking the arithmetic mean of total loans at the beginning and at the end of the year under observation.

**Shareholder's Equity**: Used for ratio I6. This includes all items from shareholders' equity part of the balance sheet, including funds from minority shareholders and preferred shareholders when applicable. The general banking risk fund is not taken into account.

**Cost**: Used in the CI ratio. This comprises all operating expenses, such as staff costs SG&A and other expenses. It is taken straight out of the Income statement.

The only bank for which we were not able to find all the data necessary to calculate these ratios was Fortis. For Banco Espirito Santo, no figures were available for 1999, and we therefore used Bloomberg figures and our ratios for the year 2000 to interpolate proxy ratios for 1999.

As you will note, the Spanish banks have particularly high asset quality. This is due to the fact that the bank of Spain imposed a Statistical provision in excess of the specific credit risk provision of Spanish banks. Unfortunately we were not able to distinguish between the two kinds of provision and this general provision is therefore included in the allowance for loan losses.

One last problem was the change in accounting standards for Deutsche Bank in 2000 from IAS to US GAAP. We solved the problem by taking pro-forma figures for 1999 so as to make the ratios comparable between the two years. This is the only exception where we used restated figure. Note that in 1999 under IAS the NPL/Loan ratio was 1.16% whereas under US GAAP the same ratio was 4.17%.

Table 1: In the Table, Panel A shows the correlation matrix for the factors considered (s.e.$\simeq$ 0.06), and the Stoxx index return. Panel B show the results of the regression $\text{BANKS}_t = \text{C} + b_1 \text{TERMSPRE}_t + b_2 \text{DEFSPRE}_t + b_3 \text{OIL}_t + b_4 \text{ER}_t + b_5 \text{STOXX}_t + \varepsilon_t$, (t-stats in parenthesis)

**Panel A**

| | **TERMSPRE** | **DEFSPRE** | **OIL** | **ER** | **STOXX** |
|---|---|---|---|---|---|
| **TERMSPRE** | 1 | | | | |
| **DEFSPRE** | -0.408 | 1 | | | |
| **OIL** | -0.013 | 0.003 | 1 | | |
| **ER** | 0.197 | -0.111 | -0.023 | 1 | |
| **STOXX** | -0.254 | 0.322 | 0.045 | -0.185 | 1 |

**Panel B**

| **C** | **TERMSPRE** | **DEFSPRE** | **OIL** | **ER** | **STOXX**$^{(q)}$ | $R^2$ |
|---|---|---|---|---|---|---|
| 0.0127 | | | | | 0.7776 | 0.74 |
| (0.499) | | | | | (53.48) | |
| -0.0006 | -0.5718 | 1.8292 | 0.0079 | -0.3958 | 0.7481 | 0.75 |
| (-0.024) | (-5.865) | (16.154) | (0.844) | (-10.519) | (48.420) | |

$^{(q)}$When more than one factor is considered, the residuals of a regression of STOXX on the other factors are used.

Table 2: The Table describes the sample of European Banks used in the individual securities analysis. All banks names are as of May 2002.

| **Bank code** | **Bank Name** | **Country** | **Approx. Market Cap Euro Bn (end of 2002)** |
|---|---|---|---|
| dexb-bb | Dexia | Belgium | 13 |
| bpin-pl | Banco BPI | Portugal | 1.6 |
| bkir-id | Bank of Ireland | Ireland | 10 |
| forb-bb | Fortis | Belgium | 21 |
| bcp-pl | Banco Comercial Portugues | Portugal | 5.3 |
| bkt-sm | Bankinter | Spain | 1.8 |
| besnn-pl | Banco Espirito Santo | Portugal | 3.7 |
| aaba-na | ABN AMRO Holding | Holland | 24.3 |
| pop-sm | Banco Popular Espanol | Spain | 8.6 |
| bip-im | Bipop-Carire (Fineco) | Italy | 1.6 |
| kbc-bb | KBC Bankverzekerings | Belgium | 9 |
| albk-id | Allied Irish Banks | Ireland | 12 |
| bpvn-im | Banco Popolare Verona e Novara | Italy | 4 |
| dbk-gr | Deutsche Bank | Germany | 26 |
| cbk-gr | Commerzbank | Germany | 4 |
| bpl-im | Bipielle Investimenti | Italy | 1.7 |
| hvm-gr | Bayerishe Hypo und Vereinsbank | Germany | 7.8 |
| bmps-im | Banca Monte dei Paschi | Italy | 6 |
| bbva-sm | Banco Bilbao Vizcaya Argenta | Spain | 30 |
| gle-fp | Societe Generale | France | 24 |
| uc-im | Unicredito Italiano | Italy | 24 |
| spi-im | San Paolo Imi | Italy | 12 |
| bnl-im | Banca Nazionale del Lavoro | Italy | 2.4 |
| bnp-fp | BNP Paribas | France | 35 |
| cl-fp | Credit Lyonnais | France | 19 |
| bin-im | Banca Intesa | Italy | 14 |
| brm-im | Banca di Roma (Capitalia) | Italy | 3 |

Table 3: The Table summarizes by sample period the number of significant factor loadings at the 5% confidence level in the individual securities regression $r_{it}$= C+ $b_{1i}$ TERMSPRE$_t$ + $b_{2i}$ DEFSPRE$_t$+$b_{3i}$ OIL$_t$+$b_{4i}$ER$_t$+$b_{5i}$ STOXX$_t$+$\varepsilon_{ti}$, (Panel A), and the average value of the estimated factor loadings across all banks (Panel B).

