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INTERACTING DEMAND AND SUPPLY CONDITIONS IN EUROPEAN BANK LENDING

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ABSTRACT

This paper investigates credit channel of monetary policy by accounting for simultaneous interaction of banks' and firms' credit conditions and their adjustment costs, which are neglected in the previous studies. Based on the European data we find that these conditions are interacting, although their adjustment costs differ across banks, firm size, countries, and over time. The results suggest that a common European monetary policy should then deal with uncertainty over credit market conditions and firms' and banks' country-specific and size-dependent reactions. It should also monitor large firms' exploitation of banks' credit rationing as it can have great impacts on the smaller firms' lending and financial stability conditions.

Key words: Bank lending, European data, manufacturing firms, system of dynamic models, adjustments, monetary policy

JEL Classification Numbers: E51, C33, G21

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I. INTRODUCTION

It is still an open issue whether changes in short-term interest rate as the main monetary policy device can significantly affect the supply of bank loans. It is not obvious why the short-term interest rate should affect in a predictable way the more long-term investments and savings, i.e. asset prices. This in mind, this paper seeks to investigate the credit channel of monetary policy, which is to identify the endogenous driving force for dynamics of banks' response to changing market conditions or banks' role in transmission of monetary policy.

However, here we emphasize banks' costs of intermediation (i.e. price effect) rather than their effects on credit supply (i.e. quantity effect) as is usually done. We believe that the price effect is more crucial for the transmission of monetary policy to the extent that it affects firms' costs of borrowing relative to other sources of financing and institutions providing them. It also highlights banks' role as market intermediaries and thus banks' sensitivity to information and agency problems. The price effect also accounts better for the competitive and industrial effects, such as market efficiency. However, the price setting is especially important to banks' profitability, which is itself important to soundness of banking system and financial stability.

By emphasizing the price effect, we also avoid many empirical problems that are related to changes in credit supply. In particular, there are difficulties to separately identify the effects of changes in supply and demand for bank loans. These identification problems are partly due to balance sheet identity[1] and due to assumed direct dependence of market rates on demand and supply movements that are thought being otherwise independent of each other. The latter effect ignores then bank- and firm-specific characteristics (e.g. size, liquidity position, riskiness of investment portfolio or competitive pressure) that cause heterogeneous effects e.g. on banks' loan prices in response to market rate changes. However, these price changes can also have effects on real consumption and investments even if there are no changes in the credit aggregates, e.g. due to imperfectly elastic demand. Now, if banks do not react symmetrically to changes in market conditions, then their role in monetary policy can be overstated. These effects can also differ by country and industrial sector (see, e.g. Kashyap and Stein, 1997), which in turn forms a major concern for e.g. a common European monetary policy.

We acknowledge these bank-specific characteristics through banks' liquidity management. In general, uncertain expectations over future make firms hold excess liquidity either for transaction, speculation or hedging purposes. This liquidity, although costly due to trade-off with more risky investments (incl. loans), creates an opportunity to smooth firms' responses to changes in market conditions. This is especially vital for banks, because they also simultaneously manage interest rate linkage between their inputs and outputs due to a direct and costly trade-off between banks' liquidity and profitability. As a result, banks are assumed to react changes in market conditions (incl. competition) by managing their terms of credit subject to costly adjustments to their liquidity. However, these supply conditions depend also on demand for credit. Firms control this instead by analysing the credit market conditions, investment opportunities and

[1] Assets or credit aggregates (i.e. loans and liquidity) and liabilities or monetary aggregates (i.e. deposits and borrowing) have to be equalized in balance sheets. Hence, change in one side causes similar change in the other side. Equity belongs also to liabilities but acts more as a last resort of finance for banks.

endogenous adjustment costs faced. Hence, the demand and supply conditions are interacting.

This paper contributes to the literature of credit channels in a number of ways by using a system of dynamic partial adjustment models. First, the paper accounts for the simultaneous interaction between the separate, yet interdependent demand and supply conditions and thus avoids incorrect inferences within and between the two sides of bank lending. Second, it accounts for banks' and firms' adjustment costs, which are largely neglected in the previous studies. These costs associated with changes in liquidity status reflect market imperfections and uncertainty that can not only restrict these firms adjustment to their optimal supply and demand conditions but also prevent monetary policy from having desired impact on changes in market conditions. Finally, as empirical banking literature is mostly based on US data or country-specific European data, this paper makes a contribution to the existing literature by using a wide harmonized European multi-country bank and manufacturing data including small, medium and large firms that has not been available until quite recently. As a result, this paper provides information that can be useful for the common European monetary policy.

Our results show that banks' and firms' credit conditions interact. In fact, tightening monetary policy and firms' increased demand for credit affect similarly banks' supply conditions by increasing their interest rate or risk margins. These, instead, tend to decrease the small and mediums-sized firms' demand for loans but unexpectedly increase it for large firms. There are also opposite reactions between small and large firms and between these and banks that are likely to depend on the differences in uncertainty or time-orientation and bank dependence. Further, the adjustment costs differ across banks, firm sizes, and countries as well as over time. Still, size is found to be the most relevant adjustment cost parameter for banks whereas default risk is emphasized for firms. In addition, banks' competition over medium-sized firms' financing together with these firms' greater growth orientation (or risk) is likely to raise these costs. As a result, the effects of monetary policy on the economy depend very likely on the size composition of its banks and firms. Still, the wide spectrum of firms' leverage incentives (such as different regulatory environments) is a real challenge for the common European monetary policy. There is also a threat that large firms' unpredictable demand for banks loans due to their ability to take advantage of banks' credit rationing and its compounded effects made payable to smaller and more bank-dependent firms can danger the financial stability.

Rest of the paper is organized as follows. Section II reviews briefly the theories behind this paper. Section III introduces next the modelling approach used and its specifications including variables of interest. Section IV describes then the data set and Section V presents the main results and discusses further of their implications. Finally, Section VI concludes.

II. THEORY

Circulation of money in the economy can be viewed as firms' creation of excess funds by borrowing these once created funds for their uncertain future investment opportunities. This market of funds is however not perfect, nor complete, which is opposite to the Modigliani and Miller (1958) claim of the financial irrelevancy. Informational costs

(mainly e.g. agency costs and asymmetric information[2]) create market frictions in capital markets, which implicate that: (1) firms' investment and financing decisions become interdependent, (2) firms cannot substitute different financing sources without additional costs, (3) financial intermediaries are allowed to exist by providing services that decrease these costs of financing for informational opaque borrowers, and finally (4) the amount of these costs is thought of depending on firms' size. These market frictions are also important because they may explain the propagation of business cycles and hence, show how monetary policy or changes in market conditions are transmitted to real sector investments.

Supply conditions

Market frictions have been ignored in the conventional money view in which changes in the supply of money affect the opportunity cost of capital and hence directly firms' investments. Therefore, two complementary credit channels of monetary policy (or accelerators of the money view) to the economy are identified: balance sheet and bank lending channel.[3] Unlike in the money view, these credit channels consider banks one of the main vehicles for monetary policy and emphasize the distributional effects.[4] According to these, the credit availability is a positive function of firm's collateral value. Thus, if banks cannot substitute their financing without additional costs[5] due to the imperfect and incomplete information present between them and both financial markets or their customers, any reduction in the banks' supply of loans (either due to shock in their liability or asset side) is likely to increase their funding premiums[6] and to reduce their lending especially for bank-dependent or balance sheet constrained firms.

Beside these input costs or refinancing costs, output prices also seem to control bank lending. This is interestingly the case even though banks are assumed to operate under oligopolistic market conditions, in which they are not only price takers but set their lending and deposit rates partly independently from market clearing prices. Still, in order to exist and survive banks must provide value for their shareholders. Therefore, the ability to supply loans is necessary but not sufficient condition for banks' existence, unlike profitability**.** In fact, unlimited supply of credit is ideally controlled by price, although in reality this is not always so straightforward. First of all, high market interest rates, in general and independent of banks, tend to decrease consumption and investment activity. On the hand, if banks, for example, cannot price properly their borrowers due to the

[2] Agency costs mean incentive conflicts related to moral hazard and adverse selection problems due to asymmetry in payoff structures among different claimholders of firms. Information asymmetry on the other hand relates to financiers' difficulties (or costs) of assessing the quality (risk and return) of firms in need of financing.

[3] See, e.g. Bernanke and Blinder (1992), Kashyap, Stein and Wilcox (1993), Romer and Romer (1993), Kashyap and Stein (1994), Gertler and Gilchrist (1994), and Kashyap and Stein (1995), Bernanke and Gertler (1995), and Bernanke, Gertler and Gilchrist (1996). Cecchetti (1995) and Hubbard (2000) provide an excellent synopsis of the effects of monetary policy on economic activity.

[4] Certain conditions have to be met here. These include: (1) bank loans are important sources of funds for economy and there are no perfect substitutes to them, (2) central authorities have ability or means to control volume of bank lending, (3) there exists bank-dependent or other balance sheet constraint firms, and (4) there is an imperfect price adjustment between money and real markets.

[5] This seems to be the case even though banks have very low transaction costs in issuing new debt because the demand for banks' managed liabilities, i.e. deposit base is not perfectly elastic.

[6] This reflects the difference between relative prices of inputs or internal funds, e.g. deposits, and opportunity cost of external funds, such as certificate of deposits.

informational market frictions, they may also be tempted to use equilibrium interest rates rather than unique measures of creditworthiness (Stiglitz and Weiss, 1981). Or alternatively, banks could apply this credit rationing to limit the total amount of their loans (Williamson, 1987). Nevertheless, this breaks the connection between price and quality (i.e. risk and return) in banks' loan portfolio and results in a flight of good quality borrowers from the loan markets. Eventually, banks' risk margins can only increase up to a limit that cannot be exceeded due to high market interest rates or credit rationing.

