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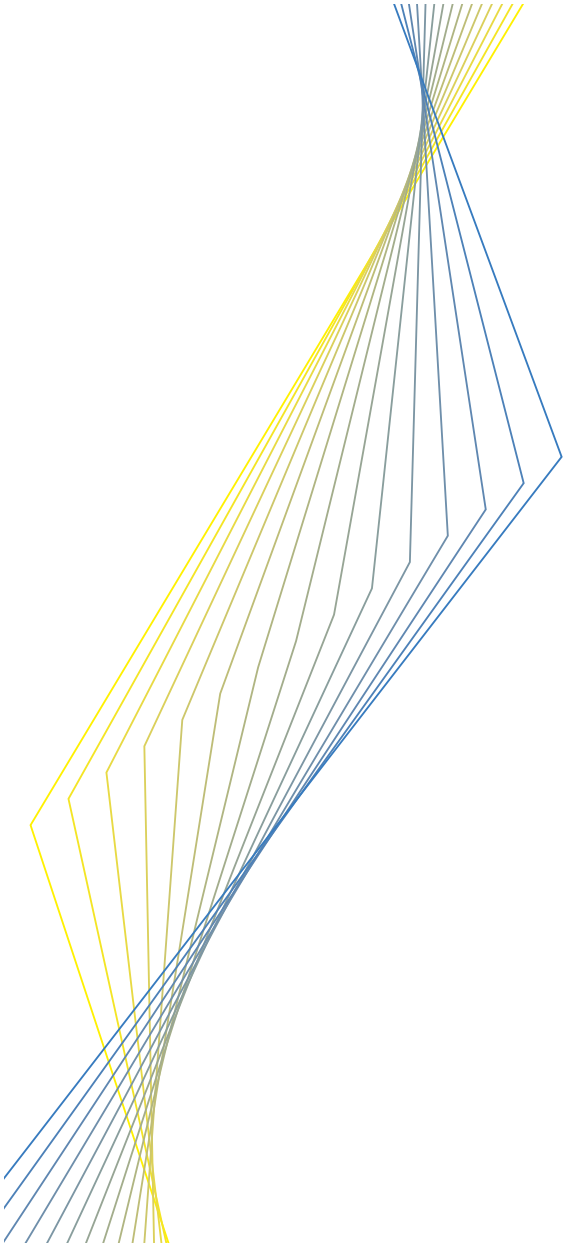

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BANK-SPECIFIC CHARACTERISTICS AND MONETARY POLICY TRANSMISSION: THE CASE OF ITALY

BY LEONARDO GAMBACORTA[1]

December 2001

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The Eurosystem Monetary Transmission Network

This issue of the ECB Working Paper Series contains research presented at a conference on "Monetary Policy Transmission in the Euro Area" held at the European Central Bank on 18 and 19 December 2001. This research was conducted within the Monetary Transmission Network, a group of economists affiliated with the ECB and the National Central Banks of the Eurosystem chaired by Ignazio Angeloni. Anil Kashyap (University of Chicago) acted as external consultant and Benoît Mojon as secretary to the Network.

The papers presented at the conference examine the euro area monetary transmission process using different data and methodologies: structural and VAR macro-models for the euro area and the national economies, panel micro data analyses of the investment behaviour of non-financial firms and panel micro data analyses of the behaviour of commercial banks.

Editorial support on all papers was provided by Briony Rose and Susana Sommaggio.

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Contents

Abstract

This paper tests cross-sectional differences in the effectiveness of the bank lending channel of monetary policy in Italy from 1986 to 1998 using a panel approach. After a monetary tightening the decrease in deposits subject to reserve requirements is sharper for those banks that have less incentive to shield the effect of a monetary squeeze: small banks characterized by a higher ratio of deposits to loans and well-capitalized banks that have a greater capacity to raise other forms of external funds. As to lending, size does not affect the banks' reaction to a monetary policy impulse. This can be explained by a closer customer relationship, which provides an incentive for small banks, which are more liquid on average, to smooth the effects of a tightening on credit supplied. Banks' liquidity is the most significant factor enabling them to attenuate the effect of a decrease in deposits on lending.

JEL classification: E44, E51, E52.

Keywords: monetary policy, transmission mechanisms, bank lending channel.

Non-technical summary:

This paper studies the role of banks in monetary policy transmission in Italy from 1986 to 1998. The reaction of the main bank balance-sheet items to monetary shocks is analyzed through a panel study, taking into account the bank-specific characteristics of size, liquidity and capitalization to check whether the distributional effects among banks are similar to those traditionally detected for the US. The main findings are the following.

After a monetary restriction deposits fall and banks reduce their lending. A decrease in liquidity suggests that banks try to shield their loan portfolio by drawing down cash, securities and their net interbank position.

The impact on deposits is more pronounced for the banks that have less incentive to shield the effect of a monetary squeeze: small banks with a higher ratio of deposits to loans and well-capitalized banks with greater capacity to raise other forms of external funds.

The size of banks does not affect the impact of monetary policy on lending; small banks, which also tend to be more liquid, smooth the effect of a monetary tightening on the supply of lending to their customers, possibly reflecting closer customer relationships. This result, which differs from the conclusions of studies for the US, is consistent with previous works on the response of Italian lending rates to monetary policy. Liquidity is the most significant factor enabling banks to contain the effect of a deposit contraction.

1. Introduction[1]

The "lending channel" hypothesis postulates the existence of a channel of monetary policy transmission through bank credit. Such a channel is independent of the traditional "money channel", which considers the effects of changes in the real interest rate on economic activity; it stems instead from financial market incompleteness and hinges upon imperfect substitutability between bank loans and privately-issued debt. If some borrowers not only households but presumably also small firms do not have access to the capital market, their expenditure and investment decisions depend exclusively on bank credit and self-financing: in this case, every change in the composition of bank assets affects both the level and the distribution of private consumption and investment expenditure.

At the aggregate level, monetary shocks that affect deposits alter bank's credit supply; if the resulting reduction in funds cannot be offset with other sources of financing, the shocks translate into real effects. This mechanism can vary between banks with different degrees of access to non-deposit funding. According to Kashyap and Stein (1995), the lending channel should be more important for small banks, which have a very simple capital structure and are financed almost exclusively with deposits and common equity. The impact of the bank lending channel should also be greater for banks with less liquid assets and less capital. Less liquid banks cannot protect their loan portfolio against monetary tightening simply by drawing down cash and securities (Kashyap and Stein, 2000); poorly capitalized banks have less access to markets for uninsured funding, so their lending is more dependent on monetary policy shocks (Peek and Rosengren, 1995; Stein, 1998).

The present paper tests cross-sectional differences in the effectiveness of the bank lending channel of monetary policy transmission in Italy from 1986 to 1998. The reaction of bank deposits and loans to monetary shocks has been analyzed through a panel study, taking simultaneously into account the bank-specific characteristics of size, liquidity and capitalization. Since the structure of the Italian banking system is quite different from that of the US, it is interesting to verify whether the distributional effects are similar to those traditionally detected in the literature.

The results indicate the existence of shifts in deposit demand and loan supply due to monetary policy action. The effects of monetary policy differ among banks: after a tightening the decrease in deposits is more pronounced for the banks that have less

[1] This paper is part of a joint project undertaken within the Eurosystem's Monetary Transmission Network. I wish to thank Gabe J. de Bondt, Alessio De Vincenzo, Dario Focarelli, Andrea Generale, Eugenio Gaiotti, Giorgio Gobbi, Paolo Emilio Mistrulli, Fabio Panetta, Alberto Franco Pozzolo and the MTN members for helpful discussions and comments. Roberto Felici provided excellent research assistance. The usual disclaimer applies. The opinions expressed in this paper are those of the author only and in no way involve the responsibility of the Bank of Italy. Email gambacorta.leonardo@insedia.interbusiness.it

incentive to shield the effect of a monetary squeeze: small banks with a higher ratio of deposits to loans and well-capitalized banks with greater capacity to raise other forms of external funds. On the lending side, the size and the capitalization of banks do not affect their reaction to a monetary policy impulse. Rather, the primary factor enabling banks to contain the effect of a deposit drop on lending is their degree of liquidity.