**Panel A: number of significant factor loadings**

| | TERMSPRE | DEFSPRE | OIL | ER | MK | CONST |
|---|---|---|---|---|---|---|
| 1999 | 9 | 5 | 4 | 16 | 26 | 1 |
| 2000 | 3 | 13 | 3 | 3 | 26 | 0 |
| 2001 | 8 | 26 | 9 | 5 | 27 | 2 |
| 2002 | 24 | 25 | 1 | 3 | 26 | 1 |
| 9902 | 18 | 26 | 2 | 19 | 27 | 0 |

**Panel B: average factor loadings**

| | TERMSPRE | DEFSPRE | OIL | ER | MK | CONST |
|---|---|---|---|---|---|---|
| 1999 | 0.52 | -0.29 | 0.03 | -0.30 | 0.71 | 0.08 |
| 2000 | 0.18 | 1.69 | 0.01 | -0.11 | 0.44 | 0.06 |
| 2001 | -0.65 | 1.96 | -0.05 | -0.14 | 0.73 | -0.08 |
| 2002 | -2.98 | 2.09 | 0.01 | -0.20 | 0.73 | 0.05 |
| 9902 | -0.72 | 1.84 | -0.01 | -0.23 | 0.69 | 0.00 |

Table 4: Value at Risk of Trading Portfolio

The table reports information about the banks risk control derived from the 2001 consolidated financial statements.

| Bank | Shareh. Equity, Euro ml | Trading Portf., Euro ml | Avg. VaR, Euro ml | Avg VaR to Shrh. Eq. | Avg VaR to Trading Port | VaR Horizon | Confidence Interval | Notes |
|---|---|---|---|---|---|---|---|---|
| dexb-bb | 8,337 | 116,780 | 18,125 | 0.22% | 0.02% | 10 days | 99% | average of first 9 and last 3 months, where trading exposure was quite different |
| bpin-pl | 909 | 2,859 | N.A. | N.A. | N.A. | N.A. | N.A. | adopts maturity gap and VAR approach |
| bkir-id | 3,798 | 8,673 | 8 | 0.21% | 0.09% | 1 day | | effect of 1% parallel upward shift in term structure |
| forb-bb | 13,844 | 19,447 | N.A. | N.A. | N.A. | N.A. | | Uses basis point sensitivity of swap curve rates, VAR, and duration of net equity |
| bcp-pl | 2,187 | 4,783 | 4.5 | 0.21% | 0.09% | 10 days | 99% | 1% Parallel shift of yield curve, historical stress tests |
| bkt-sm | 847 | 777 | 9.38 | 1.11% | 1.21% | 1 day | 95% | Stress test (125 bp, -30% on stock market, 5% change in FX, Volatility 60%) |
| besnn-pl | 1,404 | 5,489 | 31.22 | 2.22% | 0.57% | 10 days | 99% | |
| aaba-na | 11,787 | 152,455 | 41 | 0.35% | 0.03% | 1 day | 99% | stress test |
| pop-sm | 2,296 | 617 | 0.269 | 0.01% | 0.04% | 1 day | 95% | stress tests, duration, sensitivity to shift in yield curve and change in volatility |
| fco-im | 2,119 | | N.A. | N.A. | N.A. | 1 day | 99% | VaR at 31/12/01 = 3.3M whereas the 10 day VaR was 10.7m |
| kbc-bb | 9,480 | 66,224 | 13.98 | 0.15% | 0.02% | 10 days | 99% | Av. VaR is for equity portfolio only. Basis Point Value: Change in portfolio value for |
| albk-id | 5,626 | 20,414 | 13 | 0.23% | 0.06% | 1 day | 99% | Trading Equity portfolio only. Interest Sensitivity gap analysis. |
| bpvn-im | 1.937 | 2.787 | N.A. | N.A. | N.A. | | | |
| dbk-gr | 35,663 | 365,319 | 41.02 | 0.12% | 0.01% | 1 day | 99% | Av. VaR is total for Corporate and Investment Bank Group Division Trading Units.Stress testing. |
| cbk-gr | 12,043 | 104,455 | 13 | 0.11% | 0.01% | 7 days | 99% | Stress testing. |
| bpl-im | 1,756 | 5,208 | N/A | N.A. | N.A. | | | Covariance approach, Stress tests |
| hvm-gr | 25,110 | N/A | 76 | 0.30% | N.A. | 1 day | 99% | |
| bmps-im | 5,308 | 11,467 | 9.77 | 0.18% | 0.09% | 1 day | 99% | Sensitivity analysis |
| bbva-sm | 17,498 | 93,246 | 24.18 | 0.14% | 0.03% | 1 day | 99% | Sensitivity analysis |
| gle-fp | 15,750 | 128,597 | 38 | 0.24% | 0.03% | 1 day | 99% | Stress test, sensitivity, Vega |
| uc-im | 9,466 | 29,367 | 3.69 | 0.04% | 0.01% | 1 day | 99% | Duration |
| spi-im | 8,002 | 16,798 | 7.5 | 0.09% | 0.04% | 10 days | 99% | Sensitivity analysis (100bp), Worst case scenario |
| bnl-im | 3,613 | 6,471 | 13.5 | 0.37% | 0.21% | 1 day | 99% | Av. Var is for Dec. 2001over-estimated because 911.Year av. Approx. 8 mill. |
| bnp-fp | 24,610 | 98,559 | 30 | 0.12% | 0.03% | 10 days | 99% | Gross Earning at Risk (GEaR), Stress tests |
| cl-fp | 8,207 | 17,816 | 19 | 0.23% | 0.11% | 1 day | 99% | 50 Stress scenarios |
| bin-im | 14,061 | 56,419 | 15 | 0.11% | 0.03% | 1 day | 99% | Volatility sensitivity (Vega), Delta risk |
| cap-im | 5,624 | 16,179 | N.A. | N.A. | N.A. | 1 day | 99% | VaR at 31/12/01 = 24.8M, 30/6/01 = 15M, 31/12/2000 = 10M. Expected shortfall method |

