ISSN 1974-4110

Università
degli Studi di Urbino
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www.econ.uniurb.it

WP-EMS
Working Papers Series in
Economics, Mathematics and Statistics

"On the Role of a Stock Market in the Bank Loan Market: a Study of France, Germany, and the Euro Area (1)"

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WP-EMS # 2008/09

ON THE ROLE OF A STOCK MARKET IN THE BANK LOAN MARKET: A STUDY OF FRANCE, GERMANY, AND THE EURO AREA (1)

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September 2009

This Draft: April 2010

Key Words: Bank Loans, Stock Market, Non-nested Hypothesis Tests

ON THE ROLE OF A STOCK MARKET IN THE EUROPEAN BANK LOAN MARKET: A STUDY OF FRANCE, GERMANY, AND THE EURO AREA

Abstract

In this paper we compare a traditional demand oriented model to a non-traditional capital budgeting model of bank lending based on movements in the equity cost of capital for France, Germany, and the Euro area. Using non-nested hypothesis tests and omitted variables tests, we find that we reject the traditional demand oriented model of bank lending and fail to reject the capital budgeting model of bank lending for Monetary Financial Institutions in France and the Euro area. For Germany the results are inconclusive. Even though Europe is a bank-based financial system, it appears the stock market plays a key role in the lending decisions of banks.

JEL Classification: E3, E5, G2

I. Introduction

Banks as financial intermediaries play an important role in the financial system and the real economy. As the institution whose deposit liabilities represent an important component of the medium of exchange, they are well-positioned to reduce the information asymmetries that naturally arise in the transfer of resources from household savers to investing firms in a decentralized market economy. There exists a large amount of cross-sectional empirical research on this subject that documents the importance of bank screening and monitoring of small firms where the real investments and investment returns are particularly opaque.[1] Moreover the benefits of bank screening and monitoring go beyond small firms. Large firms having access to external capital markets also benefit from bank screening and monitoring. When a bank grants a new loan or extends an existing loan to a firm, that piece of information sends a strong signal to the capital market that is reflected in the market valuation of the firm's outstanding securities.[2]

In addition to allocating financial resources across firms in different sectors in the economy at a point in time, there is another important question concerning the role aggregate bank lending plays in the supply of finance over time. More particularly, does bank lending over time amplify or dampen fluctuations in real economic activity? Theoretical and empirical work in this area suggests that bank lending amplifies the business cycle.[3] The world-wide financial and economic crisis of 2007-2009 is but the most recent case study supporting this view. This being the case it is important to ask the question: What determines bank lending over time and why does it amplify business fluctuations? In order to formulate sensible government regulations for the banking sector as well as central bank policy it will be necessary to answer those questions. The objective of this paper is to provide some evidence on one of the above questions, namely, the determinants of inter-temporal bank lending in Europe.

To be more specific, this paper compares two reduced-form specifications for MFI (monetary financial institutions) investments in private loans in France, Germany, and the entire Euro area when data availability permits. The terms monetary financial institutions or MFI's (defined in the Appendix on Data Sources) and banks will be used interchangeably when there is no confusion in the meaning. One specification takes the view that MFI or bank lending is an investment decision, and like all investment decisions it must meet a cost of capital hurdle. This view emphasizes the capital budgeting aspects of bank lending and the role of the market valuations of bank stocks reflecting the equity cost of capital for banks.[4] Other relevant factors (eg., expected cash flows from investment projects of firms and the wealth of bank loan customers) will be captured with the market valuations of stocks in general. This specification takes the view that bank and non-bank share prices incorporate all the relevant information that is needed for the capital budgeting version of the bank lending decision. Certain rare exogenous events like the reunification of Germany in 1990 and the 2001 attack on the financial district in New York City will be accommodated in the regression analysis with dummy variables. The alternative and more conventional specification looks directly to the market for bank loans, and for institutional reasons peculiar to Europe focuses attention on the demand side of the market. This approach emphasizes the importance of such variables as a measure of aggregate income like GDP and the interest rate charged on bank loans. This specification will also include dummy variables for the reunification of Germany in 1990 and the attack on the New York financial district in 2001. We compare these two specifications of bank lending using non-nested hypothesis tests and omitted variables tests. The test results reported below indicate that the stock market-based capital budgeting hypothesis provides a better regression specification of MFI lending for France and the Euro area than the alternative specification based on indirect

measurements of supply and demand factors. For Germany the evidence is somewhat less clear as to which hypothesis provides the better specification for MFI lending to the private sector in that both specifications seem to be rejected by the data. However, for the commercial banking sector within the German MFI classification, it appears that the stock market hypothesis provides a better specification of lending than the traditional proxies for the supply and demand factors. These tests are presented in Section II. Section III summarizes the results of this study.

II. Bank Lending in Europe

A. Two Models of Bank Lending

What determines the asset adjustments of firms? When the assets are the real tangible assets of nonfinancial enterprises, economists tend to use capital budgeting rules such as the NPV or IRR rules that have firms compare the rate of return on the new real investment projects to the risk-adjusted cost of capital appropriate for the new investment projects. When the asset adjustments are loans of banks, economists tend to use the supply/demand framework. In this framework the quantity of bank loans and the interest rate on bank loans are simultaneously determined by the interaction of the factors influencing the supply of loans by banks and the factors influencing the demand for loans by borrowers. Once the supply and demand factors are identified and the equilibrium condition specified, estimation can proceed.[5] One characteristic often associated with bank-based financial systems such as those in Europe and Japan is that there is a close and often long-term relationship between banks and their loan customers. Through this strong relationship bank loan officers come to know the economic environment and financial requirements of their loan customers, and loan customers in turn come to know the capacity of their banks to supply loan finance. The end result of this close relationship is that

banks typically accommodate the informed loan requests of their customers. For these reasons supply factors such as Basle type risk-based capital requirements, loan losses, changes in bank risk aversion, changes in credit standards, and changes in monetary policy are often argued (and empirically found) to play a relatively small role in determining the volume of new loans in bank-based financial systems.[6] Among other things this focus on the demand side of the loan market assumes that banks have a cushion of liquidity or wholesale borrowing capacity that can be utilized to accommodate the unexpected loan demands of their customers. The primary determinants of bank lending in bank-based financial systems then comes from the demand side factors such as GDP (a proxy for business profitability and household income) and interest rates charged on loans (a proxy for the cost of loan finance). Recent empirical work on demand oriented specifications of bank lending in Europe using VAR and VEC techniques include Calza, Gartner, and Sousa (2003), Eickmeir, Hofmann, and Worms (2006), Frommel and Schmidt (2006), and Sorensen, Ibanez, and Rossi (2009) among others. In these demand oriented studies bank lending is typically described by the following parsimonious reduced-form linear specification.

1) $\Delta L = b_0 + b_1(GDP) + b_2(R) + b_3(DV,90/1) + b_4(DV,2001/3,4) + e$

where

ΔL = The real value of investment in private loans to firms and households by banks.

GDP = Real gross domestic product, a proxy for business and household income.

R = Real interest rate charged on bank loans, a proxy for the cost of loan finance.

DV = Dummy variables for the year and quarter indicated.

e = Random disturbance term.

The demand interpretation of bank lending in (1) specifies that b_2 is negative. However, theory does not exactly pin down the sign of b_1. The traditional argument is that b_1 is positive reflecting the idea that higher incomes of firms and households imply a greater ability to service debt. On the other hand Friedman and Kuttner (1993), Bernanke and Gertler (1995), and Calza Manrique, and Sousa (2003) have argued that b_1 could in principle be negative. Their argument is that higher business and household incomes that accompany higher GDP could be used by financially conservative agents to pay down outstanding debt and increasingly finance the acquisition of goods, services, and assets from internally generated funds. Similarly when business profits and household incomes as reflected in GDP fall, firms and households will borrow more from banks in order to smooth their expenditures on goods, services, and assets. However, the existing evidence clearly favors the traditional demand interpretation for $b_1>0$ and $b_2<0$.

