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THE CREDIT CHANNEL OF MONETARY POLICY ACROSS HETEROGENEOUS BANKS: THE CASE OF ITALY

I. Angeloni, L. Buttiglione, G. Ferri and E. Gaiotti(*)

Abstract

In this paper we use micro-data to study the impact of monetary policy shocks on the lending rates offered by selected groups of banks in Italy. Within the literature on the "credit view", the paper contributes in two directions: first, it offers evidence in favour of a separate lending channel in the transmission of monetary policy in Italy; second, it shows the existence of significant distributional effects, which may be relevant for evaluating the constraints and trade-offs of alternative monetary policies. The average loan-bond rate spread is shown to rise after a monetary tightening, a well known implication of the lending view. Moreover, contrary to theory and observed experience in other countries, large banks and banks with large loans tend to tighten credit conditions more than other banks following a monetary restriction. Since bank size and borrower size are correlated, this implies a comparatively smaller impact of monetary policy on small firms. We offer two interpretations of these findings, both compatible with the credit view; namely, smaller banks may refrain from fully adjusting their lending rates because of the existence of customer relationships and because of their monopoly power in local markets.

Contents

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1. Introduction and summary

Do banks affect the speed and intensity of the transmission of monetary policy to the real economy? Can they influence the distribution of monetary shocks across sectors, regions, or other classes of economic agents? How do these diversities originate and how can they, if necessary, be corrected? Prominent among policy makers' concerns, these questions have recently received increasing attention in the literature. The theoretical premise was the recognition that informational failures in the financial markets make the pure market mechanism an imperfect instrument for resource allocation (Diamond, 1984). Credit institutions, which specialize in project screening and are able to develop stable relationships with individual clients, can overcome the informational failures and provide financing to worthy borrowers who would not otherwise have access to external finance. If market financing and bank credit are imperfect substitutes, then the loan supply behavior of banks can alter the transmission of monetary policy, either by inducing credit rationing or through other mechanisms of price selection. Despite their strong theoretical appeal and some empirical support (e.g. Friedman, 1983), the views stressing the importance of credit markets in the monetary policy transmission process nevertheless remained largely peripheral to the policy debate until late in the 1980s.[1]

Recently, partly as a consequence of the breakdown of money demand relationships in many industrialized countries, research into the so-called "credit view" has intensified, following several lines of research. First, the macrotheoretical underpinnings of the "view" have been more carefully developed (Bernanke and Blinder, 1988). Second, many empirical papers have successfully tested its aggregate im-

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1 An exception is Caranza and Fazio (1983).

plications on time-series data (Kashyap et al., 1993; Friedman and Kuttner, 1993). While confirming the relationship between monetary policy cycles and the growth of bank loans, aggregate time-series analyses have found it difficult to solve the well known "identification problem", i.e. to distinguish whether the credit contraction that typically follows a monetary restriction is due to a reduction in supply by commercial banks, as predicted by the credit view, or to a fall in demand stemming indirectly from the slowdown in economic activity. Cross-sectional data can provide the additional evidence needed to solve this ambiguity (Hubbard, 1994); in the last three years, several papers have turned their attention to micro data, to ascertain whether the distribution of monetary policy effects across lenders and borrowers follows the cross-sectional predictions of the credit view (e.g. Gertler and Gilchrist, 1993; Kashyap and Stein, 1994, henceforth KS). On the bank side, theory suggests that the impact of monetary policy on loan supply should depend on ability of banks to isolate themselves from the effects of monetary policy, using liability and asset management; small banks, which normally have simpler and less flexible balance sheets, should be affected more by monetary shocks. On the borrower side, small firms and households, which are characterized by stronger informational asymmetries and lower access to alternative sources of financing, should be more sensitive to monetary restrictions. The two effects could reinforce each other, strengthening the asymmetry of the monetary policy transmission process, if bank size and borrower size are positively correlated.

The analysis of micro data is interesting not only for the indirect evidence it provides on the credit view, but more generally because it helps to measure the empirical relevance of the distributional effects in the monetary transmission process. Cross-sectional asymmetries are relevant in evaluating the constraints and trade-offs of monetary

policy, for many reasons. For example, a stronger impact on small size borrowers would be undesirable if it overly increased their risks of failures, with potential loss of productive capacity; a stronger impact on the traded than on the non traded goods sector of the economy could unduly add to the deflation produced by exchange rate changes; an uneven effect across geographical areas could exacerbate regional disparities. Evidence that heterogeneous bank structures have significant distributional effects would strengthen the case for a close co-ordination between monetary policy and structural policies in the banking field, including bank supervision.[2]

Most of the empirical research on the credit view has so far centered on the US case. However, useful results could be derived from the experience of other countries in which banks play a dominant role in the financial system (Tsatsaronis, 1995; Dale and Haldane, 1993; Escrivà and Haldane, 1994). Several features suggest that a credit channel of monetary transmission is very likely to occur in Italy: the modest development of the stock and private bond markets; the virtual non existence of commercial paper; the high fragmentation and heterogeneity among credit institutions; the low degree of international credit market integration, partly deriving from the high fiscal and reserve burdens imposed on domestic banks; the high interest elasticity of money demand, which implies that monetary policy exerts a powerful impact on the size of bank balance sheets. The evidence collected so far on the Italian case, based on aggregate time-series data (Buttiglione and Ferri, 1994), is broadly consistent with the indications of the credit view. A cross-section analysis by Rondi et al. (1993) on a sample of non-financial firms, although not explicitly referred to the

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2 A comprehensive survey of arguments for and against such connection is presented by Goodhart and Schoenmaker (1992).

role of credit in the transmission process, points to the existence of asymmetries in the transmission process that could, inter alia, be related to the lending behavior of the banking system.

In this paper we look at the Italian case from a different angle, looking at the response of selected bank groups to monetary shocks in the period 1987-1993. After recalling some features of the Italian financial markets that are likely to enhance the role of banks in the transmission process (par. 2), we introduce two classifications of banks (par. 3): large vs. small-size (A1 vs. A2 groups); and large vs. small-average-loan-size (B1 vs. B2). The first criterion is best suited for identifying bank balance sheet characteristics, such as those stressed by KS, that are likely to make the loan supply responsive to monetary shocks; the second is interesting because it moves one step forward towards a classification based on the size of the borrower (loan-size and borrower-size are indeed positively correlated, as we shall see). As explained in par. 2, we concentrate the analysis on bank lending rates rather than focusing, as other authors have done, on the balance sheet components; we do this in order to minimize the impact of structural instabilities that occurred in the financial markets during our sample period. We find (par. 4) that the basic condition for the existence of a credit channel of monetary transmission -- namely, that loan rates rise more than bond market rates after a monetary contraction -- is met in the aggregate and across all our bank groups. However, contrary to theory and observed experience in other countries, the rates offered by large banks (and by large-loan banks) rise more than those of other banks; large borrowers thus experience a stronger impact of monetary contractions than small ones, at least as far as price conditions are concerned. We present evidence supporting the view that this heterogeneous response depends on structural features of the loan market. Specifically, A2 and

B2 banks tend to lend in areas characterized by a higher market concentration, which could increase their monopoly power, and, especially, to have closer relationships with their customers: both factors are likely to slow down the response of lending rates to money market conditions. In the concluding section (par. 5) we argue that our results, although contrary to those found in the literature, are consistent with the credit view and we discuss some suggestions for future research.

2. Relevance of the credit view in the Italian financial structure

Unlike the "money view" of the transmission process, which stresses the imperfect substitutability between money and bonds and the role of the term structure of interest rates (Hicks, 1937; Modigliani, 1944), assuming implicitly that bank credit and securities are completely interchangeable, the credit view stresses the imperfect substitutability of alternative forms of financing for non-financial borrowers and puts the bank loan supply at the center of the monetary transmission process. As recently clarified by Kashyap and Stein (1993), several "building blocks" must simultaneously be present for the lending channel to operate.

First, monetary policy must be able to affect the total volume of bank intermediation. If reserve requirements are uniformly imposed on all deposit liabilities, the supply of base money by the central bank sets a limit to the volume of bank intermediation. Even if some deposits are exempt from reserve requirements or subject to lower compulsory ratios, banks may be unable or unwilling to offset changes in the supply of base money by modifying their liability composition. Several features of the money market -- such as compulsory ratios, the remuneration of reserves, the tax treatment of bank deposits, the existence of an active secondary market

for CDs, and the structure of the payment system -- are relevant in this context if they affect the elasticity of money demand to changes in the general level of interest rates.

A second crucial element to be considered is the link between the banks' total volume of intermediation and the supply of credit. According to the standard theory of the banking firm (Baltensperger, 1980; Tobin, 1982), the portfolio allocation problem of commercial banks focuses on the distinction between two asset categories: "loans", non-marketable assets whose amount is not controlled by the bank in the short run, and "defensive assets", i.e. lower yielding paper which can be liquidated at low cost if the need arises. A profit maximizing bank operating under uncertainty chooses its balance sheet structure knowing that deposit shortfalls exceeding the available amount of defensive assets will have to be financed by recourse to the central bank, at penalty cost. In this framework, monetary shocks affect the supply of loans through bank deposits: a (say) positive shock on deposits increases the supply of loans, because it reduces the marginal value of the liquidity services provided by defensive assets. The intensity of this effect depends on a number of elements: the uncertainty of deposit flows; the availability of secondary markets for securities and interbank funds; the willingness of the central bank to refinance the system. Other elements, including the tax treatment of alternative assets, credit and market risk, may also, for other reasons, influence the banks' preferred asset composition.

Thirdly, the relevance of the lending channel hinges crucially on the "uniqueness" of banks as providers of funds for a significant number of borrowers (firms and/or households). This requires either that alternative sources of financing (private bond and stock markets; international credit markets; commercial paper for firms; liquid assets for households) be not readily available, or that their substitutabil-

ity with bank loans be limited, perhaps due to the lack of publicly available information on individual borrowers. In these circumstances, as pointed out by Kashyap and Stein (1993), a credit squeeze may originate indifferently from quantity rationing or from an increase in lending rates; in either case, the borrowers' spending behavior will be affected.

The practical relevance of each of these three "buildings blocks" depends on country-specific institutional features and can only be determined on empirical grounds. A quick look at Italy's financial market structures and recent monetary history reveals, however, that all three are likely to be present.