Table 5: The table reports the correlation matrix between the average value (over the four year considered) of the fundamental indicators of the banks considered.

| | I4 | I5 | Tier1 | NII | COM | CI |
|---|---|---|---|---|---|---|
| I4 | 1.000000 | | | | | |
| I5 | 0.67952 | 1.000000 | | | | |
| Tier1 | -0.25997 | -0.36952 | 1.000000 | | | |
| NII | -0.22305 | 0.001807 | -0.15129 | 1.000000 | | |
| COM | 0.15509 | 0.27949 | -0.084553 | -0.36959 | 1.000000 | |
| CI | 0.23274 | 0.12938 | -0.36329 | -0.60424 | 0.35333 | 1.000000 |

Table 6: The Table reports the probability that a bank that has a rank according to the value of a fundamental indicator maintains its rank in the subsequent year. After ranking the bank according to the value of the indicator in a particular year as High, Medium or Low, the probability of the indicator being in the same percentile the following year is computed and reported.

| | I4 | I5 | Tier 1 | NII | COM | CI |
|---|---|---|---|---|---|---|
| 1999 | 0.8519 | 0.7407 | 0.6800 | 0.7692 | 0.6154 | 0.7308 |
| 2000 | 0.8519 | 0.6667 | 0.7407 | 0.8889 | 0.7407 | 0.7778 |
| 2001 | 0.7407 | 0.6667 | 0.5926 | 0.7778 | 0.8148 | 0.8148 |

Table 7: **Cross-section regressions 1999-2002.** The Table reports the results of univariate OLS regressions in which the factor loadings of all banks on common factors, estimated over the period 1999-2002, are individually regressed over the average value of the bank fundamental indicator, and a constant (not reported). In the Table the regression coefficients of each factor loading on each of the fundamental indicator are reported, with standard errors in parenthesis. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level.

| | TERMSPRE | DEFSPRE | OIL | ER; | MK |
|---|---|---|---|---|---|
| I4 | -0.0525 | 0.2782*** | -0.0004 | -0.0350** | 0.0537 |
| | ( 0.0575) | ( 0.0870) | ( 0.0029) | ( 0.0174) | ( 0.0328) |
| I5 | -0.2069 | 1.1777** | -0.0192 | -0.1360 | 0.1634 |
| | ( 0.3383) | ( 0.5537) | ( 0.0166) | ( 0.1057) | ( 0.1986) |
| Tier1 | -0.0262 | 0.0291 | 0.0013 | -0.0200 | 0.0456 |
| | ( 0.0749) | ( 0.1324) | ( 0.0037) | ( 0.0237) | ( 0.0434) |
| NII | 2.2746*** | -2.0385 | 0.0169 | 0.2062 | -1.1178** |
| | ( 0.7660) | ( 1.5190) | ( 0.0444) | ( 0.2823) | ( 0.4761) |
| COM | -2.3855** | 2.4560 | 0.0299 | -0.3069 | 0.8828 |
| | ( 1.0571) | ( 1.9877) | ( 0.0576) | ( 0.3663) | ( 0.6616) |
| CI | -2.9483*** | 3.7069** | -0.0331 | -0.4528 | 1.5302*** |
| | ( 0.8928) | ( 1.7372) | ( 0.0530) | ( 0.3304) | ( 0.5526) |

Table 8: **Cross-section regressions 1999.** The Table reports the results of univariate OLS regressions in which the factor loadings of all banks on common factors, estimated over the period 1999, are individually regressed over the value of the bank fundamental indicator at the end of 1999, and a constant (not reported). In the Table the regression coefficients of each factor loading on each of the fundamental indicator are reported, with standard errors in parenthesis. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level.

| | TERMSPRE | DEFSPRE | OIL | ER; | MK |
|---|---|---|---|---|---|
| I4 | -0.0053 | -0.0085 | -0.0001 | -0.0403 | 0.0119 |
| | ( 0.0460) | ( 0.0916) | ( 0.0088) | ( 0.0403) | ( 0.0200) |
| I5 | 0.1863 | 0.1706 | -0.0481 | -0.0293 | 0.0882 |
| | ( 0.3188) | ( 0.6381) | ( 0.0607) | ( 0.2868) | ( 0.1397) |
| Tier1 | -0.0350 | -0.1787* | 0.0266*** | -0.1092** | -0.0130 |
| | ( 0.0572) | ( 0.1080) | ( 0.0095) | ( 0.0463) | ( 0.0249) |
| NII | -0.3059 | -1.5828 | -0.1530 | 0.1046 | -0.6186 |
| | ( 0.9347) | ( 1.8168) | ( 0.1751) | ( 0.8344) | ( 0.3830) |
| COM | -2.3561** | 0.8536 | 0.2349 | -0.5007 | 1.0899** |
| | ( 1.0562) | ( 2.2793) | ( 0.2150) | ( 1.0290) | ( 0.4472) |
| CI | 0.7955 | -1.1654 | -0.0092 | 0.1195 | -0.2949 |
| | ( 0.9063) | ( 1.7979) | ( 0.1748) | ( 0.8200) | ( 0.3917) |