The second specification of bank lending emphasizes the capital budgeting aspects of bank investments in private loans. According to this view banks adjust their investments in loans in response to changes in the cash flows (or profitability) associated with the loans and their cost of capital. The cash flows or profitability generated on the asset acquisitions of loan customers is proxied by general equity share prices and reflects the investment opportunities of firms and the wealth of households.[7] The cost of bank loan capital is proxied with bank equity share prices. We ignore the cost of deposit finance since it is practically zero. The parsimonious reduced-form linear specification for this stock market oriented view of bank lending is then given by:

2) $\Delta L = a_0 + a_1(SP,bk) + a_2(SP) + a_3(DV,90/1) + a_4(DV,2001/3,4) + u$

where

(SP,bk) = The real stock market valuation of bank equity shares.

(SP) = The real stock market valuation of shares in general.

DV = Dummy variable for the year and quarter indicated.

U = Random disturbance term.

The prediction from the capital budgeting theory of bank lending is that a_1 and a_2 are positive.

To sum up we have two non-nested hypotheses H1 and H2 on the linear regression specification for bank investments in private loans. They are:

H1 $\Delta L = a_0 + a_1(SP,bk) + a_2(SP) + a_3(DV,90/1) + a_4(DV,2001/3,4) + u \quad a_1>0 \quad a_2>0$
a_3 and $b_3>0 \quad a_4$ and $b_4<0$

H2 $\Delta L = b_0 + b_1(GDP) + b_2(R) + b_3(DV,90/1) + b4(DV,2001/3,4) + e \quad b_1>0 \quad b_2<0$

Our objective for the rest of this section is to see which of the two specifications provides the better explanation of the data on MFI (and in addition, commercial banks in the case of Germany) investments in private loans for France, Germany and the Euro area.

Before beginning the empirical work it is important to note that even though Europe is usually characterized as a bank oriented financial system, there are important differences between the separate countries. For example Barth, Caprio, and Levine (2001) report that bank assets relative to GDP are more than twice as large in Germany than in France (313 percent versus 147 percent), and Germany has 3.9 banks per 100,000 people whereas France has only .6 banks per 100,000 people. The composition of bank assets and liabilities are also quite different between France and Germany. In this connection Barth, Nolle, and Rice (1997) report that the loan to asset ratio is .656 in Germany whereas it is only .346 in France. Similarly, the deposit to asset ratio is .428 in Germany and only .203 in France. German banks appear to be more risky than French banks. These differences in the composition of MFI balance sheets might imply MFI lending in these two countries is not determined by the same set of explanatory variables. There

are also data problems across the three geographical areas. Euro area data before 1999 is mostly reconstructed from the original 11 countries (Greece was included after 2000). The national contributions to Euro area data on GDP, interest rates, nominal loans, and the GDP deflator were aggregated up from the individual countries using the irrevocable fixed exchange rates at the end of 1998. For a description of the aggregation method used see Calza, Manrique, and Sousa (2003). Before 1990 Germany was two different countries. The measures for stock prices, GDP, the producer price index, private loans, and the interest rate were for West Germany before 1990 and for the united Germany after 1990. The Appendix on Data Sources describes the data used in this study in more detail.

B. Empirical Results

Table 1 presents the regression results for the two models of MFI/bank lending, Δ(L,MFI/banks), for France, Germany, and the Euro area. The dependent variable is defined to be the change in the real stock of loans made to the private sector in those two countries and the Euro area. For the H1 specification MFI/bank investments in real private loans depends on the real market value of bank equity shares, (SP,bk), and the real market value of shares in general, (SP). The market value of bank shares reflects the cost of capital or required yield of bank shareholders. It turned out that $(SP,bk)^2$ was also a significant statistical predictor of lending in France so that variable was also included in the H1 specification for that country to test for any nonlinearities in the relationship between lending and bank stock prices. The second variable (SP) represents a capital market signal for the expected profitability and wealth of bank loan customers. Since European banks (unlike U.S. banks) are allowed to hold equities in their portfolio, (SP) also captures a wealth effect that can influence the risk aversion of banks and the

supply of loan finance to the risky private sector. The general stock market variables used in Table 1 are as follows: i) France, the real value of the SBF index of 250 French stocks traded on the Paris Bourse indicated in the regression as (SP,250); ii) Germany, the real value of the CDAX index of general stock prices indicated by (SP,CDAX); and finally, iii) the Euro area, the real value of the MSCI EU stock price index indicated in the regression as (SP,MSCI). Qualitatively similar results were obtained for the narrower CAC40 index for France and the DAX index for Germany. For the demand oriented H2 specification of bank lending the explanatory variables include an economic activity variable (reflecting business revenues and household income) like real GDP, and a real interest rate variable, R, reflecting the cost of loan finance for business firms and households. Outside shocks such as the reunification of Germany and the attack on the financial district in New York will be incorporated in both regression specifications with the following dummy variables, (DV,90/1) and (DV,2001/3,4) but only when these shocks have a statistically significant effect on bank lending. The expected signs on these dummy variables is positive for (DV,90/1) and negative for (DV,2001/3,4).

The next question is whether the explanatory variables from these two specifications of bank lending are measured as levels or first differences. A related question is whether these explanatory variables are contemporaneous with Δ(L,MFI/banks) or lagged. If they are lagged, how many quarters are they to be lagged? Theory provides little guidance on this question. The following *sample specific* strategy will be used throughout this study to answer these questions of regression specification. Whether an explanatory variable is expressed as a level or a first difference along with the exact lag will be determined by a search for the "best" OLS specification of the two competing hypotheses. The "best" in this sense is in terms of the predicted signs from the two underlying theories, the statistical significance of the estimated

coefficients, and the overall explanatory power of each specification as measured by the coefficient of determination. This strategy is implemented in order to give the underlying theories associated with each of the two specifications the best possible chance to explain MFI/bank investments in private loans. Using this criterion the best sets of explanatory variables for **H1** are as follows.

France MFI's: $\Delta(SP,bk)_{t-4}$, $\Delta(SP,bk)_t^2$, $(SP,250)_t$, and (DV2001/3,4)

German MFI's: $\Delta(SP,bk)_{t-2}$, $\Delta(SP,CDAX)_t$, and (DV,90/1)

German Banks: $\Delta(SP,bk)_{t-2}$, $\Delta(SP,CDAX)_t$, and (DV,90/1)

Euro Area MFI's: $(SP,bk)_{t-1}$, $\Delta(SP,MSCI)_{t-1}$, (DV,90/1), and (DV,2001/3,4)

For **H2** the best sets of explanatory variables are the following.

France MFI's: $\Delta(GDP)_t$, $(R,ST)_{t-4}$, and (DV,2001/3,4)

German MFI's: $\Delta(GDP\text{-}GR)_t$, $\Delta(R,Ave)_{t-3}$, and (DV,90/1)

German Banks: $(GDP\text{-}GR)_{t-2}$, $\Delta(R,Ave)_{t-3}$, and (DV,90/1)

Euro Area MFI's: $\Delta(GDP)_{t-2}$, $(R,Loan)_{t-1}$, (DV,90/1), and (DV,2001/3,4)

Table 1 presents the regression evidence on the determinants of bank lending in France (part A), Germany (part B), and the Euro area (part C). The first two regressions in each part of the table reports the OLS results of this search for the best H1 and H2 specification of MFI/bank lending in France, Germany, and the Euro area. The last two regressions report the results of a non-nested hypothesis test of H1 and H2.

