The credit channel in the transmission of monetary policy: the case of Spain

Ignacio Hernando[*]

Introduction

The existence of a credit channel in the process of transmission of monetary impulses is a recurrent topic in the literature on the effects of monetary policy. Nevertheless, macroeconomic models have frequently tended to ignore this channel of transmission and empirical tests of its existence have usually been unsatisfactory. Over the past decade, a large number of papers, mainly about the US economy, have helped to correct the traditional assumption that credit is relatively unimportant in the monetary transmission mechanism. They have also provided new empirical approaches to test the existence of this credit channel.

Conventional wisdom regarding the effects of monetary policy on the real economy has concentrated on the so-called money channel, using models based on two financial assets (money and bonds). Under this approach, in the event of an alteration in the supply of money in a given economy, equilibrium will be restored by changes in the interest rate for bonds that will ultimately have an effect on real variables. This approach implicitly assumes that there is only one alternative asset to money (or that all alternative assets are perfect substitutes) and may therefore reflect a partial view of the monetary transmission mechanism. Such a partial approach could lead to erroneous conclusions regarding the degree of effectiveness of monetary policy or the usefulness of the different variables as intermediate targets.

An exhaustive study of how monetary impulses are transmitted requires consideration of the credit channel. The literature uses this term to refer to two different, albeit related, transmission processes. First, in accordance with the bank lending channel (or credit channel in the strict sense) – represented in models based on three assets: money, bonds and bank loans (see, for instance, Bernanke and Blinder (1988)) – the effects of monetary policy are not just via its impact on interest rates for open market transactions but also the result of its independent impact on the supply of bank loans. Secondly, the balance-sheet channel (or credit channel in the broad sense) refers to the additional effects of monetary policy on the final variables through variations in the net financial income received by agents and on their net wealth. Based on more extensive studies by Bernanke (1993), Kashyap and Stein (1994) and Gertler and Gilchrist (1993), this paper describes the theoretical grounds supporting the existence of the credit channel, distinguishing between the two senses of the term.

Consideration of the credit channel contributes to a fuller understanding of the response of output and of demand components to monetary policy measures. Kashyap and Stein (1994), for instance, list a number of reasons why it is important to take the existence of a credit channel into account. One is that the credit channel supports the existence of a different impact of monetary policy depending on agents' degree of access to capital markets. For their part, van Ees et al. (1994) present a model – comprising two types of firm, local and international, with the former lacking access to

public capital markets – where the credit channel may even play an effective role in a small, open economy with fixed exchange rates and high international mobility of capital.

The credit channel should not be envisaged as an isolated, independent path, but rather as just another component in the complex workings of the mechanism for monetary policy transmission. As Bernanke and Gertler (1995) point out, the credit channel should be considered a mechanism that reinforces the traditional money channel. How important it is depends on various factors conditioning the relationship between the monetary authority's interventions and economic agents' expenditure decisions. Two such factors that are worth noting are, on the one hand, the institutional framework governing the financial system and, on the other, economic agents' financial position. Regarding the former, the extent to which the banking system acquires liabilities that are not subject to reserve requirements and the role played by non-bank intermediaries are key determinants of the relative importance of the credit channel. Related to this point, there are also implications for the implementation of the single monetary policy in the European Union. Along this line, Dornbusch et al. (1997) suggest that monetary policy shocks could have different effects across member countries depending on their financial structures. Regarding the second above-mentioned factor, as Peñalosa (1996) analyses in some detail, economic agents' financial position has a decisive influence on the transmission of monetary impulses. In this sense, the financial health of economic agents, insofar as it determines their degree of access to credit and the terms under which it is granted, affects the relative importance of the credit channel.

The aim of this study is to provide evidence, in the Spanish case, regarding the existence of the credit channel in the transmission of monetary disturbances. Unlike most of the empirical approaches to this topic, which are based on analysis of the response of money, credit and output to monetary impulses, this paper follows the Kashyap et al. (1993) approach and examines the relative behaviour of bank loans and some alternative source of financing for economic agents. For instance, Table 1 illustrates the considerable changes observed in the financial structure of companies. Such variation could be explained, at least partly, by changes in the extent and terms of access to different sources of finance induced by shifts in monetary policy. It is, moreover, expected that the composition of the financing also has a bearing on the determination of the real variables. With these considerations in mind, the test presented here, which is based on Kashyap et al., takes as a reference point the composition of corporate liabilities. The basic idea is that, when the credit channel exists, monetary policy measures have an impact, in relative terms, on the supply of bank loans and induce changes in the financial structure of companies, which, in turn, affects their level of activity. As we explain in due course, the test does not, however, permit a distinction to be drawn between the two

Table 1

Structure of borrowed funds of non-financial firms (1987-96)

	Loans [1]	Foreign borrowing	Bonds	Short-term securities [2]	Trade credit	Other sources [3]
1987	47.8	7.2	7.5	2.7	21.0	13.8
1988	48.1	7.3	6.7	4.7	20.3	12.9
1989	49.6	5.8	6.1	3.9	20.5	14.1
1990	49.1	5.1	5.2	5.7	20.5	14.4
1991	49.5	5.7	5.1	4.4	20.3	14.8
1992	48.0	8.4	5.1	4.0	20.2	14.4
1993	45.3	11.4	5.4	3.3	19.4	15.2
1994	44.3	11.0	5.0	2.6	21.5	15.5
1995	44.3	10.4	4.4	2.4	23.6	15.0
1996	44.5	9.9	4.0	2.1	23.8	15.7

[1] Includes loans from national credit institutions. [2] Includes commercial paper and asset transfer certificates. [3] Includes credit from insurance companies, the public sector and households, technical insurance reserves and other deposits.

Source: Banco de España, Cuentas Financieras (1987-96).

meanings attached to the credit channel concept, although it does demonstrate the existence of a transmission channel which supplements the traditional money channel.

Vega (1992) reviews the role assigned to credit within the monetary transmission mechanism according to the economic and econometric literature. He provides estimates for the demand functions of credit and of ALP (liquid assets held by the public) in the Spanish economy, and he analyses the effectiveness of the credit controls introduced as a temporary measure between mid-1989 and early 1991. One of that study's findings is that, in connection with the controls, a process of substitution can be observed between bank loans and commercial paper. In this paper, our aim is to determine whether there are equivalent substitution processes in response to monetary policy measures – not necessarily quantitative restrictions. If so, this would provide evidence in favour of the existence of the credit channel.

Thus, two key questions to determine the existence of a bank lending channel impact are: (i) does the financing mix chosen by economic agents respond to changes in monetary policy, and (ii) does that mix affect their expenditure decisions?

The economic literature provides theoretical support and empirical evidence for a positive reply to the second question. For instance, non-fulfilment of the terms of the Modigliani-Miller theorem suggests that corporate financial structure does have a bearing on companies' investment decisions. The evidence in respect of the first question is less conclusive. The test discussed in this paper is an attempt to answer it. The article is structured as follows. Section 1 gives a brief description of the theoretical arguments in favour of the existence of the credit channel in the monetary policy transmission process. Section 2 provides, first, a brief review of the different approaches used to test the existence of that channel, and then presents the findings of the test based on the approach of Kashyap et al. (1993). It also assesses to what extent the findings are conditioned, in one part of the period studied, by the authorities' restrictions on the expansion of credit. The final section summarises the paper's conclusions.