Table 9: **Cross-section regressions 2000.** The Table reports the results of univariate OLS regressions in which the factor loadings of all banks on common factors, estimated over the period 2000, are individually regressed over the value of the bank fundamental indicator at the end of 2000, and a constant (not reported). In the Table the regression coefficients of each factor loading on each of the fundamental indicator are reported, with standard errors in parenthesis. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level.

| | TERMSPRE | DEFSPRE | OIL | ER; | MK |
|---|---|---|---|---|---|
| I4 | 0.0066 | 0.1287* | 0.0017 | -0.0015 | 0.0275 |
| | ( 0.1033) | ( 0.0762) | ( 0.0041) | ( 0.0147) | ( 0.0320) |
| I5 | 0.0077 | 0.0863 | 0.0239 | 0.0231 | 0.0150 |
| | ( 0.6207) | ( 0.4830) | ( 0.0240) | ( 0.0882) | ( 0.1953) |
| Tier1 | 0.1111 | -0.0359 | -0.0077* | -0.0250 | -0.0010 |
| | ( 0.1207) | ( 0.0953) | ( 0.0046) | ( 0.0167) | ( 0.0386) |
| NII | 2.4663* | -1.3332 | 0.1403*** | -0.0732 | -0.9234** |
| | ( 1.3389) | ( 1.0785) | ( 0.0487) | ( 0.2025) | ( 0.4094) |
| COM | -5.8826*** | 1.6398 | -0.0402 | 0.3411 | 1.6249*** |
| | ( 1.4153) | ( 1.3951) | ( 0.0721) | ( 0.2528) | ( 0.4796) |
| CI | -1.5884 | 2.1711 | 0.0123 | 0.1367 | 1.2250** |
| | ( 2.0316) | ( 1.5412) | ( 0.0810) | ( 0.2913) | ( 0.5991) |

Table 10: **Cross-section regressions 2001.** The Table reports the results of univariate OLS regressions in which the factor loadings of all banks on common factors, estimated over the period 2001, are individually regressed over the value of the bank fundamental indicator at the end of 2001, and a constant (not reported). In the Table the regression coefficients of each factor loading on each of the fundamental indicator are reported, with standard errors in parenthesis. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level.

| | TERMSPRE | DEFSPRE | OIL | ER; | MK |
|---|---|---|---|---|---|
| I4 | -0.0682 | 0.4218*** | -0.0025 | -0.0294 | 0.0987*** |
| | ( 0.0582) | ( 0.1203) | ( 0.0053) | ( 0.0348) | ( 0.0363) |
| I5 | -0.2246 | 0.4757 | -0.0055 | -0.1742* | 0.2141** |
| | ( 0.1592) | ( 0.3954) | ( 0.0148) | ( 0.0914) | ( 0.1061) |
| Tier1 | 0.0592 | 0.0852 | -0.0031 | 0.0576* | 0.0401 |
| | ( 0.0577) | ( 0.1438) | ( 0.0052) | ( 0.0328) | ( 0.0399) |
| NII | 0.4633 | -0.3233 | 0.0288 | -0.0348 | -0.6309 |
| | ( 0.7293) | ( 1.8062) | ( 0.0655) | ( 0.4344) | ( 0.4925) |
| COM | -1.6092* | 2.8143 | -0.0514 | -0.6986 | 1.3566** |
| | ( 0.8967) | ( 2.2736) | ( 0.0846) | ( 0.5455) | ( 0.6004) |
| CI | -1.2779** | 1.7180 | -0.0522 | -0.9671*** | 1.1557*** |
| | ( 0.6466) | ( 1.6745) | ( 0.0613) | ( 0.3626) | ( 0.4216) |

Table 11: **Cross-section regressions 2002.** The Table reports the results of univariate OLS regressions in which the factor loadings of all banks on common factors, estimated over the period 2002, are individually regressed over the value of the bank fundamental indicator at the end of 2002, and a constant (not reported). In the Table the regression coefficients of each factor loading on each of the fundamental indicator are reported, with standard errors in parenthesis. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level.

| | TERMSPRE | DEFSPRE | OIL | ER; | MK |
|---|---|---|---|---|---|
| I4 | -0.3883 | 0.2699** | 0.0030 | -0.0206 | 0.0700 |
| | ( 0.2540) | ( 0.1087) | ( 0.0053) | ( 0.0216) | ( 0.0434) |
| I5 | -0.4935 | 0.8574 | -0.0225 | -0.1416 | 0.0124 |
| | ( 1.2774) | ( 0.5599) | ( 0.0253) | ( 0.1021) | ( 0.2199) |
| Tier1 | -0.5308 | -0.1681 | -0.0006 | 0.0135 | 0.0772 |
| | ( 0.3647) | ( 0.1626) | ( 0.0073) | ( 0.0313) | ( 0.0633) |
| NII | 9.4142** | -1.9537 | -0.1084 | -0.3440 | -1.5355** |
| | ( 3.7415) | ( 1.8739) | ( 0.0812) | ( 0.3394) | ( 0.6500) |
| COM | -0.9119 | 1.5523 | 0.0116 | -0.4818 | 0.3224 |
| | ( 5.9454) | ( 2.7007) | ( 0.1193) | ( 0.4823) | ( 1.0189) |
| CI | -6.3523* | 3.8048** | 0.0196 | 0.0484 | 0.9416 |
| | ( 3.7186) | ( 1.6510) | ( 0.0796) | ( 0.3157) | ( 0.6536) |