To ease these problems further, banks' use economies of scale and scope in diversification and collection and processing of private information.[7] As a result, banks face systematic or market risk rather than idiosyncratic risks in their operations. Still, the market levels of interest rates represent also an opportunity costs for banks similar to other non-financial firms (i.e. monetary phenomenon), because banks' cost of intermediation into financial markets is not only a compensation for market risk taken, but also or rather a compensation for their services provided, e.g. liquidity provision (i.e. real phenomenon).[8] Therefore, again similar to other firms, but with greater emphasis, banks are thought of anticipating the future by managing their liquidity.[9] In doing this, they also manage interest rate linkage between their inputs and outputs due to a direct and costly trade-off between banks' liquidity and profitability. These bank-specific adjustments are then costly due to information and agency problems created by uncertainty and irreversibility.

Demand conditions

Although we have emphasized the banks' role in monetary policy transmission under information problems, the analysis so far have lacked for another crucial component affecting this, namely demand for bank loans.

This is important because credit markets are primarily demand or non-financial sector driven and bank loans accounts only for one part of the total markets. As a result, firms, foremost separate from banks, control their credit demand depending on their investment opportunities and financial status. Indeed, firms can be expected to choose among alternative competing sources of financing by comparing their terms and firm-specific adjustment costs caused.[10] These costs related to information problems are expected to increase with firms' growth opportunities, leverage and lack of net worth. Hence, these costs are thought being higher for younger and smaller firms with high degree of idiosyncratic risk and low level of collaterals.[11] The effect of monetary policy working

[7] See, e.g. Diamond (1984). The objective is to reduce monitoring costs linked to borrowers' possible information and agency problems.

[8] Provision of services is related to transformation process where mainly safe and liquid deposits from public, but also equity and money market borrowing (i.e. inputs), are turned into larger and longer maturity risky loans and deposit services (i.e. outputs). Also labour, information technology and plants can be considered as inputs, but are ignored here.

[9] A bank should always have enough liquid assets to meet the demands of its creditors and depositors.

[10] The competition between banks, alternative sources of financing and institutions providing them as well as different financial markets are expected to increase over time due to three major external trends: deregulation and liberalisation; advances in information technology and financial innovations; and economic, financial and monetary integration.

[11] Small amounts to be borrowed do not either attract financial institutions or give reason to a more direct access to financial markets due to the possible costs faced, e.g. fixed costs and cost of continuous disclosure of detailed information.

through the banks is suggested to be most severe on those firms that have limited access to financial markets or are otherwise balance sheet constrained or bank-dependent, i.e. they cannot substitute bank loans without additional costs.[12]

Also, the interdependence of supply and demand conditions becomes crucial for analysis of monetary policy effects on industrial structure and performance because firms' adverse demand shocks tend to be compounded in recessions, and *vice versa*. First, increasing information problems raise credit providers' risk margins and then, through the reduction of their liquidity, eventually also their credit supply. Hence, although demand and supply conditions are separately controlled, they are still partially dependent on each other.

III. MODELLING

Our modelling approach is based on Banerjee, Heshmati and Wihlborg (2004) and Lindström and Heshmati (2004). Banerjee, Heshmati and Wihlborg (2004) assume that firms dynamically adjust their decision variables, e.g. leverage, periodically to some target levels. As these target levels are functions of the observable determinants, they are known within the period, but not beyond that because of uncertainty. Their model also recognises that as these adjustments are usually costly due to market frictions, firms may find it optimal to adjust only partially to these targets. These periodic changes towards the target levels, i.e. speed of adjustments, are allowed to be flexible and have determinants of their own representing the cost parameters. Hence, the key feature of their model is to simultaneously endogenize the adjustment parameter and the optimality of a decision variable. Lindström and Heshmati (2004) refine the model so that in addition to accounting for dynamics and non-linearities above it permits the analysis of simultaneity and thereby avoids the incorrect inferences of causalities within and between the two separate but interdependent decisions, e.g. leverage and investment. Therefore, we also apply this system approach for our study, where decisions of banks' credit terms and firms' demand for credit are assumed to be made separately but interdependently and subject to their adjustment costs faced. As a result, this approach better recognizes the effects of simultaneous interaction, which is likely to reduce biases in the results, allow for non-partial inferences, and improve our understanding of these joint decisions and they interplay.

Theoretical models

The optimal or target levels of the key variables, banks' decisions of their risk margin or supply conditions (R) and firms' decisions of their leverage or demand conditions (D) respectively are determined as follows:

(1a) $R^*_{ikt} = f(X^R_{ikt}, X^R_i, X^R_k, X^R_t, \hat{D}_{jkt})$

(1b) $D^*_{jkt} = g(X^D_{jkt}, X^D_j, X^D_k, X^D_t, \hat{R}_{ikt})$

where the subscript i denotes bank, j firm, k country and t time period. The f and g indicate functional forms. R^*_{ikt} denotes optimal bank and D^*_{jkt} optimal firm decision.

[12] For more details about firms' capital structure theories, see e.g. Harris and Raviv (1991) for general review, Rajan and Zingales (1995) for international evidence, Fazzari, Hubbard and Petersen (1988) for financial constraints, and Berger and Udell (2000) for differences of large and small firms, and the references there.

$\hat{R}_{ikt}$ and $\hat{D}_{jkt}$ are their estimated feedbacks from one decision to another. These predicted values are based on the static models with similar specifications as those in the dynamic models but without this interaction term. $X's$ are vectors of explanatory variables and they may partially overlap across the two equations. The dynamics is captured here through the changes in determinants of the observed levels ($X's$) that also cause the optimal or target levels (R^*_{ikt} and D^*_{jkt}) to shift. All of these parameters are allowed to change over time and across firms and countries due to changing circumstances and market conditions.

To avoid the misspecification errors caused by the aggregation effects, the absence of adjustment costs and the dynamic nature of the bank-firm relationship, a dynamic formulation is employed. The dynamic models based on a general equilibrium formula $Y_{ikt} - Y_{ik,t-1} = \delta_{it}(Y^*_{ikt} - Y_{ik,t-1})$, where $Y(R, D)$ is the vector the two dependent variables and $\delta(\delta^R, \delta^D)$ the vector of their adjustment rates, can be written as follows:[13]

(2a) $R_{ikt} = (1-\delta^R_{ikt})R_{ik,t-1} + \delta^R_{ikt}R^*_{ikt} + u^R_{ikt}$

(2b) $D_{jkt} = (1-\delta^D_{jkt})D_{jk,t-1} + \delta^D_{jkt}D^*_{jkt} + u^D_{jkt}$

where the δ^R_{ikt} and δ^D_{jkt} are adjustment parameters that measure the speed of adjustment from observed to optimal levels. For example, if $\delta^R_{ikt} = 1$ or $\delta^D_{jkt} = 1$, the adjustment is made fully within one period and the firms and banks are in their optimum. On the other hand, if $\delta^R_{ikt} < 1$ or $\delta^D_{jkt} < 1$, the adjustment falls short, and respectively, while if $\delta^R_{ikt} > 1$ or $\delta^D_{ikt} > 1$, there is an over-adjustment. Here u^R_{ikt} and u^D_{jkt} are the random error terms whose components are assumed to be independent of each other and of the explanatory variables. They are further assumed to have mean zero and constant variances and covariances.

The adjustment parameter here is flexible because the costs of adjustment do not have to be convex or constant as is often assumed in many dynamic models. This is also important because of the assumed heterogeneity in the cost of adjustment among banks, firms, industries, and countries as well as over time. Hence, the periodic values for the adjustment parameters also allow us to model their determinants:

(3a) $\delta^R_{ikt} = l(Z^R_{ikt}, Z^R_i, Z^R_k, Z^R_t)$

(3b) $\delta^D_{jkt} = m(Z^D_{jkt}, Z^D_j, Z^D_k, Z^D_t)$

where $Z's$ are vectors of determinants of the speed of adjustment and l and m indications of a functional form. Hence, these determinants can be seen as measures of adjustment costs that characterize the costs of shifting from one level to another rather than the actual cost associated with specific levels. If the effect of determinant to the adjustment parameter is positive, it indicates that the actual variable increases the speed of

[13] For more details about this model, see either Banerjee, Heshmati, and Wihlborg, 2004, or Lindström and Heshmati, 2004.

adjustment and is a real cost parameter, whereas in the opposite case, it provides flexibility for the decision by smoothing the speed or cost of an adjustment needed.

Empirical models and their variables

Both banks and firms are similarly but separately, yet interdependently expected to partially adjust their terms of credit to changing exogenous credit market conditions. For this reason, we need in some extent joint, country-specific market variables for banks' and firms' target determination and bank- and firm-specific variables for their costly liquidity adjustments. We should also be able to control for firms' size as it is expected to be correlated with the information problems causing the interaction and adjustment costs.

Market-specific variables

Interest rates are the main variables in the credit markets. They affect firms' investment activity and willingness to acquire debt. Monthly interbank interest rate (IRm) is expected to reflect monetary policy changes due to its high correlation with central bank controlled rates. In general, monetary policy affects short-term interest rates; the more its patterns are unanticipated. A rise in IRm decreases asset values of the same maturity, through the increase in their opportunity cost of capital. Although the price effect on shorter-term assets, such as inventories, could be predicted, its effect on more long-term assets, such as fixed asset investment, is still an unresolved issue. In fact, these assets should be expected to depend on longer-term interest rates. Therefore, we also add a one-year inter-bank offered rate (IR1) and a rate of ten-year benchmark bond (IR10) to our set of explanatory variables.[14] These rates are also more closely related to short- and long-term future expectations.