1. Theoretical aspects

Several recent papers – Bernanke and Blinder (1988) and Kashyap et al. (1993), among others – offer theoretical models that support, in aggregate terms, the existence of a differentiated credit channel within the monetary transmission mechanism. This section, based on the more detailed studies carried out by Bernanke (1993), Gertler and Gilchrist (1993) and Kashyap and Stein (1994), summarises the arguments that constitute the theoretical basis for this transmission path.

The traditional view of the process through which monetary measures are transmitted maintains that reductions in the money supply induced by the authorities lead to an increase in real interest rates that is needed to restore equilibrium in financial markets. This increase in the cost of funding affects economic agents' expenditure decisions. As Cecchetti (1995) points out, this approach focuses on the impact on aggregate expenditure, but fails to take into consideration the possible differences in the effects that monetary policy has on different agents. By contrast, both versions of the credit channel approach address the problems of asymmetric information among economic agents with respect to financing, and emphasise the distributive consequences of monetary policy measures. Thus, the credit channel in the strict sense suggests that, for certain agents, the only way to surmount the problem of asymmetric information is to resort to financial intermediaries, i.e. specialised agents benefiting from economies of scale in monitoring tasks. Therefore, if monetary measures affect the supply of bank funds, some economic agents will be especially affected. Similarly, the credit channel in the broader sense indicates that asymmetric information problems lead to the existence of a risk premium determined by the value of the agents' net wealth. To the extent that monetary policy affects this net wealth, it will have a different impact on different agents.

1.1 The bank lending channel

The bank lending channel approach (or credit channel in the strict sense) stresses that monetary policy affects the level of economic activity not only by modifying short-term interest rates, but also by altering the availability and terms of bank loans.

In other words, whereas the money channel in monetary transmission refers to the effects on the liabilities of the credit system, i.e. the money supply, the credit approach emphasises what happens to the assets side of financial institutions' balance sheets. Hence, a monetary policy tightening, as it translates into a reduction in deposits, must be accompanied by a contraction on the other side of the banking institutions' balance sheets. This reduction in bank assets will have an effect on real economic activity additional to the impact of the money channel if two conditions are met:

(1) The monetary authority is able to affect the supply of intermediated credit. For this to be the case, there must be no other bank asset that could act as a perfect substitute for loans to companies.

(2) There exists no other alternative source of corporate financing that is a perfect substitute for bank lending.

If bank loans are an imperfect substitute for other bank assets, the counterpart to the drop in deposits will be a drop in the various kinds of bank asset (including loans) i.e. the banks will not be able to accommodate in full the agents' demand for funds solely by resorting to reductions in assets that are alternatives to credit. On the other hand, to the extent that firms (and consumers) lack perfect substitutes for bank loans, they will not be able to offset the lower availability (or different terms) of these loans simply by greater direct recourse to savers in public capital markets.

Both assumptions appear to be fairly reasonable. First, the different degrees of liquidity, profitability and risk of the various kinds of bank asset suggest that they are imperfect substitutes. Secondly, as a corporate liability, bank loans have no perfect substitutes, at least for a significant number of firms that depend heavily on bank financing and lack access to alternative sources.

Nonetheless, several authors – including Romer and Romer (1990), Thornton (1994) and Morris and Sellon (1995) – have cast doubt on the relevance of the two above-mentioned conditions, especially the first one. With regard to the first condition, factors such as the acquisition by banks of liabilities not subject to reserve requirements or the supply of credit from non-bank intermediaries would, in principle, weaken the possibility of a credit channel existing or, at any rate, its importance. Thus, Thornton and Morris and Sellon present evidence for the United States that suggests that financial innovation and deregulation processes have altered the structure of financial markets, weakening the monetary authorities' ability to control the supply of intermediated credit. Countering these arguments, Kashyap and Stein (1994) describe in detail several reasons why consideration of these factors is not so important. They underline, for instance, the fact that the marginal cost of financing via bank liabilities that are alternatives to deposits increases with the amount of financing obtained. They also stress that the volume of credit from non-bank intermediaries continues to be small compared with the volume of bank loans. As to the second condition, it tends to be weakened by companies' growing ability to tap non-intermediated funds or to obtain financing from abroad. Nevertheless, bank loans remain a principal source of funding for a significant number of firms.

1.2 The balance-sheet channel

Along with the previously described view of the credit channel (contraction of bank lending as a result of restrictive monetary measures), Gertler and Gilchrist (1993 and 1994) and Hubbard (1995) emphasise a related approach which, in looking at the impact of financial conditions on monetary policy transmission from another angle, generates several predictions similar to those derived from the existence of the bank lending channel. This complementary approach, usually known in the literature as the balance-sheet channel (or credit channel in the broader sense), rests on two basic ideas.

First, asymmetric information gives rise to a differential between the cost of internal financing and that of external funds. This external funding premium compensates lenders for the better information of the borrowers regarding the quality and profitability of investment projects. The second basic idea is that this differential between the cost of internal and external funds is inversely related to the net wealth that the borrower can provide as collateral. The greater the value of the collateral relative to the size of the loan, the greater the borrower's commitment to his own investment project.

Under these conditions, any disturbance affecting the net wealth of economic agents will affect the cost of external financing. Thus, an increase in the interest rate on open market transactions will lower the discounted value of assets that can be used as collateral, thereby raising the cost of borrowing. It will also increase the financial expenditure/cash flow ratio, thereby possibly reducing the volume of self-financing. Moreover, the initial drop in demand causes a subsequent decline in profits and the value of assets, with the resulting effect on the cost of external funds. Thus, this mechanism amplifies the impact of monetary policy measures. Unlike the bank lending channel, this credit channel in the broader sense does not depend on the institutional characteristics of the banking system. It is, rather, an operational transmission mechanism triggered by any disturbance affecting the net wealth of economic agents.

In sum, both approaches – the bank lending channel and the balance-sheet channel – can be understood as complementary mechanisms with which to explain, whenever asymmetric information problems exist, the influence of financial factors on the effects of monetary policy. Both would suggest a reinforcing of the traditional money channel in monetary policy transmission. But this reinforcement would take the form of a different impact on different agents, which would not be the case if only the money channel were operative. Thus, the credit channel in the broader sense tells us that there will be a greater impact on those agents for whom the cost of funds is more sensitive to the collateral offered, whereas the bank lending approach predicts a greater impact on agents who are more dependent on bank loans. Both approaches appear to suggest that consumers and small firms are the economic agents most affected.[1]

1.3 Credit rationing

Lastly, before beginning our analysis of the evidence on the existence of the credit channel, it is worth making one point about its relationship to credit rationing. The importance of credit in the monetary transmission process is not confined to situations in which credit rationing occurs. The existence of rationing has been well substantiated theoretically with models of asymmetric information in the credit market, and it is also an observable phenomenon, at least in certain periods. Nevertheless, credit rationing is not a necessary condition for the existence of the credit channel in either of its two versions. The bank lending channel will exist whenever conditions (1) and (2) are found to exist, i.e. that, faced with a restrictive measure, banks cut back loans and that firms are forced to supplement them by tapping alternative sources if they can, or by incurring additional costs (the increase in bank lending rates will exceed that of alternative instruments) if they continue to use bank financing. In other words, the bank lending channel is compatible with the existence of credit rationing, but it is also compatible with the increase in the relative cost of bank loans in response to monetary restrictions. At the same time, the balance-sheet channel will exist whenever the cost of borrowing is inversely related to collateral, even when there is no quantitative restriction.