The remainder of the paper is organized as follows. Section 2 analyzes the problem of identifying the existence of a "credit channel" and Section 3 describes the institutional characteristics of the Italian economy in the eighties and the nineties. After a description of the econometric model and the data in Section 4, Section 5 presents evidence on the response of the main banks' balance-sheet items (deposits, loans and liquidity) to a monetary shock. Section 6 checks the robustness of the results. Section 7 summarizes the main conclusions.

2. How can we identify the "credit channel"?

According to the traditional "money channel" theory (IS-LM model), a monetary tightening (such as a decrease in total reserves) reduces deposits. Bank assets (bonds and loans) are perfect substitutes and demand for them is a negative function of a common interest rate (r). After a monetary tightening, equilibrium is reached through an increase in r, which reduces money demand to match supply, while on the asset side of banks' balance sheet, bonds and loans fall to match deposits. The effects on the real economy come via the reduction in investment and consumption due to the higher cost of capital. No attention is paid to changes in firms' finance.

The model of Bernanke and Blinder (1988) shows that if some borrowers have limited access to the capital market and depend on bank credit for external funding, bonds and loans are imperfect substitutes and changes in the composition of bank assets also influence investment financing. In response to a monetary restriction, the "lending channel" works if the reduction in credit is larger than that in other forms of financing to firms. *A priori*, the interest rate spread between loans and bonds should widen, although this may depend upon the institutional characteristics of credit markets.

The identification problem consists in separating the effects of the traditional money channel from those of the bank lending channel. A stylized explanation of the functioning of the lending channel is provided in Figure 1, which shows the simultaneous equilibria in the markets for loans (L) and corporate bonds (B). Quantities are on the horizontal axis, interest rates on the vertical. Firm liabilities are given by credit demand (L_d) and bond supply (B_s), while bank assets are represented by the supply of loans (L_s) and the demand for bonds (B_d). At the initial equilibrium point, for simplicity, the interest rates on bonds and loans are equal ($i_0=\rho_0$).

In Figure 1a, which represents the case of similar elasticities for the demand and supply curves, after a monetary restriction banks modify their asset composition, reducing the supply of loans (from L_s to L_s') and the demand for bonds (from B_d to B_d'). If some agents do not have access to the capital market, the reduction in lending will be greater than that in bond purchases, which causes an increase in the spread (ρ-i). In other words, when elasticities are similar, the credit channel response to a monetary tightening is identified with an increase in the spread on the price side, and in a greater reduction in bank loans than in other forms of corporate financing on the quantity side.[2]

It is worth remembering that loan supply shifts could also be originated by a "balance sheet channel", working through the relative prices of the guarantees provided to the banks (Mishkin, 1995; Oliner and Rodebusch, 1996; Kashyap and Stein, 1997): a monetary squeeze increases debt service which can prompt sales of real assets, reducing their value and causing a loss of creditworthiness and a reduction of lending. In this situation there is a greater incentive for banks to finance less risky projects and to start a "flight to quality" (Bernanke, Gertler and Gilchrist, 1994; Lang and Nakamura, 1995).

The result clearly depends upon the elasticities of the functions. Let us assume that credit demand is more elastic than bond supply (L_d, see Figure 1b). This could happen if firms were not heavily dependent upon bank credit and the bond market were very efficient in solving asymmetric information problems, but such a situation seems realistic only if bank credit has some form of additional costs with respect to the bond market. In this case, it is clear that even if a bank lending channel exists, the loan-bond spread diminishes; nevertheless there could be always a greater reduction in lending than in bond issues.

The bold line L_d^* represents the opposite case: loan demand is more inelastic than bond supply. In this situation the credit market is characterized by substantial asymmetric information mainly for small firms that do not have access to other sources of financing; in such circumstances the effect on the spread would be amplified and lending would contract less than bond issues. The economic intuition behind this result is that due to the bank-customer relationship, loans are more shielded than bonds.

After a monetary tightening, banks sell securities mainly to attenuate the reduction in lending, so as to preserve the credit relationship with the client. In this case the size of the adjustment of liquid assets in the bank's portfolio will depend upon the customer links between the bank and the client. Therefore, in order to correctly identify a monetary restriction, we should observe a reduction not only in loans but also in securities holdings.

[2] The effect on the spread could not hold if the monetary restriction also caused an investment reduction and a decrease in credit demand (L_d moves downwards). In this case, the loan-bond spread could be reduced even if the bank lending channel is at work. Nevertheless, it is worth noting that an investment reduction should also decrease the supply of bonds (B_s moves downwards), so it is plausible that the final effect would be an increase in the spread.

Indeed, a decrease in lending combined with an increase in the securities portfolio could be the result of a simple reallocation of assets, independent from exogenous monetary shocks.

3. The Italian case

Two conditions are necessary for there to be a distinct bank lending channel of monetary policy transmission: (1) some firms and households must be dependent on bank loans; (2) the monetary authority must be able to shift the bank's loan supply schedule.

Italy provides an interesting case study to test the existence of the bank lending channel. As regards the first condition, in the period examined here, 1986 to 1998, private debt markets have been less developed than in the US or UK (commercial paper and private bonds had a limited role) and banks' portfolios consisted mainly of government paper, which dominated the bond market. Therefore the business sector has been heavily dependent on bank credit, while the small size of the capital market has limited the diversification of bank assets.[3]

National financial accounts show that at the end of 1998 bonds accounted for only 1 per cent of the total financial liabilities of Italian firms. This figure, similar to that for Germany, is lower than in France and Spain (4 per cent) or the United Kingdom (7 per cent). Another indicator of the importance of banks in financing business is major stock market capitalization. In Italy and Germany this is relatively low (respectively, 46 and 48 per cent of GDP), compared with France (65 per cent), Spain (69 per cent), the Netherlands (153 per cent) and the United Kingdom (165 per cent) where there are many large corporations (Guiso, Kashyap, Panetta and Terlizzese, 1999).

As to our second condition, the monetary authorities' ability to shift the bank's loan supply schedule, some institutional details suggest that it has been greater in Italy than in other countries. At the beginning of the 1980s the Italian banking system was quite tightly regulated: 1) foreign exchange controls were in place; 2) the establishment of new banks and the opening of new bank branches were subject to authorization[4]; 3) competition was curbed limited by mandatory maturity specialization, with special credit institutions operating at medium-long term maturities and commercial banks at short term; 4) bank lending was subject to a ceiling. All these restrictions were gradually removed between the mid-1980s and the early 1990s (Passacantando, 1996): 1) foreign exchange controls were lifted between 1987 and 1990; 2) branching was liberalized in 1990; 3) the 1993

[3] A brief summary of Italian financial reforms during the 1980s and early 1990s is available in Cottarelli et al. (1995) and Passacantando (1996), among others.

[4] Before 1987 the Bank of Italy authorized the opening of new branches on the basis of a 4-year plan reflecting estimated local needs for banking services.

Banking Law allowed banks and special credit institutions to perform all banking activities[5]; 4) the lending ceiling was definitely removed in 1985.

Other factors increased the ability of the monetary authorities to control the banks' loan supply schedule. Almost all bank liabilities were subject to the reserve requirement. CDs longer than 18 months were not excluded from reserve requirements until May 1994. Until 1992 only special credit institutions could issue bonds; regular commercial banks started to use this form of funding only in 1995.

In principle, therefore, the financial structure of the Italian economy during this period makes more likely that a credit channel was at work. Table 1 summarizes some indicators concerning the relative importance of such a channel in the main countries of the euro area. Each factor is given a grade from A to C. "A" indicates the lowest degree of sensitivity to monetary policy. The first two columns are adapted from Borio (1996). The first indicator highlights the weight of bank credit respect to total credit (defined as the sum of banking credit and bonds, with the exclusion of trade credit). The second factor taken into consideration is real guarantees (share of secured loans in total bank lending): the higher the share of loans backed by collateral, the sharper should be the variations of bank lending in response to a tightening of monetary policy via the balance sheet channel.