Table 12: **Factor loadings of sorted portfolios.** The Table shows the estimated factor loadings on the common factors of portfolios with Low, Medium, and High value of each fundamental indicator.

| | | TERMSPRE | | | DEFSPRE | | | OIL | | | ER | | | MK | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L | M | H | L | M | H | L | M | H | L | M | H | L | M | H |
| 1999 | I4 | 0.6338 | 0.8213 | 0.4418 | 0.6097 | 0.6667 | 0.2174 | -0.0659 | -0.1997 | -0.2891 | -0.0020 | 0.0266 | 0.0472 | 0.5909 | 0.5574 | 0.5658 |
| | I5 | 0.7507 | 0.6784 | 0.4732 | 0.6452 | 0.7394 | 0.0467 | -0.1420 | -0.1730 | -0.2935 | 0.0139 | 0.0578 | 0.0017 | 0.6122 | 0.5382 | 0.5739 |
| | Tier1 | 0.4506 | 0.8449 | 0.4969 | 0.3548 | 0.7314 | 0.3134 | -0.1942 | -0.1702 | -0.2512 | 0.0082 | 0.0588 | -0.0126 | 0.5499 | 0.6015 | 0.5123 |
| | NII | 0.7419 | 0.9313 | 0.4222 | 0.6282 | 0.9270 | 0.1991 | -0.2148 | -0.1747 | -0.2083 | 0.0657 | 0.0175 | 0.0063 | 0.5519 | 0.5438 | 0.6082 |
| | COM | 0.9675 | 0.4355 | 0.3974 | 0.6851 | 0.3288 | 0.4100 | -0.2392 | -0.1595 | -0.2271 | 0.0129 | 0.0434 | 0.0279 | 0.6019 | 0.5839 | 0.5094 |
| | CI | 0.3943 | 0.7816 | 0.6269 | 0.4477 | 0.3790 | 0.6327 | -0.1654 | -0.2663 | -0.1675 | 0.0162 | 0.0085 | 0.0587 | 0.6078 | 0.5672 | 0.5580 |
| 2000 | I4 | -1.0450 | -0.5494 | -1.2379 | 0.9519 | 1.1360 | 1.7121 | 0.1492 | 0.1071 | 0.1709 | 0.0251 | 0.0024 | 0.0096 | 0.5486 | 0.5011 | 0.7607 |
| | I5 | -0.8104 | -0.9345 | -0.8753 | 1.0637 | 1.3294 | 1.4631 | 0.0915 | 0.1416 | 0.1900 | 0.0236 | 0.0012 | 0.0163 | 0.5582 | 0.6445 | 0.5179 |
| | Tier1 | -0.8438 | -0.9764 | -0.8416 | 1.4521 | 1.5028 | 0.9230 | 0.1822 | 0.1363 | 0.1022 | 0.0285 | 0.0006 | 0.0026 | 0.5002 | 0.6770 | 0.6045 |
| | NII | -0.9531 | -0.5451 | -1.0014 | 1.3698 | 1.1891 | 1.2294 | 0.1160 | 0.1361 | 0.1650 | -0.0047 | -0.0013 | 0.0352 | 0.6973 | 0.4338 | 0.5692 |
| | COM | -0.6192 | -0.7709 | -1.2178 | 0.8139 | 1.4586 | 1.2897 | 0.1146 | 0.1642 | 0.1181 | 0.0016 | 0.0239 | -0.0068 | 0.3494 | 0.5525 | 0.8065 |
| | CI | -0.7501 | -0.7281 | -1.1554 | 1.0078 | 1.5091 | 1.1832 | 0.1312 | 0.1592 | 0.1203 | 0.0284 | 0.0162 | -0.0086 | 0.5300 | 0.4799 | 0.7614 |
| 2001 | I4 | 0.0616 | -0.1766 | -0.5752 | 1.6528 | 1.8842 | 2.4926 | -0.4022 | -0.4829 | -0.4940 | -0.0255 | -0.0328 | -0.0414 | 0.5717 | 0.7008 | 0.9454 |
| | I5 | 0.0243 | -0.5447 | -0.3187 | 2.1565 | 2.0269 | 2.1000 | -0.4005 | -0.6385 | -0.3715 | -0.0311 | -0.0372 | -0.0346 | 0.6976 | 0.8550 | 0.7612 |