---

[1] In general, small firms rely more on bank loans, and they also bear higher borrowing costs. The latter may, as Gertler and Gilchrist (1993) point out, be due to the fact that they represent a higher risk since their activities are less diversified, to the relatively greater costs in the event of bankruptcy, and to the fact that, proportionally, they have less wealth to use as collateral.

2. Empirical evidence

2.1 Overview of the literature

Empirical studies of the credit channel have mainly been concerned with testing the existence of the bank lending channel in the monetary transmission process. To this end, a first approach, used in many studies, focuses on interpreting the correlations between money, credit and output, and on assessing how money and credit respond to monetary policy measures. For the US economy, the findings tend uniformly to show that credit responds to monetary shocks with a certain lag and that, in turn, changes in credit run fairly parallel to changes in output. Along these lines, Bernanke and Blinder (1992)[2] use a vector autoregression (VAR) model with six variables: the federal funds rate (FFR), the unemployment rate, the price level and three bank balance-sheet variables – deposits, loans and bond holdings. They find evidence that, after a monetary policy shock (measured as an orthogonal shift in the FFR), in the short run bond holdings adjust more strongly than loans, owing to the existence of committed loans (credit lines). In the longer term, the response of loans is greater and it tends to coincide in time with the response of the unemployment rate. Although this evidence is compatible with the existence of the credit channel, it is also compatible with the traditional money channel in the transmission of monetary impulses, which makes it difficult to identify which is which.[3] In other words, given a restrictive monetary policy, the observed drop in credit may be the result of a contraction in the supply of credit or it could be the result of a reduction in the demand for credit due to a slowdown in economic activity induced by increases in interest rates.

Another alternative found in the literature has been to assess the response of output to shifts in the volume of credit, either through studies based on the estimation of VAR models or by identifying periods in which there were clear shocks in the supply of credit (runs on the banks, for instance, or explicit credit controls) and measuring the response of output in such situations. The results of this approach show that contractions in the lending process induce significant fluctuations in output. This evidence thus proves that there is no perfect substitute – as a corporate liability – for bank loans; but in order to test the existence of the credit channel, it must also be proved that, as a bank asset, loans have no perfect substitute either.

A third approach, employed by Kashyap et al. (1993), attempts to solve the aforementioned identification problem by considering the relative behaviour of bank lending and some close substitute (in this case, commercial paper). Specifically, given a restrictive monetary policy, if the money channel were the only operative mechanism, one would expect the contraction in corporate demand for funds to lead to a simultaneous drop in all sources of finance. Conversely, if the credit channel in the strict sense also operates, the monetary contraction will induce a more pronounced decline in bank lending, which will tend to be substituted by alternative sources, at least by some of the companies with access to those sources.

The basic identification assumption on which this approach rests is that the contraction in the corporate demand for funds (induced by a contraction in aggregate demand) affects the different sources of financing proportionally. This assumption does not escape criticism. Thus, Eichenbaum (1994) suggests an alternative interpretation. Concretely, if small firms (which resort more to bank loans) were concentrated in sectors more sensitive to cyclical swings, they would face a greater fall in demand, and if they had more flexible technology enabling them to adapt production more swiftly to demand conditions, they would need to finance fewer stocks at the start of a slowdown than large

---

[2] Bacchetta and Ballabriga (1995) extend Bernanke's and Blinder's analysis to 14 OECD countries. For the majority of the countries, their findings are similar to those obtained by Bernanke and Blinder for the United States.

[3] See Bernanke and Gertler (1995) for a critique of the comparative analysis of the dynamic response of monetary and credit aggregates to monetary policy measures, as an approach to testing the existence of the credit channel.

firms.[4] As a result, the demand for bank loans would decline in relative terms. More generally, as Kashyap and Stein (1995) point out, a relative increase in commercial paper could be observed, even if the credit channel were not operative, if the companies less affected by the contraction in aggregate demand are those that make greater use of this financing instrument.

Under this approach, an essential role is played by the variables related to the composition of corporate financial structure and, specifically, those variables that express the volume of bank loans in relative terms compared with their close substitutes. Employing a variable of this kind, Kashyap et al. (1993) carry out a two-stage test. First, an assessment is made of the response of the composition variable to changes in the degree of restrictiveness of monetary policy, with a view to examining compliance with condition (1) and using the above-mentioned identification assumption. If condition (1) is not found to exist, i.e. if all bank assets are perfect substitutes, then, faced with a contraction in their balance sheets, banks will be able to accommodate corporate demand for credit and the companies will not alter their share of liabilities. Conversely, if condition (1) holds, banks will not fully accommodate the demand for credit and companies will attempt to resort more to alternative sources of finance. Secondly, that paper examines whether the composition (mix) variable makes investment equations more meaningful, which is a way of testing condition (2). If this condition is not found to hold, i.e. if companies can replace bank loans with other sources at no extra cost, their financing mix will not affect their real decisions. Conversely, if condition (2) holds, financial structure variables can help explain investment behaviour.

As Oliner and Rudebusch (1995) point out, this test – specifically, its first stage – does not allow for a distinction between the broader and the strict notions of the credit channel. They maintain that the fall in the bank loans/alternative sources ratio may be due not just to a contraction in the supply of bank loans (as the strict version suggested), but also to the increase in the premium in the cost of all external financing (not just bank loans), especially for agents with greater problems of asymmetric information (as the broader version would predict). Thus, in their analysis of the reaction of the financial structure of small and large firms to monetary measures, they confirm that, after a restrictive monetary measure, there is a drop in the quotient between the volumes of indebtedness of small and large firms, while the bank loans/alternative sources ratio remains constant for both small and large companies. As small firms have a higher proportion of bank loans, the above findings imply a reduction of the bank loans/alternative sources ratio in the aggregate, even though there may have been no shift from bank loans to other sources in either small or large firms.

At the same time, tests for the credit channel in the broader sense discussed in the literature are based on the distinction between the behaviour of small and large firms when faced with monetary disturbances. Two examples of this kind of test are Gertler and Gilchrist (1994) and Oliner and Rudebusch (1996). The former analyse – for small and large firms – the different responses to restrictive monetary policy measures of a set of real variables (sales and stocks) and financial variables (short-term debt) and they observe that all are more pronounced in the case of small firms. Oliner and Rudebusch observe that investment expenditure relies more on self-financing following restrictive monetary shocks and that this reliance is significantly greater in the case of small firms. Nevertheless, it must be pointed out that the distinction by size does not allow distinguishing between the two versions of the credit channel, since, as discussed above, both versions would predict a greater impact on small firms: in the strict version because such companies are more dependent on bank loans, and in the broader version because their cost of financing is more sensitive to the collateral offered.

---

[4] A similar argument, discussed in Gertler and Gilchrist (1994), is that firms may play the role of marginal producers in some sectors. If this were the case, large firms would enjoy more stable demand and small firms would absorb residual demand and therefore be more sensitive to the cycle.

Finally, some recent papers make use of disaggregated data on bank balance sheets to implement a test of the bank lending view. These articles focus on the response of bank assets to monetary policy shocks, trying to assess the ability of the central bank to affect the supply of bank loans. The seminal reference in this literature is Kashyap and Stein (1995).[5] These authors find that the loan and security portfolios of large and small banks respond differentially to monetary policy shocks, which is consistent with the lending view.