Other factors that could explain the effectiveness of the lending channel in the EMU area are proposed by Kashyap and Stein (1997). The third column represents the importance of small banks, measured by the share of commercial bank assets held by the three largest commercial banks. As we have seen, following Kashyap and Stein (1995), small banks should be more responsive to monetary tightening. The fourth column gives the importance of small firms. In fact, the international differences in the efficacy of the credit channel also depends on differences in productivity. As Guiso et al. (1999) suggest, smaller firms are more likely to rely on a small bank and may thus be more subject to the lending channel. The fifth column represents the availability of non-bank finance, measured by equity value as a percentage of GDP.

From the last column, which illustrates a subjective weighting of the factors, Italy emerges (together with Greece and Portugal) as the country where the potential relevance of a lending channel for monetary policy transmission is greatest.[6]

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[5] The 1993 Banking Law completed the enactment of the institutional, operational and maturity despecialization of the Italian banking system and ensured the consistency of supervisory controls and intermediaries' range of operations with the single market framework. The business restriction imposed by the 1936 Banking Law, which distinguished between banks that could raise short-term funds ("aziende di credito") and those that could not ("Istituti di credito speciale"), was eliminated. For more details see the Annual Report of the Bank of Italy for 1993. The potential impact of this regulation on the results of the study has been checked in Section 6.

[6] Guiso et al. (1999) also suggest a number of structural features that would be useful to measure the efficiency of credit markets such as the relative time required to repossess collateral in the event of a default and the estimated legal costs of repossessing a house in the event of mortgage default. Both variables are very high in Italy. For other indicators see also Ehrmann et al. (2001).

Table 2 summarizes studies on the credit channel for Italy. Most empirical works confirm the existence of an aggregate credit channel (Buttiglione and Ferri, 1994; Angeloni et al., 1995; Bagliano and Favero, 1995; Fanelli and Paruolo, 1999; Chiades and Gambacorta, 2000), while conflicting results are presented by Bagliano and Favero (1996), de Bondt (1999) and Favero et al. (1999). However, there is much less evidence on the effects of bank-specific characteristics on the effectiveness of the lending channel. Moreover in these studies the evidence on the disaggregated prediction of Kashyap and Stein (1995) concerning the role of size is weak: only de Bondt (1999) finds a size effect when the monetary policy stance is measured by a monetary condition index.

4. The econometric model and the data

The empirical specifications, based on Kashyap and Stein (1995), are designed to test whether banks react differently to monetary policy shocks.[7] The model is given by the following equation, which includes interaction terms that are the product of the monetary policy indicator and a bank specific characteristic:

$$\Delta \ln x_{it} = \mu_i + \sum_{j=1}^{4} \alpha_j \Delta \ln x_{it-j} + \sum_{j=1}^{4} \beta_j \Delta MP_{t-j} + \sum_{j=1}^{4} \gamma_j Z_{it-j} \Delta MP_{t-j} + \lambda Z_{it-j} + \\ + \sum_{j=1}^{4} \varphi_j \pi_{t-j} + \sum_{j=1}^{4} \delta_j \Delta \ln y_{it-j} + \varepsilon_{it} \qquad (1)$$

with i=1,…, N and t=1, …, T and where

N = number of banks

x_{it} = deposits, loans or liquidity of bank i in quarter t

MP_t = monetary policy indicator

y_{it} = real GDP

π_t = inflation rate

Z_{it} = bank-specific characteristic (size, liquidity, capitalization)

The model allows for fixed effects across banks, as indicated by the bank-specific intercept μ_i. Four lags have been introduced in order to obtain white noise residuals. The model in growth rates has been chosen because variables in levels are integrated of order one (this has been verified by an augmented Dickey Fuller test). This was the approach used by Kashyap and Stein (1995) to avoid the problem of spurious correlations.

The sample used goes from the fourth quarter of 1986 to the fourth quarter of 1998. The interest rate taken as monetary policy indicator is that on repurchase agreements between

[7] An explanation of the model is in Ehrmann et al. (2001).

the Bank of Italy and credit institutions. CPI inflation and the growth rate of real GDP are used to control for demand effects. The introduction of these two variables allows us to capture cyclical movements and serves to isolate the monetary policy component of interest rate changes. For more details on the dataset see the appendix.

To test for the existence of distributional effects of monetary policy among banks, the following indicators have been used for size (S), liquidity (Liq) and capitalization (Cap):

$$S_{it} = \log A_{it} - \frac{\sum_i \log A_{it}}{N_t}$$

$$Liq_{it} = \frac{L_{it}}{A_{it}} - \left(\sum_t \frac{\sum_i L_{it} / A_{it}}{N_t} \right) / T$$

$$Cap_{it} = \frac{C_{it}}{A_{it}} - \left(\sum_t \frac{\sum_i C_{it} / A_{it}}{N_t} \right) / T$$

Size is measured by the log of total assets, A_{it}. Liquidity is defined as the ratio of liquid assets L_{it} (cash, interbank lending and securities) to total assets, and capitalization is given by the ratio of capital and reserves, C_{it}, to total assets.

All three criteria are normalized with respect to their average across all the banks in the respective sample, in order to get indicators that sum to zero over all observations. This means that for the regression model (1), the average of the interaction term $Z_{it-1}\Delta MP_{t-j}$ is also zero, and the parameters β_j are directly interpretable as the average monetary policy effect. The size indicator has been normalized not just with respect to the mean over the whole sample period but also with respect to each single period. This removes unwanted trends in size (namely, that due to the fact that size is measured in nominal terms).

Ehrmann et al. (2001) present detailed information on the characteristics of the whole dataset on December 1998, before the filtering process. The sample represents 92 per cent of total system assets. Table 3 gives some basic information on what bank balance sheets look like after the filtering for loan regressions.[8] The first three parts of the table split the sample with respect to size, liquidity and capitalization, the last gives information on the whole dataset.

The first part brings out differences between "big" and "small" banks. Small banks are more liquid and better capitalized. This result fits with the standard idea that smaller banks need big buffer stocks of securities because of their limited ability to raise external finance on the capital market. This interpretation is confirmed on the liability side, where the

[8] The characteristics of the datasets used for deposit and liquidity regressions are very similar and are not reported. They are composed, respectively, of 629 and 531 banks. For more details see the appendix.

percentage of deposits (overnight deposits, CDs and savings accounts) is greater among small banks, while their bonds issues are more limited.

Liquid banks are smaller and better capitalized than average. Their bond portfolio consists mainly of government paper. Low liquid banks have less deposits and make more loans. They have also a higher percentage of short-term loans, which should increase the speed of the bank lending channel transmission.

Poorly capitalized banks make more loans, mainly at short term, and are less liquid. On the liability side, they raise less deposits and issue less bonds. They are larger than average in size.

5. The results

The main results of the study are summarized in Tables 4-7, which present the long-run elasticities of the models.[9] These have been estimated using the GMM estimator suggested by Arellano and Bond (1991) which ensures efficiency and consistency provided that the models are not subject to serial correlation of order two and that the instruments used are valid (which is tested for with the Sargan test).[10]

Table 4 presents the results of benchmark regressions, which do not include any specific bank's variables; it aims at detecting the monetary policy effects on deposits, loans and liquidity for the average sample bank. The existence of distributional effects is tested in Tables 5-7, which do take bank-specific characteristics into account. Models 1 to 3 include, one at a time, size, liquidity and capitalization; Model 4 considers these three indicators together to test the robustness of previous results; Model 5 checks the double interaction between size and liquidity.

5.1 The response of bank deposits to a monetary shock

The results reported in Table 5 show that the long-run effects of monetary policy on total deposits (which are subject to reserve requirements) are significantly different from zero and do not differ too much among the models. These estimates roughly imply that a 1 per cent increase in the monetary policy indicator leads to a decline in deposits of around 0.6-0.8 per cent for the average bank in the long run. The long-run multipliers are lower than

[9] The complete set of coefficients of the models is available from the author upon request. Standard error for the long run effect have been approximated with the "delta method" which expands a function of a random variable with a one-step Taylor expansion (Rao, 1973).