In part A of the table for France it can be seen in regression (1) that the estimated coefficients on $\Delta(SP,bk)_{t-4}$, $(SPbk)^2_t$, and $(SP,250)_t$ are all positive and statistically significant as predicted by the H1 hypothesis of MFI lending. In addition the dummy variable (DV,2001/3,4) capturing the effect on bank lending resulting from the attack on the financial district in New York is negative

and statistically significant.[8] It should also be noted that the CUSUM plots of the recursive residual (not shown here) all lie within the critical 5 percent significance lines indicating that we cannot reject the hypothesis that the estimated coefficients of the explanatory variables are stable over the sample period 1989/2-2006/4. This regression fails to reject H1. The regression in (2) of part A of the table presents the results for H2. There it can be seen that the estimated coefficients on $\Delta(GDP)_t$, and the lagged interest rate variable $(R,ST)_{t-4}$ are respectively positive and negative as predicted by H2, and both estimated coefficients are statistically significant at the 5 percent significance level. In this regression (DV,2001/3,4) while negative is not statistically significant. For this specification of MFI lending the CUSUM plot of recursive residuals also indicate that we cannot reject the hypothesis that the estimated coefficients are stable over the sample period. There is empirical support for both H1 and H2 in France. A second way to compare H1 and H2 is to carry out the J-type of non-nested hypothesis test developed by Davidson and MacKinnon (1981)(1993). In this test we first run the regression in H2 and collect the fitted values of $\Delta L(H2)$. In the second step these fitted values from $\Delta L(H2)$ are included as an explanatory in the regression H1. If the estimated coefficient on the fitted values from $\Delta L(H2)$ is statistically significant, then reject H1; if not, then we cannot reject H1. This procedure is then repeated for H2 by running the regression in H1 and taking the fitted values $\Delta L(H1)$ and including them in the second step as an additional explanatory variable in the regression for H2. If the estimated coefficient on the fitted values of $\Delta L(H1)$ is statistically significant, then reject H2; otherwise fail to reject H2. When there are two non-nested hypotheses to be compared, four outcomes are possible: i) reject H2, and fail to reject H1; ii) reject H1, and fail to reject H2; iii) reject both H1 and H2; and iv) fail to reject both H1 and H2. If both H1 and H2 are rejected as in (iii), then neither model is very useful in explaining MFI

lending. If it is not possible to reject both H1 and H2 as in (iv), then the data is not rich enough to discriminate between the two contending models of MFI lending. The results of the J-test for the two specifications of bank lending in France are presented in the 3rd and 4th regressions in part A. There it can be seen that that the estimated coefficient on $\Delta L(H2)$ in regression H1 is not significantly different from zero whereas the estimated coefficient on $\Delta L(H1)$ in regression H2 is statistically significant at the 1 percent level of significance. On the basis of the J-test and a significance level of 1 percent we can reject the H2 specification of MFI lending based on demand considerations, and fail to reject the H1 specification based on stock market valuations and the cost of capital.

Still another way to differentiate between H1 and H2 is to carry out an "omitted variables" test. To do this we add the explanatory variables representing the demand for loans—i.e., $\Delta(GDP)_t$ and $(R,ST)_{t-4}$ in H2—to the stock market variables in H1 to get an unrestricted regression for the H1 specification. It is then possible to see whether adding these two demand variables from H2 makes a significant contribution to explaining $\Delta(L,MFI)$ over and above the stock market variables from H1. The Null hypothesis is that the additional two demand regressors are not jointly significant and therefore do not belong in the H1 specification. The test for this is an F-statistic and an associated P-value. The result for the H1 specification is as follows; when adding $\Delta(GDP)_t$ and $(R,ST)_{t-4}$ to H1, the F-statistic is 1.80 and the P-value is .17. Accordingly we fail to reject the Null at the 5 percent level of significance indicating that GDP and the lagged interest rate on short-term bank loans are not omitted variables from the H1 stock market specification of MFI lending in France. On the other hand when $\Delta(SP,bk)_{t-4}$, $(SP,bk)_t^2$, and $(SP,250)_t$ from the H1 specification of MFI lending are added to the H2 demand specification, we can easily reject the Null that the additional stock market variables are not

omitted variables. The F-statistic (and P-value) for this unrestricted specification for H2 are 7.68(.00). The omitted variable test like the J-test rejects the H2 specification of MFI lending in France but does not reject the H1 specification.

Put Table 1 here

The statistical results for Germany are presented in part B of Table 1. In the first two regressions we present the best OLS specification for the H1 and H2 model of MFI lending. For H1 the regression specification makes Δ(L,MFI) depend on $\Delta(SP,bk)_{t-2}$, and $\Delta(SP,CDAX)_t$, whereas for H2 Δ(L,MFI) depends on $\Delta(GDP\text{-}GR)_t$ and $\Delta(R,Ave)_{t-3}$. For Germany we add the dummy variable (DV,90/1) to account for the reunification of the country. The shock of September 2001 did not have a statistically significant effect on MFI lending so it was not included in the regression specification. The sample period is from 1974/1-2006/4. The first thing to note is that for both specifications of MFI lending there was a severe problem of first-order serial correlation in the residuals. To overcome this problem we implemented a Cochrane-Orcutt procedure that transforms the data in H1 and H2 with an AR(1) process. The cost of correcting the serial correlation problem with this AR(1) process is that we will not be able to use the CUSUM diagnostic to test for the inter-temporal stability of the estimated coefficients or carry out an omitted variables test on the two specifications of MFI lending. In any event for the variables of interest in the H1 specification it can be seen in regression (1) that the estimated coefficients on $\Delta(SP,bk)_{t-2}$ and Δ(SP,CDAX) are both positive, and the Newey-West calculated t-statistics indicate that both estimated coefficients are statistically significant. It is also the case that the positive estimated coefficient on (DV,90/1) is statistically significant. These results are consistent with the stock market oriented theory of MFI lending. We had more difficulty verifying the H2 specification in regression (2). The estimated coefficient on $\Delta(GDP\text{-}GR)_t$ while

positive (as predicted by the demand oriented theory) is only statistically significant at the 13 percent level. The estimated coefficient on $\Delta(R,Ave)_{t-3}$ is negative and statistically significant. At this point the best OLS evidence for H2 seems less strong than the evidence for H1. To analyze this further we carried out the J-form of the non-nested hypothesis test in the third and fourth regression in part B of the table. The results of this test presented in regressions (3) and (4) are that we end-up rejecting both the H1 and H2 specifications for MFI lending in Germany.[9]

Germany also has balance sheet data for the commercial bank component of the MFI sector. The commercial bank sector is the largest component of the MFI sector. Accordingly we will carry-out our comparison between H1 and H2 on these banks. The dependent variable is now the change in the stock of real commercial bank loans to the private sector, $\Delta(L,Banks)$. For the H1 specification the explanatory variables are exactly the same as they were for German MFI's. For the H2 specification the only different regressor is now $(GDP\text{-}GR)_{t-2}$. The results of the OLS tests are presented in regressions (5) and (6) in part B of the table. The first thing to note is that the Durbin-Watson statistics for both regressions indicate an absence of first-order serial correlation in the residuals and consequently no Cochrane-Orcutt transformation is applied to the data. The second thing to note is that the estimated coefficients, Newey-West t-scores, and the coefficients of determination are all smaller for the commercial bank sector of bank lending than the MFI formulation reported above. In (5) the estimated coefficients on the two stock market variables are again positive and statistically significant as predicted by H1. In (6) the estimated coefficient on $(GDP\text{-}GR)_{t-2}$ is positive and statistically significant at the 5 percent level while $\Delta(R,Ave)_{t-3}$ is negative and significant at the 11 percent level. The OLS evidence seems stronger for H1 than H2. The CUSUM test for both H1 and H2 indicates that the cumulative sum of the recursive residuals are within the 5 percent critical boundaries (although the residuals for H2

creep along the lower boundary) indicating that the estimated parameters are stable over the sample period. Finally, the results of the non-nested hypothesis test for H1 and H2 are presented in regressions (7) and (8). There it can be seen that H1 is not rejected when the computed values from Δ(L,H2) are included as an additional regressor in the H1 regression. On the other hand H2 is rejected when Δ(L,H1) is included as an additional explanatory variable in the H2 regression. On this criterion the H1 specification of bank lending has more support from the data than the H2 specification.