2.2 Monetary policy and corporate financial structure

In this section, we apply, for the Spanish case, the first stage of the Kashyap et al. (1993) test, which seeks to assess the validity of condition (1) by examining whether the response of bank loans to changes in monetary policy differs from that of some alternative asset. We forgo testing condition (2), because, as indicated in the introduction, the economic literature provides abundant evidence in favour of its fulfilment.

In the test put forward, the alternative asset chosen is commercial paper.[6] This is a short-

Chart 1

Commercial paper
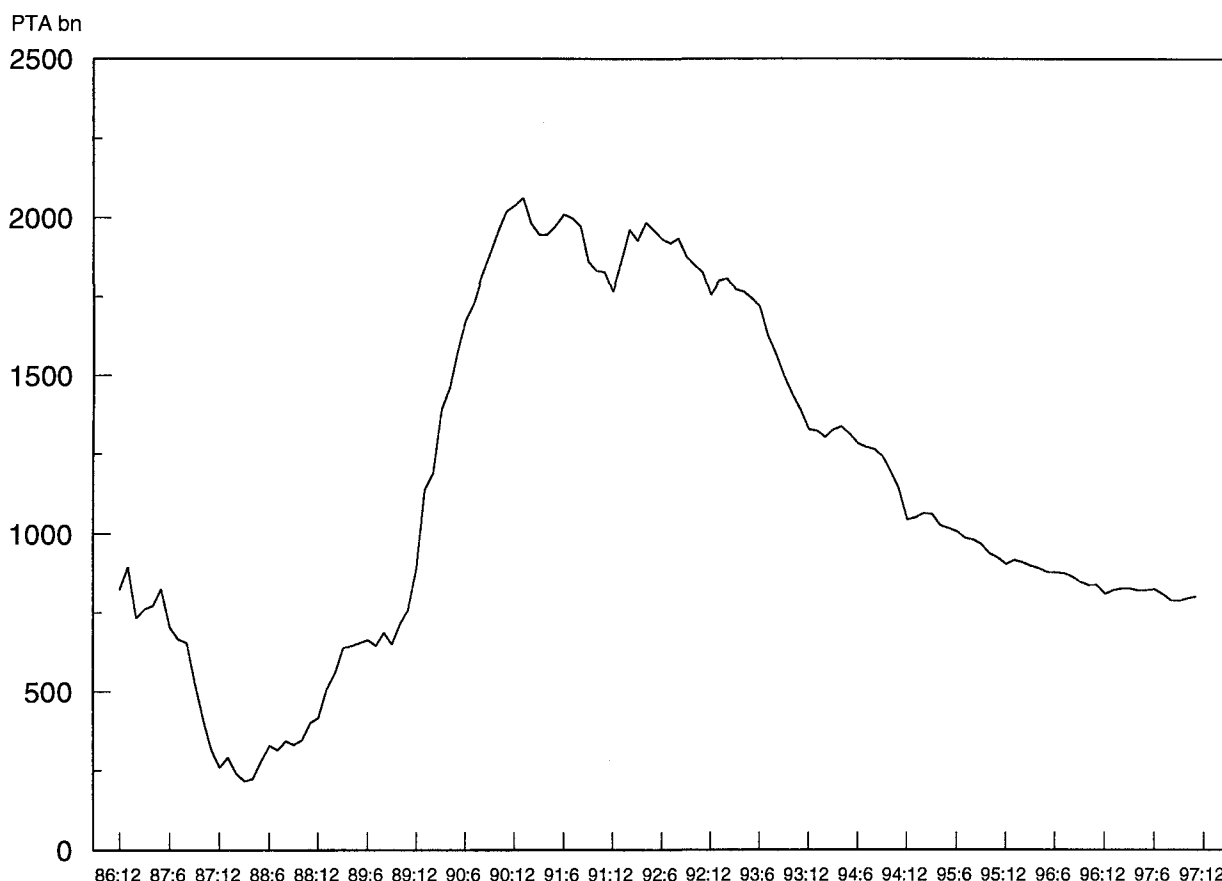
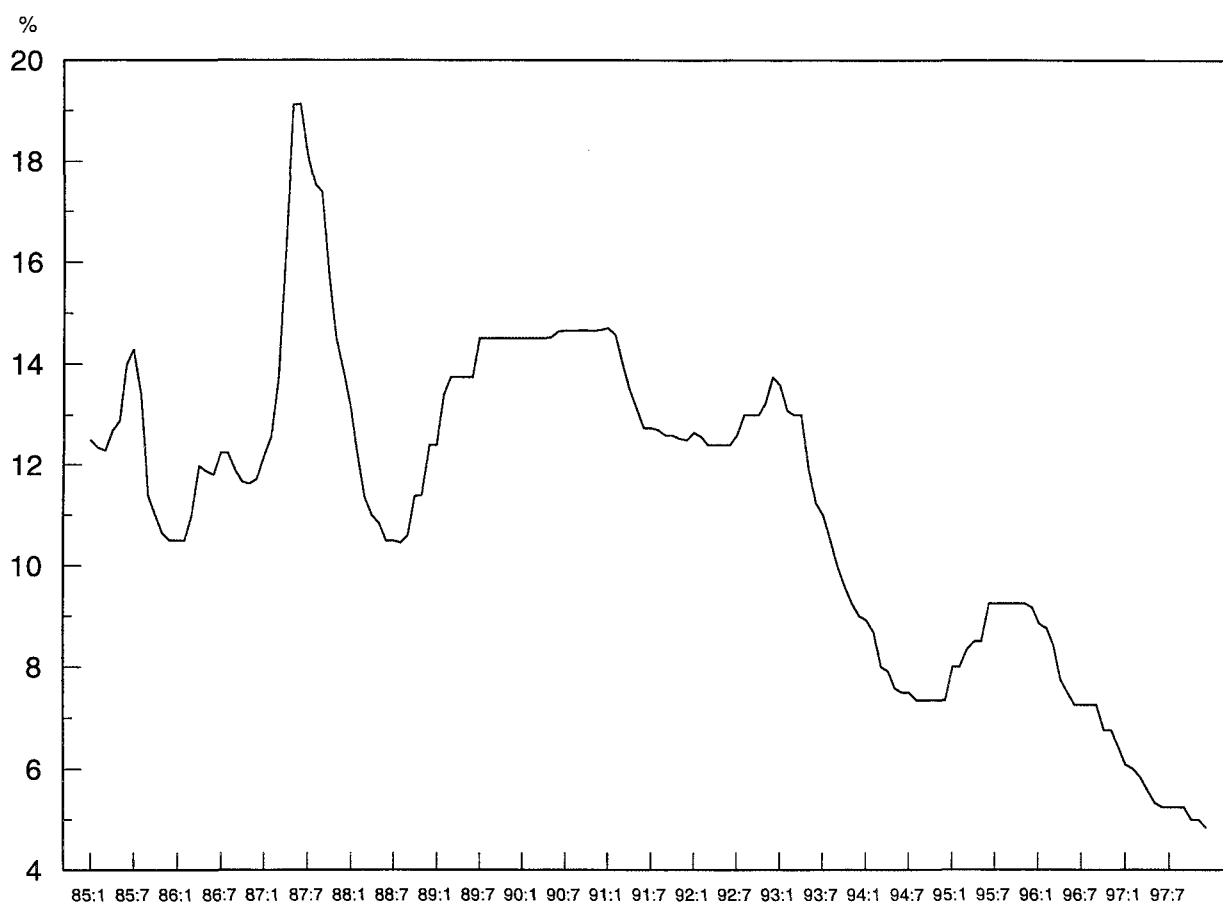*Source*: Banco de España.