Because banks are considered as the main transformers of monetary policy in our theory setting, it should be noted that beyond the standard interest rate channel, other factors of asset prices influence banks, although not necessarily on monetary policy.[15] These are stock market prices and foreign exchanges rates, which are linked to expectations of the future state of economy. Nevertheless, firms' net worth and banks' debt capacity are expected to increase with the stock-market index (SMI, USD denominated) due to enhanced collateral values. Foreign exchange rates (FX, a trade-weighted currency index[16] denominated in USD) on the other hand measures the international price competitiveness of the economy. Foreign exchange rates affect economy through devaluation of home currency that causes debt denominated in foreign currency to increase firms' debt burden and decrease the value of banks' assets, and vice versa. It further affects firms' net worth and banks' debt capacity each alike but also on inflation rate through the purchasing power parity. In contrast to US banks that have only negligible foreign exchange reserves, this could be a major factor for European banks.

[14] The Netherlands' interest rates are zero coupon quotes or rates.

[15] The effect of asset prices on monetary policy is still a controversial issue. However, stock market price index can be used as a trigger for actions in monetary policy – or at least as a proxy for future inflation and volatility forecasts. This way, monetary authorities could quite possibly smooth emerging shocks or prevent them spreading without relying on their super-natural ability to predict future better than markets. For more details on this issue see, e.g. Mishkin (2001), Cecchetti, Genberg and Wadhwani (2002), and Bernanke and Gertler (1999 and 2001).

[16] J. P. Morgan's daily trade-weighted currency index measures nominal exchange rate strength of individual OECD currency relative to 18 other OECD countries. The each country's bilateral trade in manufactured goods weights these indices. The base year 1990 equals 100.

Inflation (INF) is a measure for macroeconomic performance and price stability of an economy. As inflation is related to all asset prices, it has been nominated as the central monetary policy target in many central banks including e.g. Federal Reserve Bank (FED) and European Central Bank (ECB). Inflation also correlates with credit and market risks that again affect firms' liquidity and solvency. However, as it denotes an opportunity cost of holding money, it is bad for lenders but good for borrowers. Therefore, effects of inflation on real output are hard to control not least because of its long-term economy-wide effects but also because of the possible lack of real influence on asset prices.

Further, uncertainty over these future credit market and macroeconomic conditions (V prefix or letter indicates the variance of the above variables) is expected to be a major factor in financial markets. Greater uncertainty about these economic indicators will give rise to informational problems and thus have an effect on banks' lending over and above the constraints posed by monetary policy. In particular, an increase in uncertainty is likely to increase firms' (including banks) demand for liquidity, which is associated here with increase in their adjustment costs. It can also cause decline in economic activity, and is therefore a major issue for both banks' supply and firms' demand for credit.

Bank-specific variables

In addition to market conditions above, firms' demand for credit ($\hat{D}$) is expected to affect our first decision variable, the banks' interest rate margin (R, measured as net interest income to total loans). This margin is a major source of net income for banks and a measure for banks' cost of intermediation and external finance premium which are likely to reflect banks' risk margin involved with credit and interest rate risk premiums. Hence, it is also a measure for market efficiency: the lower the margin, the more efficient is the banking system and the lower cost of funding it can provide for firms. Alternatively, these margins can be seen as indicators of banks' market power.

Banks' adjustment parameters indicate on the other hand their potential future funding and lending position or liquidity management, and its sources or dependencies. Changes in banks' overall liquidity should affect their risk margins and collateral requirements, respectively. Therefore, we have included various measures for it: *AM* (the ratio of total deposits to total assets) is a proxy for banks' asset liquidity, *LM* (total loans to total deposits ratio) is instead a liquidity measure for banks' liability side and *LIQM* (total loans to total assets ratio) is a measure for banks' total liquidity. The higher these measures are, the lower is the liquidity. In addition, *OM* (ratio of non-interest income to revenues) measures banks' concentration on traditional intermediation activities, i.e. the higher the measure, the more diversified the bank is, and *LL* (ratio of provision of loan losses to total loans) for their expected credit risk. Finally, both *GROWTH* (yearly growth in loans) correlating with banks' risk-taking and *SIZE* (log of total assets) correlating with their risk capacity are also assumed to be factors affecting banks' adjustment costs.

The interest rate margin (R^*_{ikt}) and its adjustment (δ^R_{ikt}) for a bank *i* can now be specified empirically as follows:

$$
\begin{aligned}
R^*_{ikt} &= \alpha_0 + \alpha_D \hat{D}_{jkt} + \alpha_{IRm} IRm_{kt} + \alpha_{IR1} IR1_{kt} + \alpha_{IR10} IR10_{kt} + \alpha_{FX} FX_{kt} \\
&+ \alpha_{SMI} SMI_{kt} + \alpha_{INF} INF_{kt} + \alpha_{VIRm} VIRm_{kt} + \alpha_{VIR1} VIR1_{kt} \\
&+ \alpha_{VIR10} VIR10_{kt} + \alpha_{VFX} VFX_{kt} + \alpha_{VSMI} VSMI_{kt} + \alpha_{VINF} VINF_{kt}
\end{aligned} \qquad \text{(4a)}
$$

$$(4b)\quad \delta^{R}_{ikt} = \xi_0 + \xi_{AM} AM_{ikt} + \xi_{LM} LM_{ikt} + \xi_{OM} OM_{ikt} + \xi_{LL} LL_{ikt} + \xi_{LIQM} LIQM_{ikt} + \xi_{GROWTH} GROWTH_{ikt} + \xi_{SIZE} SIZE_{ikt}$$

Firms' size-specific variables

In addition to long-term interest rates (IR1 and IR10) and their variances (VIR1 and VIR10), investments (I, measured as ratio of fixed investment to total assets) and banks' predicted risk margin ($\hat{R}$) are thought being exogenous for our second decision variable, namely firms' demand for credit (D, measured as the ratio of long-term debt payable after one year to total assets).

Firms' adjustment parameters in bank perspective reflect instead their ability to repay loans and they include here collateral value of firm's assets (K, measured as ratio of fixed assets to total assets), default risk (CR, interest rate coverage ratio or interest paid on financial debt to net operating profits), growth or investment opportunities (G, yearly change in firm's turnover), and liquidity (WK, working capital measured as ratio of current assets less current liabilities to total assets). These adjustment cost parameters are the ones banks are likely to monitor not the ones necessarily used by firms as basis of their debt decisions. However, these two cannot be clearly separated.

Interest rate coverage ratio (CR) links monetary policy to firms' financial health. Rising interest rates increase payments to debtors and weaken the borrowers' net worth by reducing their net cash flows. If firms cannot meet their periodic interest payments, debt can also be called. Hence, this is also a measure for firms' default risk. Firms' liquidity (WK) relates to firms' decisions to raise external capital to adjust financial deficit between their operating earnings and investments. For example, Fazzari and Petersen (1993) state that apart from being an important use of funds due to inventory investments, working capital is also a source of funds because it provides liquidity to fluctuations in cash flow without the need for costly external financing. It is therefore considered as additional collateral for banks although firms' main collateral value is their amount of fixed capital (K). In any case, rising interest rates shrink the value of borrowers' collateral needed by banks to protect themselves against firms' possible adverse selection and moral hazard problems. In addition to collateral values, greater growth opportunities (G) are expected to correlate positively with the extent of informational problems between banks and firms.

Here the debt (D^{*}_{jkt}) and its adjustment (δ^{D}_{jkt}) equations for firms when controlling firms' size class *j* are specified as follows:

$$(5a)\quad D^{*}_{jkt} = \beta_0 + \beta_R \hat{R}_{ikt} + \beta_{IR1} IR1_{kt} + \beta_{IR10} IR10_{kt} + \beta_I I_{jkt} + \beta_{VIR1} VIR1_{kt} + \beta_{VIR10} VIR10_{kt}$$

$$(5b)\quad \delta^{D}_{jkt} = \varsigma_0 + \varsigma_K K_{jkt} + \varsigma_{WK} WK_{jkt} + \varsigma_{CR} CR_{jkt} + \varsigma_G G_{jkt}$$

IV. DATA

One major objective of this study is to use European data in a study of bank lending. Many related previous studies are based on US data or are country-specific because of the lack of harmonised European Small and Medium-sized Enterprises (SME) data. As most European countries differ by regulatory, legal and political environments from USA and

are also more bank-dependent, certainly there is a demand for this kind of analysis. This is further motivated by the integration of monetary policy in Europe. Hence, our data is chosen to account for presence of heterogeneity in response of banks and their home countries to changes in market conditions and in firms' demand for credit by taking into account their interaction and adjustment costs related to changes in firms' and banks' balance sheets.

We have used Eurostat's Bank for the Accounts of Companies Harmonised (BACH) database containing harmonised annual accounts statistics of non-financial enterprises for 11 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, The Netherlands, Portugal, Spain and Sweden. With the exception of Sweden and Denmark, all the other countries have accepted the single currency, Euro. In the data set, we focus on the manufacturing sector because it is the most comprehensive data series and because it is the one most often linked to bank lending due to its ability to provide collaterals. The data is divided by size (measured using turnover) into three classes: Small (turnover $\leq$ 7 million €), Medium-sized (7 million € < turnover $\leq$ 40 million €), and Large firms (turnover > 40 million €). Since banks use diversification for mitigating firm-specific risks, country-level data is considered to be reasonable, although some caveats must be raised due to the industry-specificity. In addition to these somewhat arbitrary size classifications, the use of size as a proxy for access in capital markets and turnover as its proxy can also be questioned. Finally, we prefer to use book values that are backward-looking[17] because in the case of default, asset values are in general closer to their book values. This is a major concern for banks expecting repayment of their issued loans.

Thomson Worldscope is used to obtain bank-specific data within these countries. In particular, we have chosen to investigate commercial banks that have their primary industry SIC (standardized industrial code) 6021, i.e. National Commercial Banks. This gives us 237 banks. Finally, market data in monthly quotes is acquired from Thomson Datastream. This data set is country-specific and in nominal terms.