First, empirical research has repeatedly shown the existence in Italy of a stable, interest elastic demand for money and, specifically, for bank deposits (see Angelini et al., 1994 for recent estimates). Bank liability instruments (sight and time deposits; certificates of deposit) compete mainly with short term Treasury bills and to some extent with medium to long term Treasury bonds, with fixed and floating coupons. Banks set their own deposit rates freely, following market conditions and taking into account demand elasticities, lending opportunities, tax considerations, etc. The limited strength of competitive forces in the deposit market[3] tends to reduce both the speed and the overall magnitude of the response of deposit rates to changes in money market rates; therefore, monetary policy tends to have a relatively strong control over the opportunity cost of bank funds, as measured by the differential between the returns on deposits

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[3] Foreign banks have so far been discouraged from entering the Italian retail deposit market by the heavy tax and reserve burdens applied to bank intermediation. In more recent years, particularly after the liberalization of bank branching, competition in the deposit market intensified; however, the properties of money demand were not substantially altered.

and on alternative assets. The observed relationship between the velocity of circulation of monetary aggregates and their opportunity costs (Fig. 1) is due also to two additional factors: first, the low cross-border and cross-currency mobility of deposits, due until 1990 to the presence of exchange controls and after 1992 to the very high volatility of the exchange rate; second, the high tax and reserve burdens applied to CDs[4] and the lack of a secondary market for these instruments, which have limited the possibility for banks to circumvent monetary restrictions by engineering shifts between deposits and CDs on their liability side.

Regarding the second "building block", several developments suggest that the relationship between deposits and the supply of loans may have become stronger in recent years[5]. After the removal of credit ceilings in 1983, competition among banks for market shares resulted in a steady increase in the share of loans in total bank assets, and a corresponding decline in Treasury bills and bonds. As a ratio to total assets, loans rose from 31.5 percent in 1983 to 46.5 in 1991, and Government securities fell from 31.7 to 16.6 percent. A new equilibrium in asset composition may have been reached after 1991, when the securities/assets ratio reached a historic low and there was a contraction in credit lines made available by banks to their clients. All these elements indicate that banks have gradually strengthened their control over the supply of credit and that this supply has become more dependent on their fund-raising ability. A generalized increase in the speed of adjustment of lending rates to money

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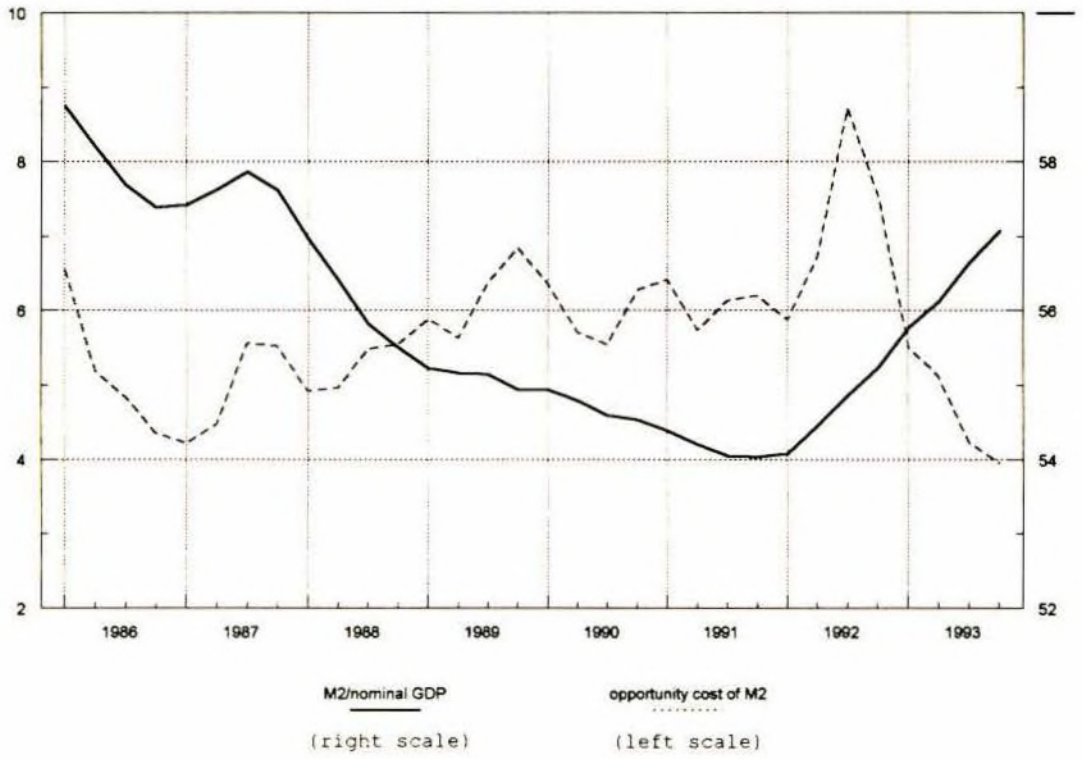
4 Until 1993, CDs were subject to the same reserve ratios as regular deposits, with the only advantage of a higher remuneration of reserves. Subsequently, CDs with an original maturity of 18 months or more have gradually been exempted from reserve obligations.

5 Buttiglione and Ferri (1994).

Fig. 1

VELOCITY OF CIRCULATION AND OPPORTUNITY COST OF M2



market conditions has been the result (Cottarelli, Ferri and Generale, 1995).

Finally, there is evidence confirming the limited substitutability between intermediated credit and market financing for private, non financial borrowers. Bank financing accounts for nearly all debt raised by firms, with the exclusion of shares. The absence of active secondary markets for commercial paper and private bonds explains the overwhelming role of banks in channeling funds to the private sector and precludes important alternative sources of finance when bank loans tend to dry up (Kashyap et al., 1993). Shares, despite being the largest component of firms' liabilities (43.9 percent in 1993) cannot represent a viable alternative to bank funds in the short run for several reasons: first, listing in the stock market is still limited and tax regulations tend to encourage debt as opposed to equity financing; second, the cyclical behavior of stock market prices does not encourage equity issues in periods of tight monetary policy. Overall, the main alternative to bank credit for firms is often provided by the availability of internal funds, in the form of a drawdown of liquid assets; even this channel, however, has been reduced in recent years, as the degree of liquidity of non financial firms has dropped sharply.

In view of these elements, it is not surprising that the limited econometric evidence collected so far tends to support the view that Italian banks play a role in the transmission of monetary policy. The existing structural econometric models (e.g. Banca d'Italia, 1986) assume imperfect substitutability between credit and other sources of financing and are consistent with the view that bank lending rates provide a key link in the transmission process. More recently, Buttiglione and Ferri (1994) have estimated a 6 variable VAR including short and long term interest rates, loans granted, loans used, the lending rate, and industrial production.

Shocks in the short term rate (identified as shocks in monetary policy) are found to affect the lending rate, which tends to overreact, and to induce a restriction in the amount of credit granted and in industrial production. Credit used ("demand") seems to respond largely to credit granted ("supply"), while the converse is not true. The authors interpret these findings as evidence in favor of the credit channel.

On the micro-economic side, the impact of monetary policy on individual non-financial firms has been studied by Rondi et al. (1993), using a cross-section sample over the period 1968-1991. They find evidence that, after monetary tightening, small firms experience larger drops in sales and inventories and in bank and trade debt than large-firms; they interpret this as an indication of the existence of stronger informational asymmetries and capital market imperfections for small borrowers. These results are consistent with the credit view but also admit other interpretations, not necessarily related to the behavior of banks or the nature of the transmission process. The "identification problem" reappears: asymmetries may derive from differentiated credit policies followed by banks according to the size and riskiness of their clients, or alternatively from a different sensitivity of borrowers to cyclical conditions, which in turn is reflected in their demand for credit. An analysis more directly focused on the behavior of banks may clarify the issue.

3. Definition of bank groups

Micro data on individual banks' balance sheet items and interest rates on selected categories of deposits and loans could be used for an explicit panel estimation of the impact of monetary policy shocks, capable of explaining what factors make this impact differ across heterogeneous banks. In light

of the complexities involved in accounting for all aspects of individual behavior and of the lack of previous empirical work on the subject, we have decided to base our analysis on groups of banks, selected according to features which are relevant in the context of the credit view.

In assembling our sample, we have chosen to work with the sub-category of Italian banks operating in the short term (i. e. commercial banks), thus excluding the so-called Special Credit Institutions (long term credit banks)[6]. For all our sample period, these two classes of banks were subject to different supervisory regulations regarding the maturity range of their assets and liabilities and have differed widely in their balance sheet structures, fund raising and investment policies, compulsory reserve regulations and so on. Even after the introduction of the EU Second Banking Directive in 1994, which removed all regulatory distinctions, many of these discriminations de facto persisted and remain relevant today. Short term banks normally finance themselves by issuing deposits and short term CDs, generally subject to reserve requirements, and use funds mostly to grant short term loans and to invest in Treasury bills and long term bonds. Special Credit Institutions issue long term CDs and bonds, exempt from reserve requirement, and specialize in long-term credit. The exclusion of this category from the sample is suggested by at least two considerations: first, the exemption from reserve requirements removes one of the basic conditions for the working of the lending channel, i.e. the link with central bank money; second, the loans granted by the Institutions are normally directed towards larger clients and entail stronger collateral, which implies that informational asymmetries are likely to be less relevant than in the case of commercial banks.

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6 More details on this distinction are provided in the Annual Report of the Banca d'Italia for 1993.

There are many types of bank groups that it would be interesting to investigate, each of which emphasizes different bank characteristics and has specific implications for monetary policy. Focusing on the subject of our study, we chose to start with the following two:

a) Large vs. small banks (groups A1 and A2). The two groups include, respectively, the 15 largest and 25 smallest banks, measured by the total size of their loan portfolio. The interest of this classification derives from KS argument that the size of a bank affects its ability to substitute alternative sources of finance and neutralize the impact of monetary restrictions.

b) Large vs. small average loan banks (groups B1 and B2). The groups include the 15 largest and 25 smallest banks, classified by the average size of their loans. The interest of this classification is twofold. First, it tends to approximate a classification based on the dimension of the borrowers, since loan size and borrower size are positively correlated (see below). Second, B1 and B2 banks are characterized by different market structures; large banks' borrowers normally entertain simultaneous credit relationships with a large number of counterparts, a factor which tends to weaken customer relationships and strengthen bank competition. Conversely, small borrowers have closer ties with their banks and competition on credit terms tends to be weaker. The existence of these two segments of the Italian credit market was recently noted by Padoa-Schioppa (1994), who emphasized the contrast between banks that are large in absolute terms but small in their own market (i.e., in relation to their clients) and banks for which the opposite is true.