| | Tier1 | -0.3145 | -0.4031 | -0.2188 | 1.9300 | 2.4010 | 2.0039 | -0.4208 | -0.5558 | -0.4450 | -0.0355 | -0.0311 | -0.0368 | 0.7176 | 0.8613 | 0.7626 |
| | NII | -0.5160 | -0.1539 | -0.1745 | 2.3676 | 1.7695 | 2.0100 | -0.5558 | -0.4036 | -0.4182 | -0.0389 | -0.0427 | -0.0264 | 0.9088 | 0.6960 | 0.6927 |
| | COM | -0.2132 | -0.4712 | -0.1214 | 1.9270 | 2.0531 | 2.2439 | -0.4515 | -0.5679 | -0.3492 | -0.0486 | -0.0398 | -0.0185 | 0.6822 | 0.8657 | 0.7069 |
| | CI | 0.0504 | -0.4265 | -0.3895 | 1.8903 | 2.3341 | 2.0390 | -0.3366 | -0.4723 | -0.5303 | -0.0192 | -0.0462 | -0.0343 | 0.5719 | 0.8200 | 0.8452 |
| 2002 | I4 | -2.7827 | -3.5510 | -5.2828 | 1.7664 | 2.5849 | 2.4113 | 0.0375 | -0.1055 | 0.0537 | -0.0109 | -0.0153 | 0.0418 | 0.5479 | 0.7203 | 0.9793 |
| | I5 | -3.7563 | -5.0865 | -3.2118 | 2.5228 | 2.3714 | 2.1240 | -0.0050 | 0.0781 | -0.1349 | -0.0033 | 0.0410 | -0.0169 | 0.7858 | 0.9400 | 0.6129 |
| | Tier1 | -4.3431 | -4.4506 | -4.1841 | 2.4422 | 2.1632 | 2.4501 | 0.0130 | 0.0951 | -0.1276 | 0.0054 | 0.0515 | -0.0146 | 0.8439 | 0.8335 | 0.8000 |
| | NII | -4.6007 | -5.0002 | -3.3414 | 2.4515 | 2.4329 | 2.1403 | 0.0499 | -0.0410 | -0.0526 | 0.0386 | -0.0062 | -0.0121 | 0.8530 | 0.9390 | 0.6855 |
| | COM | -3.8800 | -3.7950 | -4.7054 | 2.6563 | 2.3347 | 2.2100 | 0.0982 | -0.0746 | 0.0093 | 0.0127 | -0.0176 | 0.0356 | 0.7868 | 0.7599 | 0.8580 |
| | CI | -2.0030 | -5.8445 | -4.7317 | 2.1263 | 2.7186 | 2.3076 | -0.1080 | -0.0335 | 0.1013 | -0.0271 | 0.0097 | 0.0515 | 0.4898 | 1.0639 | 0.8877 |
| 9902 | I4 | -0.4129 | -0.4665 | -1.0725 | 1.7089 | 2.2204 | 2.5108 | -0.1478 | -0.2489 | -0.2568 | -0.0105 | -0.0184 | -0.0070 | 0.5690 | 0.6759 | 0.8820 |
| | I5 | -0.5240 | -0.9534 | -0.5511 | 2.2611 | 2.3629 | 2.0427 | -0.2158 | -0.2502 | -0.2240 | -0.0106 | -0.0079 | -0.0174 | 0.7113 | 0.8249 | 0.6427 |
| | Tier1 | -0.8194 | -0.7011 | -0.7530 | 2.2325 | 2.3864 | 2.1552 | -0.1963 | -0.2317 | -0.2671 | -0.0118 | -0.0018 | -0.0283 | 0.7276 | 0.7883 | 0.7339 |
| | NII | -0.7988 | -0.7409 | -0.6085 | 2.4450 | 2.2905 | 2.0028 | -0.2591 | -0.2279 | -0.2061 | -0.0071 | -0.0259 | -0.0073 | 0.8086 | 0.7668 | 0.6629 |
| | COM | -0.4644 | -0.7494 | -0.9128 | 2.2365 | 2.2008 | 2.2338 | -0.2262 | -0.2296 | -0.2206 | -0.0224 | -0.0103 | -0.0084 | 0.6833 | 0.7302 | 0.7747 |
| | CI | -0.2853 | -0.9827 | -0.8969 | 1.8389 | 2.6368 | 2.2426 | -0.1679 | -0.2780 | -0.2293 | -0.0048 | -0.0223 | -0.0063 | 0.5326 | 0.8684 | 0.8161 |