We use balanced panel data, in which missing unit and few extreme observations on the explanatory variables are replaced by firm-specific means. The data covers the period from 1994 to 2003. However, the first year, 1994, is excluded due to the use of lag values of the dependent variables. As a result, the number of observation used in the final analysis is 2370. It should also be noted that the data is in ratios to allow the comparison over time and across firms and countries. Furthermore, the use of ratios is a standard way to gain trend-stationary series and to minimize the heteroscedasticity in the data by normalizing the variables by size.

[17] Market values are forward-looking, i.e. they include expectations, and thus are expected to capture the "true value" more efficiently. However, as they incorporate liquidity risk, it is hard to analyse adjustment costs that are mainly related to changes of liquidity base.

Table I: Summary statistics of the data during 1994-2003 is divided by their origin into market-specific, firm-specific and bank-specific variables. Market variables include interest rate levels for one-month (IRm), one-year (IR10) and for 10-year period (IR10), foreign exchange rate (FX), inflation (INF), stock-market index (SMI) and their variations denoted by the letter V. Firm-specific variables are divided by size into small, medium and large firms and include firms' debt ratio (D), investments (I), fixed assets (K), default risk (CR), liquidity (WK) and growth (G). Bank-specific variables are banks' interest rate margin (R), solvency (AM), productivity (LM), liquidity (LIQM), operational efficiency (OM), expected loan losses (LL), loan GROWTH and asset SIZE.

Summary statistics of the data, NT=2370 obs.				
Variable	Mean	Std Dev	Minimum	Maximum
A. MARKETS:				
IRm	4.587	1.947	2.361	10.213
IR1	4.708	2.021	2.346	11.146
IR10	6.105	1.948	4.116	12.326
FX	92.936	13.992	68.773	111.955
INF	2.319	1.070	0.253	5.368
SMI	0.400	2.192	0.000	25.456
VIRm	0.215	0.231	0.001	2.175
VIR1	0.226	0.239	0.006	1.257
VIR10	0.288	0.428	0.007	3.071
VFX	1.643	2.013	0.136	21.869
VINF	0.181	0.313	0.005	2.816
VSMI	0.417	4.202	0.000	151.967
B. SMALL FIRMS				
D	17.912	4.983	10.820	31.980
I	0.244	0.878	-2.940	4.840
G	-0.023	0.199	-0.437	1.095
K	37.299	8.558	23.250	53.690
WK	15.595	7.478	-0.570	33.040
CR	0.603	0.270	0.150	1.364
C. MEDIUM-SIZED FIRMS				
D	14.420	3.019	9.170	25.780
I	0.058	2.001	-20.570	18.590
G	0.010	0.099	-0.282	0.958
K	36.827	7.822	25.280	60.260
WK	18.049	6.145	8.640	32.260
CR	0.381	0.112	0.171	0.765
D. LARGE FIRMS				
D	12.525	4.379	4.218	23.500
I	0.311	1.542	-6.940	5.500
G	0.059	0.073	-0.201	0.295
K	47.144	7.398	36.590	72.620
WK	14.557	5.815	-2.320	27.270
CR	0.422	0.159	0.119	1.057

E. BANKS				
R	3.602	2.784	-22.592	21.382
AM	48.305	21.737	0.000	93.129
LM	232.313	435.971	17.998	8140.179
OM	19.487	13.485	-31.717	86.818
LL	0.833	2.101	-59.313	17.175
LIQM	70.441	15.507	0.253	198.617
GROWTH	9.658	19.717	-99.988	261.702
SIZE	3.870	0.970	1.363	5.967

The descriptive statistics is summarized in Table I. Interest rate curve is upward sloping and the variances behave accordingly. Inflation (INF) is low, little over 2%. Foreign exchange rates (FX) of these countries are devaluated on average against the base year of the reference index less than 10%.

Firms' leverage (D) decreases with the size. Investments (I) are by far the lowest, but their variance greatest for medium-sized firms. Small and large firms' investments are pretty much on the same level. Large firms are growing (G) in the period while medium-sized firms are quite stable and small firms shrinking. Large firms' collateral values (K) are at a higher level compared to levels of small and medium-sized firms. Liquidity demand (WK) is highest for medium-sized firms and lowest for large firms. Interest rate coverage or default risk (RC) is highest for small firms.

Banks' interest rate margin (R) is on average 3.6 %, which would give quite small real return to banks after deduction for the inflation rate (2.4%) is made. However, the variance of inflation is also quite large. Deposits cover half of the total assets (AM) that consist of loans for 70% (LIQM). Deposits are turned into loans (LM) at rate of 2. Operational efficiency (OM) shows that one fifth of the banks' revenue comes on average from the non-interest sources. Loan losses (LL) make less than 1% of the total assets. Finally, GROWTH in loans is around 10% in our sample.

Table II gives information on bank frequencies over countries. The number of banks is not proportional to the size of the sample country. In particular the Danish and Italian banks are over-represented, while the French are underrepresented. It is to be noted that since the firm-level data only varies between these three size classes for each country and over time, it is constant across countries for multiple observations of banks.

Table II: Bank frequencies by country during 1994-2003. Austria (AUT), Belgium (BEL), Germany (DEU), Denmark (DNK), Spain (ESP), Finland (FIN), France (FRA), Italy (ITA), the Netherlands (NLD), Portugal (PRT) and Sweden (SWE).

Bank frequencies by country, NT=2370 observations				
Country	Frequency	Percent	Cum. Frequency	Cum. Percent
Austria	130	5.49	130	5.49
Belgium	90	3.80	220	9.28
Germany	390	16.46	610	25.74
Denmark	400	16.88	1010	42.62
Spain	220	9.28	1230	51.90
Finland	70	2.95	1300	54.85
France	240	10.13	1540	64.98
Italy	560	23.63	2100	88.61
Portugal	70	2.95	2170	91.56
Netherlands	130	5.49	2300	97.05
Sweden	70	2.95	2370	100.00

V. RESULTS

Our goal is to identify the key market determinants of banks' interest rate margins and firms' debt levels as well as the causal relation between these two. In addition, we are interested in finding out the adjustment parameters affecting these two. Also, a closer analysis on the mean adjustment parameters by year and country provides new information on the bank lending and its role for the common European monetary policy.

Models for banks' interest rate margins and firms' debt demands are estimated as single as well as system of banks' interest rate and firms' debt equations and separately for small, medium-sized and large firms, each assuming static and dynamic formulations. In each of these cases, we control for time-, bank- or firm-heterogeneity. The static models are linear and estimated with the two-stage least squares method. The feedback or interaction effects are based on the static models with similar specifications as those in the dynamic models but without the interaction term. The dynamic models are non-linear and they are estimated using iterative FIML (Full Information Maximum Likelihood) method.

The comparison over these models' performances and various tests suggests that the static models and single equations should be rejected in favour of dynamic and system of equation models due to relevant time-, firm- and bank-variant adjustment parameters and significance of the feedback effects. Thus, the final results are based on the system of dynamic models with flexible adjustment parameters. Table III presents these short-term parameter estimates for bank and firm equations in each of the three size-classes. Long-run estimates are received by multiplying these short-term estimates with the adjustment rates. The performance of the models in terms of high R^2 (fit index) and low *RMSE* (root mean square of error) is good in all cases except in the case of banks under medium-sized firms. We have no explanation for the divergence but suspect that it is related to the heterogeneity of the class.

Table III: Parameter estimates of the dynamic partial adjustment models between 1994-2003 for bank and manufacturing industry by size. Explanatory variables describing exogenous market conditions include interest rate levels for one-month (IRm), one-year (IR1) and for 10-year period (IR10), foreign exchange rate (FX), inflation (INF), stock-market index (SMI) and their variations denoted by the letter *V*. In addition, investments (I) are exogenous for firms. Interaction parameters (PR) and (PD) measure the predicted effects of banks' interest rate margin (R) and firms debt (D) decisions to each other. Adjustment parameters are for banks: solvency (AM), productivity (LM), liquidity (LIQM), operational efficiency (OM), expected loan losses (LL), GROWTH and SIZE, and for firms: fixed assets (K), default risk (CR), liquidity (WK) and growth (G). Model performances are described by R^2 for their explanation power and RMSE for their errors.

Parameter estimates of the dynamic partial adjustment models, NT=2370 obs.							
BANK MODEL				FIRM MODEL			
Size	SMALL	MEDIUM	LARGE	Size	SMALL	MEDIUM	LARGE
Para-meter	Estimate t Value	Estimate t Value	Estimate t Value	Para-meter	Estimate t Value	Estimate t Value	Estimate t Value
A. DETERMINANTS FOR OPTIMAL LEVELS							
α_0	-129.30***	-1.05	-19.73***	β_0	7.72	26.49***	44.95
	(-127.30)	(-0.26)	(-24.91)		(1.39)	(4.78)	(1.46)
α_{IRm}	0.62***	0.06	1.11***				
	(7.58)	(0.15)	(6.62)				
α_{IR1}	6.33***	0.55	1.02***	β_{IR1}	-8.35***	-4.32***	9.33**
	(54.01)	(0.92)	(4.87)		(-11.38)	(-7.45)	(1.96)
α_{IR10}	0.32***	-0.34	-3.07***	β_{IR10}	7.89***	2.67***	-4.39
	(4.79)	(-1.01)	(-18.58)		(7.09)	(3.21)	(-1.15)
α_{FX}	0.00***	-0.05***	0.02***				
	(3.17)	(-7.56)	(5.64)				
α_{INF}	0.03	0.28**	0.43***				
	(1.13)	(2.54)	(7.72)				
α_{SMI}	-0.01	-0.00	-0.04**	β_I	-1.00***	-0.45***	-0.80***
	(-0.89)	(-0.11)	(-1.96)		(-3.91)	(-5.89)	(-3.88)
α_{VIRm}	0.63***	0.78	-2.34***				
	(3.96)	(1.18)	(-7.05)				
α_{VIR1}	10.11***	-0.30	-3.71***	β_{VIR1}	0.05	6.69***	-31.97**
	(48.72)	(-0.36)	(-9.85)		(0.04)	(4.00)	(-2.26)
α_{VIR10}	-6.42***	-0.65	4.56***	β_{VIR10}	11.93***	8.17***	-252.52***
	(-29.15)	(-0.61)	(10.51)		(5.39)	(3.90)	(-4.28)
α_{VFX}	0.12***	-0.04	0.14***				
	(10.73)	(-0.87)	(6.37)				
α_{VINF}	-0.34***	0.07	-1.03***				
	(-6.35)	(0.44)	(-7.89)				
α_{VSMI}	-0.00	0.03	0.01				
	(-0.01)	(1.06)	(0.72)				
α_{PD}	4.21***	0.42**	2.67***	β_{PR}	-0.80**	-0.56***	3.92***
	(126.31)	(2.27)	(54.03)		(-2.19)	(-2.76)	(7.87)