The degree of overlapping among the groups (A1 vs. B1 and A2 vs. B2) is shown in Tables 1 and 2. The overlapping

Table 1

BANK GROUPS BY SIZE AND AVERAGE LOAN SIZE

A1: Large bank size

Bank [1]	Deposit market share	Loan market share
1	6.6	6.3
4	4.2	6.2
5	4.2	5.2
7	3.6	5.2
2	5.2	5,1
3	4.4	4
6	4.2	3.2
8	2.8	3.1
9	2.6	2.8
13	1.8	2
10	2	1.9
14	1.8	1.9
12	1.9	1.8
11	2	1.6
15	1.7	1.5
Total	49.0	51.7

B1: Large loan size

Bank [1]	Deposit market share	Loan market share
1	6.6	6.3
4	4.2	6.2
5	4,2	5.2
7	3.6	5.2
3	4.4	4
13	1.8	2
15	1.7	1.5
17	1.1	1.4
24	0.5	0.7
22	0.6	0.6
25	0.5	0.6
23	0.6	0.5
26	0.3	0.4
27	0.3	0.3
28	0.3	0.3
	30.8	35.2

A1: Small bank size

Bank [1]	Deposit market share	Loan marke share
33	0.3	0.3
38	0.3	0.3
39	0.3	0.3
37	0.3	0.3
36	0.3	0.3
34	0.3	0.2
46	0.3	0.2
41	0.3	0.2
42	0.3	0.2
40	0.3	0.2
48	0.2	0.2
44	0.2	0.2
45	0.2	0.2
51	0.2	0.2
43	0.2	0.2
47	0.2	0.1
50	0.2	0.1
49	0.2	0.1
53	0.2	0.1
52	0.2	0.1
35	0.2	0.1
57	0.1	0.1
54	0.1	0.1
56	0.1	0.1
55	0.1	0.1
Total	5.6	4.5

B2: Small loan size

Bank [1]	Deposit market share	Loan market share
12	1.9	1.8
16	1.7	1.3
18	1	1
20	0.7	0.7
21	0.7	0.7
19	0.8	0.5
29	0.3	0.4
33	0.3	0.3
38	0.3	0.3
32	0.3	0.3
46	0.3	0.2
41	0.3	0.2
30	0.3	0.2
42	0.3	0.2
48	0.2	0.2
44	0.2	0.2
45	0.2	0.2
31	0.2	0.2
47	0.2	0.1
50	0.2	0.1
49	0.2	0.1
53	0.2	0.1
52	0.2	0.1
57	0.1	0.1
54	0.1	0.1
	11.2	9.7

1 Banks in the sample are ranked from 1 to 57, in descending deposit market share order.

Table 2

OVERLAPPING BETWEEN BANK GROUPS A1-A2 AND B1-B2 [1]

	Bank size		Loan size	
	A1: large (15 banks)	**A2: small (25 banks)**	**B1: large (15 banks)**	**B2: small (25 banks)**
A1	15 (51.7; 49.0)	0	7 (30.4; 26.5)	1 (1.8; 1.9)
A2	-	25 (4.5; 5.6)	0	14 (2.3; 3.1)
B1	-	-	15 (35.2; 30.8)	0
B2	-	-	-	25 (9.7; 11.2)

1 Number of banks included in both groups and market shares in the loan and deposit market, respectively.

between the two classifications is significant, but not exceedingly large: in particular, 7 out of 15 (with a loan market share of 30.4 percent against 51.7 for the total) belong to both A1 and B1, and 14 out of 25 (with a market share of 2.3 out of 9.7) belong to both A2 and B2. A low degree of overlapping is a desirable feature of the data because it makes it possible to discriminate hypotheses that distinguish A1-A2 from B1-B2.

Information on borrowers' characteristics is provided by the "Centrale dei Bilanci" (Company Accounts Data Service), a yearly survey which covers about 5 percent of the total number of borrowers (28 percent in terms of value added). We used these data to get rough indications of the relationship between our bank groups and the size of their clients, measured by the volume of their total annual sales. The data are shown in Table 3, from which two indications emerge. First, there is a significant difference between B1 and B2 in relation to the customers' gross sales, which confirms that there is a relationship between the loan size and the dimension of the borrower. Secondly, comparing A1- A2 with B1 - B2, we notice that, on average over the seven year period considered, the difference is more significant in relation to the second classification, owing to the fact that group A2 shows a much higher standard deviation than group B2; thus the latter classification provides a closer approximation of the size of the client.

4. The impact of monetary policy across heterogeneous banks; results and interpretation

The behavior of different bank groups could alternatively be measured by the response to monetary shocks of either the outstanding quantity or the cost of bank loans. Both approaches have been followed in the literature and can be

Table 3

AVERAGE DIMENSION OF THE BORROWER FOR BANK GROUPS A1-A2 AND B1-B2 [1]

(billion lire)

	1986	1987	1988	1989	1990	1991	1992	Mean
Group A1:								
Mean	586	640	333	326	260	367	386	**414**
St. deviation	248	352	164	109	82	143	128	**132**
Max.	1266	1660	874	590	381	656	737	**791**
Min.	350	234	187	182	106	167	204	**251**
Group A2:								
Mean	199	157	145	180	147	170	170	**167**
St. deviation	377	220	149	194	135	151	148	**167**
Max.	1543	869	566	816	525	609	568	**667**
Min.	19	16	16	11	15	18	23	**23**
t test A1≠A2 [2]	3.52	5.29	3.69	2.67	2.90	4.05	4.66	**4.85**
Group B1:								
Mean	375	389	261	238	216	316	308	**300**
St. deviation	241	285	140	118	104	168	180	**153**
Max.	789	808	495	437	381	656	737	**566**
Min.	32	42	30	59	47	53	60	**47**
Group B2:								
Mean	113	104	110	125	112	135	132	**119**
St. deviation	109	73	69	75	83	93	94	**65**
Max.	512	270	275	286	314	375	429	**251**
Min.	19	16	16	11	13	18	23	**23**
t test B1≠B2 [2]	4,72	4,77	4,53	3,71	3,5	4,4	4,07	**5,22**

1 Source: Centrale dei Rischi (Central Credit Register) and Centrale dei Bilanci (Company Accounts Data Service). Only private firms are included. The figures are computed as weighed avareges.- 2 Test t for the difference between the two means. H° always accepted at the 1 percent.

shown to be equivalent if the demand for credit remains constant across monetary policy cycles; in that case, no identification problem arises and changes in the loan quantities and rates can unambiguously be attributed to shifts in the supply side. Unfortunately, this assumption cannot safely be made; if monetary restriction affects the business sector though a variety of channels (e.g. financial market rates; exchange rate; expectations), an inward shift in the demand for credit is likely to occur, and a loan contraction ceases to be unambiguously related to the working of the credit channel.

In addition, elements specific to the Italian credit market suggest that the use of quantity variables may be ill-suited to our analysis. Several factors have contributed, in the last decade, to destabilize both the supply and demand sides of the loan market, resulting in large changes in the growth rates of outstanding credit (Fig. 2). Structural changes following the removal of the credit ceiling in 1983 stimulated bank competition and resulted, in the aggregate, in an outward expansion of the loan supply unrelated to the business cycle or to the stance of monetary policy. The liberalization of international capital movements and the growing use of bank credit for arbitrage transactions in the second part of the 1980s[7] produced a corresponding expansion in demand. In the early 1990s, an increase in the perceived riskiness of loans and the cyclical downturn produced an analogous shift in the opposite direction. Overall, the presence in our sample period of <u>both</u> demand <u>and</u> supply shifts, large in size and positively correlated, strongly advise against using aggregate time series data to test theories concerning the existence of a credit channel. This is confirmed by the results of cointegration and causality tests conducted on the quantity of loans and a selected number of

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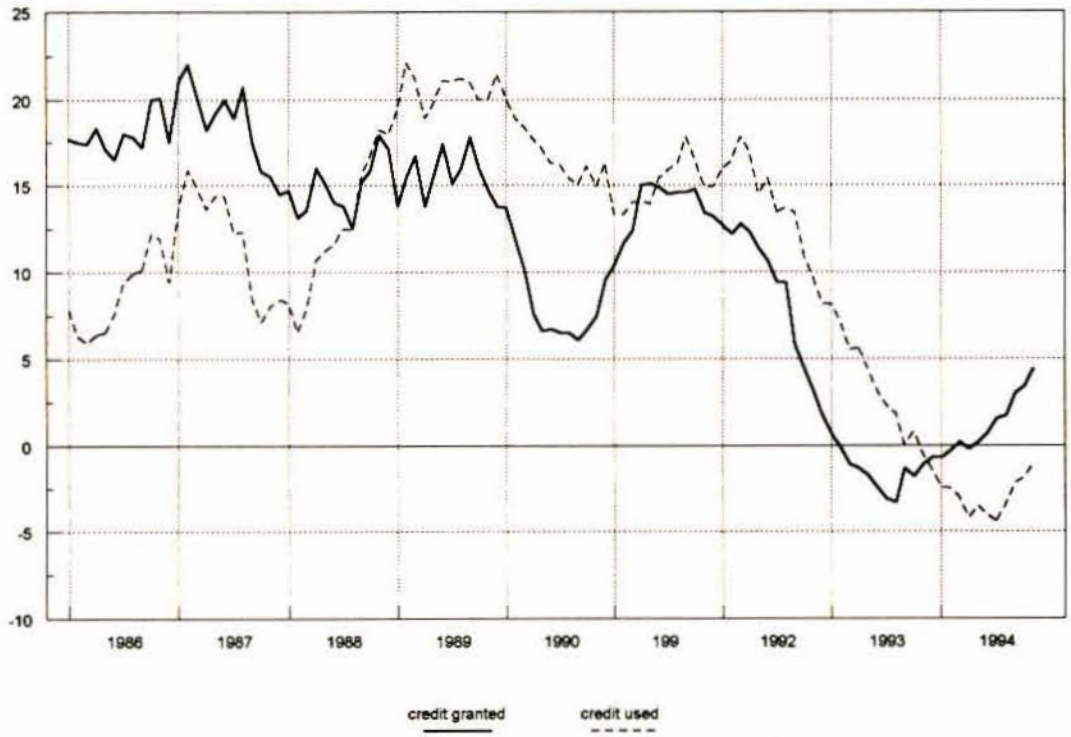
7 See Angeloni (1994).