[10] In the GMM estimation, instruments are the second and further lags of the growth rate of the dependent variable and of the bank-specific characteristics included in each equation. Inflation, GDP growth rate and the monetary policy indicator are considered as exogenous variables.

the sum of the lagged coefficients for monetary policy that approximate the overall effect after one year.[11]

The effects of a monetary tightening on total deposits are greater for those banks which have less incentive to shield the effect of a monetary squeeze on this form of liability: small banks, characterized by deposits in excess of loans, and well capitalized banks that have a higher capacity to raise other forms of external funds. In all cases (Models 1, 3 and 4) the null hypothesis that monetary policy effects are equal for small and big banks and for well and poorly capitalized banks can be rejected at the 95 per cent level of confidence. The reduction of the deposit growth rate for small banks is around 1 per cent, while that for a well capitalized bank is 1.5 per cent.

These results are influenced by some specific institutional characteristics of the Italian financial system. In Italy, small banks have traditionally high capacity in local deposit markets which reduces their need to raise other forms of external funds.[12] Moreover, the very high degree of effective deposit insurance makes it hard to argue that the deposits of small banks are riskier.[13] As for capitalization, in Italy, the impact of bank failures has been very small, especially with respect to deposits. During our sample period, the share of deposits of failed banks in total deposits approached 1 per cent only twice, namely in 1987 and 1996 (Boccuzzi, 1998). In this situation deposits with less capitalized banks should not be considered riskier than others.

The impact of liquidity is more difficult to interpret. Taking only liquidity into account (Model 2), there are no significant differences between the more and less liquid banks. Liquidity turns out to be significant only when all the bank-specific characteristic are

[11] The long-run coefficient on inflation is positive while that on the growth rate of real GDP is negative. The low procyclicality of total deposits in the period under investigation is confirmed by the coefficient of simultaneous correlation between the two series (around -14 per cent). The correlation maintains the negative sign also with respect to lags of the growth rates of GDP (up to the fourth order). This pattern could have been caused by precautionary motives that increase the growth rate of deposits during periods of recession and decrease it during booms (when other forms of investment become more appealing). It is worth noting that the correlation between the level of deposits and real GDP is positive (around 84 per cent).

[12] Apart from the reaction to monetary policy, the growth rate of deposits is higher for small banks. This can be checked through the scale variable Z_{kt-1} in equation (1), which is always highly significant in all the models. Other things equal, this coefficient captures the high capacity of small banks in local deposit markets.

[13] Two explicit limited-coverage deposit insurance schemes (DISs) currently operate in Italy. Both are funded ex-post; that is, member banks have a commitment to make available to the Funds the necessary resources should a bank default. All the banks operating in the country, with the exception of mutual banks, adhere to the main DIS, the 'Fondo Interbancario di Tutela dei Depositi' (FITD). Mutual banks ('Banche di Credito Cooperativo') adhere to a special Fund ('Fondo di Garanzia dei Depositanti del Credito Cooperativo') created for banks belonging to their category. The 'Fondo Interbancario di Tutela dei Depositi' (FITD), the main DIS, is a private consortium of banks created in 1987 on a voluntary basis. In 1996, as a consequence of the implementation of European Union Directive 94/19 on deposit guarantee schemes, the Italian Banking Law regulating the DIS was amended, and FITD became a compulsory DIS. FITD performs its tasks under the supervision of and in cooperation with the banking supervision authority, Banca d'Italia. The level of protection granted to each depositor (slightly more than 103,000 euros) is one of the highest in the European Union. FITD does not adopt any form of deposit coinsurance.

taken jointly into account (Model 4): in this case the deposits of more liquid banks suffer less from a monetary tightening.

5.2 The response of bank lending to a monetary shock

The second step of the analysis focuses on the response of bank lending to a monetary shock. The results are presented in Table 6, which is analogous to Table 5, except that the dependent variable is now the growth rate of nominal total lending.

Again, the estimated long-run multipliers of monetary policy have the expected negative sign and are significantly different from zero in all models. A 1 per cent increase in the REPO rate determines a loan reduction of 0.5-0.8 per cent.[14] In this case the overall effect after one year is slightly lower.

The interaction term between size and monetary policy is insignificant (see Models 1 and 3), which conflicts with the evidence for the US. The results do not support the prediction of Kashyap and Stein (1995) that the lending volume of smaller banks is more sensitive to monetary policy than that of large banks. This may be explained by the features of the Italian banking system, well documented in the literature, which may counterbalance the distributional effects traditionally associated with the lending channel. There is closer customer relationship between small firms and small banks (Angelini, Di Salvo and Ferri, 1998) which may increase the expected value to the bank of a continuation of the relationship and thus provide greater incentive to smooth the effect of a monetary squeeze on credit (Angeloni et al. 1995; Ferri and Pittaluga, 1996). Indeed, the empirical evidence shows that the intensity of bank-firm relations does reduce the probability that a firm will be rationed (Conigliani et al., 1997).

A long-standing relationship increases the ability of the bank to learn about the nature of the borrowing firm. Long experience with the borrower should reduce the expected cost of lending and therefore increase the bank's willingness to provide funds (Petersen and Rajan, 1994). As the length of the relation increases, informational problems between bank and firm are reduced and, with them, the risk premium (Berger and Udell 1995; Conigliani et al. 1997).

On the same lines, Cottarelli, Ferri and Generale (1995) and Angeloni et al. (1995) find that large banks tend to adjust lending rates more quickly than other banks. In their analysis, the dominant explanatory factor is the loan concentration index at the local level,

[14] The long run elasticity of credit to GDP is always significant and larger than one. The sign of the response of lending to inflation is not unique. The results are mainly not significant at conventional levels. It is worth noting that this coefficient picks up both the positive effect of inflation on nominal loan growth and the potential negative effects due to higher interest rates. This second effect was important in the period under investigation since inflation (and interest rates) fell significantly during the eighties and the nineties.

suggesting that cross-bank differences in price setting can be related to the micro-structure of the credit market.

Banks with a higher liquidity ratio are better able to buffer their lending activity against shocks to the availability of external finance, by drawing on their stock of liquid assets. The lending growth rate decreases by between 0.1 and 0.4 for liquid banks and between 0.4 and 1.3 for less liquid banks (see Models 2 and 4).

The robustness of these results has been checked with Model 5, which includes the double interaction between size and liquidity; through this coefficient it is possible to test whether the effect of liquidity is identical across banks regardless of size. In the spirit of Kashyap and Stein (2000) the double interaction should be negative, because small banks have a higher degree of informational asymmetry. The double interaction is negative but not significant further supporting the thesis that size is not important in distinguishing banks' responses to monetary policy.

Bank capital interaction with monetary policy has the expected sign but is not significant at conventional values (see Models 3 and 4). This could be explained by three factors. First, the measure used, the capital/asset ratio, is only indicative in measuring the effect of the Basle capital requirements. In fact, it does not contain information on the structure of the loan portfolio or its risk characteristics. Second, Italian banks, especially the small ones, may have operated in those years with a level of capitalization that was high enough for the Basle requirement not to be binding. Third, as noted, the impact of bank failures was small, so less capitalized banks could have been considered similarly safe by the market.

5.3 The response of bank liquidity to a monetary shock

Our third step analyses the effects of a monetary tightening on banks' liquidity: if the credit channel is at work, from an aggregate point of view, a given contraction in deposits causes not only lending but also cash and securities holding to decrease (Kashyap and Stein, 1995; Stein, 1998). Again the distributional effects could play an important role, but since liquidity is the endogenous variable, the liquidity ratio has not been used as explanatory variable.

Tables 4 and 7 present the evidence. In this case the optimal number of lags in Model 1 is three. The specifications yield results for liquidity that parallel those for lending volume: a monetary restriction also determines a significant reduction in cash, securities and interbank accounts. The implication is twofold. First, the endogenous modelling of liquidity confirms that variable's role in shielding the loan portfolio; second, there is no evidence that a lending reduction due to monetary tightening comes together with an increase in liquidity, which means that there is no simple reallocation of assets. The

estimates show that a 1 per cent increase in the DREPO leads to a decline in the liquidity growth rate of around 0.4 per cent after three quarters and 0.3 per cent in the long run. The drop in liquidity is greater for small banks, which as we have seen have more incentive to shield their customer relationships (see Table 7).