Table 13: The Table tests the hypothesis that the factor loadings of the three sorted portfolios (according to the fundamental indicator) on each of the common factors, reported in Table 12, are equal. The values of the $\chi^2$ statistic of the restricted system of regressions for the three portfolios, in which the factor loading is set to be the same, are reported. *** denotes rejection at the 1% level, ** denotes rejection at the 5% level, * denotes rejection at the 10% level.

| | | TERMSPRE | DEFSPRE | OIL | ER | MK |
|---|---|---|---|---|---|---|
| 1999 | I4 | 2.8914 | 1.2069 | 2.5933 | 1.7520 | 0.1570 |
| | I5 | 1.1353 | 3.9471 | 1.5868 | 2.7113 | 0.6465 |
| | Tier1 | 2.8970 | 1.1021 | 0.6868 | 3.4391 | 1.2761 |
| | NII | 4.1418 | 2.4061 | 0.1208 | 2.7344 | 0.8286 |
| | COM | 5.3273* | 0.5446 | 0.5431 | 0.7636 | 1.3076 |
| | CI | 2.1187 | 0.4604 | 1.4332 | 2.4379 | 0.2505 |
| 2000 | I4 | 5.4178* | 5.1852* | 0.9505 | 1.2310 | 21.2843*** |
| | I5 | 0.1573 | 1.7304 | 1.1300 | 1.4693 | 8.7662** |
| | Tier1 | 0.1976 | 3.2258 | 0.9711 | 2.6584 | 10.3335*** |
| | NII | 3.0952 | 0.3136 | 0.3351 | 4.6523* | 29.6841*** |
| | COM | 2.8493 | 3.9595 | 0.5037 | 2.3393 | 36.8864*** |
| | CI | 1.9485 | 3.2500 | 0.2668 | 2.1384 | 22.3151*** |
| 2001 | I4 | 6.6372** | 6.0166** | 1.3588 | 0.4156 | 34.7819*** |
| | I5 | 4.0390 | 0.0788 | 4.1863 | 0.0766 | 7.5725** |
| | Tier1 | 0.6469 | 5.2412* | 2.5380 | 0.1203 | 8.6799** |
| | NII | 3.6976 | 6.2345** | 3.1252 | 0.8700 | 14.7784*** |
| | COM | 2.3254 | 1.3555 | 3.3107 | 1.3376 | 23.0319*** |
| | CI | 4.4136 | 3.0182 | 4.5410 | 1.1684 | 19.7982*** |
| 2002 | I4 | 42.9120*** | 6.5227** | 2.1021 | 3.7366 | 52.1513*** |
| | I5 | 26.4316*** | 1.1826 | 3.0673 | 4.3805 | 29.8137*** |
| | Tier1 | 0.5122 | 0.8090 | 2.3060 | 3.5464 | 0.9487 |
| | NII | 23.0127*** | 0.8523 | 0.9671 | 3.3819 | 34.2350*** |
| | COM | 13.9516*** | 1.6321 | 1.5945 | 3.5803 | 6.5555** |
| | CI | 36.6446*** | 1.5079 | 2.4374 | 4.5570 | 49.7383*** |
| 9902 | I4 | 22.6082*** | 18.3540*** | 4.3951 | 0.8057 | 83.8258*** |
| | I5 | 10.2705*** | 2.8680 | 0.4312 | 0.5471 | 38.5823*** |
| | Tier1 | 0.7187 | 1.7420 | 1.8630 | 3.9464 | 6.9820** |
| | NII | 2.5469 | 7.0816** | 1.2200 | 1.8191 | 36.1283*** |
| | COM | 8.0105** | 0.0424 | 0.0286 | 1.0737 | 11.9204*** |
| | CI | 18.1107*** | 12.8759*** | 2.8963 | 2.0487 | 67.1562*** |

Table 14: **Average return of one dimensional sort portfolios.** The Table shows the average daily return, over the period 1999-2002, of portfolios containing bank stocks with indicator values in the L,M,and H quantile. The $\chi^2$ statistic is computed under the null hypothesis that the returns are equal.

| | L | M | H | $\chi^2$ |
|---|---|---|---|---|
| I4 | -0.012 | -0.033 | 0.014 | 1.81 |
| I5 | -0.021 | -0.009 | -0.014 | 0.09 |
| Tier 1 | -0.032 | 0.000 | -0.015 | 0.81 |
| NII | 0.004 | -0.039 | -0.014 | 1.56 |
| COM | -0.034 | -0.023 | 0.027 | 2.58 |
| CI | -0.003 | -0.052 | 0.027 | 4.43 |

## References


1. Brewer, E., Jackson, W. E., Mondshean, T.S., (1996), Risk, regulation, and the S&L diversification into non-traditional assets, *The Journal of Banking and Finance*, Vol. 20, 723-744.

2. Brewer, E., Jackson, W. E., Moser, J.T., (1996), Alligators in the Swamp: The Impact of Derivatives on the Financial Performance of Depository Institutions, *Journal of Money, Credit, and Banking*, Vol. 28, No. 3, 482-497.

3. Chen N., Roll R., Ross S.A., (1986), Economic Forces and the Stock Market, *Journal of Business*, Vol. 59 no. 3., pp. 383-403.

4. Connor G., (1995), The Three Types of Factor Models: A Comparison of Their Explanatory Power, *Financial Analysts Journal*, May-June, pp. 42-46.

5. Cooper, M.J., Jackson, W.E., Patterson, G.A., (2003), Evidence of Predictability in the Cross-Section of Bank Stock Returns, *The Journal of Banking and Finance*, Vol. 27, Issue 5, 817-850.

6. Docking, D.S., Hirschey, M., Jones, E., (1997), Information and contagion effects of bank loan-loss reserve announcements, *Journal of Financial Economics*, 43, 219-239.

7. Fama, E.F., French, K.R., (1992), The Cross Section of Expected Stock Returns, *The Journal of Finance*, Vol. 47, Issue 2, 427-465.

8. Fama, E.F., French, K.R., (1993), Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics*, 33, 3-56.

9. Flannery, M.J., James, C.M., (1984), The Effect of Interest Rate Changes on the Common Stock Returns of Financial Institutions, *The Journal of Finance*, vol 39, No. 4, 1141-1153.

10. Grammaticos, T., Saunders, a., (1990), Additions to bank Loan-Loss Reserves - Good News or Bad News ?, *Journal of Monetary Economics*, 25, 289-304.

11. Lakonishok, J., Schleifer, A., Vishny, R., (1994), Contrarian Investment, Extrapolation, and Risk, *The Journal of Finance*, Vol 49, no. 5, 1541-78.

12. McElroy M.B., Burmeister E., (1988), Arbitrage Pricing Theory as a Restricted Nonlinear Multivariate Regression Model, *Journal of Business & Economic Statistics*, January, Vol.6. No.1, pp. 29-42.

13. Rogers, K., Sinkey, J.F., (1999), An analysis of nontraditional activities at U.S. commercial banks, *Review of Financial Economics*, Vol. 8, 25-39.

14. Rosenberg, B.A., (1974), Extra-Market Components of Covariance in Security Returns, *Journal of Financial and Quantitative Analysis*, vol. 9, no. 2, 263-73.