A further comparison of H1 and H2 can be obtained by carrying out an omitted variable test. To test the H1 specification we add the explanatory variables $(GDP\text{-}GR)_{t-2}$ and $\Delta(R,Ave)_{t-3}$ from H2 to get an unrestricted regression for the H1 specification. The resulting F-statistic (P-value) is 1.35(.26). We therefore reject at the 5 percent level the hypothesis that these measures of income and interest rates are omitted variables in the H1 specification. On the other hand when the two stock market variables from H1 are included in the H2 specification the F-statistic is 10.06 and the P-value is .00 indicating that $\Delta(SP,bk)_{t-2}$ and $\Delta(SP,CDAX)_t$ are omitted variables from the H2 specification of bank lending.

Up to this point we have compared two non-nested hypotheses of MFI/bank lending on two large economies in the Euro area, France and Germany. Now with the somewhat limited data available we will look at the entire Euro area for the sample period 1988/3-2006/2. The results of the regression tests (including dummy variables for both the reunification of Germany in 1990 and the attack on New York in 2001) are presented in part C of Table 1. The results for the first step OLS specification search are presented in regressions (1) and (2). There it can be seen that the regression results provide support for both hypotheses of MFI/bank lending. For H1 the estimated coefficient on lagged real bank share prices, $(SP,bk)_{t-1}$, is positive and statistically

significant. Similarly, the estimated coefficient on share prices in general, $\Delta(SP,MSCI)_{t-1}$, is also positive and statistically significant. These results are consistent with the theory underlying H1. The Durbin-Watson statistic indicates an absence of first-order serial correlation in the residuals and the CUSUM test indicates that we cannot reject the hypothesis that the estimated coefficients are stable over the sample period 1988/3-2006/2. The same is more or less true for H2 in regression 2. The estimated coefficient on $\Delta(GDP)_{t-1}$ is positive while the estimated coefficient on $(R,loans)_{t-1}$ is negative. Both estimates are statistically significant and both are consistent with the demand oriented theory underlying H2. Moreover as was the case for H1 the Durbin-Watson statistic indicates an absence of first-order serial correlation in the residuals, and the CUSUM plot of the recursive residuals all lie within the 5 percent upper and lower boundaries indicating that the estimated coefficients are stable over the entire sample time period.

To distinguish between these two hypotheses of bank lending with their very different implications for monetary policy we again implement the J-test version of the non-nested hypothesis test. The results are presented in regressions (3) and (4) of Table 1. In (3) we include the fitted values from the regression for H2 (i.e., $\Delta(L,H2)$) as an explanatory variable in the regression H1. As can be seen the estimated coefficient on $\Delta(L,H2)$ is not significantly different from zero. We therefore reject H2. Next this procedure is reversed by including in regression H2 the computed values of $\Delta(L,H1)$. As can be seen the estimated coefficient on $\Delta(L,H1)$ in (4) is close to unity and statistically significant. We therefore reject the specification of MFI lending in H2. To further confirm this we carry out an omitted variable test. To do this we add $\Delta(GDP)_{t-2}$ and $(R,Loan)_{t-1}$ to the regression specification in H1. The F-statistic generated by this test is 1.04 with a P-value of .36. We therefore reject at the 5 percent level the hypothesis that these two demand variables are omitted variables from the capital budgeting/stock market hypothesis

of bank lending given in H1. On the other hand adding $(SP,bk)_{t-1}$ and $\Delta(SP,MSCI)_{t-1}$ to H2 yields an F-statistic of 10.83 and a P-value of .00 indicating that these two stock market variables are omitted variables from the demand-oriented specification of bank lending in H2. These results for the omitted variables test reinforce the results obtained in the J-test presented in part C of Table 1. Our empirical work suggests that for the entire Euro area the capital budgeting/stock market specification of bank lending in H1 does a better job tracking MFI investments in private loans over the 1988/3 to 2006/2 time period than the more traditional demand factors.

Before concluding the empirical work on the determinants of MFI/bank lending in Europe, it would be useful to consider other possible explanatory variables not particularly related to either the H1 or H2 models of lending. One such variable suggested in the literature is the equity leverage ratio of banks given the prominent role it plays in the Basle Accord on risk-based capital requirements. The argument is that loans to the private sector are risky and that a prudently regulated/managed bank should be well capitalized with equity finance in order to absorb possible losses associated with investments in risky loans. To test this proposition we will add an equity leverage ratio variable to the H1 and H2 specification of MFI/bank lending. The prediction from this line of reasoning is that the sign of the estimated coefficient on the equity leverage variable should be positive and statistically significant. In choosing this equity variable we will again use the sample specific strategy used above in letting the data determine the choice. The starting point is that the sign of the coefficient on this equity leverage variable must be positive. The best result from this perspective defined the variable to be the lagged change in the ratio of equity capital to total assets. For France it was a two quarter lag, $\Delta(Equity/A)_{t-2}$; whereas for Germany it was a one quarter lag, $\Delta(Equity/A)_{t-1}$. At this point in

time there is no Euro measure of MFI equity or total MFI assets. For this reason no results are reported for the Euro area. The regression results for this test are presented in Table 2.

(Put Table 2 here)

An examination of regressions (1) and (2) in part A of the table indicate that for France the addition of $\Delta(\text{Equity/A})_{t-2}$ adds little to explaining MFI investments in private loans for either the H1 or H2 specifications. While the estimated coefficient on the equity variable is positive it is never significantly different from zero. Moreover the estimated coefficients on $\Delta(\text{SP,bk})_{t-4}$, $(\text{SP,bk})^2_t$, $(\text{SP,250})_t$, $\Delta(\text{GDP})_t$, and $(\text{R,ST})_{t-4}$ were virtually unaffected by the inclusion of the equity variable. In part B of the table we present the regression results of adding $\Delta(\text{Equity/A})_{t-1}$ to the H1 and H2 specifications of MFI and commercial bank lending in Germany. The results here are quite different than they were for France. For the most part the lagged marginal equity leverage ratio variable is a statistically significant predictor of lending by financial institutions in Germany.[10] Is this to be expected? In II A above it was noted that the French and German banking systems were quite different in terms of asset allocations and financing. In this connection French MFI's have both a smaller proportion of their assets invested in risky loans to the private sector compared to Germany (an average of 42.6 percent versus 61.6 percent) and a thicker equity cushion (an average of 8.9 percent of total assets versus 3.9 percent) over their respective sample periods. From this perspective German MFI's seem to be carrying more portfolio risk and financial risk than French MFI's thus necessitating German financial institutions to more closely link their investments in risky private loans to the change in their equity leverage ratio.