Fig. 2

CREDIT GRANTED AND CREDIT USED
(twelve-month growth rates)



real and monetary indicators. The results shown in Table 4 indicate that the hypothesis of cointegration is rejected, for all bank groups, over the 1987-1993 period; this may suggest that standard loan demand and supply functions were not stable over that period. The results for loans are in sharp contrast to those for deposits, for which a cointegration relation with similar variables does indeed exist (third row in the top part of Table 4).

The lack of cointegration does not preclude Granger-causality tests on the first differences of the variables; this is the approach chosen by KS, who test the effect of different variables representing a monetary shock (Federal Funds rate or total bank deposits) on the quantity of loans. The results are shown in the bottom part of Table 4, in which the log-difference of loans is regressed on the 3-month interbank rate or on total deposits, for each of the two groups (controlling for prices and GNP). The results confirm that no significant effect of either total deposits or short-term rates on total loans can be identified for either of the two bank groups.

An analysis focusing on bank interest rates promises to be more fruitful. Figure 3 shows the spread between the lending rates charged by A1 vs. A2 banks (upper part) and by B1 vs. B2 banks (lower part), together with the average lending rate for the whole system and the rate on three month interbank deposits.[8] The interest rate differential between

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8 The three month interbank rate was used as proxy for the monetary policy stance. The choice of this variable, instead of one more directly controlled by the central bank (like the tender rate on repurchase operations or an index of money market liquidity), was suggested by the change in the central bank operating procedures occurred in 1990, with the introduction of a a computation system for bank reserve requirements based on monthly averages; the interpretation of all liquidity measures and of short term interest rates with a maturity lower

Table 4

COINTEGRATION AND GRANGER-CAUSALITY TESTS

(a) Cointegration [1]

	Bank groups:	A 1	A 2	B 1	B 2
Dep. variables:	**Regressors:**				
Loans	Lending rates, others [2]	-1.92	-1.97	-1.66	-2.08
Loans	Lending rates, deposits, others[2]	-1.92	-2.47	-1.91	-2.10
Deposits	Deposit rates, others [3]	-4.14**	-3.00*	-4.35**	-3.33**

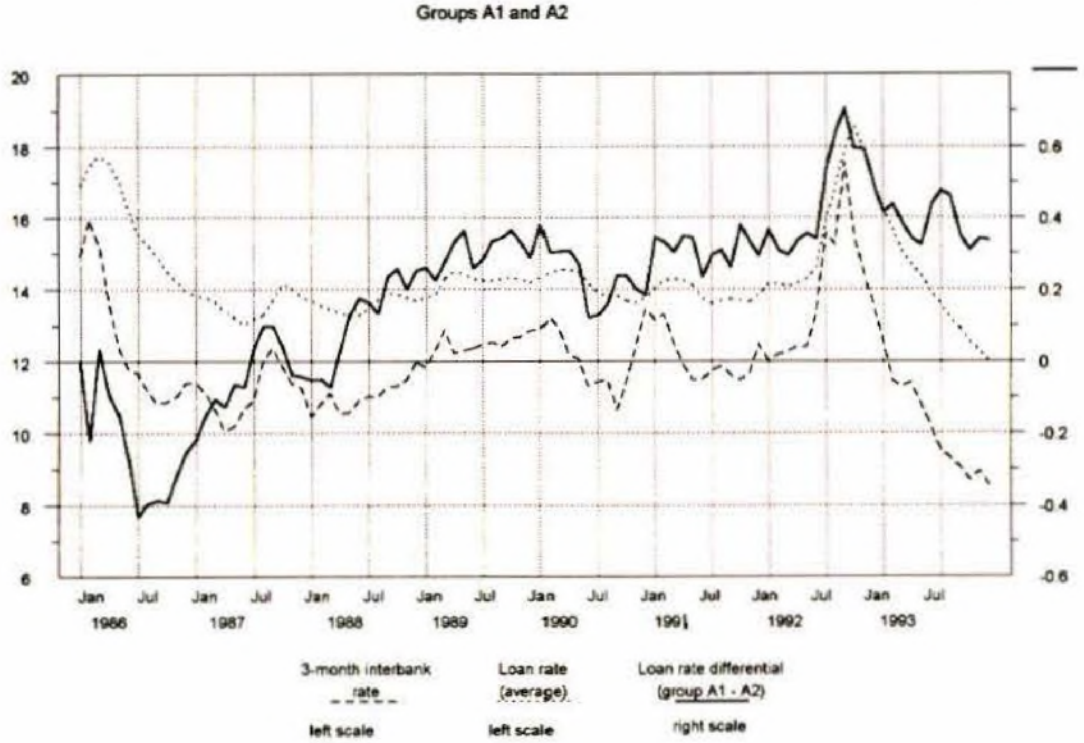
(b) Granger-causality [3]

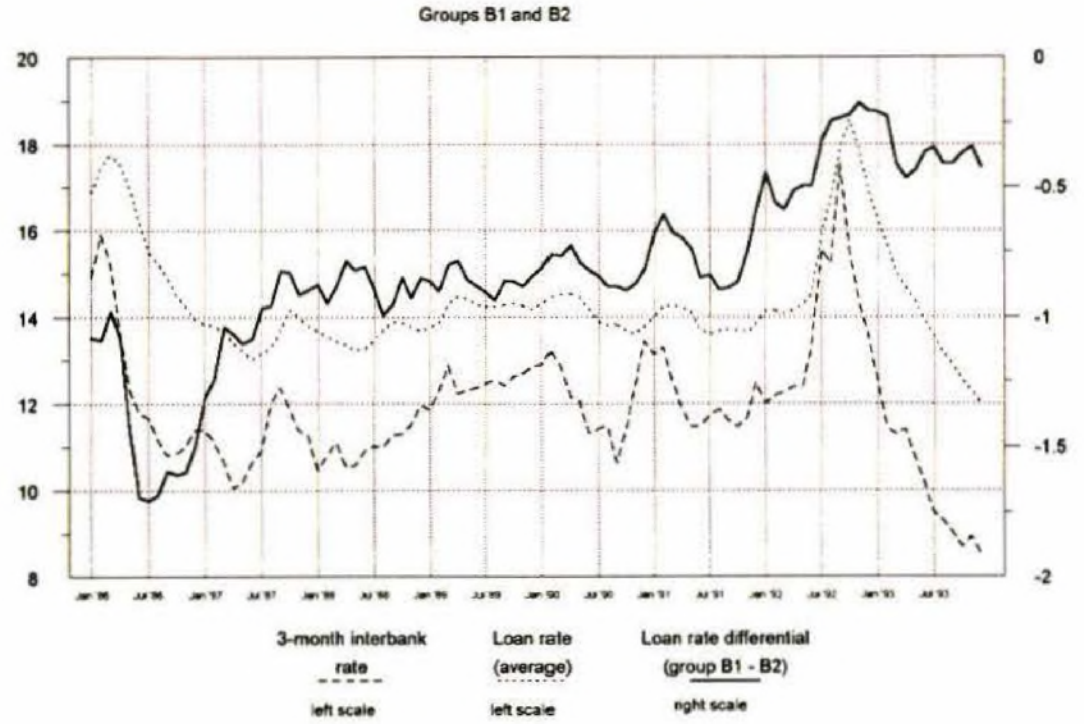
	Bank groups:	A 1	A 2	B 1	B 2
Dependent variables:	**Independent variables:**				
Loans	Interbank rate	1.35	0.65	0.08	0.30
Loans	Deposits	2.78	0.48	2.58	0.58

Sample period: 1986-1993 (monthly data). All variables in logs and seasonally adjusted, except interest rates.
1) Engle-Granger tests; * and ** mean that the null hypothesis (no cointegration) is rejected at 5 or 1 percent. - 2) Other variables: GDP; industrial production; consumer prices; Treasury bill rates. - 3) F. tests of significance of independent variable in regression of dependent variable on itself, the independent variable and consumer prices (log-differences; 2 lags).

Fig. 3

LENDING RATE SPREADS, AVERAGE LENDING RATE AND THREE-MONTH INTERBANK RATE





groups B1 and B2 is always negative, both for loans and deposits; for groups A1 and A2 it alternates in sign throughout the period. The graphic evidence seems to suggest a positive correlation in both cases between the spreads and the levels, implying that banks belonging to the A1 and B1 groups increase lending rates more than the others in periods of tight money. A similar pattern seems to emerge for deposit rates (Fig. 4); A1 and B1 banks tend to raise their deposit rates more when the general level of interest rates rises.

In order to measure the dynamic response of bank interest rates in a more systematic way, we estimated a VAR system on monthly data, separately for groups A and B, including the following variables:

RIB: three month interbank rate;
RBTP: average yield on Government fixed-coupon bonds;
RD.A1: average rate on deposits (sight and time deposits and CDs) for group A1;
RL.A1: average rate on loans for group A1;
RD.A2: as RD.A1 for group A2;
RL.A2: as RL.A1 for group A2.

The VARs were estimated over the 1987:1 - 1993:12 sample. The lag length (two lags included) was chosen for each of the two VARs through an Akaike information criterion; the unrestricted estimation produced residuals with satisfactory properties.[9] Standard tests indicate that all our interest

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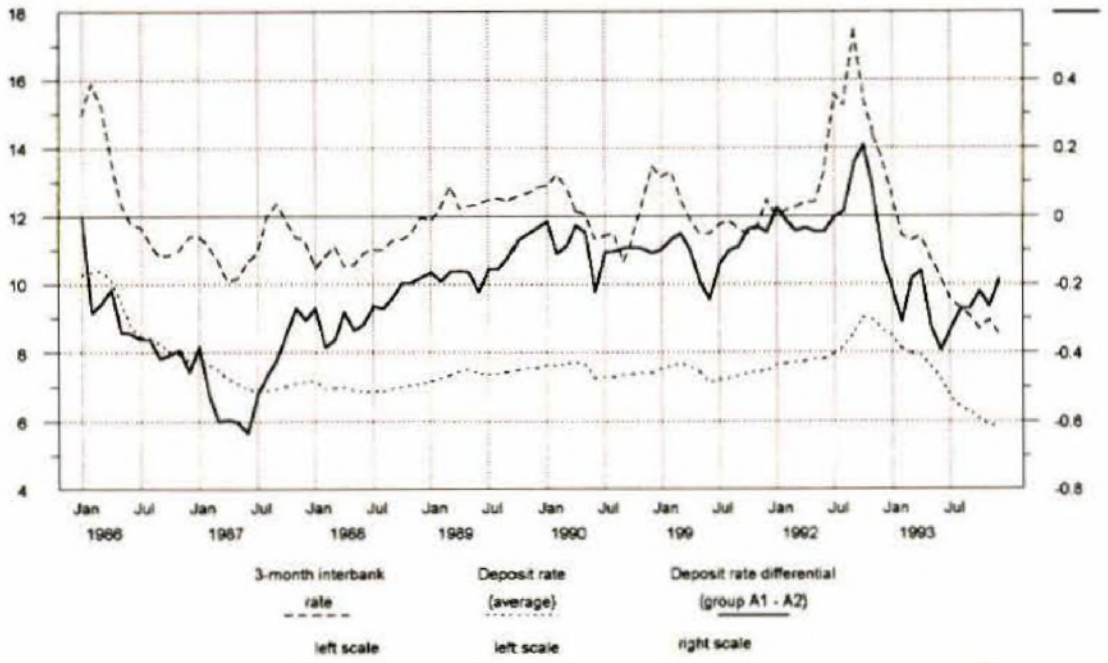
than a month was significantly altered by this reform (see Angeloni and Prati, 1993).