6. Robustness check

We have tested the robustness of these results in several ways. First, as monetary policy indicator we took the interest rate residuals from a two–lag VAR estimated in Mojon and Peersman (2001).[15] The correlation coefficient between this measure of monetary policy and DREPO is around 35 per cent (see Figure 2). This variable is designed to avoid problems of simultaneity and to represent an exogenous monetary policy shock.

In this case too, the estimated short-run and long-run multipliers have the expected signs and are always significant except for the deposits equation, where the effect of monetary policy for the average bank is not significant. The ways in which bank-specific characteristics influence the propagation of a monetary tightening on deposits, lending and liquidity growth rates do not change. The introduction of dummy variables to take account of the spikes in the change of the repo interest rate caused by the German re-unification and EMS crises do not alter the results.

The second test was to introduce additional interaction terms combining the bank-specific characteristics with inflation and real output growth rates, making the basic equation (1):

$$\Delta \ln x_{it} = \mu_i + \sum_{j=1}^{4} \alpha_j \Delta \ln x_{it-j} + \sum_{j=1}^{4} \beta_j \Delta MP_{t-j} + \sum_{j=1}^{4} \gamma_j Z_{it-j} \Delta MP_{t-j} + \lambda Z_{it-j} + \\ + \sum_{j=1}^{4} \varphi_j \pi_{t-j} + \sum_{j=1}^{4} \rho_j Z_{it-j} \pi_{t-j} + \sum_{j=1}^{4} \delta_j \Delta \ln y_{it-j} + \sum_{j=1}^{4} \phi_j Z_{it-j} \Delta \ln y_{it-j} + \varepsilon_{it} \qquad (1')$$

The reason for this test is the possible presence of endogeneity between bank-specific characteristics and the cyclical indicators. For example, nominal liquidity growth may be higher when inflation is high or banks may be better capitalized when the economy is in a boom. In the test, however, nothing changed, and the double interaction was almost always not significant.

Another robustness test was to compare equation (1) with the following model:

[15] The model is estimated in levels over the period 1980-1998 and includes as endogenous variables Italian real GDP, Italian consumer price index, the German three-month interest rate, the bilateral DM exchange rate and the Italian three-month interest rate. The domestic policy shock is identified through a standard Cholesky decomposition with the variables ordered as above. The specification also includes as exogenous variables a world commodity price index, US real GDP, the US short term interest rate and a linear trend. For more details see Peersman and Mojon (2001).

$$\Delta \ln x_{it} = \mu_i + \sum_{j=1}^{4} \alpha_j \Delta \ln x_{it-j} + \sum_{j=1}^{4} \gamma_j Z_{it-j} \Delta MP_{t-j} + \lambda Z_{it-j} + \vartheta_t + \varepsilon_{it} \quad (2)$$

where all variables are defined as before, and ϑ_τ describes a complete set of time dummies.

This model completely eliminates time variation and test whether the three pure time variables used in equation (1) (prices, income and the monetary policy indicator) capture all the relevant time effect. Again, the estimated coefficients on the interaction terms do not vary much between the two kinds of models, which testifies to the reliability of the cross-sectional evidence obtained.[16]

A geographical control dummy was introduced in each model, taking the value of 1 if the main seat of the bank is in the North of Italy and 0 if elsewhere. In all regressions, this dummy proved highly significant but showed a very low value. The lending growth rate of banks located in the North is only 0.1 per cent higher than that of the banks of the rest of Italy and the deposit growth rate is only 0.1 per cent lower. In all cases the effects of monetary policy with respect to size, liquidity and capitalization remained unchanged.

The last robustness check analyzed the maturity structure of banks' loan portfolio. For example, one of the main finding of the study is that small banks do not react more sharply than big banks to a monetary tightening and this could be because they have relatively less short term lending (see Table 3). This test is also important to consider the potential impact of the 1993 Banking Law (see footnote 5). So a new regression was performed with the quarterly growth rate of short-term lending (less than 18 months) as dependent variable. Table 8 presents the evidence for the model with all bank-specific characteristics (compare with model 4 in Table 6, which refers to total loans). The model was applied to a new dataset obtained with the filtering process described in the appendix; the results are very similar to those obtained with the same dataset used for total lending regressions.

Again in this case, distributional effects are detected only with respect to liquidity, while size and capitalization show the expected sign but are not significant. The coefficients of the interaction terms are similar in the two tables.

One important difference is detected in the average coefficient which is lower for short-term credit. This could be explained by the fact that firms need more short-term funding in recession, when working capital peaks with growing inventories and customer credit (similar results are reached by de Haan (2001) for the case of the Netherlands).[17]

[16] The coefficients of the T-models for loan regressions are reported in Ehrmann et al. (2001).

[17] In the model for short-term lending the coefficient on inflation is negative and significant, perhaps because short-term loans can be adjusted more rapidly and could be more subject to financial myopia (see the explanation in footnote 14 for the sign of the inflation coefficient).

7. Conclusions

This paper investigates the existence of cross-sectional differences in the effectiveness of the bank lending channel for monetary policy transmission in Italy from 1986 to 1998. The reaction of bank deposits and lending to monetary shocks is analyzed through a panel approach taking simultaneously into account the bank-specific characteristics of size, liquidity and capitalization.

The main results are the following. At aggregate level, after a monetary restriction deposits fall and banks reduce their lending. A simultaneous decrease in liquidity suggests that banks try to shield their loan portfolio by drawing down cash, securities and their net interbank position. All these effects are significant at conventional levels both in the short and the long run and are robust to different measures of monetary shocks.

Comparing the effects of a monetary tightening on different kinds of banks, we find that the impact on deposits is greatest for the banks with less incentive to shield this form of liability: small banks, with a high ratio of deposits to lending and well-capitalized banks that have greater capacity to raise other forms of external funds.

As regards the effects on lending, the size of banks does not affect their reaction. Small banks are not more sensitive to monetary policy shocks than large banks. This finding can be explained by closer customer relationships, owing to which small banks, which tend to be more liquid, smooth the effect of a monetary tightening on their supply of credit. This result, which differs from the conclusions of studies for the United States (Gertler and Gilchrist, 1994; Kashyap and Stein, 1995; Kishan and Opiela, 2000), is consistent with previous works on Italian lending rates (Angeloni et al., 1995 and Cottarelli et al., 1997).

Banks' liquidity is the most significant factor enabling them to contain the effect of a deposit contraction on lending. Less well capitalized banks suffer more from a monetary tightening, but this result is not significant at conventional values. Nevertheless, the measure of capitalization used, the capital/asset ratio, is only indicative in measuring the effect of the Basle capital requirements, so this result needs further investigation.

Our results are in line with Ehrmann et al. (2001), which in comparing the role of banks in monetary policy transmission in the euro area, also found that liquidity is important in characterizing a bank's reaction to a monetary policy action. On the other hand, factors like the size and capitalization of a bank are often not important. The lack of size and capitalization effects could be explained by a lower degree of informational asymmetries: the role of government, banking networks, and especially a low number of banking failures help reduce informational frictions.

Appendix – Description of the database

The data are taken from the Bank of Italy Supervisory Reports database. Deposits include certificate of deposits (longer-term CDs were subject to the reserve requirement until May 1994). Lending does not include bad debts and repurchase agreements. Liquidity is equal to the sum of cash, interbank deposits, securities and repurchase agreements at book value (repos have been considered for statistical reasons). The size of a bank is measured by the logarithm of the total balance sheet. Capitalization is given by capital and reserves. The growth rates are computed by first difference of variables in logs.

In assembling our sample, the so-called special credit institutions (long-term credit banks) have been excluded since they were subject to different supervisory regulations regarding the maturity range of their assets and liabilities. Nevertheless, special long-term credit sections of commercial banks have been considered part of the banks to which they belonged.

Particular attention has been paid to mergers. In practice, it is assumed that these took place at the beginning of the sample period, summing the balance-sheet items of the merging parties. For example, if bank A is incorporated by bank B at time *t*, bank B is reconstructed backward as the sum of the merging banks before the merger.