B. DETERMINANTS FOR ADJUSTMENTS							
ξ_0	1.00***	-0.60***	1.68***	ς_0	-0.18***	-0.19***	0.01**
	(26.80)	(-2.98)	(21.02)		(-8.39)	(-7.72)	(2.31)
ξ_{AM}	0.00***	-0.01***	-0.00***				
	(3.23)	(-7.89)	(-0.13)				
ξ_{LM}	0.00	-0.00***	-0.00	ς_K	0.00***	0.00***	-0.00**
	(0.21)	(-4.74)	(-0.68)		(9.05)	(7.36)	(-2.56)
ξ_{OM}	-0.00	0.01***	-0.01***				
	(-1.36)	(5.25)	(-6.90)				
ξ_{LL}	0.00	-0.00	-0.00	ς_{CR}	0.06***	0.09***	-0.01**
	(0.06)	(-0.45)	(-1.59)		(7.93)	(4.65)	(-2.40)
ξ_{LIQM}	-0.00***	0.01***	-0.01***	ς_{WK}	0.00***	0.00***	-0.00
	(-7.87)	(9.38)	(-12.32)		(9.03)	(8.12)	(-0.12)
ξ_{GROWTH}	0.00***	-0.00**	0.00***	ς_G	0.01	0.18***	0.01**
	(3.01)	(-2.55)	(7.69)		(1.45)	(7.50)	(2.36)
ξ_{SIZE}	0.00	0.25***	-0.04***				
	(0.70)	(13.68)	(-3.88)				
C. MODEL PERFORMANCES							
R^2	0.95	0.40	0.79	R^2	1.00	0.99	0.99
RMSE	0.62	2.15	1.28	RMSE	0.31	0.28	0.32

Notes: significant at the less than 1% (***), 1-5 % (**), and 5-10% (*) levels of significance.

Parameter estimates

Determinants for banks' optimal margin levels

In general, rise in interest rates should cause banks' margins to rise or their credit terms to tighten as a sign of increased economic risk. The effects of monetary policy through the one-month interest rate (IRm) seem to affect positively banks' margins similarly under small and large firms' demand for credit. However, the effect of uncertainty over its variance (VIRm) has mixed effects. More predictable monetary policy decreases banks' margins subject to large firms' demand for long-term credit but it increases margins for small firms' lending. This difference might be due to smaller firms' greater dependence on bank financing.

In addition to monthly interest rates, levels of foreign exchange rate, inflation and stock-market index are also related to banks' margins (R). Yet, the effect of stock markets index (SMI) is only significant in the case of large firms. Its small negative effect means that decreasing asset prices increase banks' margins as could be expected. Medium-sized firms instead seem to affect these margins only through the level of foreign exchange rate and inflation. Here, the foreign exchange rate (FX) is negatively related to banks' margins, which is opposite to the effects under small and large firms. Yet, the inflation (INF) is positively related to it similar to large firms. The difference of signs in the effects of foreign exchange rates may reflect medium-sized firms' higher dependence on loans in foreign currency. In addition, variance of foreign exchanges rates (VFX) is positively and variance of inflation (VINF) negatively related to banks' margins within small and large firms. This could instead implicate that a purchasing power parity, in which the foreign exchange rates compensate for the inflation movements, is expected to hold. However, these impacts on banks are quite low.

Determinants for firms' optimal leverage levels and their interaction with banks

Investments (I) seem to affect negatively firms' leverage (D) in all the size classes. This could be interpreted as a general indication of firms' financial constraints or cash-flow

dependency. It would also emphasize the relevance of information problems in financing. As a result, firms' decreasing investments opportunities increase their demand for debt. It is interesting though that these increases in firms' predicted demand for credit ($\hat{D}$) in each size class increase banks' margins, while the increase in these predicted margins ($\hat{R}$) decrease SME's demand for loans but unexpectedly increases it for large firms.

For SMEs case, these effects emphasize not only the view of excess-demand for credit and/or low competition but also at least partial non-substitutability of bank loans. The non-substitutability is especially highlighted among small firms because the positive effect of their demand for credit on banks' margin is much greater than the negative effect of these margins to their demand. In the case of medium-sized firms these interaction effects are quite even and their signs follow those of the small firms but with a much lower intensity. This could indicate an interest in other sources of finance.

The unexpected positive effect of banks' margins on large firms' demand for credit can be explained by credit rationing because the feedback effect from banks' margins on the firms' credit demand is one and half times higher than the other way around. As large firms are assumed to have broader access to credit and their risks for banks are thought being larger, it could mean that the effect of bank loans through the decrease of relative prices is greater than the decrease in supply, e.g. due to non-price credit rationing.[18] This could then mean that banks adjust their interest rate margins too slowly or sluggishly upwards in the short-term in response to increases in risk, which would then attract these more risky borrowers. The significant increase in loan loss provisions (LL) with size and the effect of asset prices (SMI) on banks margins (R) and onwards to large firms' demand of credit (PR) are especially good indications of such behaviour. This upward stickiness of credit prices is generally assumed to be related either to high level of interest rates or credit rationing. However, as the interest rates levels seem to be quite moderate, the reason is undoubtedly due to credit rationing.

Joint variables between these two equations, i.e. long-term interest rates (IR1 and IR10) and their uncertainty (VIR1 and VIR10), allow us to compare further the effects of credit market conditions on both supply and demand conditions. Our results lend support to balancing credit effects via size by Oliner and Rudebusch (1993) and Gertler and Gilchrist (1994), but unlike them we relate this effect more closely on credit terms. We find that increase in yearly interest rates (IR1) causes decrease in SMEs' loan demand both directly and indirectly through banks margins. Hence, these compounded effects could explain why the credit cycles are enforced for these firms. Although rise in the long-term interest rates (IR10) has unexpectedly direct positive effects on SMEs' credit demand, its indirect negative effect, yet quite weak and only evident with small firms, will trade some of it off. However, for large firms, competitiveness of bank loans relative to other sources of credit seems to improve with rising yearly interest rates (IR1) together with banks' margins (PR). This is then additional evidence supporting credit rationing and its exploitation. However, this is contrary to e.g. Kashyap, Stein and Wilcox (1993) and Romer and Romer (1993) who claim that large firms replace costly bank loans with cheaper market finance, e.g. certificate of deposits, when interest rates are rising. In fact, rising long-term

[18]These results should be interpreted with caution, because the true price of bank loans cannot be easily detected due to other non-price terms of credit, e.g. collaterals involved with pricing.

rates seem to decrease the large firms' leverage only indirectly, i.e. through banks' decreasing margins.

Above all, it seems that the uncertainty over future interest rates has the greatest effects on banks' and firms' credit conditions. Yet, these effects differ between these two as well as by the firms' size in question. Greater long-term uncertainty (VIR10) seems to have positive compounded joint effects on SMEs' leverage while the short-term uncertainty (VIR1) has mixed effects. In the case of large firms, these effects are again opposite. Their demand for credit is strongly reduced with rising uncertainty. As a result, these joint variables highlight the differences of time preference or sensitivity between firms' size and also their balancing effects in the bank lending.

Determinants for banks' margin adjustments

Similar to Kashyap and Stein (2000), we find that reactions in the banks' balance sheets to changes in market conditions depend on the demand for credit of different size classes of firms. However, unlike them we relate this behaviour to banks' adjustments to their endogenous targets and costs involved with these adjustments due to liquidity management.

Concerning small firms' demand for credit, banks' higher asset risk (AM) and lower liquidity risk (LIQM) due to possible increase in total assets, and *GROWTH* in loans seem to cause their adjustment rates to increase. These issues of course lead to a weaker risk-return position that banks need to be compensated for. However, their impact is close to null. In fact, as the intercept has only significant and positive non-zero effect close to one, it means that the adjustment costs are almost non-existent for banks. There is no credit rationing and only market conditions matter. Hence, static models for long-term effects will show same results as these short-run effects, i.e. banks adjust immediately to their long-term optimal levels.

Effects of medium-sized firms on banks adjustments seem to be opposite to that of small firms. In fact, it seems that medium-sized firms are constraining banks' adjustments. Lower liquidity risk in assets (AM) and liabilities (LM) but higher total amount (LIQM) together with lower *GROWTH,* or simply faster decrease in total assets than in loans, and wider income base (OM) seem to result in a faster pace of banks' adjustment to their optimal interest rate margin. As a result, these patterns described indicate that banks want to mitigate their adjustment costs by having an unutilised risk capacity in form of total assets. Still, *SIZE* is the only variable having a clear, i.e. a strong positive impact on the adjustment speeds. This further emphasizes the role of total assets in this competition. These firms' demand for credit also causes bank adjustments to have a strong negative intercept, which means that the adjustments to be made are either large or their costs are high.