9 The LM tests showed no sign of autocorrelation. All the equations' residuals passed the Jarque-Bera normality test, with a few exceptions due to well-identified outliers: the deposit rates in June, 1990, due to the asymmetric response to the discount rate decrease; and the interbank rates in June and September 1992, due to the monetary restriction during the currency crisis.

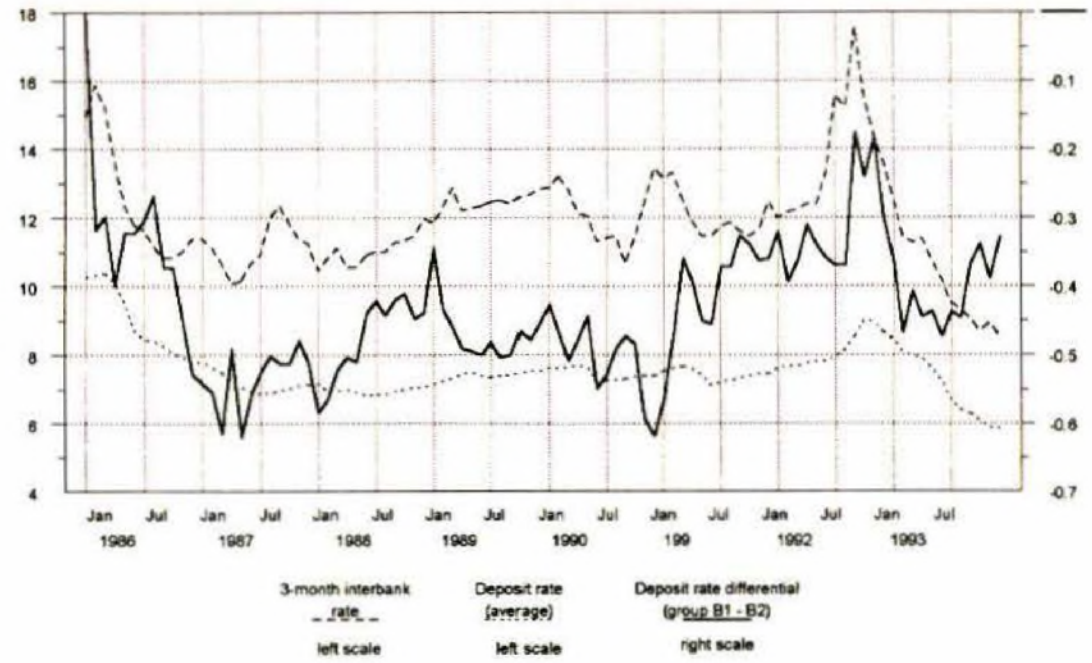
Fig. 4

DEPOSIT RATE SPREADS, AVERAGE DEPOSIT RATE AND THREE-MONTH INTERBANK RATE

Groups A1 and A2



Groups B1 and B2



rate variables have a unit root (Table 5a), including the differentials between lending and deposit rates between the two groups. Johanssen tests, estimated alternatively with the classification A and B, indicate the existence of cointegrating vectors among them; unfortunately, the number of vectors is rather unstable over our sample, varying over time between 3 and 5 (as Fig. 5 shows; Table 5b reports the tests for the whole sample period[10]). Some instability in identifying a long-term relationship could be attributed to the limited length of the sample period in relation to the very low adjustment speed of lending and deposit rates. In any case, in Table 5c we assumed 5 cointegrating vectors, thus letting only 1 long-run exogenous factor drive the entire structure of interest rates.[11] The imposition of a few restrictions was necessary to obtain economically meaningful long-run relations. For both groups, homogeneity of degree 1 between RIB and RBTP was tested and imposed; a zero intercept was also tested and imposed on deposit rate equations. The long run elasticity of deposit rates to RIB is significantly less than one. A long-run elasticity of lending rates to RIB equal to one was not rejected and was imposed on the data[12].

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10 The stability of the cointegration rank was checked with a recursive estimation. The cointegration rank decreases after 1991, when large swings in all rates were determined by the monetary restriction of 1992 and the subsequent easing in 1993.

11 On theoretical grounds, this assumption is consistent with the view that, in the long run, the entire structure of interest rates responds to changes in real interest rates and the rate of inflation. Empirically, this seems to be confirmed by the good fit obtained by one-factor Cox, Ingersoll and Ross models in interpolating the yield curve.

12 Even with a long-run elasticity equal to one, a credit channel still exists if the interim response of the spread between the lending and the bond rates is positive.

Table 5a

UNIT ROOT TESTS ON INTEREST RATES

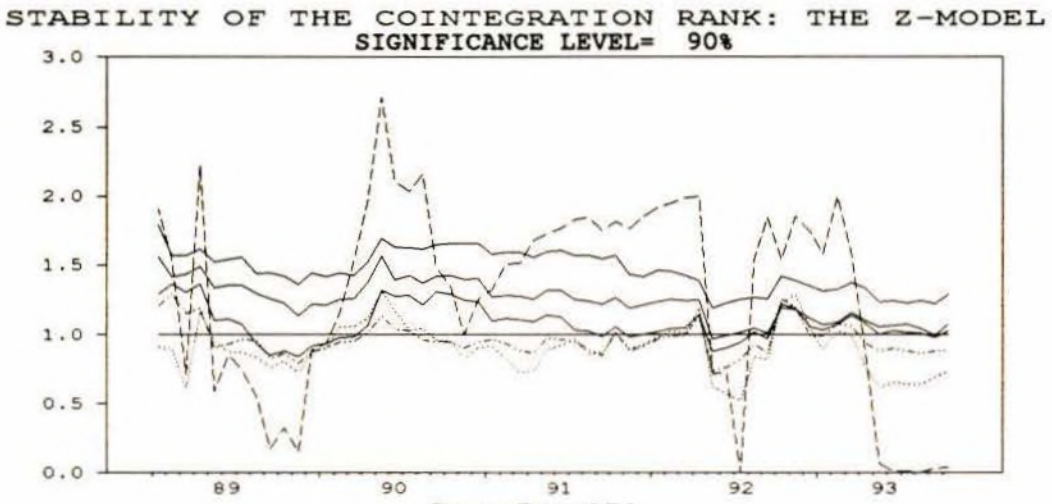
	Augmented DF test [1]			
Variables:				
Three-month rate (RIB)	-2.72			
Bond rate (RBTP)	-1.31			
	Groups:			
	A1	A2	B1	B2
Lending rate	-2.63	-2.59	-2.59	-2.56
Deposit rate	-2.22	-2.61	-2.25	-2.76
	Spreads:			
	Spread A1-A2		Spread B1-B2	
Lending rate	-2.42		-1.34	
Deposit rate	-2.72		-2.76	

1 Test performed with 2 lags. No test significant at 5 percent level.

Fig. 5

STABILITY OF COINTEGRATION RANK

Groups A1 and A2



Groups B1 and B2

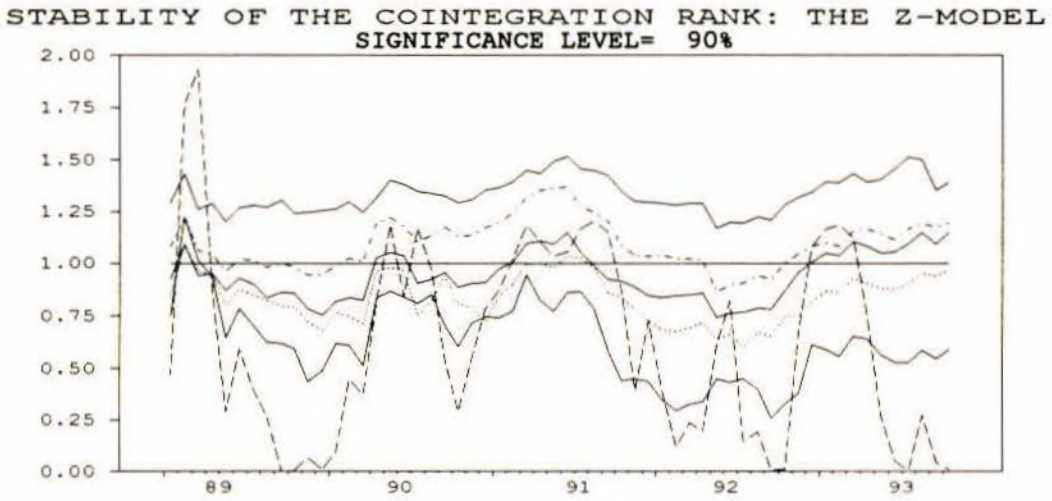


Table 5b

JOHANSSEN COINTEGRATION TESTS AMONG INTEREST RATES[1]

Groups A1 and A2

TESTS FOR r

NOTE: THE HYPOTHESIS IS ACCEPTED WHEN CALC. VALUE < TAB. VALUE

LAMBDA MAX TESTS:

r	Const.	Trend	Statistic	50%	80%	90%	95%	97.5%	99%
0	res.	0	46.07	29.08	34.25	37.45	40.30	43.22	46.82
1	res.	0	25.28	23.78	28.76	31.66	34.40	36.90	39.79
2	res.	0	21.54	18.70	22.95	25.56	28.14	30.32	33.24
3	res.	0	14.51	13.47	17.40	19.77	22.00	24.07	26.81
4	res.	0	10.01	8.27	11.54	13.75	15.67	17.63	20.20
5	res.	0	1.25	3.40	5.91	7.52	9.24	10.80	12.97