---

[5] See Pill (1997) for an application of this approach to the Spanish case.

[6] Other options were to use trade credit or foreign borrowing, which, according to Table 1, play a much greater role in corporate financing than commercial paper. The first alternative was discarded because only annual information covering a short period was available. The second option was disregarded owing to the significant changes in the regulations governing cross-border capital movements in the period under consideration.

term financing instrument recently created in the case of Spain and which has grown considerably in the past few years (see Chuliá (1992) for a detailed study of the Spanish commercial paper market). It has trended fairly unevenly owing to various disturbances. The 1985 law governing the tax status of certain financial assets made commercial paper, along with other assets, subject to tax withholdings. In 1987, the introduction of Treasury bills meant strong competition for commercial paper, especially given the high returns on the first issues of these bills. Lastly, in 1989, the introduction of restrictions on the growth of bank lending significantly boosted the market. The findings presented here were obtained using the monthly time series on commercial paper held by the public,[7] which is available from December 1986 (see Chart 1).

The choice of an indicator of the stance of monetary policy is somewhat more complicated. In some studies for the United States, the indicators used were discrete variables constructed after reviewing reports of the decision-making bodies of the monetary authority. Romer and Romer (1990) build a variable of this type, based on analysis of the minutes of the Federal Open Market Committee (FOMC), which identify the episodes in which there was a restrictive shift in the application of monetary policy. Another instance of this type of variable is the Boschen and Mills index used in Morgan (1993), which adopts five possible values to reflect the degree of tightness of monetary measures and which is also based on a review of FOMC minutes. Apart from these discrete
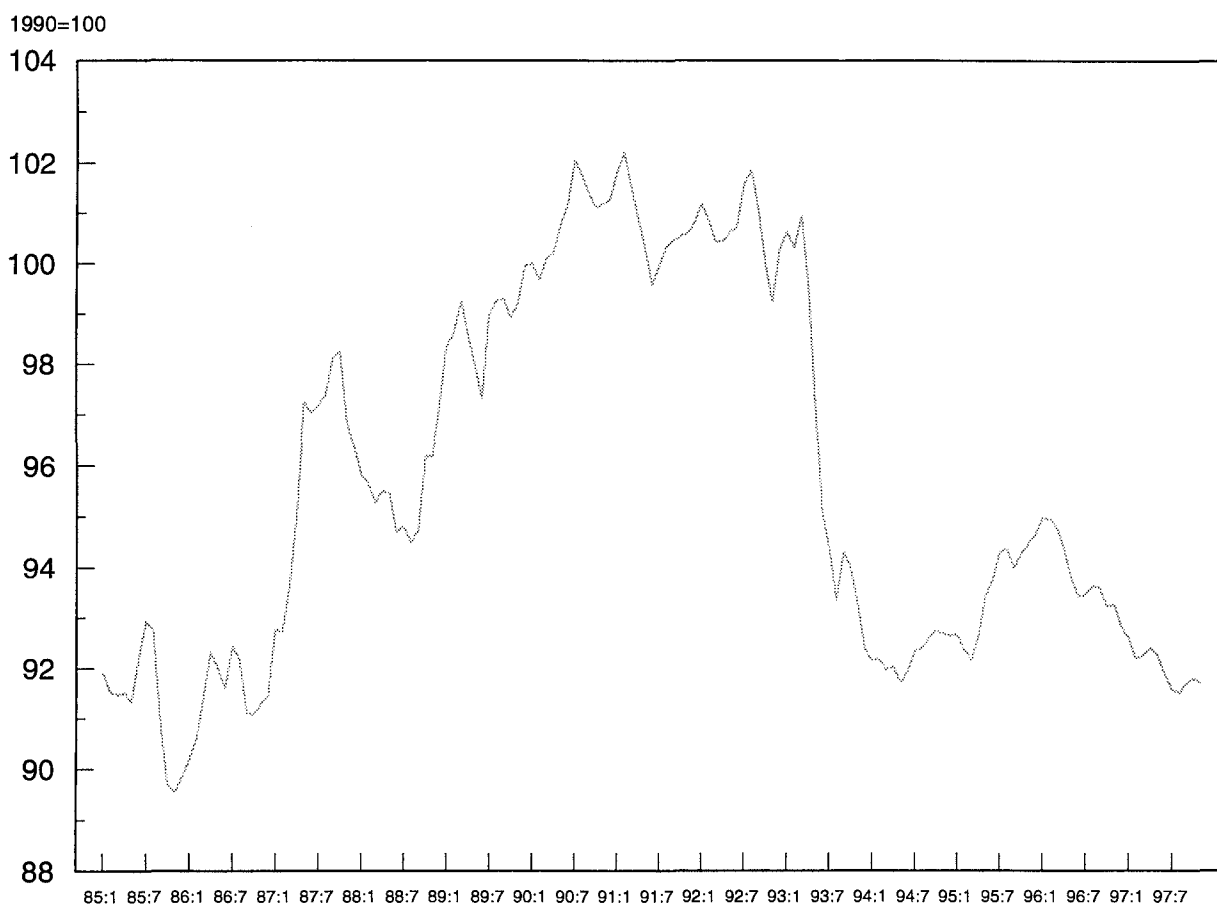
Chart 2

Intervention rate

%

Source: Banco de España.

---

[7] A description of the data used in the study can be found in the Appendix.

variables, in the case of the United States the level of changes in the FFR have often been taken as an approximation to reflect the stance of monetary policy since, with the exception of the 1979-82 period, the Federal Reserve has taken that rate as its reference in implementing monetary policy. Bernanke and Blinder (1992) and Balke and Emery (1994) produce evidence in favour of the suitability of the FFR as an indicator of the stance of monetary policy because, on the one hand, it is a good predictor of the main macroeconomic variables and, on the other, because it responds significantly to changes in the rate of inflation and the unemployment rate.