Finally, large firms' demand for credit causes larger banks to adjust slower their margins relative to changes in market conditions, i.e. *SIZE* has a weak negative effect on adjustment rates. This is not surprising. Only those banks have ability or risk capacity to provide debt financing for large firms with reasonable price relative to market rates or risks faced. In addition, lower liquidity risk (LIQM and AM) associated with decrease in total assets together with higher *GROWTH* motives and lower diversification (OM) seems to result in banks' faster adjustments. Yet, these effects do not seem to depart much from zero. However, as large firms do create the strongest intercept with positive effects on bank adjustments, these banks seem to have excess risk capacity for their adjustments.

This could enable slow or sluggish adjustments that would support further the credit-rationing claims stated above. It is also interesting that besides asset risk (AM), the signs of the variables are opposite to banks with medium-sized firms. This could be interpreted as banks desire to emphasize more the cost-side of their liquidity than the return-side of it.

Determinants for firms' leverage adjustments

Intercepts of SME adjustment parameters are moderately negative which means that their leverage adjustments are large or costly. However, these effects can also be interpreted as measures of bank dependency. These firms seem to have similar reactions on their adjustment parameters. Their intercepts are negative, while collaterals (K), liquidity (WK), interest rate coverage (CR) and growth opportunities (G) have positive effects on the adjustment speed. Still, the effect of credit risk (CR) is the only one with a positive non-zero impact. In addition to this, growth opportunities (G) also speed up the medium-sized firms' adjustments, which can then be a source of constraint for banks' adjustments as well.

For large firms, all of these parameters except growth (G) seem to have opposite effects relative to SMEs. Although these impacts are positive, they still lack clear effects. In fact, these zero-level adjustments would implicate large firms' independence on bank lending or at least, non-systematic use of it. Hence, in addition to banks' perfect adjustment in the case of small firms, this is then the other extreme of these adjustments in bank lending. Nevertheless, our argument of the large firms' ability to exploit credit-rationing conditions to their own advantage is further strengthened.

Time-variant effects

By including year dummies into our model specifications, we are able to eliminate aggregate variation in the dependent and independent variables, such that the parameter estimates reflect better idiosyncratic case-specific variation uncorrelated with any aggregate movements. Hence, year dummies control for unobserved heterogeneous time-variant effects or unpredictable common aggregate shocks. In particular, we use these time dummies then to identify the common effects caused by the introduction of euro in 1999-2003. These results are presented in the Appendix.

Banks' interest rate margin (R) seems to increase largely in each period of time during 1999-2003 with small firms but decrease more slowly with the large firms. Time dummies under medium-sized firms' demand for credit do not have, however, statistically significant effects on these margins. On the firm side, the small firms' leverage (D) increases over time 1999-2003, which seems to be opposite to medium-sized and large firms. In particular, in the case of large firms, these decreasing effects are more pronounced in 2000 and 2002-2003 and for medium-sized firms these are parallel but on a lower level in 1999 and 2002-2003.

Effects of these time dummies on banks' and firms' adjustments are the following. In 1999, 2001 and 2003 these effects are slightly positive for banks under small firms' demand for credit suggesting that banks adjust faster or face lower adjustment costs. Yet, these effects have moderate negative impacts on banks under medium-sized firms in 2001-2003 and also for banks under large firms through out the years 1999-2002. In the firms' adjustments, these time effects are differently synchronized. For small firms, these effects are negative in 2001-2002; for medium-sized firms, they are all positive in 1999-

2003, and for large firms, there is a tiny negative effect in 1999 but positive in 2000 and 2003.

The result above suggest that the introduction of euro have had some effects on bank lending because banks' and firms' time effects seem to be partly significant and follow each other but in reverse manner. Hence, there is an interaction. In particular, banks' decreasing role in large firms' financing seems to have resulted in higher rates for smaller firms. The reason for this compensation is probably twofold: on one hand, development of the other financing markets might have attracted these large firms away from traditional bank lending and on the hand, anticipation of euro caused competitive pressure on banks' margins that in some degree have been utilized by these large firms. It is also interesting that the time effects of the medium-sized and large firms generally seem here to align strongly although the other determinants react usually oppositely. This can indicate evidence of a shift taken place in medium-sized firm's sources of finance, perhaps a result of recent years' favourable development of competing financing markets or financial stability.

Mean adjustment parameters

Table IV presents summary statistics of the mean adjustment parameters in each size class. The observed interest rate margin (R) is around 3.5% and close to their endogenous targets (R^*), i.e. the optimality ration R^*/R is close to 1.0, for small and large firms. Still, there is evidence that banks under-adjust their margins to their optimal due to adjustment costs. This is most evident or costly in the case of medium-sized firms. In fact, there seems to be something to desire for these banks even at the expense of loosing some of their risk margin, i.e. target is lower to observed value. This further indicates a "fierce" competition.

Table IV: Summary statistics of the adjustment parameters during 1994-2003 are divided by size to small, medium-sized and large firms. The speeds of adjustments (δ^R and δ^D) measure firms' convergence from observed interest rate margin (R) and debt levels (D) to their optimal or target values (R* and D*). The optimality ratios (R*/R and D*/D) measure efficiency of these adjustments without any further implications.

Summary statistics of the adjustment parameters, NT=2370 obs.					
Variable	N	Mean	Std. dev.	Minimum	Maximum
A. SMALL FIRMS					
δ^R	2133	0.949	0.037	0.679	1.127
R*	2133	3.531	2.704	-22.313	21.045
R	2133	3.538	2.758	-22.592	21.382
R*/R	2059[1]	0.984	0.255	-1.692	1.698
δ^D	2133	0.010	0.023	-0.029	0.103
D*	2133	22.392	5.583	10.755	35.363
D	2133	17.869	4.960	10.820	31.980
D*/D	1632[1]	1.100	0.244	0.549	1.651
B. MEDIUM-SIZED FIRMS					
δ^R	2133	0.667	0.503	-5.279	2.393
R*	2133	2.464	0.865	1.030	6.797
R	2133	3.538	2.758	-22.592	21.382
R*/R	1891[1]	0.783	0.392	-0.941	1.698
δ^D	2133	0.016	0.026	-0.028	0.180
D*	2133	17.204	4.010	9.455	34.907

D	2133	14.403	2.949	9.530	25.780
D*/D	1951[1]	1.168	0.276	0.591	1.692
C. LARGE FIRMS					
δ^R	2133	0.834	0.167	-0.178	1.630
R*	2133	3.550	2.517	-16.757	17.238
R	2133	3.538	2.758	-22.592	21.382
R*/R	1813[1]	0.914	0.424	-1.537	1.699
δ^D	2133	0.009	0.018	-0.007	0.057
D*	2133	2.395	48.910	-219.910	87.053
D	2133	12.481	4.370	4.218	23.500
D*/D	1567[1]	0.427	0.808	-1.447	1.593

[1] N differs in all these ratios due to exclusion of extreme values

At the firm level, SMEs would like to increase their leverage ($D^*/D > 1$) while large firms decrease it ($D^*/D < 1$), or at least long-term debt. Yet, it should be acknowledged that the variance of large firms' optimal leverage might downsize these results. Nevertheless, small firms would like to increase their leverage by double the amount of medium-sized firms. We should however avoid here making too far-reaching conclusions about these adjustment rates because they are extremely low due to the use of industry-specific effects that absorb most of the industry heterogeneity.

Mean adjustment parameters by year

Table V introduces mean adjustment parameters by year. Clearly, differences in banks' adjustment rates (δ^R) depend on the firms' size they are involved with and they are not constant over time either, although observed *R*'s are here same for all banks in a given year. The interest rate margin targets (R^*) have gradually decreased till year 1999 and then started to rise again, perhaps due to immaterialized EMU expectations. The adjustment rates (δ^R) are positive but in general below 1, which means that banks cannot attain their optimal levels although they are striving constantly at them. The efficiencies of banks' adjustment (R^*/R) are however very close to their target levels in the case of small and large firms. Yet, bank margins seem to be a bit under-adjusted for small firms' credit demand and over-adjusted for the large firms, whose fluctuations are also much larger. Interestingly, banks seem to charge about 1% higher margins from the medium-sized firms than their desire. This is undoubtedly due to competition that raises banks' adjustment costs and thus slows down their adjustment speeds.

Table V: Mean adjustment parameters by year during 1994-2003 are divided by size to small, medium-sized and large firms. The speeds of adjustments (δ^R and δ^D) measure firms' convergence from observed interest rate margin (R) and debt levels (D) to their optimal or target values (R* and D*). The optimality ratios (R*/R and D*/D) measure efficiency of these adjustments without any further implications.

Mean adjustment parameters by year, NT=2370 obs.								
Year	δ^R	R*	R	R*/R	δ^D	D*	D	D*/D
A. SMALL FIRMS								
1995	0.932	3.910	3.901	1.002	0.014	18.528	17.968	1.031
1996	0.929	3.735	3.752	0.995	0.050	18.392	18.225	1.009
1997	0.928	3.656	3.671	0.996	0.002	30.342	18.133	1.673
1998	0.937	3.486	3.487	1.000	0.002	15.543	17.852	0.871
1999	0.978	3.239	3.247	0.998	0.010	24.750	17.609	1.406
2000	0.947	3.376	3.379	0.999	0.006	18.711	17.486	1.070
2001	0.961	3.422	3.435	0.996	0.004	27.858	17.832	1.562