TRACE TESTS:

r	Const.	Trend	Statistic	50%	80%	90%	95%	97.5%	99%
0	res.	0	118.66	81.90	91.57	97.18	102.14	106.74	111.01
1	res.	0	72.59	58.46	66.91	71.86	76.07	80.06	84.45
2	res.	0	47.32	38.84	45.65	49.65	53.12	56.06	60.16
3	res.	0	25.78	23.28	28.75	32.00	34.91	37.61	41.07
4	res.	0	11.26	11.25	15.25	17.85	19.96	22.05	24.60
5	res.	0	1.25	3.40	5.91	7.52	9.24	10.80	12.97

Groups B1 and B2

TESTS FOR r

NOTE: THE HYPOTHESIS IS ACCEPTED WHEN CALC. VALUE < TAB. VALUE

LAMBDA MAX TESTS:

r	Const.	Trend	Statistic	50%	80%	90%	95%	97.5%	99%
0	res.	0	47.38	29.08	34.25	37.45	40.30	43.22	46.82
1	res.	0	27.41	23.78	28.76	31.66	34.40	36.90	39.79
2	res.	0	24.76	18.70	22.95	25.56	28.14	30.32	33.24
3	res.	0	18.16	13.47	17.40	19.77	22.00	24.07	26.81
4	res.	0	7.88	8.27	11.54	13.75	15.67	17.63	20.20
5	res.	0	2.25	3.40	5.91	7.52	9.24	10.80	12.97

TRACE TESTS:

r	Const.	Trend	Statistic	50%	80%	90%	95%	97.5%	99%
0	res.	0	127.84	81.90	91.57	97.18	102.14	106.74	111.01
1	res.	0	80.46	58.46	66.91	71.86	76.07	80.06	84.45
2	res.	0	53.05	38.84	45.65	49.65	53.12	56.06	60.16
3	res.	0	28.28	23.28	28.75	32.00	34.91	37.61	41.07
4	res.	0	10.13	11.25	15.25	17.85	19.96	22.05	24.60
5	res.	0	2.25	3.40	5.91	7.52	9.24	10.80	12.97

1. Test performed on a 6-variable VAR, including RIB, RBTP, two lending rates and two deposit rates, with two lags (1987:1-1993:12).

Table 5c

ESTIMATED COINTEGRATION VECTORS

Groups A1-A2

RESTRICTED COINTEGRATION VECTORS:

RBTP	=	**0,7+ 1,0 RIB**
		(3,3) (res.)
RD.A1	=	**0,0 + 0,63 RIB**
		(res) (129,2)
RD.A2	=	**0,0 + 0,64 RIB**
		(res) (100.2)
RL.A1	=	**2.4 + 1.0 RIB**
		(19.2) (res.)
RL.A2	=	**2.1 + 1.0 RIB**
		(17.1) (res.)

CHI SQUARE TEST : 7.72274
SIGNIFICANCE LEVEL : 0.17219

Groups B1-B2

RESTRICTED COINTEGRATION VECTORS:

RBTP	=	**0,8+ 1,0 RIB**
		(3.7) (res.)
RD.B1	=	**0.0 + 0,62 RIB**
		(res.) (123.9)
RD.B2	=	**0.0 + 0,66 RIB**
		(res.) (113,0)
RL.B1	=	**2.0 + 1.0 RIB**
		(12.4) (res.)
RL.B2	=	**2.7 + 1.0 RIB**
		(22.6) (res.)

CHI SQUARE TEST : 10.31842
SIGNIFICANCE LEVEL : 0.06670

VARs with 2 lags, over 1987:1-1993:12.

In order to separate the aggregate from the sectoral implications of the VAR, we renormalize the impulse-response functions using the following linear transformation of the system:

```
RD.AM = (RD.A1 + RD.A2)/2 (average deposit rate);
RD.AD  = RD.A1- RD.A2     (deposit rate spread A1-A2);
RL.AM = (RL.A1 + RL.A2)/2 (average lending rate);
RL.AD  = RL.A1- RL.A2     (lending rate spread A1-A2);
RL.BTP = RL.AM - RBTP     (loan - BTP spread),
```

and equivalently for B. The transformed system is equivalent to the initial one but separates the impact of shocks on the banking system's average lending rate from that on the spreads between the groups, as well as on the loan - BTP spread.

In order to identify the VAR and compute the impulse-response functions, we introduced the customary assumption of orthogonal structural disturbances and a triangular matrix of simultaneous effects,[13] in the following order: RIB, RBTP, RD.AM, RD.AD, RL.BTP, RL.AD (and similarly for B). This ordering hinges on the following assumptions:

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13 Full orthogonalization, although sufficient, is not strictly necessary to our results, since we are mostly interested in identifying the effects of monetary policy shocks (i.e., shocks to RIB) on each variable of the VAR. To this limited end, we only need two assumptions: the interbank rate is weakly exogenous to the other five variables, and the disturbance to RIB is orthogonal to the other disturbances. This "partial" identification is possibly due to the fact that, when, in a VAR, the order of any two variables (different from the first) is changed, the elements in the first column of the lower triangular Choleski matrix (obtained from the variance decomposition) do not change (only their order changes accordingly). As a consequence, it is straightforward to show that the same is true for the elements in the first column of the impulse-response matrix (the responses to the first shock).

- the interbank market is weakly exogenous to the bond market. This is consistent with the assumption that RIB is policy determined and assumes that RBTP does not influence monetary policy in the same month. The secondary market for Treasury bonds became relevant only at the end of our sample, due to a number of institutional reforms (e.g., the issue of 10 and 30 year bonds, the creation of derivatives markets);

- the interbank and bond market rates are weakly exogenous to the loan and deposit markets. This is plausible because the information on bank interest rates becomes available with a delay of more than one month;

- the deposit market is weakly exogenous to the loan market. This can be justified by the faster response of the loan market to all shocks, due to its higher degree of competitiveness.

The VAR impulse responses for the two systems (groups A and B) are shown in Figures 6a and 6b. The results for average rates and the loan-BTP spread appear to be broadly consistent with earlier results showing that lending rates tend to overshoot bond market rates; the size of the overshoot is comparable to that found by Buttiglione and Ferri (1994). The results also indicate that the rate spreads between "large" and "small" banks and those between "large loan" and "small loan" banks respond positively to a monetary policy shock (thus confirming the graphical evidence): "large" banks (A1), and particularly "large loan" banks" (B1), respond more promptly to monetary policy shocks than their A2 and B2 counterparts. The positive response of rate differentials to monetary disturbances contradicts the standard result, consistent with the credit view, that smaller banks find it more difficult to isolate themselves from monetary policy shocks

Fig. 6a

IMPULSE RESPONSE FUNCTIONS TO A MONETARY POLICY SHOCK: LARGE AND SMALL BANKS (A1 AND A2)
(10 percent confidence bands)