In the Spanish case, owing to the non-existence of a discrete variable, the choice is between a quantities variable and an interest rate. This paper, given the sample period used, opts for the Banco de España intervention rate[8] (see Chart 2). A further reason for this choice is the fact that, since the mid-1980s, the variable increasingly adopted as an instrument for monetary control has been a short-term interest rate rather than bank reserves, which had previously been closely monitored as a gauge for a given target (Ayuso and Escrivá (1993)). The intervention rate time series was taken as an indicator because using innovations in this rate – as Bernanke and Blinder (1992) do, and as Eichenbaum (1994) suggests as the appropriate way to identify exogenous monetary policy signals – requires calculating a monetary authority reaction function that is impossible to estimate given the sample period available. As a matter of robustness, a monetary conditions index (MCI, see Chart 3) is chosen as an alternative indicator of monetary policy.
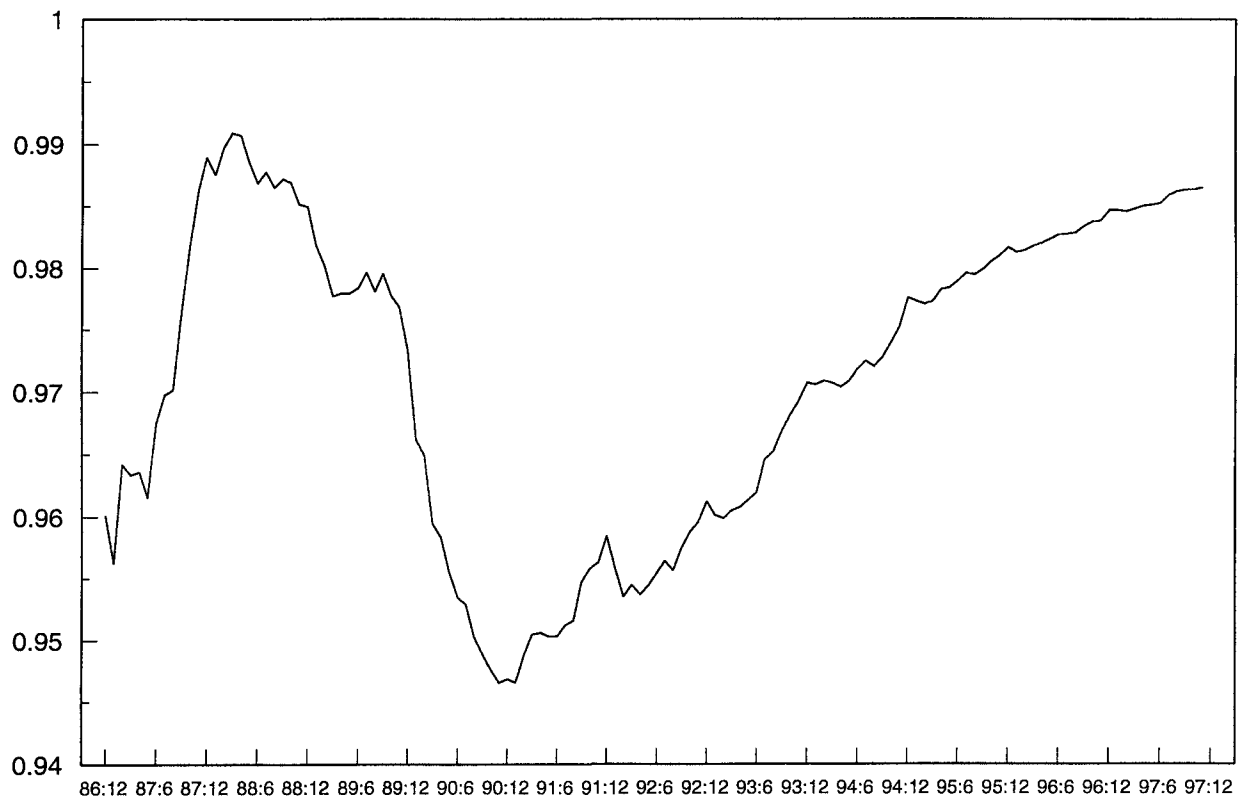
Chart 3

Monetary conditions index

1990=100

Source: Banco de España.

---

[8] From May 1990 onwards, this is the rate applied for the ten-day repurchase tender for Banco de España certificates; to April 1990, it corresponds to the overnight assistance rate.

Chart 4

Composition variable

Note: The composition variable is defined as the ratio between bank loans and bank loans plus commercial paper.

Source: Banco de España.

In line with the first stage of the test presented in Kashyap et al. (1993), an attempt is made to assess the level of significance of the impact of the indicator of the stance of monetary policy on a composition variable i.e. the aim is to analyse whether monetary measures affect companies' choices of financing sources. The composition variable selected is the ratio between bank loans to residents (including firms and households) and bank loans plus commercial paper (see Chart 4). Table 2 sets forth the causality test findings. These are Granger-type tests and, to carry them out, the composition variable (or else the lending or commercial paper series) is regressed over 12 lags of its own and over 12 intervention rate (or, alternatively, MCI) lags. Alternatively, we have also included seasonal dummy variables or 12 lags of an activity indicator, specifically the industrial production index, in order to take into account seasonal or cyclical factors that could influence the composition variable. The test checks whether the lags in the monetary policy indicator help explain the behaviour of financial variables. Table 2 presents two types of statistic: first, statistic χ^2 (12) to test the null hypothesis that all the coefficients of the lags of the indicator of the stance of monetary policy are zero; and, secondly, the t-statistic for the sum of those coefficients. The first statistic represents the result of the Granger causality test, and the second reflects the sign and degree of significance of the accumulated effect of the proxy for the stance of monetary policy on the dependent variables.

The commercial paper series used to obtain the findings set out in Table 2 was the series for commercial paper held by the public. In implementing the tests, we use monthly data for a sample period ranging from 1989:1 to 1997:11.[9]

---

[9] The available information allowed an estimation period starting in 1988:1 to be used. However, if the sample period begins in January 1988, by including lags in the regressors, we are using commercial paper data for 1987, a year in which

Table 2

Impact of the stance of monetary policy on corporate liability composition variables and on the relative cost of bank loans and commercial paper

$$\Delta x_t = \alpha_0 + \sum_{i=1}^{12} \alpha_i \Delta x_{t-i} + \sum_{i=1}^{12} \beta_i \Delta r_{t-i} + \sum_{i=1}^{12} \gamma_i \Delta \log A_{t-i} + seasonals$$

Dependent variable	r = intervention rate		r = Monetary Conditions Index	
	1	2	1	2
Commercial paper	54.99***	2.50**	30.78***	1.32
Bank loans	12.17	0.88	28.17***	2.24**
Composition variable [3]	47.28***	−2.33**	40.56***	−1.45
Spread [4]	59.74***	4.27***	44.35***	3.84***

Notes: x denotes the dependent variable (alternatively: commercial paper, bank loans, composition variable or spread), r the indicator of the stance of monetary policy (intervention rate or MCI), and A the industrial production index. Variables have been differenced so that they enter the regressions in stationary form. Specifically, the variables included are the logarithmic differences for commercial paper, bank loans (in real terms in both cases), and the industrial production index, and differences in the intervention rate, the monetary conditions index, the composition variable (MIX) and the loan/commercial paper spread. Sample period = 1989:1–1997:11.

[1] Statistic χ^2 (12) to test that all the coefficients of the intervention rate (or MCI) lags are zero (χ^2 (12) for H_0 : $\beta_i = 0$ $\forall_i$). Critical value at the 5% level = 21.03. [2] t-statistic for the sum of the coefficients of the intervention rate (or MCI) lags (t-statistic for H_0 : $\Sigma \beta_i = 0$). [3] The composition variable (MIX) is defined as the ratio between bank loans to resident sectors and bank loans plus commercial paper. [4] The spread is defined as the difference between the bank lending rate and the commercial paper rate.

The bank lending series includes, as mentioned earlier, credit to consumers and firms, for lack of monthly data on bank loans to companies. Given that the objective of the test is to analyse whether monetary measures affect the composition of corporate financing sources (and, specifically, the relative importance of bank loans), inclusion of credit to households could bias the results in favour of acceptance of the hypothesis, given the likelihood that consumer credit is more sensitive to monetary impulses. Conversely, the inclusion of long-term loans in the credit series used and the consideration of balances outstanding instead of new issues would tend to work against acceptance of the hypothesis to the extent that they imply a slower response by credit to monetary disturbances.