III. Summary and Conclusions

In this study we compare two hypotheses on the determinants of inter-temporal bank lending in France, Germany, and the combined Euro area. The traditional view of bank lending in Europe focuses attention on the demand for loans by bank loan customers. This traditional view is presented in the H2 reduced form specification of bank lending where these demand variables are proxied with GDP and various measures of short-term interest rates on bank loans. The policy implication of H2 is one where the monetary authority targets short-term interest rates in their attempt to stabilize aggregate demand. Previous empirical studies and the ones carried out here were for the most part unable to reject the H2 specification of bank lending in Europe when that was the only hypothesis on the table. This paper proposed an alternative hypothesis of bank lending based on capital budgeting theory and stock market valuations, and then proceeded to compare it to the more traditional H2 hypothesis. The view taken here was that bank investments in private loans, like investments in any asset undertaken by firms in general, have to meet a cost of capital hurdle. That cost of capital hurdle in this paper was approximated by the market valuation of bank equity shares. Moreover banks in Europe hold equity securities in their portfolios. For that reason we also included as an explanatory variable the market valuation of equity securities in general since changes in the market valuations of these securities can have a wealth affect on the willingness of European banks to supply loan finance to their customers. A complimentary interpretation for the inclusion of an index of general stock prices is that changes in general stock valuations reflect changes in expected cash flows and the profitability

of bank loan customers thereby affecting their demand for assets and ultimately the financing of those assets. The reduced-form of this stock market/capital budgeting hypothesis was labeled H1. These two hypotheses were then compared using non-nested hypothesis and omitted variables tests. For the most part these tests indicated that we were able to reject the more traditional demand oriented bank lending hypothesis in H2, but unable to reject the stock market/capital budgeting view of bank lending in H1. Omitted variables tests reinforced this conclusion. GDP and interest rates on loans were found not to be omitted variables in the H1 specification of bank lending, but share valuations were found to be omitted variables in the H2 specification. Of course this is not to say that there is not some potential third hypothesis H3 of bank investments in private loans that could beat H1. Whether that potential H3 would be devoid of an important role for equity prices is problematic. One potential H3 examined in this paper was to include an equity leverage variable, Δ(Equity/A), to both the H1 and H2 specifications. The reason for adding an equity leverage variable is that these ratios are now part of the regulatory background within which banks operate. The results of this experiment were interesting. For France the addition of this explanatory variable in the OLS specifications of H1 and H2 had no material effect on bank investments in private loans. For Germany the case was quite different in that the addition of this equity leverage variable did effect bank lending in both H1 and H2. Bank lending in Table 2 was shown to be positively related to $\Delta(\text{Equity/A})_{t-1,}$ and that positive relationship was statistically significant. One possible reason for the difference between France and Germany is that French banks were observed to have more conservative portfolios (i.e., a smaller proportion of their assets invested in risky loans) and were more heavily capitalized with equity finance than their German counterparts. For France the regulatory equity leverage constraint is less binding than was the case in Germany.

In closing there has been much research indicating that there are important differences between the financial systems in Europe and the U.S., and the way corporate investments are financed in those countries. The former is classified by this research as a bank-based financial system and the latter a stock market oriented financial system. In both systems capital budgeting theory tells us that real corporate investment should respond to changes in expected real corporate cash flows and the cost of capital. The job of the public corporation is to generate a rate of return on their assets that is at least equal to the required rate of return of their investors. It should be no different for banks. It would therefore seem that if capital budgeting rules can evaluate the merits of tangible investments, they should be able to evaluate the merits of bank investments in private loans. Under these conditions bank lending should then respond to both changes in the market valuations of bank stock, reflecting their cost of capital, and the market value of stocks in general reflecting the change in wealth and expected cash flows on real investment projects of bank loan customers. Our research indicates that the banks in Europe are in fact guided by the stock market when it comes to determining their investments in private loans. In this sense it might be said that Europe is also a stock market oriented financial system. What implications, if any, might this have for the conduct of monetary policy? Traditional monetary policy targets the short-term interest rate (the same interest rate as in H2) which with a lag affects the demand for loans by bank customers and their demand for output. This is the so-called bank lending channel that describes the conventional view on the link between bank lending and the real economy. Our research indicates that share valuations have a more powerful effect on bank lending than short-term interest rates. If fluctuations in bank lending amplifies the demand for output and hence business cycles, then perhaps central banks might want to consider

carrying out some open market operations in equities with the view of stabilizing share prices. This is an area that merits future theoretical and empirical research.

END NOTES

1. A small sample of this research would include Berger and Udell (1993, 1995, and 1996), Nakamura (!993), Peterson and Rajan (1994), Berger and Humphrey (1998), and the special issue of the Journal of Banking and Finance on the Economics of Small Business Finance edited by Berger and Udell (1998).

2. Early empirical research on the stock market value of nonfinancial firms of a bank relationship includes James (1987), Slovin, Sushka, and Hudson (1988), James and Wier (1990), Slovin and Young (1990), and Hirshey, Slovin, and Zaima (1990). For more recent research see Ongena, Roscovan, and Werker (2007).

3. Procyclicality of bank lending has long been observed in the banking literature. The reasons cited for this behavior include regulatory factors such as various versions of the Basle Accord and numerous non-regulatory factors. A partial listing of the former would include Bernanke and Lown (1991), Lang and Nakamura (1995), Berger and Udell (1994), Hancock and Wilcox (1994), Peek and Rosengren (1995), Shrieves and Dahl (1995), Stanton (1998), Wagster (1999), Borio et al. (2001), Estrella (2004), Pennacchi (2005), and Catarineu-Rabell et al. (2005). A partial listing of the non-regulatory causes would include Bernanke and Gertler (1989), Rajan (1994), Bernanke et al. 1996, Kiyotaki and Moore (1997), Berger et al. (2001), Berger and Udell (2003), Gorton and He (2003), Krainer (2009), and Abiad et al.(2009).

4. The capital budgeting approach was found to be successful in an empirical study of U.S. bank portfolio adjustments by Krainer (2009).

5. For an early attempt of estimation in this direction see Krainer (1969).

6. Evidence for this in Germany during the 2007-2009 financial crisis is provided by Kooths and Rieger (2009) where they point out that while German banks suffered large losses from U.S. subprime securities, bank loans actually rose to accommodate their customers. Furthermore interest rates on loans were more or less constant over this time period.

7. A change in general share prices could also have a balance sheet/ wealth affect on bank lending since European banks hold equities in their portfolios.

8. Curiously the reunification of Germany had no material effect on French MFI lending to the private sector. For that reason no dummy variable was included in the regression for that year.

9. An alternative strategy to implementing a Cochrane-Orcutt procedure to address the serial correlation problem in regressions 1 and 2 for Germany is to instead include a lagged value of the dependent variable as a regressor. The interpretation of the coefficient on this regressor would be a measure of the speed of adjustment in MFI loans from an old to a new

equilibrium value. The J-test results for this alternative specification turned out to be the same as those reported in part B of Table 2; namely, we rejected both H1 and H2.

10. We also carried out a non-nested hypothesis test for both the change in MFI loans and the commercial bank sector loans using the two specifications in part B of Table 2. The results were the same as those presented in part B of Table 1. For MFI's the t-statistics/P-values on the estimated coefficients for Δ(L,H2) is 6.15/.00, and for Δ(L,H1) they are 9.39/.00. We therefore reject both the H1 and H2 specifications for MFI lending which was the same result we obtained in part B of Table 1. For the commercial banking sector the t-statistics/P-values on the estimated coefficients for Δ(L,H2) is 1.24/.22 while for Δ(L,H1) it is 4.47/.00. As in part B (regressions 5-8) of Table 1 we therefore fail to reject the H1 specification of bank lending, but reject the H2 specification for the commercial banking sector.

REFERENCES

Abiad, A., R. Balakrishnan, P. Koeva Brooks, D. Leigh, and I. Tytell. 2009. "What's the Damage? Medium-term Output Dynamics After Banking Crises." IMF Working Paper WP/09/245.