Data are quarterly and are not seasonally adjusted. Three seasonal dummies and a constant are also included.

For cleaning, all observations for which deposits, lending and liquidity are equal to or less than zero were excluded. After this treatment, the sample includes 759 banks and 35,678 observations.

An observation has been defined as an outlier if it lies within the top or bottom percentile of the distribution of the quarterly growth rate of deposits, lending and liquidity. If a bank has an outlier in the quarterly growth rate of deposits (lending or liquidity) it is completely removed from the sample with respect to the deposit (lending or liquidity) regression. The final datasets for deposits, lending and liquidity regressions were composed, respectively, of 629, 587 and 531 banks (27047, 25241 and 23364 observations).

A "small" bank has the average size of the banks below the third quartile, while a "big" bank has the average size of the banks above the 95th percentile.[18] A "low liquid" bank has the average liquidity ratio of the banks below the 10th percentile; a "liquid" bank, that of the banks above the 90th percentile. A "poorly capitalized" bank has a capital ratio equal to the average capital ratio below the 10th percentile, a "well capitalized" bank, that of the

[18] This partitioning produces a result similar to that obtained by the splitting criteria used by the Bank of Italy in January 1995 to define size groups. In this case "big" banks are those with total balance-sheet items larger than 8.3 billions euro, while "small" banks have less than 2.8 billions euro. For a more detailed description of this criterion see Banca d'Italia (1995).

banks above the 90th percentile. Since the characteristics of each bank could change over time, percentiles have been worked out on mean values.

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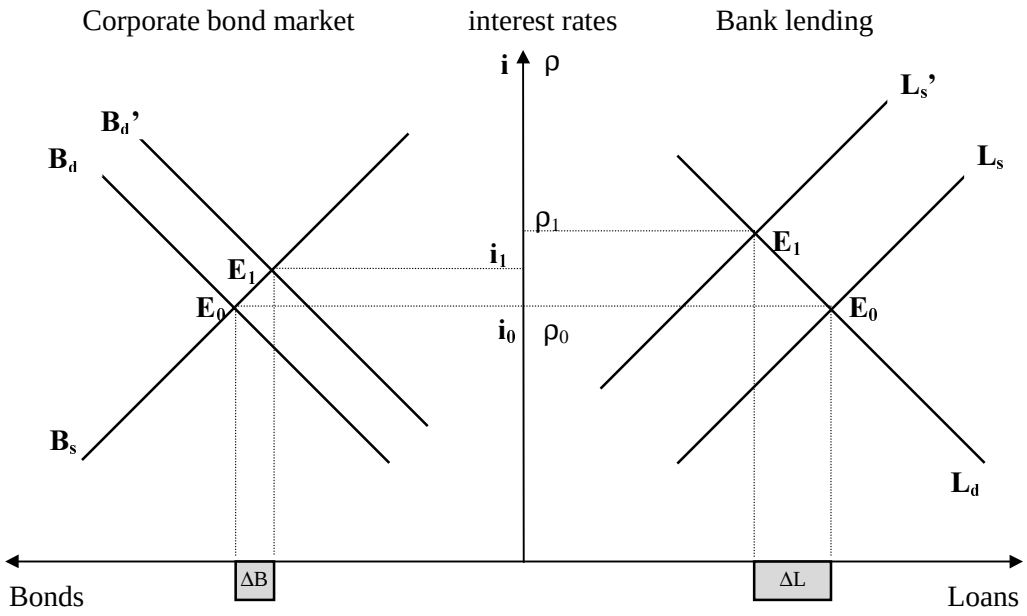
Figure 1: The impact of a monetary restriction