15. Rosenberg, B.A., McKibben, W., (1973) ,The Prediction of Systematic and Specific Risk in Common Stock, *Journal of Financial and Quantitative Analysis*, 317-333.

16. Walhen, J.M., (1994), The Nature of Information in Commercial Bank Loan Loss Disclosure, *The Accounting Review*, Vol. 69, No. 3, 455-478.

**Figure 1**

**Stoxx Index**

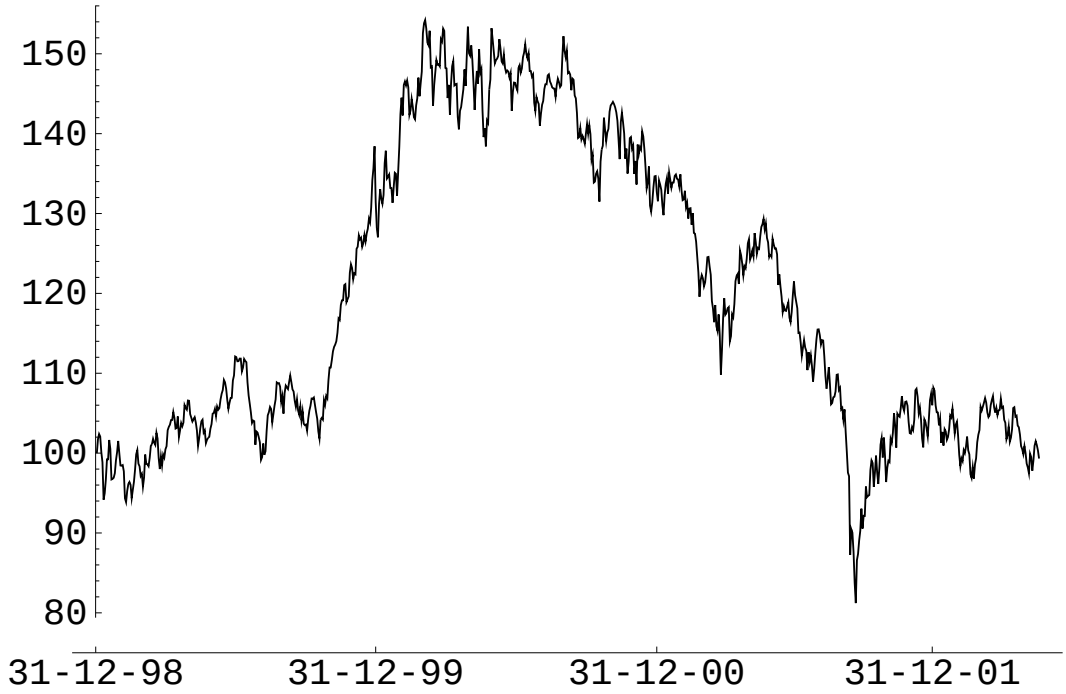
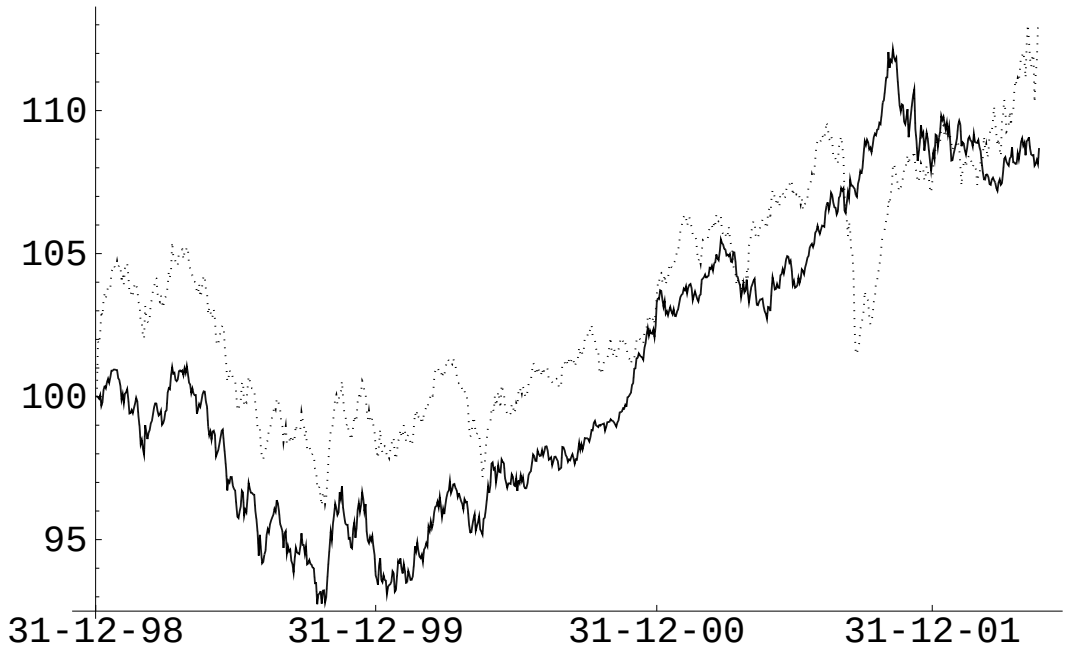


**Figure 2**

**Government and Corporate bond index**




The Figure shows the behavior of the government bon index (solid line) and corporate bond index (dashed line)

**Figure 3**

The Figure shows the relationship between reserves to loans ratio and default spread factor loading in 2001. On the $x$ axis, the I4 indicator, on the $y$ axis, factor loading of each bank on DEFSPRE.