Barth, J., G. Caprio, and R. Levine. 2004. "The Regulation and Supervision of Banks around the World: A New Data Base." University of Minnesota Financial Studies Working Paper No. 0006; World Bank Policy Research Working Paper No. 2588.

Barth, J., D. Nolle, and T. Rice.1997. "Commercial Bank Structure, Regulation, and Performance: An International Comparison." Office of the Comptroller of the Currency, Economics Working Paper 97-6.

Berger, A. and G. Udell. 1993. "Securitization, Risk, and the Liquidity Problem in Business." In M. Klausner and L. White, eds., *Structural Change in Banking.* Homewood, Il, 227-291.

_____, _____. 1994. "Did Risk-Based Capital Allocate Bank Credit and Cause a "Credit Crunch" in the United States?" *Journal of Money, Credit, and Banking* 26, 585-628.

_____, _____ 1995. "Relationship and Lines of Credit in Small Firm Finance. *Journal of Business* 68, 351-382.

_____, _____ 1996. "Universal Banking and the Future of Small Business Lending." In A. Saunders and I. Walter, eds., *Universal Banking: Financial System Design Reconsidered*. Chicago: Irwin, 558-627.

Berger, A. and D. Humphrey. 1998. "Efficiency of Financial Institutions: International Survey and Directions for Future Research. In P. Harker and S. Zenios, eds., *Performance of Financial Institutions*. Cambridge: Cambridge University Press.

Berger, A. and G. Udell. 1998. "The Economics of Small Business Finance." *Journal of Banking and Finance* 22, 613-1,116.

Berger, A., M. Kyle, and J. Scalise. 2001. "Did U.S. Bank Supervisors Get Tougher During the Credit Crunch?, Did They Get Easier During the Banking Boom?, Did it Matter to Bank Lending?" in Mishkin, F. (Editor) *Prudential Supervision: What Works and What Doesn't.* Chicago: University of Chicago Press.

Berger, A. and G. Udell. 2003. "The Institutional Memory Hypothesis and the Procyclicality of Bank Lending Behavior." *Journal of Financial Intermediation* 13, 458-495.

Bernanke, B. and M. Gertler. 1989. "Agency Costs, Net Worth, and Business Fluctuations." *American Economic Review* 79, 14-31.

Bernanke, B. and M. Gertler. 1995. "Inside the Black Box: The Credit Channel of Monetary Policy Transmission." *Journal of Economic Perspectives* 9, 27-48.

Bernanke, B. and C. Lown. 1991. "The Credit Crunch." *Brookings Papers on Economic Activity* 2, 205-247.

Bernanke, B., M. Gertler, and S. Gilchrist. 1996. " The Financial Accelerator and the Flight to Quality." *Review of Economics and Statistics* 78, 1-15.

Borio, C., C. Furfine, and P. Lowe. 2001. "Procyclicality of the Financial System and Financial Stability: Issues and Policy Options." Bank for International Settlements, BIS Papers No. 1.

Calza, A. C. Gartner, and J. Sousa. 2003. "Modelling the Demand for Loans to the Private Sector in the Euro Area." *Applied Economics* 35, 107-117.

Calza. A., M. Manrique, and J. Sousa. 2003. "Aggregate Loans to the Euro Area Private Sector." European Central Bank Working Paper No. 202.

Catarineu-Rabell, E. P. Jackson, and D. Tsomocos. 2005. "Procyclicality and the New Basel Accord: Bank's Choice of Loan Rating System." *Economic Theory 26, 537-557.*

Davidson, R. and J. MacKinnon. 1981. "Several Tests for Model Specification in the Presence of Alternative Hypotheses." *Econometrica 49,* 781-793.

_____, _____. 1993. *Estimation and Inference in Econometrics*. Oxford: Oxford University Press.

Eickmeier, S., B. Hofmann, and A. Worms. 2006. "Macroeconomic Fluctuations and Bank Lending: Evidence for Germany and the Euro Area." Deutsche Bundesbank Discussion Paper, Series 1: Economic Studies, No 34/2006.

Ediz, T. I. Michael, and W. Perraudin. 1998. "The Impact of Capital Requirements on U.K. Bank Behaviour." FRBNY *Economic Policy Review*, 15-22.

Estrella, A. 2004. "The Cyclical Behavior of Optimal Bank Capital." *Journal of Banking and Finance* 28, 1469-1498.

Friedman, B. and K. Kuttner. 1993. "Economic Activity and the Short-Term Credit Markets: An Analysis of Prices and Quantities." *Brookings Papers on Economic Activity* 2, 193-283.

Frommel, M. and T. Schmidt. 2006. "Bank Lending and Asset Prices in the Euro Area." Unpublished paper available on the SSRN.

Gorton, G. and P. He. 2007. "Bank Credit Cycles." Working Paper available on the SSRN at http://ssrn.com/abstract=720721.

Hancock, D. and J. Wilcox. 1994. "Bank Capital and the Credit Crunch: The Roles Risk-Weighted and Un-weighted Capital Regulations." *Journal of the American Real Estate Urban Economic Association* 22, 59-94.

Hirshey, M., M. Slovin, and J. Zaima. 1990. "Bank Debt, Insider Trading, and the Return to Corporate Selloffs." *Journal of Banking and Finance* 14, 85-98.

James, C. 1987. "Some Evidence on the Uniqueness of Bank Loans." *Journal of Financial Economics* 19, 217-235.

James, C. and P. Wier. 1990. "Borrowing Relationships, Intermediation and the Cost of Issuing Public Securities." *Journal of Financial Economics* 28, 149-171.

Kiyotaki, N. and J. Moore. 1997. "Credit Cycles." *Journal of Political Economy* 105. 211-248.

Kooths, S. and M. Rieger. 2009. "Caught in the US Subprime Meltdown 2007/2008: Germany Loses its Wallet but Escapes Major Harm. Unpublished manuscript available at http://ssrn.com/abstract=1425530.

Krainer, R. 1969. "Structural Estimates of Supply and Demand in the U.S.A. Short Term Bank Loan Market." *Oxford Bulletin of Economics and Statistics* 31, 39-46.

_____, 2009. "Portfolio and Financing Adjustments for U.S. Banks: Some Empirical Evidence." *Journal of Financial Stability* 5, 1-24.

Lang, W. and L. Nakamura. 1995. "Flight to Quality in Bank Lending and Economic Activity." *Journal of Monetary Economics* 36, 145-164.

Nakamura, L. 1993. "Recent Research in Commercial Banking: Information and Lending." *Financial Markets, Institutions, and Instruments* 2, 73-88.

Ongena, S., V. Roscovan, and B. Werker. 2007. "Banks and Bonds: The Impact of Bank Loan Announcements on Bond and Equity Prices." Unpublished manuscript available on SSRN.

Peek, J. and E. Rosengren. 1995. "Bank Regulation and the Credit Crunch." *Journal of Banking and Finance* 19, 679-692.

Pennacchi, G. 2005. "Risk-Based Capital Standards, Deposit Insurance, and Procyclicality." *Journal of Financial Intermediation* 14, 432-465.

Peterson, M. and R. Rajan. 1994. "The Benefits of Lending Relationships: Evidence From Small Business Data." *Journal of Finance* 49, 3-37.

Rajan, R. 1994. Why Bank Credit Policies Fluctuate: A Theory and Some Evidence." *Quarterly Journal of Economics* 109, 399-44

Shrieves, R. and D. Dahl. 1995. “Regulation, Recession, and Bank Lending Behavior: The 1990 Credit Crunch.” *Journal of Financial Services Research* 9, 5-30.

Slovin, M., M. Sushka, and C. Hudson. 1988. “Corporate Commercial Paper, Note Issuance Facilities, and Shareholder Wealth.” *Journal of International Money and Finance* 7, 289-302.