2002	0.949	3.407	3.416	0.997	-0.004	22.980	17.804	1.291
2003	0.984	3.544	3.555	0.997	0.004	24.428	17.912	1.364
B. MEDIUM-SIZED FIRMS								
1995	0.652	2.550	3.901	0.654	0.005	21.919	14.667	1.494
1996	0.676	2.479	3.752	0.661	0.049	15.454	15.306	1.010
1997	0.708	2.486	3.671	0.677	0.027	14.107	14.311	0.986
1998	0.736	2.533	3.487	0.726	0.013	17.725	14.354	1.235
1999	0.756	2.393	3.247	0.737	-0.009	11.956	14.320	0.835
2000	0.683	2.421	3.379	0.717	0.012	16.608	13.847	1.199
2001	0.577	2.359	3.435	0.687	0.014	22.416	14.050	1.595
2002	0.623	2.505	3.416	0.733	0.024	17.560	14.356	1.223
2003	0.591	2.450	3.555	0.689	0.013	17.091	14.420	1.185
C. LARGE FIRMS								
1995	1.012	3.955	3.901	1.014	0.002	-3.167	12.571	-0.252
1996	0.926	3.720	3.752	0.992	0.000	-61.392	12.200	-5.032
1997	0.849	3.742	3.671	1.020	-0.000	54.573	11.834	4.611
1998	0.769	3.521	3.487	1.010	-0.001	-9.395	12.097	-0.777
1999	0.725	3.189	3.247	0.982	-0.004	7.752	12.555	0.617
2000	0.609	3.305	3.379	0.978	0.055	12.500	12.633	0.989
2001	0.838	3.494	3.435	1.017	0.004	16.484	13.077	1.261
2002	0.794	3.464	3.416	1.014	-0.000	-7.403	12.835	-0.577
2003	0.981	3.554	3.555	1.000	0.028	11.602	12.525	0.926

SMEs are in general under-leveraged relative to their targets ($D^*/D > 1$). In the case of large firms, the fluctuations are unfortunately too large to allow any conclusions to be drawn. However, we can see that these firms face some kind of a shock in 1996-1997 that might have affected negatively SMEs credit demand in 1997-1999. The sample period lows and highs in banks' and firms' yearly adjustment speeds (δ^R and δ^D) also seem to be synchronized but with opposite effects. Indeed, in the small firms' case, there is a one-year lead to the banks' reactions, whereas medium-sized firms' low and banks' high in their adjustment costs match in year 1999 similar to large firms' peak and banks' low the year after, in 2000. Thus, there seems to be different credit cycles depending on the size.

More detailed look at the correlations between these firms' mean adjustment parameters reveals also interesting information. We find that SME's adjustment costs (inverse of δ^D) and their observed leverages (D) are positively correlated and their leverage targets (D^*) seem to direct the efficiency of their leverage ratio as in the large firms case. Although these firms behave quite similarly, there are still differences between banks' mean adjustment parameters and their relation to these firms.

In the small firms' case, the correlations between banks' adjustment costs (inverse of δ^R) and both the observed and target margins (R and R^*), as well as in between the latter two, are positive. This means that higher margins will raise adjustment costs to banks. Still, banks' have managed to decrease their adjustment costs over time, probably at the expense of the small firms' leverage adjustment costs that have simultaneously increased. This emphasizes the small firms' high dependence on bank financing.

However, banks' adjustment costs under medium-sized firms have instead increased over time. This is explained by the increased competition that seems to have dropped banks' observed margins over time simultaneously with these firms' decrease in their observed

leverage. Banks' even signal readiness to improve their competitiveness by lowering margins even though there is positive relation with their adjustment costs and these firms' desire to increase their leverage, i.e. increase in risk.

Large firms' demand for credit causes banks' adjustment costs and both their target and observed margins to be negatively correlated although the observed and target margins themselves are positively correlated. This is interpreted so that banks' higher margins for these firms would lower banks' adjustment costs and improve their risk margin efficiency. Despite this, banks' target and observed margins have dropped simultaneously over time with these firms' leverage increases. Hence, there is no room for margin increases because large firms are receiving more competitive financing elsewhere. In fact, positive relation of banks' margin efficiency and these firms' adjustment costs over time indicates a large firms' negotiation power toward banks.

Mean adjustment parameters by country

Not only adjustment rates differ by size and time over the sample data but they also differ by size across countries as shown in Table VI. Hence, there is likely to be asymmetric effects for the common European monetary policy across member countries. The level of banks' interest rate margin (R) is by far the highest in Denmark followed by Spain in all size groups and lowest in Germany and France. This may be explained by differences in country-specific competitiveness among banks or their market power. Scandinavian firms are instead most leveraged (D) in all size classes, whereas Italian and Spanish SMEs and German large firms have least leverage. This could be due to differences in regulation, e.g. taxation. This degree of heterogeneity by firms' size across countries will probably be even higher after the new members have joint the common market.

Table VI: Mean adjustment parameters by country during 1994-2003 are divided by size to small, medium-sized and large firms. The speeds of adjustments (δ^R and δ^D) measure firms' convergence from observed interest rate margin (R) and debt levels (D) to their optimal or target values (R* and D*). The optimality ratios (R*/R and D*/D) measure efficiency of these adjustments.

Mean adjustment parameters by country, NT=2370 obs.								
Country	δ^R	R*	R	R*/R	δ^D	D*	D	D*/D
A. SMALL FIRMS								
AUT	0.932	2.052	1.939	1.058	-0.010	24.552	24.262	1.012
BEL	0.974	2.575	2.877	0.895	0.030	24.297	19.218	1.264
DEU	0.932	1.590	1.490	1.067	-0.001	23.641	20.238	1.168
DNK	0.965	7.066	7.314	0.966	0.010	21.745	22.711	0.957
ESP	0.951	3.958	4.179	0.947	0.005	21.843	12.554	1.740
FIN	0.953	2.940	2.768	1.062	0.055	25.548	27.801	0.919
FRA	0.946	1.955	1.848	1.058	0.012	22.669	16.529	1.371
ITA	0.944	3.660	3.648	1.003	0.003	21.245	11.421	1.860
NLD	0.951	2.523	2.287	1.103	0.033	23.581	20.060	1.176
PRT	0.985	3.483	3.232	1.078	0.010	20.896	18.178	1.150
SWE	0.938	2.826	2.682	1.054	0.071	21.063	23.587	0.893
B. MEDIUM-SIZED FIRMS								
AUT	0.682	2.089	1.939	1.077	0.014	17.986	18.064	0.996
BEL	0.723	1.803	2.877	0.627	0.018	18.656	15.942	1.170
DEU	0.948	1.676	1.490	1.125	0.010	18.424	13.750	1.340
DNK	0.182	1.820	7.314	0.249	0.016	16.457	15.868	1.037
ESP	0.691	3.484	4.179	0.834	0.004	16.218	10.470	1.549

FIN	0.552	2.844	2.768	1.028	0.065	20.157	20.491	0.984
FRA	0.883	1.707	1.848	0.924	0.019	17.239	16.001	1.077
ITA	0.752	3.573	3.648	0.980	0.004	16.505	11.241	1.468
NLD	0.790	2.161	2.287	0.945	0.050	18.170	18.704	0.971
PRT	0.343	2.778	3.232	0.860	0.037	16.322	16.404	0.995
SWE	0.874	1.934	2.682	0.721	0.068	17.644	18.975	0.930
C. LARGE FIRMS								
AUT	0.817	1.399	1.939	0.722	0.008	17.487	14.203	1.231
BEL	0.931	2.480	2.877	0.862	0.006	11.177	19.546	0.572
DEU	0.798	1.613	1.490	1.083	0.010	9.553	4.584	2.084
DNK	0.893	6.501	7.314	0.889	0.009	19.478	14.355	1.357
ESP	0.815	3.567	4.179	0.854	0.010	-6.119	11.258	-0.544
FIN	0.851	2.747	2.768	0.992	0.008	-15.250	20.207	-0.755
FRA	0.806	2.660	1.848	1.439	0.010	21.525	16.601	1.297
ITA	0.815	3.652	3.648	1.001	0.010	-22.955	11.820	-1.942
NLD	0.775	3.804	2.287	1.663	0.006	24.442	17.190	1.422
PRT	0.909	4.447	3.232	1.376	0.009	0.483	12.692	0.038
SWE	0.801	3.902	2.682	1.455	0.008	-11.306	15.662	-0.722

Banks' adjustment rates under small firms' demand for credit are almost identical. Portugal has the fastest and Germany and Austria slowest rates. However, the direction of these adjustments differs. In Belgium, banks tend to decrease their margins most whereas in the Netherlands, they want to increase them. This is the case also with firms' leverage adjustments. In Austria, small firms wish to diverge from their leverage targets, while the Scandinavian (Swedish and Finnish) firms strive to their optimal fastest. Yet, the direction is the same, towards lower leverage. In Italy and Spain, instead, these firms surprisingly desire to increase their leverage.

In general, medium-sized firms cause much more variation in banks' adjustment speeds than small firms do. Still, German banks increase their margins at the highest rate, while Danish banks tend to decrease their margins most, but at the slowest rate. Again, medium-sized firms' desire to decrease their leverage mostly and at the highest rate in Scandinavia, while Spain and Italy suggest the opposite case.

Variance of banks' adjustment speeds under large firms is somewhere between the small and medium sizes. Highest banks' adjustment rates are in Belgium and lowest in the Netherlands. Banks in the Netherlands also desire to increase their margins most, whereas Austrian banks behave quite the contrary. Large firms in Italy instead tend to depart heavily from their leverage targets, i.e. decrease their leverage, while in Germany large firms wish to increase most their leverage.

These differences in the above adjustments could indicate sample countries' different competitive status or efficiency within banks and between them as well as alternative sources of financing. In addition, over and above banks, differences in firms' regulative environments, e.g. in taxation, are likely to affect firms' capital structure decisions or incentives to acquire debt. Despite this, we are however able to find few noticeable correlations (or similarities) within these country mean adjustment parameters.

Firstly, there are very high negative correlation between observed leverage and leverage ratio (i.e. leverage incentives) in the SME adjustments. This suggests that there could be

some kind of European-wide mean reversion in leverage ratios. In particular, while the banks respective correlations are negative for small and medium-sized firms, these findings could lend support to a formation of a common European markets and also enhance the functioning of the common monetary policy.

Secondly, banks' adjustment speeds and margin ratios or incentives are positively correlated among medium-sized firms. Hence, the higher the speed of adjustments (or the lower adjustment costs), the closer banks' margins is to their target levels. On the other hand, the adjustment rates and efficiencies of medium-sized firms' leverage are negatively correlated considering the country mean values. Interestingly, these firms would like to take more debt despite the rise in their adjustment costs. This is probably a result of bank competition that results in favorable terms of financing for these firms.