(a) Same elasticities



(a) Different elasticities

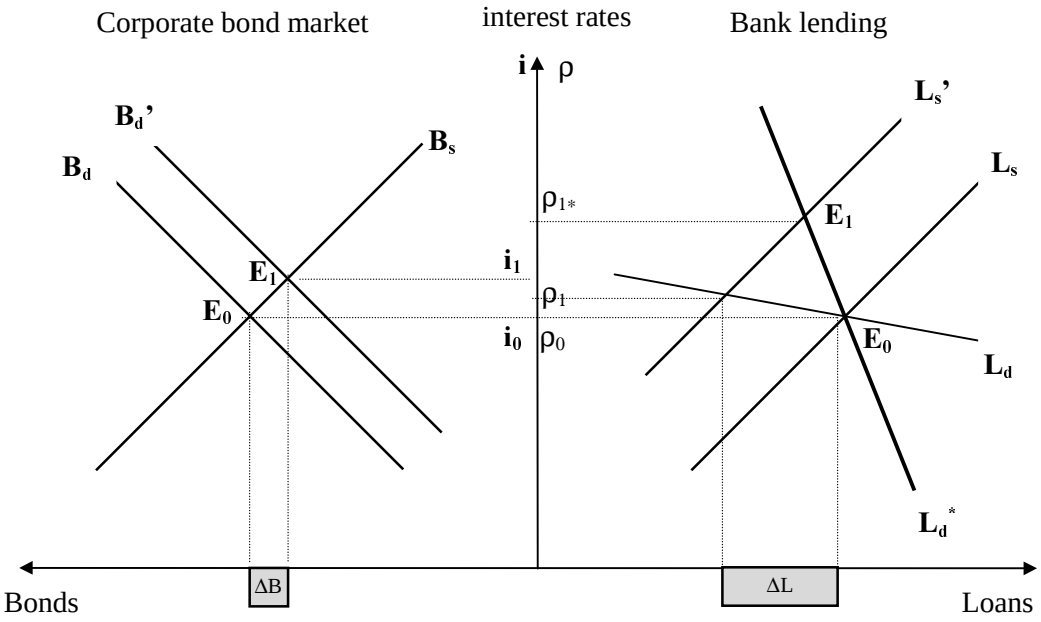


Figure 2 - Measures of monetary policy shocks

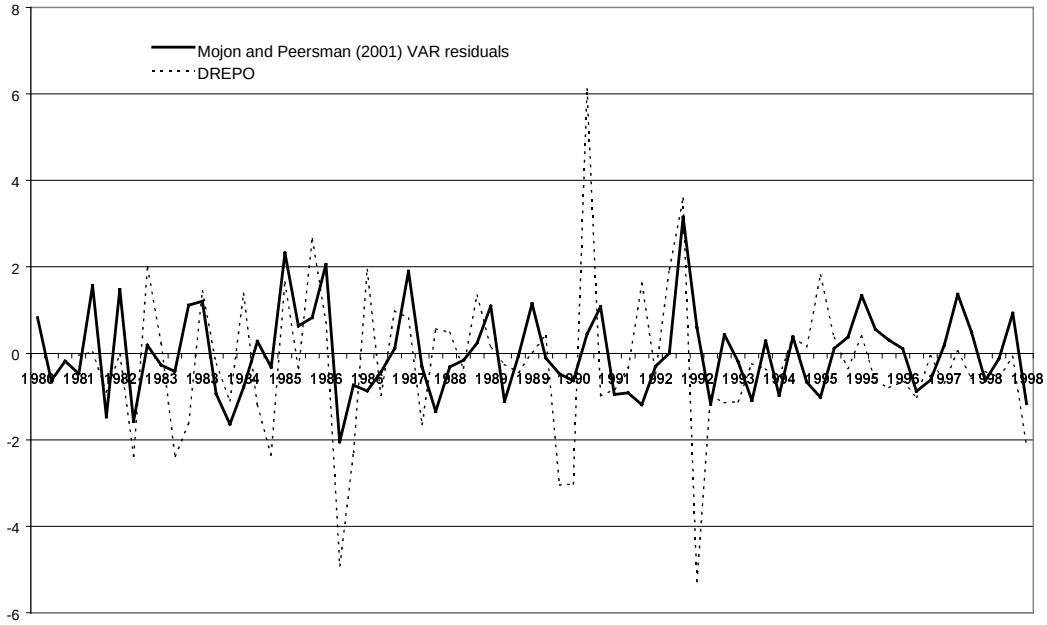


Table 1 – The credit channel effectiveness: an international comparison

Country	Bank credit (1)		Real estate (2)		Importance of small banks (3)		Importance of small firms (4)		Availability of non bank finance (5)		Ranking (6)
Belgium	84	[C]	34	[A]	44	[A]	64.7	[B]	0.39	[A]	[A/B]
Denmark	n.a.	-	n.a.	-	64	[B]	80.7	[B]	0.32	[A]	[B]
France	63	[A]	41	[C]	64	[B]	69.0	[B]	0.34	[B]	[B]
Germany	84	[C]	36	[B]	89	[C]	65.9	[A]	0.24	[B]	[B]
Greece	n.a.	-	n.a.	-	98	[B]	82.7	[C]	0.09	[C]	[C]
Ireland	n.a.	-	n.a.	-	94	[B]	n.a.	[B]	0.43	[B]	[B]
Italy	85	[C]	40	[C]	36	[B]	80.3	[C]	0.19	[C]	[C]
Luxembourg	n.a.	-	n.a.	-	17	[C]	74.5	[A]	1.81	[B]	[B]
Netherlands	71	[A]	36	[B]	59	[A]	75.5	[C]	0.90	[B]	[A/B]
Portugal	n.a.	-	n.a.	-	38	[B]	79.0	[C]	0.18	[C]	[C]
Spain	82	[B]	33	[A]	50	[B]	84.7	[C]	0.35	[B]	[B]
United Kingdom	45	[A]	59	[C]	29	[A]	66.2	[A]	1.28	[A]	[A/B]

Note: A grade of "A" indicates low effect of lending channel sensitivity to monetary policy; a grade "C" indicates high sensitivity. Columns 1-2 are adapted from Borio (1996); columns 3-5 are taken from Kashyap and Stein (1997). (1) Share of bank credit with respect to total credit defined as credit obtained by domestic households and businesses from domestic financial institutions plus any securities outstanding (not held by those institutions). It excludes trade credit and loans from abroad and from the Government. All figures refer to 1993. (2) Share of loans backed by collateral. (3) Commercial bank assets in the three largest commercial banks. The figures refer to 1993. Source: Barth, Nolle and Rice (1997). (4) Percentage of employment in firms with less than 500 people. Source: Commission of the European Communities, Enterprises in Europe, 1994. (5) Equity value as a percentage of GDP. The figures refer to 1995. (6) Subjective weighting of the factors.

Table 2 Empirical literature on the bank lending channel for Italy

Paper	Sample period	Method	Identification assumptions	Findings
Buttiglione and Ferri (1994)	1988-93 (monthly; aggregate data)	Unrestricted VAR model.	Monetary policy shocks are identified by means of orthogonalised interest rate residuals in a VAR (Cholesky decomposition). The policy variable (the overnight rate) is ordered first and considered the most exogenous variable. Credit supply shocks are identified by means of credit lines granted by banks and credit actually drawn.	The credit channel exists.
Angeloni, Buttiglione, Ferri and Gaiotti (1995)	1987-1993 (monthly; 40 banks)	Comparison of VAR impulse response functions for different kinds of banks. The sample is divided into big and small banks and banks with large and small loan sizes.	Monetary policy shocks are identified by means of orthogonalised interest rate residuals in a VAR (Cholesky decomposition). The policy variable (the three month interbank rate) is ordered first and considered the most exogenous variable. Credit supply shocks are identified by means of the spread between the lending interest rate and the interest rate on bonds.	The credit channel exists.
Bagliano and Favero (1995)	1982-93 (monthly; aggregate data)	The authors estimate two VARs. In order to gain efficiency the analysis of interest rates is separated from that of the link between the financial and the real side of the economy. The existence of long-run relationships is tested through the Johansen's FIML methodology.	Monetary policy shocks are identified by means of orthogonalised interest rate shock in a SVAR (A-B identification scheme). The policy variable (the REPO rate) is ordered first and considered the most exogenous variable. Credit supply shocks are identified by means of the spread between the lending rate and the interest rate on bank loans and the interest rate on government securities with residual life longer than two years.	The credit channel exists.
Bagliano and Favero (1996)	1982-94 (monthly; aggregate data)	The authors adopt the same Bernanke and Blinder setup used in the previous 1995 paper building this time a unique VAR. The long-run dynamics have been analyzed through the Johansen's FIML methodology	The problem of the identification has been addressed within the SVAR modeling technique, applied to a seven-variable system including three interest rates (the policy rate, the bond rate and the bank loan rate), two financial quantities (bank loans and deposits), the industrial production index and the inflation rate.	There is evidence of the first step of the credit channel (on deposits), but not of the second step (on lending).
Fanelli and Paruolo (1999)	1983-1998 (quarterly; aggregate data)	Cointegration techniques and simultaneous system of structural error correction equations.	The monetary variable is measured by M2. The identification of the credit channel is obtained including credit granted to both firms and households.	The credit channel exists.
Favero, Giavazzi and Flabbi (1999)	1992 (annual; micro data from Bankscope)	Cross section analysis. Sample banks are divided in three groups (small, medium and large).	The estimation is based on a single equation where the growth of lending depends upon the change in reserves, a variable called strength which represents the liquid part of total assets and the size. The presence of the credit channel is identified by means of the interaction of the size and the strength effects.	The credit channel does not exist. They do not find evidence of a significant response of bank loans to the monetary tightening which occurred in 1992.
de Bondt (1999)	1990-95 (annual, unbalanced panel dataset from Bankscope)	Models with random effects; check of the robustness of the estimation results via sub-sample estimates and using different measures of the monetary policy shock.	The estimation is based on a single equation where the growth of net lending over total assets depends upon the change in a monetary policy indicator, its interactions with the liquidity ratio, a size measure and their double interaction. The presence of a balance sheet channel is identified by means of the interaction of size and real GDP growth.	There is evidence for the existence of a bank lending channel only when the stance of monetary policy is measured by a monetary condition index. There is some evidence also for the existence of a balance sheet channel.
Chiades and Gambacorta (2000)	1984-1998 (monthly; aggregate data)	Structural VAR. The long-run dynamics have been analyzed through the Johansen's FIML methodology.	Monetary policy shocks are identified by means of orthogonalised interest rate shock in a SVAR (A-B identification scheme). Credit supply shocks are identified by means of the spread between the lending rate and the interest rate on bank loans and the interest rate on government securities with residual life longer than two years.	The credit channel exists.

Table 3 Description of the dataset used for lending regressions (December 1998)

	Big	Small	Liquid	Low liquid	Well cap.	Poorly cap.	Total
Number of banks	29	440	59	57	59	57	587
Mean assets (billions of euro)	32.974	0.152	0.138	15.630	0.227	9.592	2.189
Fraction of total assets	0.744	0.052	0.006	0.693	0.010	0.425	-
Mean deposits (billions of euro)	11.225	0.077	0.076	5.320	0.106	3.405	0.795
Fraction of total deposits	0.698	0.073	0.010	0.650	0.013	0.416	-
Mean lending (billions of euro)	14.343	0.063	0.036	6.997	0.082	3.963	0.942
Fraction of total lending	0.752	0.050	0.004	0.721	0.009	0.408	-
Liquidity/total assets	0.239	0.418	0.563	0.227	0.466	0.339	0.392
Loans/total assets	0.418	0.392	0.279	0.478	0.331	0.424	0.400
Deposits/total assets	0.355	0.551	0.618	0.385	0.542	0.476	0.520
Deposits/loans	0.851	1.406	2.215	0.807	1.636	1.123	1.302
Capital and reserves/total assets	0.069	0.113	0.135	0.077	0.156	0.059	0.105
Short term /total lending	0.593	0.487	0.434	0.617	0.486	0.569	0.519
Public securities/total securities	0.572	0.867	0.892	0.662	0.895	0.714	0.814
Bad debts/(loans and bad debts)	0.080	0.073	0.084	0.071	0.098	0.082	0.074
Bonds/(deposits and bonds)	0.257	0.206	0.123	0.276	0.184	0.228	0.213
Number of branches per province	15	5	3	12	4	9	7

Source: Bank of Italy supervisiory returns.