Slovin, M. and J. Young. 1990. “Bank Lending and Initial Public Offerings.” *Journal of Banking and Finance* 14, 729-740.

Sorensen, C., D. Ibanez, and C. Rossi. 2009. “Modelling Loans to Non-Financial Corporations in the Euro Area.” European Central Bank Working Paper no. 989.

Stanton, S. 1998. “The Underinvestment Problem and Patterns in Bank Lending.” *Journal of Financial Intermediation* 7. 293-326.

Wagster, J. 1999. “The Basle Accord of 1988 and the International Credit Crunch of 1989-1992.” *Journal of Financial Services Research* 15, 123-143.

APPENDIX ON DATA SOURCES

FRANCE

MFI= Monetary financial institutions excluding the Banque de France and mutual funds. MFI's include resident credit institutions and other resident credit institutions that issue deposits and/or close substitutes, and grant credit and/or make investments in securities.

(L,MFI)= The stock of MFI loans outstanding to euro area residents. This variable is deflated by the French consumer price index. Source: Banque de France. Pre-1999 data converted into euros at the fixed irrevocable exchange rate between French francs and euros.

(Equity)= The total stock of equity capital and reserves of French MFI's. Source: Banque de France. Pre-1999 data converted at the fixed irrevocable exchange rate between French francs and euros.

A= The stock of total assets of MFI's in France. Source: Banque de France. Pre-1999 data converted at the fixed irrevocable exchange rate between French francs and euros.

(SP,bk)= Quarterly index of French bank share prices deflated by the consumer price index in France. Source: Datastream, Code: SBFNNKZ.

(SP,250)= Quarterly index of general share prices of 250 stocks traded on the Paris bourse. This stock series was deflated by the consumer price index in France. Source: Datastream, Code: FSBF250.

(GDP)= Real gross domestic product in France. Nominal GDP was deflated by the consumer price index for France. Source: Banque de France.

(R,LT)= Real interest rate on medium to long-term loans to business. The nominal interest rate was deflated by the percentage rate of change in the French consumer price index. Monthly rates were averaged to obtain quarterly rates. Source: Banque de France, Business Conditions Division.

(R,ST)= Real interest rate on overdraft facilities. The nominal rate was deflated by the percentage rate of change in the French consumer price index. Monthly rates were averaged to obtain quarterly rates. Source: Banque de France, Business Conditions Division.

(R,T-Bill)= Real interest rate on French T-bills. The Nominal rate was deflated by the percentage rate of change in the French consumer price index. Monthly rates were averaged to obtain quarterly rates. Source: Banque de France, Business Conditions Division.

GERMANY

MFI= Monetary financial institutions excluding the Deutsche Bundesbank and mutual funds. These are financial institutions that issue deposits or close substitutes for deposits, and grant credit and/or make investments in securities.

(L,MFI)= The stock of MFI loans outstanding to non-MFI borrowers. This variable is deflated by the German producer price index (2000=100) seasonally adjusted. Source: Deutsche Bundesbank, Time series key OU0083. Pre-1999 data converted at the fixed irrevocable exchange rate between DM's and euros.

(L,Banks)= The stock of commercial bank loans outstanding to non-MFI borrowers. This variable is deflated by the German producer price index seasonally adjusted. Commercial banks comprise the sub-group of big banks, regional banks, other commercial banks, and branches of foreign banks. Source: Deutsche Bundesbank, Time series key OU0783. Pre-1999 data converted at the fixed irrevocable exchange rate between DM's and euros.

(A,MFI)= The stock of total assets of MFI's. Source: Deutsche Bundesbank, Time series key: OU0308. Pre-1999 data converted at the fixed irrevocable exchange rate between DM's and euros.

(A,Banks)= The stock of total assets of commercial banks. Source: Deutsche Bundesbank, Time series key: OU0749. Pre-1999 data converted at the fixed irrevocable exchange rate between DM's and euros.

(Equity)= Total equity capital. For MFI's this variable was obtained from the Deutsche Bundesbank, time series key OU0322. For commercial banks this variable was obtained from the Deutsche Bundesbank, time series key OU1543. Pre-1999 data converted at the fixed irrevocable exchange rates between DM's and euros.

(SP,bk)= Quarterly index of large German bank share prices deflated by the German producer price index. Source: Datastream, DS banks, Code BANKSBD (PI).

(SP,CDAX)= The CDAX stock price index of all ordinary and preference shares officially listed on the Frankfurt stock exchange of companies domiciled in Germany. The series is deflated by the German producer price index. Source: Deutsche Bundesbank S 300, Time series key WU 001a.

(GDP-GR)= The percentage quarter to quarter change in the chain linked index of real GDP in Germany. For 1974-1990 the data was for West Germany. For 1991-2006 the data was for the unified Germany. Source: Deutsche Bundesbank, Time series key jbb000.

(R,Ave)= The average yield on German debt securities of all maturities. Monthly data were averaged to obtain quarterly data. The average yields were deflated by the percentage change in the German producer price index. Source: Deutsche Bundesbank, Time series key WU0017.

EURO AREA

MFI= Monetary institutions excluding central banks and mutual funds in the Euro area. MFI's include resident credit institutions and other financial institutions that issue deposits and/or close substitutes, and grant credit and/or make investments in securities.

(L,MFI)= The stock of MFI loans outstanding to Euro area residents deflated by the GDP deflator. Source: ECB *Monetary Statistics*, October 2006, pp. 1C*-6C*.

(SP,bk)= The quarterly stock price index of Euro area banks deflated by the Euro area GDP deflator. Source: Datastream, EU-DS Banks; Code, BANKSEU.

(SP,MSCI)= The quarterly MSCI European Union general stock price index deflated by the Euro area GDP deflator. Source: Datastream.

(R,loan)= The composite lending rate of banks in the original 11 Euro countries. This lending rate was deflated by the GDP deflator for the Euro area. Source: Unofficial data provided to the author by the European Central Bank.

(GDP)= Real gross domestic product for the Euro area. Source: Unofficial data provided to the author by the European Central Bank.

Table 1: Part A (FRANCE)
Quarterly: 1989:2 to 2007:1

1. $\Delta(L,MFI)_t = -1087.368 + 86.534\Delta(SP,bk)_{t-4} + 0.312(SP,bk)^2_t + 236.254(SP,250)_t - 1379.583(DV,2001/3,4)$ **H1**
(-3.16/.00) (3.28/.00) (3.22/.00) (3.91/.00) (-3.37/.00)
$\bar{R}^2 = 0.50$ DW = 1.77

2. $\Delta(L,MFI)_t = 2033.997 + 222.876\Delta(GDP)_t - 233.403(R,ST)_{t-4} - 460.237(DV,2001/3,4)$ **H2**
(2.99/.00) (2.02/.05) (-3.40/.00 (-0.90/.37)
$\bar{R}^2 = 0.31$ DW = 1.58

J-Test Results

3. $\Delta(L,MFI)_t = - 759.759 + 91.116\Delta(SP,bk)_{t-4} + 0.239(SP,bk)^2_t + 130.883(SP,250)_t - 815.110(DV,2001/3,4) + 0.446\Delta(L,H2)$
(-1.89/.06) (3.45/.00) (1.86/.07) (1.26/.21) (-1.08/.28) (1.76/.08)

4. $\Delta(L,MFI)_t = 155.637 + 125.103\Delta(GDP)_t - 37.603(R,ST)_{t-4} + 134.689(DV,2001/3,4) + 0.862\Delta(L,H1)$
(0.26/.80) (1.49/.14) (-.57/.57) (.19/.85) (4.75/.00)