While the findings must be interpreted with the utmost caution, given the modest size of the sample and the aforementioned data limitations, it is worth pointing out some of the observations derived from Table 2. Starting with the tests using the intervention rate as an indicator of the stance of monetary policy, there is a clear rejection of the hypothesis that the coefficients of the intervention rate lags are zero in the commercial paper regression. What is more, judging by the t-statistic in the second column, there is a positive and statistically significant effect of the intervention rate on the behaviour of commercial paper.

As regards the regression with bank loans, the hypothesis that the intervention rate does not affect the volume of credit cannot be rejected, and, moreover, contrary to expectations, the sum of the coefficients is positive, although not significant. These findings may be explained, in part, by the evidence produced in other studies that credit responds with a certain time lag (sometimes longer than a year, which is the maximum lag considered in this paper) to monetary impulses.[10] This explanation is particularly relevant if, as in this study, the credit series includes long-term loans. On the other

the behaviour of commercial paper was clearly conditioned by the appearance of Treasury bills. As a matter of robustness, we repeated the tests for the period 1988:1–1997:11 by including a dummy variable of value 1 for 1988 (i.e. while the 1987 data appear as regressors), and the results did not change significantly.

[10] Thus Bernanke and Gertler (1995) point out that credit may rise in periods following a monetary policy tightening because consumers and firms may wish to soften the impact of cyclical swings on expenditure and output. Companies may, for instance, increase their volumes of stocks after a monetary tightening, going deeper into debt, albeit less than if credit markets were perfect.

hand, the findings are consistent with the fact that the intervention rate has increased in response to bouts of intense growth in lending in periods when economic activity has accelerated sharply.

The effects of the intervention rate on the composition variable are, because of the way the model is built, a combination of the previous findings. The hypothesis that the intervention rate does not affect the composition variable is rejected. At the same time, the sum of the coefficients for the intervention rate lags is, as expected, negative and significant. These findings suggest that monetary policy measures, by inducing changes in the conditions governing access to bank loans, lead to a recomposition of corporate liabilities.

The tests run with the MCI as indicator of the degree of tightness of monetary policy provide quite similar results. There is a clear rejection of the hypothesis that the coefficients of the MCI lags are zero in all the regressions. However, the sum of the coefficients of the MCI is now significant in the bank loans regression.

Complementing the above evidence are the findings of the test run on the causal relationship between the stance of monetary policy and the differential between the bank lending interest rate and the commercial paper interest rate. The hypothesis tested is that a monetary policy tightening leads to an increase in the relative cost of bank loans vis-à-vis commercial paper. A finding in favour of this hypothesis would be consistent with the evidence derived from the tests with the composition variable, since we would expect to find a close inverse relationship between the loan/commercial paper spread and the composition variable defined above.

The last row in Table 2 sets out the findings of this test aimed at ascertaining whether intervention rate lags (or, alternatively, MCI lags) help explain the behaviour of the bank loans/commercial paper spread. This spread, with and without adjustment for fiscal factors, is depicted in Chart 5.[11] There are two basic findings:[12] first, the hypothesis that the coefficients of the intervention rate are zero is rejected; and, secondly, there is a positive effect of the intervention rate on the spread considered.[13] These results hold when the MCI is used instead of the intervention rate. This evidence might be partially explained by the small size of the Spanish commercial paper market, which may induce a sluggish response of commercial paper rates to monetary policy shocks.

The results shown in Table 2 appear to point in the expected direction in the sense that, in response to a monetary policy tightening (identified by increases in the intervention rate or in a monetary conditions index), there is a relative increase in the cost of bank loans vis-à-vis the cost of commercial paper, and, in terms of the financing sources, a drop in the relative proportion of bank loans can be observed. These findings, in line with those obtained in Kashyap et al. (1993), thus argue in favour of the hypothesis that an active credit channel exists in the transmission of monetary impulses.

Given the time period taken, which includes a prolonged phase (relative to the sample size) of government restrictions on the growth of credit, it is essential to evaluate the extent to which the results obtained are conditioned by the existence of this period of direct controls on credit growth. To this end, the previous analysis was repeated by incorporating in the regressions with the intervention rate a dummy variable which assigns the value 1 for those months during which quantitative restrictions on credit were in effect. As expected, this dummy variable has a positive and significant effect on commercial paper and a negative effect on bank loans and the mix variable,

---

[11] Details of the adjustment for fiscal factors applied to bank lending and commercial paper rates are given in Cuenca (1994).

[12] The results of the tests with both definitions of the spread are very similar. In Table 2, the results with the spread without tax adjustment are presented.

[13] This finding is consistent with the increasing sensitivity of the bank lending rate to changes in the intervention rate since the late 1980s (see Box V.3 in Banco de España (1994)).

Chart 5

Domestic loans/commercial paper spread

Not adjusted for taxes   Adjusted for taxes

Source: Banco de España.

although in the case of loans the effect is not significant. At the same time, that dummy variable has a negative, although not significant, effect on the differential between the lending rate and the rate for commercial paper. Two possible ways to explain that sign are, first, the intense demand pressure in the commercial paper market during the period of credit restrictions; and, secondly, the possibility that, under those circumstances, banks might have considered that increases in their lending rates would translate into notable increases in the average risk of the projects they were financing.

The results of the causality tests – which took into account the phase of direct controls on credit growth – are shown in Table 3. With regard to the quantity variables, Table 3 shows, in the commercial paper and composition variable regressions, that the hypothesis that the coefficients of the intervention rate lags are zero continues to be rejected. The effect of the intervention rate on commercial paper continues to be positive, albeit less significant. Similarly, the impact on the composition variable is negative, but ceases to be significant. As to the relative cost of bank loans and commercial paper, a comparison of Tables 2 and 3 shows that the results do not change substantially and maintain the positive and significant effect of the intervention rate lags on the loan/commercial paper spread.

Comparing these results with those shown in Table 2, two conclusions can be drawn. First, the observed decline in the relative proportion of bank loans may be more pronounced in response to the introduction of direct controls on the growth of credit than in response to increases in the intervention rate. Secondly, the relative increase in the cost of bank loans vis-à-vis commercial paper in response to increases in the intervention rate appears to be a solid finding which also holds when the period of direct credit controls is taken into account.

Table 3

**Impact of the stance of monetary policy on corporate liability composition variables
and on the relative cost of bank loans and commercial paper**

$$\Delta x_t = \alpha_0 + \sum_{i=1}^{12} \alpha_i \Delta x_{t-i} + \sum_{i=1}^{12} \beta_i \Delta r_{t-i} + \sum_{i=1}^{12} \gamma_i \Delta \log A_{t-i} + seasonals + \psi_0 DUMCR$$

Dependent variable	r = intervention rate	
	1	2
Commercial paper	50.53***	2.12**
Bank loans	12.22	0.87
Composition variable [3]	50.00***	−1.04
Spread [4]	59.53***	4.32***

See notes to Table 2. The difference with respect to Table 2 is that the regressions on which the above results are based incorporate as a regressor a dummy variable ($DUMCR$) that takes values of 1 for observations in the July 1989 to December 1990 period.