Note: A “small” bank has the average size of the banks below the third quartile, while a “big” bank has the average size of the banks above the 95th percentile. A “low liquid” bank has the average liquidity ratio of the banks below the 10th percentile, a “liquid” bank has the average liquidity ratio of the banks above the 90th percentile. A “poorly capitalized” bank has a capital ratio equal to the average capital ratio below the 10th percentile, a “well capitalized” bank has the average capitalization of the banks above the 90th percentile. Since the characteristics of each bank could change through time, percentiles have been worked out on mean values.

Table 4 Benchmark regressions

Dependent variable is the quarterly growth rate of :	A Deposits		B Lending		C Liquidity	
	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error
Long-run coefficients						
Monetary policy (MP)	-0.547 ***	0.048	-0.695 ***	0.101	-0.296 **	0.121
Real GDP growth	-0.669 ***	0.084	1.357 ***	0.163	-1.467 ***	0.261
Inflation (CPI)	3.620 ***	0.170	0.111	0.291	8.689 ***	0.689
Sum of lagged coefficients	(lag=4)		(lag=4)		(lag=3)	
Monetary policy (MP)	-0.601 ***	0.057	-0.439 ***	0.056	-0.327 **	0.147
Real GDP growth	-0.735 ***	0.095	0.857 ***	0.098	-1.780 ***	0.312
Inflation (CPI)	3.986 ***	0.190	0.070	0.184	10.540 ***	0.810
Sargan test (2nd step; p-value)		0.101		0.283		0.215
MA(1), MA(2) (p-value)	0.000	0.887	0.000	0.137	0.000	0.536
No of banks, no of observations	629	27047	587	25241	531	23364

Table 5 Deposit regressions

Dependent variable: quarterly growth rate of deposits	Model 1 Bank characteristic: SIZE		Model 2 Bank characteristic: LIQ		Model 3 Bank characteristic: CAP		Model 4 Bank char.: SIZE,LIQ,CAP	
	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error
Long-run coefficients								
Monetary policy (MP)	-0.563 ***	0.041	-0.796 ***	0.053	-0.664 ***	0.102	-0.839 ***	0.059
Real GDP growth	-0.710 ***	0.054	-1.019 ***	0.109	-0.446 ***	0.101	-0.708 ***	0.110
Inflation (CPI)	3.417 ***	0.176	5.435 ***	0.255	3.579 ***	0.190	4.260 ***	0.250
Bank char.*MP								
Size	0.236 ***	0.020					0.272 ***	0.032
Liquidity			-0.149	0.317			2.279 ***	0.474
Capitalization					-11.802 ***	1.504	-11.030 ***	1.589
MP effect for:								
large bank	0.576 ***	0.101					0.472 ***	0.136
small bank	-0.750 ***	0.043					-1.060 ***	0.076
high liquid			-0.823 ***	0.072			-0.426 ***	0.072
low liquid			-0.766 ***	0.089			-1.300 ***	0.138
well capitalized					-1.325 ***	0.193	-1.457 ***	0.113
poorly capitalized					-0.168	0.156	-0.375 ***	0.080
Sum of lagged coefficients (lags=4)								
Monetary policy (MP)	-0.710 ***	0.054	-0.838 ***	0.058	-0.709 ***	0.057	-0.981 ***	0.064
Real GDP growth	-0.891 ***	0.116	-1.070 ***	0.117	-0.476 ***	0.111	-0.829 ***	0.130
Inflation (CPI)	4.306 ***	0.227	5.722 ***	0.240	3.822 ***	0.210	4.980 ***	0.250
Sargan test (2nd step; pvalue)		0.196		0.073		0.064		0.080
MA(1), MA(2) (p-value)	0.000	0.665	0.000	0.843	0.000	0.749	0.000	0.324
No of banks, no of observations	629	27047	629	27047	629	27047	629	27047

Table 6 Lending regressions

Dependent variable: quarterly growth rate of lending	Model 1 Bank characteristic: SIZE		Model 2 Bank characteristic: LIQ		Model 3 Bank characteristic: CAP		Model 4 Bank char.: SIZE,LIQ,CAP		Model 5 Bank char.: SIZE*LIQ	
	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error
Long-run coefficients										
Monetary policy (MP)	-0.703 ***	0.103	-0.529 ***	0.102	-0.695 ***	0.102	-0.825 ***	0.127	-0.675 ***	0.113
Real GDP growth	1.363 ***	0.175	1.879 ***	0.162	1.419 ***	0.173	1.389 ***	0.213	1.084 ***	0.175
Inflation (CPI)	0.230	0.302	-1.931 ***	0.307	0.101	0.308	-0.622	0.386	-0.264	0.310
Bank char.*MP										
Size	-0.009	0.025					0.079	0.054	-0.046	0.073
Liquidity			2.593 **	1.284			2.278 ***	0.831	2.058 ***	0.574
Capitalization					4.226	2.818	3.616	3.099		
Double interaction									-1.238	0.845
MP effect for:										
large bank	-0.778 ***	0.215					-0.431 *	0.258		
small bank	-0.690 ***	0.112					-0.891 ***	0.147		
high liquid			-0.062	0.201			-0.414 ***	0.151		
low liquid			-1.053 ***	0.322			-1.285 ***	0.249		
well capitalized					-0.454 **	0.193	-0.622 ***	0.223		
poorly capitalized					-0.887 ***	0.156	-0.976 ***	0.017		
Sum of lagged coefficients (lags=4)										
Monetary policy (MP)	-0.439 ***	0.058	-0.353 ***	0.063	-0.438 ***	0.058	-0.512 ***	0.072	-0.538 ***	0.081
Real GDP growth	0.851 ***	0.104	1.255 ***	0.102	0.895 ***	0.105	0.863 ***	0.131	0.864 ***	0.141
Inflation (CPI)	0.143	0.189	-1.290 ***	0.197	0.064	0.194	-0.386	0.252	-0.210	0.268
Sargan test (2nd step; pvalue)		0.196		0.079		0.186		0.077		0.062
MA(1), MA(2) (p-value)	0.000	0.110	0.000	0.246	0.000	0.116	0.000	0.128	0.000	0.156
No of banks, no of observations	587	25241	587	25241	587	25241	587	25241	587	25241

Table 7 Liquidity regression

Dependent variable: quarterly growth rate of liquidity	Model 1 Bank characteristic: Size	
	Coeff.	S.Error
Long-run coefficients		
Monetary policy (MP)	-0.329 ***	0.118
Real GDP growth	-1.112 ***	0.300
Inflation (CPI)	8.184 ***	0.928
Bank char.*size	0.082 **	0.040
MP effect for:		
large bank	-0.314 ***	0.118
small bank	-0.345 ***	0.119
Sum of lagged coefficients (lags=3)		
Monetary policy (MP)	-0.395 ***	0.142
Real GDP growth	-1.336 ***	0.357
Inflation (CPI)	9.835 ***	1.080
Sargan test (2nd step; pvalue)		0.203
MA(1), MA(2) (p-value)	0.000	0.579
No of banks, no of observations	531	23364

Table 8 Lending maturity breakdown

Dependent variable: quarterly growth rate of short term lending	Model 4 Bank char.: SIZE, LIQ, CAP Coeff.	 S.Error
Long-run coefficients		
Monetary policy (MP)	-0.105	0.137
Real GDP growth	1.244 ***	0.284
Inflation (CPI)	-1.379 ***	0.504
Bank char.*MP		
Size	0.082	0.062
Liquidity	3.192 ***	0.955
Capitalization	3.052	3.260
Double interaction		
MP effect for:		
large bank	0.303	0.292
small bank	-0.172	0.163
high liquid	0.384	0.243
low liquid	-0.615 **	0.246
well capitalized	0.056	0.222
poorly capitalized	-0.229	0.182
Sum of lagged coefficients (lags=4)		
Monetary policy (MP)	-0.094	0.122
Real GDP growth	1.115 ***	0.241
Inflation (CPI)	-1.236 ***	0.430
Sargan test (2nd step; pvalue)		0.078
MA(1), MA(2) (p-value)	0.000	0.726
No of banks, no of observations	551	26448

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