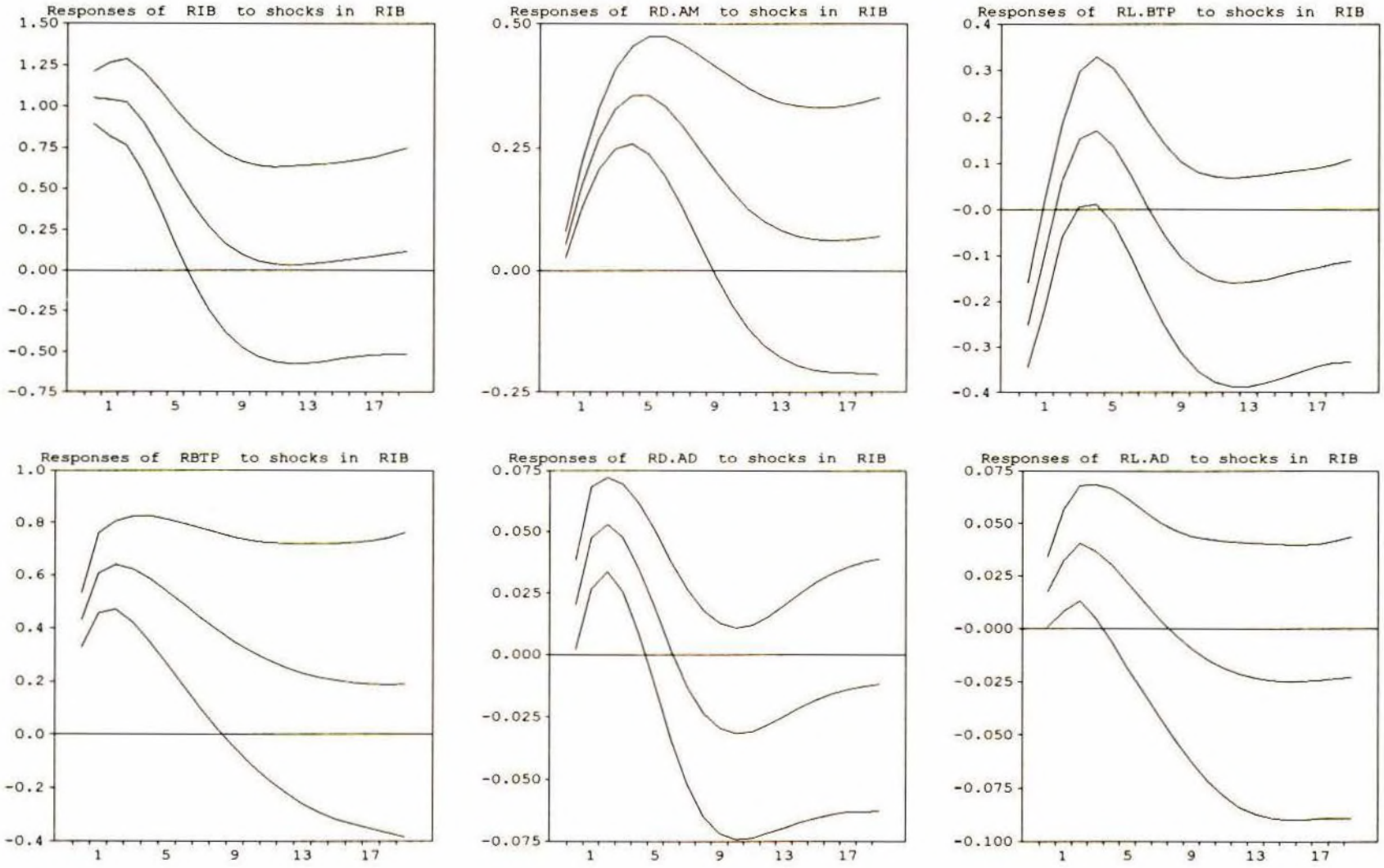
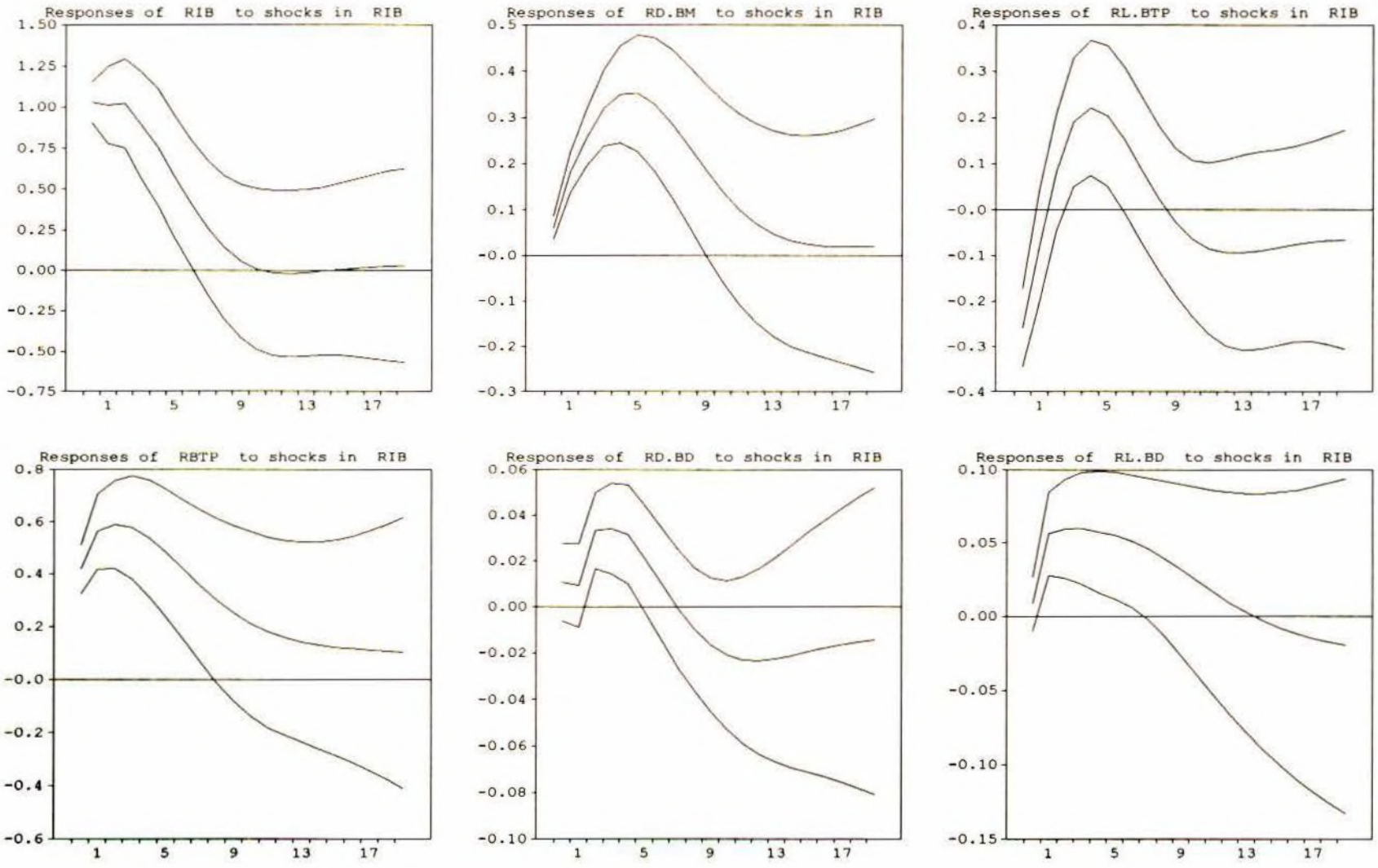


Fig. 6b

IMPULSE RESPONSE FUNCTIONS TO A MONETARY POLICY SHOCK: LARGE AND SMALL LOAN SIZE BANKS (B1 AND B2)
(10 percent confidence bands)



through asset and liability management and that informational and risk problems become more serious under monetary restriction; both factors, if present, would imply greater lending rate elasticity for A2 and B2 than for A1 and B1 banks.

To explain these results, we focused firstly on evidence that deposit rates exhibit a pattern of response similar to lending rates in our VAR estimates, for both bank groups. Although the literature does not stress any specific implications concerning deposit rates, a plausible interpretation of our evidence could be that our bank groups be confronted with different interest elasticities of money demand; higher elasticity could result in a stronger reaction of both bank rates to monetary policy changes. To verify this conjecture, we estimated separate demand for deposit functions for A1 and A2 (and for B1, B2) banks, with unrestricted lags, using the SURE method to take into account simultaneous residual correlation. Our model includes, as regressors, the contemporaneous value and two lags of real GNP, prices and the differential between the T-bill rate and the average rate on deposits of the group; it also includes two lagged values of the dependent variable. Once the model was estimated, we used it to test cross-equation restrictions to detect any significant differences in the respective deposit markets. The results are summarized in Table 6. We tested the assumption that the sum of the coefficients on each variable is equal between A1 and A2 and between B1 and B2; the tests indicate a high degree of similarity between the equations in each group. No significant difference could be detected between B1 and B2, while a significant difference between A1 and A2 exists only for the lagged dependent (the sum of the coefficients is larger in group A2) and for prices (the sum of the coefficients is smaller in group A2). The latter, however, implies a larger long-run elasticity of deposit demand for small banks, which goes in the opposite direction to our conjecture.

Table 6

SUR MODELS FOR THE DEMAND FOR DEPOSITS[1]

(a) Group A

		Sum of coefficients:	
Independent variables	**A1**	**A2**	**χ^2 test on the difference [2]**
Lagged deposits	0.58	0.84	19.0
	(8.7)	(23.5)	
T-bill - deposit rates	-0.006	-0.005	0.56**
	(4.6)	(4.2)	
GDP	0.32	0.23	1.64**
	(4.3)	(3.0)	
Consumer prices	0.34	0.08	16.31
	(4.6)	(1.6)	
Correlation of the residuals(across-equation):	**0.64**		

(b) Group B

		Sum of coefficients:	
Independent variables	**A1**	**A2**	**χ^2 test on the difference [2]**
Lagged deposits	0.70	0.70	0.00**
	(12.1)	(13.2)	
T.bill - deposit rates	-0.004	-0.006	1.01**
	(3.7)	(4.6)	
GDP	0.27	0.24	0.23**
	(3.7)	(3.3)	
Consumer prices	0.23	0.26	0.09**
	(3.5)	(3.7)	
Correlation of the residuals (across-equation):	**0.64**		

1) SUR estimation of two equation models (for A and B separately), in semilogarithmic form, of deposits or lagged deposits, GDP, consumer prices and the spread between T-bill and deposit rates (2 lags). - 2) (**) indicates that the null hypothesis (the sum of the coefficients is the same across the two groups) can not be rejected at the 5 percent level.

These results suggest that the differences observed in rate setting behavior are probably not related to specificities in the deposit market. An alternative interpretation is that loan market structures may differ, and that heterogeneous responses in the lending rate may be transmitted to deposit rates through mark-down relationships.[14] Unfortunately, the structural instability of the loan demand equations, already documented in Table 4, prevents us from using a similar method for testing heterogeneity in the loan market to that followed for the deposits equations.

The relationship between lending rate dynamics and the structure of the loan market has recently been analyzed using cross-country data by Cottarelli and Kourelis (1994), which attribute international differences in the degree of stickiness of bank lending rates to two main classes of explanatory factors:

- The structure of the banking system. According to the authors, a more competitive banking environment increases the speed of response of lending rates to monetary shocks; the reason is that competition increases the cost for banks to be out of equilibrium and reduces the relevance of customer relationships and other causes of non-profit-maximizing behavior. Empirical proxies for the degree of competition in banking are the degree of concentration in the loan market, the extent of public ownership in the banking system, the existence of barriers to entry.

- The structure of money and financial markets. The responsiveness of the lending rate to monetary policy signals can be reduced if there is a high volatility of short-term interest rates, since banks tend not to respond to what

14 A mark-down pricing relationship for Italian banks is used in Banca d'Italia (1986).

they perceive as noisy movements in the money market. Conversely, the existence of alternative financing instruments for firms fosters competition in the financial markets and can thus increase lending rate flexibility. Proxies for the degree of development of financial markets, such as the financial assets/GDP ratio and the velocity of money are thus possible explanatory variables for the degree of lending rate stickiness.

Using a similar approach, Cottarelli, Ferri and Generale (1995), henceforth CFG, try to explain differences across Italian banks in the speed of adjustment of lending rates with the following variables:

- concentration of credit in local markets; a Herfindhal index, computed for each geographical province, is weighted by the share of loans of each bank in each province; this gives a proxy of the strength of competition in the loan market faced by each bank;

- strength of customer relationships; the share of loans not granted in the form of overdraft is used by CFG as a proxy of the propensity on the part of the bank to engage in long-term customer relationships;

- bank liability composition; proxied by the share of CDs over total deposit liabilities. A higher share of CDs normally implies that the cost of funds for the bank is more responsive to money market conditions, and this may in turn be reflected in loan conditions through a mark-up pricing mechanism.

- bank size, measured by the loan portfolio;

- bank ownership (public vs. private);

- average loan size.

The results of CFG are related to the analysis of this paper in several ways. First, CFG find that large and large-average-loan banks tend to adjust lending rates more quickly than other banks; this simply mirrors our own VAR estimates, which show that A1 vs. A2 and B1 vs. B2 lending rate spreads rise under a monetary contraction. Second, the CD share seems to influence the determination of lending rates, through a mark-up effect; the higher the share, the more variable is the cost of funding and, therefore, the cost charged on loans. Third, and most importantly, for CFG the Herfindahl loan concentration index at the local level is the dominant factor in explaining the speed of adjustment of lending rates, suggesting that cross-bank differences in price setting should be related to the micro-structure of the credit market. The proxy for customer relationships has the correct sign but is marginally significant.