Table 1: Part B (GERMANY)
Quarterly: 1974:1 to 2006:4

1. $\Delta(L,MFI)_t = 17.318 + 0.253\Delta(SP,bk)_{t-2} + 0.379\Delta(SP,CDAX)_t + 106.047(DV,90)$ **H1**
(3.85/.00) (3.56/.00) (2.46/.02) (38.43/.00)
$\bar{R}^2 = 0.36$ DW = 2.20 AR(1) = 0.47

2. $\Delta(L,MFI)_t = 17.468 + 1.385\Delta(GDP - GR)_t - 16.530\Delta(R,Ave)_{t-3} + 95.423(DV,90)$ **H2**
(3.71/.00) (1.53/.13) (-2.75/.01) (18.26/.00)
$\bar{R}^2 = 0.32$ DW = 2.20 AR(1) = 0.48

J-Test Results

3. $\Delta(L,MFI)_t = -4.768 + 0.175\Delta(SP,bk)_{t-2} + 0.135\Delta(SP,CDAX)_t - 14.976(DV,90) + 1.229\Delta(L,H2)$
(-1.51/.13) (2.46/.02) (1.27/.21) (-.54/.59) (8.43/.00)

4. $\Delta(L,MFI)_t = -2.386 + 1.325\Delta(GDP - GR)_t - 9.850\Delta(R,Ave)_{t-3} - 3.823(DV,90) + 1.094\Delta(L,H1)$
(-.73/.47) (.72/.47) (-2.16/.03) (-.13/.90) (7.37/.00)

Quarterly: 1973:4 to 2006:4

5. $\Delta(L,Banks)_t = 4.180 + 0.132\Delta(SP,bk)_{t-2} + 0.180\Delta(SP,CDAX)_t + 83.077(DV,90)$ **H1**
(3.60/.00) (2.91/.00) (2.04/.04) (70.42/.00)
$\bar{R}^2 = 0.29$ DW = 2.21

6. $\Delta(L,Banks)_t = 3.553 + 2.119(GDP - GR)_{t-2} - 2.665\Delta(R,Ave)_{t-3} + 81.087(DV,90)$ **H2**
(2.66/.01) (2.13/.04) (-1.63/.11) (52.23/.00)
$\bar{R}^2 = 0.20$ DW = 2.10

J-Test Results

7. $\Delta(L,Banks)_t = -0.056 + 0.126\Delta(SP,bk)_{t-2} + 0.184\Delta(SP,CDAX)_t + 8.402(DV,90) + 0.902\Delta(L,H2)$
(-0.02/.99) (2.93/.00) (2.97/.00) (0.166/.87) (1.53/.13)

8. $\Delta(L,Banks)_t = -1.161 + 2.242(GDP - GR)_{t-2} - 1.089\Delta(R,Ave)_{t-3} - 2.015(DV,90) + 1.004\Delta(L,H1)$
(-0.67/.50) (1.63/.10) (-0.41/.68) (-0.09/.93) (4.50/.00)

Table 1: Part C (EURO AREA)
Quarterly: 1988:3 to 2006:2

1. $\Delta(L,MFI)_t = -32.109 + 0.136(SP,bk)_{t-1} + 0.445\Delta(SP,MSCI)_{t-1} + 113.801(DV,90) - 47.671(DV,2001/3,4)$ **H1**

(-2.55/.01) (6.43/.00) (2.53/.01) (23.11/.00) (-2.22/.03)

$\bar{R}^2 = 0.50$ DW = 2.16

2. $\Delta(L,MFI)_t = 135.808 + 0.002\Delta(GDP)_{t-2} - 12.690(R,Loan)_{t-1} + 114.567(DV,90) - 51.429(DV,2001/3,4)$ **H2**

(6.09/.00) (2.22/.03) (-4.99/.00) (14.30/.00) (-2.12/.04)

$\bar{R}^2 = 0.36$ DW = 1.87

J-Test Results

3. $\Delta(L,MFI)_t = -22.264 + 0.107(SP,bk)_{t-1} + .418\Delta(SP,MSCI)_{t-1} + 104.418(DV,90) - 25.418(DV,2001/3,4) + 0.065\Delta(L,H2)$

(-1.74/.08) (3.08/.00) (1.99/.05) (2.25/.03) (-0.90/.37) (0.23/.82)

4. $\Delta(L,MFI)_t = -18.756 + 0.001\Delta(GDP)_{t-2} + 1.344(R,Loan)_{t-1} - 12.009(DV,90) + 3.472(DV,2001/3,4) + 1.037\Delta(L,H1)$

(-0.52/.60) (1.30/.20) (0.39/.70) (-0.27/.79) (0.12/.90) (4.67/.00)

$\bar{R}^2$ = Adjusted coefficient of determination.
DW= Durbin-Watson statistic.
Newey-West computed t-scores and p-values are given in the parentheses beneath the estimated coefficients.

Table 2: Part A (FRANCE)
Quarterly: 1989:2 to 2007:1

1. $\Delta(L,MFI)_t = -1084.521+85.401\Delta(SP,bk)_{t-4}+0.315(SP,bk)^2_t+233.780(SP,250)_t-1351.301(DV,2001/3,4)+16386.77\Delta(\frac{Equity}{A})_{t-2}$

(-3.16/.00) (3.13/.00) (3.28/.00) (3.91/.00) (-3.21/.00) (.31/.76)

$\bar{R}^2 = 0.50$ DW = 1.78

2. $\Delta(L,MFI)_t = 2038.554 + 220.668\Delta(GDP)_t - 236.607(R,ST)_{t-4} - 377.279(DV,2001/3,4) + 58710.00\Delta(\frac{Equity}{A})_{t-2}$

(2.96/.00) (2.01/.05) (-3.40/.00) (-0.73/.47) (1.35/.18)

$\bar{R}^2 = 0.31$ DW = 1.60

Part B (GERMANY)
Quarterly: 1974:3 to 2006:4

1. $\Delta(L,MFI)_t = 17.521 + 0.234\Delta(SP,bk)_{t-2} + 0.388\Delta(SP,CDAX)_t + 4188.863\Delta(\frac{Equity}{A})_{t-1} + 102.328(DV,90)$

(3.74/.00) (3.12/.00) (2.42/.02) (1.85/.07) (39.12/.00)

$\bar{R}^2 = 0.36$ DW = 2.13 AR(1) = 0.50

2. $\Delta(L,MFI)_t = 17.488 + 1.183\Delta(GDP - GR)_t - 17.127\Delta(R,Ave)_{t-3} + 4726.387\Delta(\frac{Equity}{A})_{t-1} + 90.397(DV,90)$

(3.46/.00) (1.44/.15) (-2.71/.01) (2.14/.03) (18.82/.00)

$\bar{R}^2 = 0.33$ DW = 2.09 AR(1) = 0.53

3. $\Delta(L,Banks)_t = 4.328 + 0.116\ \Delta(SP,bk)_{t-2} + 0.191\Delta(SP,CDAX)_t + 2051.596\Delta(\frac{Equity}{A})_{t-1} + 74.954(DV,90)$

(3.65/.00) (2.66/.01) (2.26/.03) (2.70/.01) (22.71/.00)

$\bar{R}^2 = 0.34$ DW = 1.99

4. $\Delta(L,Banks)_t = 3.983 + 1.629(GDP - GR)_{t-2} - 2.308\Delta(R,Ave)_{t-3} + 2039.889\Delta(\frac{Equity}{A})_{t-1} + 73.342(DV,90)$

(2.91/.00) (1.68/.10) (-1.41/.16) (2.64/.01) (22.71/.00)

$\bar{R}^2 = 0.25$ DW = 1.88

$\bar{R}^2$ = Adjusted coefficient of determination.
DW= Durbin-Watson statistic.
Newey-West computed t-scores and p-values are given in the parentheses beneath the estimated coefficients.