Finally, banks under medium-sized firms' demand for credit show a negative correlation between their observed interest rate margins and their speeds of adjustments. Hence, higher existing margins seem to cause slower adjustments for banks due to their higher adjustment costs. As these firms' higher observed leverage also seem to lower their adjustment costs, i.e. correlation is positive, they are certainly benefiting from the bank competition. This is further emphasized, as the correlation is negative among large firms because higher leverage would normally cause a higher adjustment costs to firms.

Differences in the key mean adjustment parameters

In Table VII, we highlight the size of the key mean adjustment parameter differences. Banks adjustment parameters under small firms demand for credit indicate that joint EMU monetary policy could work through this channel. Yet some caution is in place because firms' leverage incentives vary greatly over time and across countries.

Table VII: Differences of adjustment parameter mean minimum and maximum values during 1994-2003 are divided by size to small, medium-sized and large firms. The speeds of adjustments (δ^R and δ^D) measure firms' convergence from observed interest rate margin (R) and debt levels (D) to their optimal or target values (R* and D*). The optimality ratios (R*/R and D*/D) measure efficiency of these adjustments.

Differences of adjustment parameter mean min and max values, NT=2370 obs.				
Firm size	δ^R	R*/R	δ^D	D*/D
A. BY COUNTRY:				
Small	5%	21%	8%	97%
Medium-sized	77%	88%	6%	62%
Large	16%	94%	0%	403%
B. BY YEAR:				
Small	6%	1%	5%	80%
Medium-sized	18%	8%	6%	76%
Large	40%	4%	6%	964%

Although banks' margin efficiencies seem to be quite stable over time in each size class, their speeds (or costs) of adjustments differ greatly over time and across countries. There is also disparity among the country-specific interest rate margin incentives. This can be due to differences in regulations or other country-specific factors, e.g. competition. For instance, medium-sized firms' credit demand cause banks' adjustment rates to differ more among countries than they do over time. In the large firms' case, the result is however opposite. Their yearly differences are more pronounced, which would then be an indication of unpredictability or a shock effect.

Leverage adjustment speeds in manufacturing industry are quite even over time and across countries. However, the leverage incentives differ significantly among large firms across countries and over time. This can be due to differences in concentration of large manufacturing firms among industries and over countries. Nevertheless, this wide spectrum of firms' leverage incentives poses the greatest challenge for the common European monetary policy.

VI. CONCLUSIONS

This paper has investigated the credit channel as a part of the monetary policy transmission mechanism by accounting for the simultaneous interaction between banks' and firms' credit conditions and their adjustment costs. These issues have been previously neglected in the literature. Effects of asset prices on banks' external funding premium (or costs of intermediation) and on firms' borrowing as well as on the interaction of these two have also been emphasized in this paper. In addition, emphasis has been given to the issues linked to a common European monetary policy.

Using wide, harmonized European data and a system of dynamic partial adjustment models we find that the banks' and firms' credit conditions are interacting, although their adjustment costs differ across banks, firm sizes, countries, and over time. In fact, tightening monetary policy and firms' increased demand for credit affect similarly banks' supply conditions by increasing their interest rate margins. These increasing margins instead tend to decrease the small and mediums-sized firms' demand for loans but unexpectedly increase it for large firms. In fact, small and large firms and the banks they are involved with have in general opposite reactions to changes in credit market conditions. We also find that uncertainty over future interest rates has most impact on banks' and firms' credit behaviour, in which smaller more bank-dependent firms are more subject to short-term whereas larger firms to long-term expectations. Interestingly, medium-size firms' demand for credit affects banks' margins only through the foreign exchange and inflation rates, i.e. comparative competitiveness of an economy.

Banks in response to small firms' demand for credit adjust their risk margins according to credit market conditions so that they immediately attain their long-run target levels. However, when banks are involved with medium-sized firms' credit demand, they seem to face highly competitive environment and face severe adjustment costs related to their size. In the case of large firms, we find instead strong evidence on banks' credit rationing or its exploitation by these firms due to their non-costly leverage adjustments. Unlike large firms, small and medium-sized firms however tend to face adjustment costs that are related to their default risk and in the case of medium-sized firms also for their growth orientation. Interestingly, we find an indication of banks' willingness to make small firms pay for the larger firms growing independence on banks. Hence, a large firms' benefit from common European financial markets is turned into loss for smaller firms.

A further analysis of the adjustment parameters reveals that efficiency of loan markets improved constantly till year 1999 due to threat of EMU (European Monetary Union) competition but has since then started to weaken again. In general, central European (German and French) loan markets are found most efficient and the Danish and Spanish markets least efficient. Firms' leverage is instead highest in Scandinavia and lowest in southern Europe. Despite these prevailing differences, we observe indications of a mean reversion within the countries' SME leverage and banks margins, which lends support for

a formation of common European financial markets. Yet, the wide spectrum of firms' leverage incentives, e.g. due to different regulatory environments, poses the greatest challenge for the common European monetary policy. In particular, its total effect on the EMU area is likely to depend on the size composition of firms and their dependence on bank loans within and between countries. As these country differences are especially large among large firms, these firms can pose a threat to the financial stability due to their unpredictable, credit rationing exploiting demand. This threat is due to large firms compounded effects made payable by smaller and more bank dependent firms and their lending. Hence, better financial integration also in regulative terms is needed to provide better means for monetary policy to control this phenomenon in the EMU area. However, more data intensive research is still required to shed lights on how changes in large firms' demand for credit affect smaller firms' credit conditions and how short-term credit is related to this.

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APPENDIX

Time dummies of the dynamic partial adjustment models between 1994-2003 for bank and manufacturing industry are divided by size to small, medium-sized and large firms. Subscript of the parameter denotes the year in question. The presence of significant time effects in the optimal and adjustment equations is interpreted as an unobserved heterogeneous time-variant effect.

Time dummies of the dynamic partial adjustment models, NT=2370 obs.

	BANK MODEL				FIRM MODEL		
Size	SMALL	MEDIUM	LARGE	Size	SMALL	MEDIUM	LARGE
Para-meters	Estimate t Value	Estimate t Value	Estimate t Value	Para-meters	Estimate t Value	Estimate t Value	Estimate t Value
A. DETERMINANTS OF OPTIMAL LEVELS:							
α_{1996}	12.57*** (103.58)	0.46 (1.05)	0.09 (0.57)	β_{1996}	-4.50*** (-3.36)	-10.67*** (-4.62)	-19.93 (-0.83)
α_{1997}	21.04*** (119.99)	1.07* (1.76)	-1.45*** (-6.30)	β_{1997}	13.28*** (6.17)	-9.46*** (-3.63)	26.07 (0.78)
α_{1998}	26.69*** (111.66)	0.96 (1.21)	-5.49*** (-14.43)	β_{1998}	4.54 (1.45)	-4.43 (-1.35)	-31.73 (-1.27)
α_{1999}	34.58*** (116.56)	1.37 (1.35)	-6.14*** (-15.16)	β_{1999}	6.22** (2.01)	-14.41*** (-4.10)	29.94 (1.51)
α_{2000}	20.38*** (96.08)	0.03 (0.04)	-4.07*** (-10.25)	β_{2000}	10.37*** (3.50)	-3.96 (-1.31)	-52.73** (-2.51)
α_{2001}	23.13*** (106.88)	0.17 (0.22)	-6.58*** (-17.89)	β_{2001}	18.24*** (5.92)	0.18 (0.06)	-33.29 (-1.61)
α_{2002}	30.25*** (119.26)	0.92 (1.15)	-5.78*** (-16.63)	β_{2002}	7.62** (2.55)	-6.32** (-2.01)	-51.59* (-1.88)
α_{2003}	38.56*** (121.81)	1.38 (1.42)	-4.88*** (-14.11)	β_{2003}	6.01** (1.89)	-8.94** (-2.54)	-37.90* (-1.77)
B. DETERMINANTS OF ADJUSTMENTS:							
ξ_{1996}	-0.00 (-0.06)	0.00 (0.03)	-0.07** (-2.03)	ς_{1996}	0.03** (2.52)	0.06*** (6.32)	-0.00 (-0.42)
ξ_{1997}	-0.00 (-0.15)	0.03 (0.48)	-0.16*** (-3.94)	ς_{1997}	-0.01 (-1.55)	0.04*** (4.01)	-0.00 (-1.34)
ξ_{1998}	0.01 (0.52)	0.01 (0.23)	-0.22*** (-5.63)	ς_{1998}	-0.01 (-0.81)	0.03*** (4.90)	-0.00 (-1.47)
ξ_{1999}	0.05*** (2.61)	0.01 (0.16)	-0.26*** (-6.28)	ς_{1999}	-0.00 (-0.01)	0.02*** (2.81)	-0.00* (-1.70)
ξ_{2000}	0.02 (1.06)	-0.07 (-0.93)	-0.38*** (-9.93)	ς_{2000}	-0.00 (-0.50)	0.02*** (3.69)	0.05*** (4.66)
ξ_{2001}	0.03* (1.83)	-0.16** (-2.49)	-0.14*** (-3.53)	ς_{2001}	-0.01* (-1.79)	0.03*** (5.83)	0.00 (0.60)
ξ_{2002}	0.03 (1.36)	-0.13** (-1.97)	-0.17*** (-4.15)	ς_{2002}	-0.02*** (-3.65)	0.05*** (6.59)	-0.00 (-0.56)
ξ_{2003}	0.06*** (3.07)	-0.17*** (-2.59)	0.02 (0.40)	ς_{2003}	-0.01 (-1.58)	0.03*** (4.49)	0.03*** (3.88)

Notes: significant at the less than 1% (***), 1-5 % (**), and 5-10% (*) levels of significance

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