The role of bank-firm relations in affecting the availability and terms of credit granted by banks has repeatedly been singled out in the literature. For instance, Hoshi, Kashyap and Scharfstein (1990) have shown that the cost of solving problems of financial distress is much lower for corporations entertaining a strong relation with a main bank than for the others; Petersen and Rajan (1994) show that, among the small firms, those having close ties with banks enjoy better credit availability. Besides having implications for the allocation of credit, customer relations may also exert an impact on the transmission of monetary policy <u>via</u> the credit channel, by affecting the response of lending rates to monetary policy shocks. As mentioned above, the presence of different kinds of bank-customer relations in different market segments in Italy has recently been suggested by Padoa-Schioppa (1994), who finds that customers of small banks usu-

ally concentrate most of their borrowing with single institution, while this is not true for customers of larger banks.[15]

In principle, one would wish to distinguish two separate factors affecting bank lending rate setting: degree of competition in the market, extent of long term customer relationships. The degree of competition is a systematic effect on price setting that may be approximated by market concentration, as in CFG: more concentrated markets may induce more extensive collusive behavior[16] independently of the actual intensity of monopoly power at the micro level associated with long term relationships between individual bank and customers (the idiosyncratic effect on rate setting). In fact, although the two variables are often correlated, this is not always the case: e.g. the CFG territorial market concentration index has a low value (low systematic effect) if the bank operates predominantly in highly fragmented local markets, even though the bank entertains close customer ties with a few clients (high idiosyncratic effect).

To pursue the identification of close customer relationships further, we have constructed a proxy as a weighted average of Herfindahl indices of loan relationships for each borrower (rather than, as in CFG, in each geographical area). The underlying idea is that a high concentration of credit between the bank and the borrowing firms favors, ceteris paribus, the build up of stronger customer ties. We have constructed the index using data drawn from the Centrale dei Bi-

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15 Elliehausen and Wolken (1990), referring to a sample survey of US small and medium-sized businesses, show that smaller firms tend to do more business with local (and therefore smaller) banks and are more likely to entertain relations with only one bank.

16 The extistence of these two separate effects on price setting is also stressed by Hannan and Berger (1991).

lanci (Company Account Data Service; henceforth CB) as in Table 3, in the following way.

Let LCB_{ij} be the amount of loans granted by bank i to firm j, included in CB, and LCB_i be the total amount of loans granted by bank i to all firms in CB. A measure of loan concentration for firm j can be written as:

$$h_j = \Sigma^m_{i=1} [LCB_{ij} / (\Sigma^m_{i=1} LCB_{ij})]^2$$

where the sums run over all banks lending to firms in CB.

The concentration index for bank i concerning its customers included in CB is then

$$H_{i,CB} = \Sigma^n_{j=1} q_{ij} h_j$$

where $q_{ij} = LCB_{ij} / LCB_i$ is the share of client j in the portfolio of total loans by bank i to firms in CB, and the sum runs over j = 1, ..., n (all clients of bank i included in CB).

A correction must be made to take into account the fact that small banks and firms are relatively under-represented in CB (the coverage of the sample for our four groups is shown in Table 7, section C).[17] The true value of the concentration index for bank i computed over all customers (H_i) is

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17 CB surveys some 37,000 Italian firms. The selection of firms by CB follows three criteria: 1) they must be surveyed by the Central Credit Register (the data base used by the Bank of Italy for supervisory purposes, covering all banks and almost all of their clients); 2) they have to borrow from at least one of the 55 (mostly medium-large) banks reporting to CB; 3) the final selection gives preference to firms that borrow from the largest number of banks. The first criterion does not appear to be particularly distorting: only firms having an amount of credit lines below 80 million lire are not included in the Register. This is not the case for criteria 2) and 3), which bias the selection against smaller firms, typically doing business with fewer -- and probably smaller -- banks.

given by a linear combination of $H_{i,CB}$ and the unobserved credit concentration value computed over all bank i's clients not included in CB (x_i):

$$H_i = \alpha_i H_{i,CB} + (1 - \alpha_i) x_i$$

where $\alpha_i = LCB_i/L_i$ is the share of loans by bank i to firms included in CB on the bank's total loans. We have computed the index imposing a constant x for all banks.[18] We have tentatively used two benchmark, extreme values for x, namely 0.5 and 1.[19] The results are shown in Table 7 (sections A and B) which presents values of the index of customer relationships together with statistical tests of the differences in the value that the index assumes across our bank groups. For comparison, we show also similar values of the Herfindahl index for geographical provinces, used by CFG as a proxy of monopoly power in local markets.[20]

The data confirm that the index of customer relationships strongly discriminates groups A1 and B1 versus A2 and B2, respectively. The difference is always significant at the

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18 Small (and small-loan) banks tend to operate on average with clients having a higher concentration of loans, i.e. tend to have a higher x_i. Therefore, by assuming a uniform x we are underestimating the true value of concentration for A2 and B2 banks and overestimating it for A1 and B1. Since our goal is to show that concentration for the first two groups is significantly smaller than that of the others, our simplifying assumption tends to bias the comparison against our presumption.

19 A value of 1 implies that each firm not included in CB borrows from only one bank. A value of 0.5 implies an average number of banks per firm which at most equals 2: it equals 2 only in case of a perfectly even distribution. Since, on average, the number of lending banks for the universe of borrowers is lower than 2, and those included in CB borrow from a larger number of banks than the average, the actual concentration index for firms not included in CB must lie between 0.5 and 1, being probably closer to the latter.

20 This index needs no correction for data coverage, since it does not rely on CB data.

Table 7

INDICES OF LOAN MARKET CONCENTRATION BY PROVINCE AND OF CUSTOMER RELATIONSHIPS

Bank groups:	A1		A2		B1		B2
			A. Concentration by province				
Average	0.105		0.131		0.107		0.128
Standard dev.	0.020		0.050		0.050		0.050
t test[1]		**3.8***				**11.8**	
Median	0.104		0.116		0.107		0.121
MWW [2]		**17.1**				**48.6**	
			B. Customer relationships				
			(average values over 1986-1993)				
			Upper bound (x = 1)				
Average	0.722		0.770		0.722		0.790
Standard dev.	0.043		0.062		0.056		0.037
t test[1]		**0.71****				**0.01****	
Median	0.713		0.777		0.733		0.785
MWW [2]		**0.14****				**0.0003****	
			Lower bound (x = .5)				
Average	0.388		0.403		0.388		0.412
Standard dev.	0.020		0.027		0.025		0.015
t test[1]		**3.17***				**0.02****	
Median	0.386		0.404		0.391		0.411
MWW [2]		**0.32****				**0.10****	
			C. For reference: coverage of the CB survey [3]				
Average	22.7		16.0		22.9		13.9
Minimum	17.5		5.6		5.3		5.5
Maximum	29.6		40.9		30.7		23.4
Standard dev.	3.7		7.3		6.3		5.0
t test[1]		**0.10****				**0.01****	
Median	23.2		15.2		23.2		13.2
MWW [2]		**0.0002****				**0.00007****	

Source: Our computation on data taken from Centrale dei Rischi (Central Credit Register) and Centrale dei Bilanci (Company Accounts Data Service). ** and * mean significance at the 1 percent and 5 percent level, respectively.

(1) t test of the hypothesis that the two averages are equal (marginal significance).- (2) Mann-Whitney-Wilcoxon U statistic test of the hypothesis that the two medians are equal (marginal significance). - (3) All values refer to $\alpha_i = LCB_i/L_i$, i.e. the share of bank is total loans surveyed by CB.

1 percent level, but is more significant for B1 versus B2 as are the differences we observed in the speed of response of lending rates; group B2, with the highest index of customer relationships, is also slowest in adjusting its average rate. The geographical concentration index also differs across our bank groups in a direction consistent with a-priori reasoning; but the significance is much lower, and the difference seems to be stronger for groups A1 and A2, contrary to what expected on the basis of our VAR estimates. On balance, concentration in local markets could be a further explanatory factor of lending rate stickiness, but could at the same time be a spurious measure of customer relationships.

5. Conclusions and open questions

In this paper we used micro data on bank interest rates in Italy to study the relevance of the "credit view" and to verify the existence of distributional asymmetries in monetary policy. Our results are threefold: 1) we collected new and updated evidence, based on the aggregate time-series analysis, confirming the relevance of the credit view for Italy; 2) we showed that large-size (and particularly large-loan) banks tend to raise their lending rates more than other banks in periods of monetary tightness; 3) this difference was shown to be related to two structural features of the credit market: customer relationships and monopoly power in local markets. Although opposite to those of Kashyap and Stein (1994), our results seem to us consistent with the credit view, for two reasons: first, the key condition for the existence of a lending channel, namely that the loan-bond spread rises after a monetary contraction, holds robustly for all our bank groups; second, the behavioral differences that we observed across bank groups are consistent with the notion that bank credit is an imperfect substitute for other forms of financing.

Our results mitigate the concerns which could arise about possible adverse distributional effects of monetary policy; small borrowers, for which the access to other sources of finance is more difficult and the risk of failure probably higher, tend to be sheltered from monetary policy shocks by a relatively "benign" attitude on the part of their banks. However, many qualifications are in order, and further research is necessary before drawing firm conclusions. First of all, the different lending rate response across bank groups, though statistically significant, is not large in economic terms. A similar objection could be raised against many of the results concerning the credit channel recently appeared in the literature; the research has often tended to confirm its existence, but this does not necessarily prove its relevance. Our results need also be reconciled with other evidence for Italy (Rondi et al., 1993) showing that the effects of monetary policy shocks on non-financial balance sheets tend to be stronger for small than for large firms. Several aspects deserve attention here. First, the exclusion from their sample of most small-size firms may bias the results. Second, lending rate effects do not necessarily exhaust all possible channels of monetary policy; financial market rate effects and -- more likely -- credit rationing could turn out to be more relevant for small borrowers.[21] Third, small firms could be more sensitive to <u>any given</u> changes in interest rates, due to a shorter planning horizon and lower ability to absorb negative cash-flows.

Two extensions of our analysis appear particularly worth pursuing. First, our dimensional criteria for classifying banks are suggestive, but do not exhaust all the bank-firm breakdowns that one would wish to investigate. Regional

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21 However, recent survey results collected by the Banca d'Italia indicate that large firms declare themselves to be credit constrained more frequently than small firms.

distinctions, different exposure to international financial markets, private vs. public ownership, traded vs. non-traded sectors, are just some of alternative criteria that could bring new and interesting insights. A panel analysis would be a good way to take many relevant aspects simultaneously into account. Second, our results for heterogeneous bank groups are probably not unique to Italy, but may apply to other countries where the banking system is highly fragmented and diversified and plays a prominent role in the financial system. Countries for which aggregate time series test have already suggested the relevance of the credit channel (such as Germany and Spain) are the prime candidates for analyses based on cross-section data.

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