The evidence so far presented is consistent with the findings in van Ees et al. (1994) for the Dutch case, which underline the lag in the response of bank loans to indirect monetary control measures and, hence, the lower degree of effectiveness of the credit channel in this case as compared with the introduction of direct controls. This finding would help explain the first of the conclusions discussed in the previous paragraph, especially if we bear in mind that we are considering the effect of the intervention rate on bank loans with a maximum lag of one year. Regarding the relationship between the credit channel and alternative ways of implementing monetary policy, it is worth looking at Tsatsaronis (1994), who analyses, for the past three decades, the existence of the credit channel in four countries: Germany, the United States, Japan and the United Kingdom. A priori, the credit channel might be expected to be more important in Japan and Germany, countries characterised by a high degree of bank involvement in corporate projects and where bank lending plays a greater role in corporate financing than it does in the United States or the United Kingdom. Nevertheless, Tsatsaronis finds evidence that the credit channel is most effective in the cases of Japan and the United Kingdom, both of which resorted, especially prior to 1980, to direct credit control mechanisms. This finding suggests that, as far as the effectiveness of the credit channel is concerned, more importance attaches to the type of monetary policy instrument used than to the relative weight of bank lending.

Conclusions

The analysis of the existence of a credit channel in the transmission of monetary impulses is a frequent topic in recent economic literature. Nevertheless, this area of research continues to suffer from certain limitations. On the theoretical level, there is a marked lack of microeconomic substantiation and a lack of precision in defining the credit channel concept. At the same time, the various empirical approaches, using alternative methodologies, are inevitably based on identification assumptions that are needed to determine to what extent changes in credit respond to alterations in credit supply or demand. Another limitation lies in the inability of the available tests to distinguish between the different transmission mechanisms that are classified together under the concept of credit channel. Finally, although there is some agreement regarding the existence of the credit channel, the quantification of its impact and the assessment of its importance in relation to the liquidity channel have yet to be addressed with due rigour.

In addition to briefly reviewing the theoretical arguments associated with the existence of the credit channel and distinguishing between the different meanings attached to it, this study

conducts a test of its existence based on Kashyap et al. (1993). Specifically, it tests the non-existence of alternative assets that could be perfect substitutes for bank lending as a bank asset, in such a way that restrictive monetary policy measures manage to reduce the supply of bank loans, and financial institutions do not fully accommodate the corporate demand for funds. If this condition is met and if companies do not have a perfect substitute for bank loans, the credit channel will operate.

More precisely, the findings of this study show that, in the event of a monetary policy tightening (for which the Banco de España intervention rate and, alternatively, a monetary conditions index serve as proxies), there is an increase in financing via commercial paper relative to funds obtained from financial institutions. Consistent with this, from the standpoint of prices, is the fact that a relative increase in the cost of bank loans vis-à-vis the cost of commercial paper is observed.

When the existence of a period of direct controls on the growth of credit is taken into account and its effect is excluded, the impact of changes in the intervention rate on the differential between lending and commercial paper rates is maintained, but its influence on the composition of corporate liabilities is more moderate. This finding partially weakens the evidence for the existence of the credit channel.

These findings are conditioned by the short sample period used and by the definition of credit employed (which includes lending to households and long-term loans). As indicated, the shortness of the sample period is especially worrying, given the possibly excessive weight in the analysis of the period of government restrictions on the growth of bank lending.

In addition, the short sample period available means that the analysis cannot consider effects with a time lag of more than one year. Given that the full response of lending to monetary policy measures can take longer, consideration of a larger number of lags would argue in favour of the findings obtained, i.e. acceptance of the hypothesis that changes in the stance of monetary policy affect corporate financial structure.

Finally, the tests presented in this paper cannot discriminate between the different versions of the credit channel concept. The use of microeconomic data is essential to distinguish between these alternative versions.

Appendix: data used

- Commercial paper held by the public. *Source*: Banco de España, Boletín Estadístico.

- Bank loans: we used the time series on the loans of credit institutions to other resident sectors (private sector). *Source*: Banco de España, Boletín Estadístico.

- Composition variable: defined as the ratio of bank loans to bank loans plus commercial paper.

- Banco de España intervention rate: to April 1990 we used the overnight assistance rate, and from May 1990 onwards the rate for the ten-day repurchase tender for Banco de España certificates. *Source*: Banco de España.

- Monetary conditions index: constructed with the weights being 1.5 to 1, interest rate to exchange rate.

- Industrial production index: general index with base year 1990. *Source*: Instituto Nacional de Estadística.

- Bank lending rate: we used the time series on domestic credit extended by banks and savings banks. *Source*: Banco de España.

- Commercial paper rate. *Source*: Banco de España.

On the method used to construct these time series on interest rates, with and without adjustment for fiscal factors, see Cuenca (1994).

References

Ayuso, J. and J. L. Escrivá (1993): "La evolución del control monetario en España". Banco de España, Working Paper, 9325.

Bacchetta, P. and F. Ballabriga (1995): "The impact of monetary policy and bank lending: some international evidence". *Papers ESADE*, 137, April.

Balke, N. S. and K. M. Emery (1994): "The Federal funds rates as an indicator of monetary policy: evidence from the 1980s". *Federal Reserve Bank of Dallas Economic Review*, 1st quarter, pp. 1-15.

Banco de España (1994): *Informe Anual 1993*.

Bernanke, B. S. (1993): "Credit in the macroeconomy". *Federal Reserve Bank of New York Quarterly Review*, Spring, pp. 50-70.

Bernanke, B. S. and A. S. Blinder (1988): "Credit, money and aggregate demand". *American Economic Review*, 78, pp. 435-9.

Bernanke, B. S. and A. S. Blinder (1992): "The Federal funds rate and the channels of monetary transmission". *American Economic Review*, 82, pp. 901-21.

Bernanke, B. S. and M. Gertler (1995): "Inside the black box: the credit channel of monetary policy transmission". *Journal of Economic Perspectives*, 9, pp. 27-48.

Cecchetti, S. (1995): "Distinguishing theories of the monetary transmission mechanism". *Federal Reserve Bank of St. Louis Review*, 77, pp. 83-97.

Chuliá, C. (1992): "Mercado español de pagarés de empresa". Banco de España, *Estudios Económicos*, No. 49.

Cuenca, J. A. (1994): "Variables para el estudio del sector monetario: agregados monetarios y crediticios, y tipos de interés sintéticos". Banco de España, *Working Paper*, 9416.

Dornbusch, R., C. Favero and F. Giavazzi (1997): "A red letter day?" Paper presented at the *Asset Prices and Monetary Policy Conference* held at Basle (January 1998).

Ees, H. van, H. Garretsen and E. Sterken (1994): "On the scope for monetary policy in a small open economy with fixed exchange rates and capital market imperfections". University of Groningen, *Research Report*, 9435.

Eichenbaum, M. (1994): "Comment" (on Kashyap and Stein), in G. Mankiw (ed.), *Monetary Policy*, University of Chicago Press, Chicago.

Gertler, M. and S. Gilchrist (1993): "The role of credit market imperfections in the monetary transmission mechanism: arguments and evidence". *Scandinavian Journal of Economics*, pp. 43-64.

Gertler, M. and S. Gilchrist (1994): "Monetary policy, business cycles and the behavior of small manufacturing firms", *Quarterly Journal of Economics*, 109, pp. 309-40.

Hubbard, R. G. (1995): "Is there a 'credit channel' for monetary policy?" *Federal Reserve Bank of St. Louis Review*, 77, May-June, pp. 63-77.

Kashyap, A. K. and J. C. Stein (1994): "Monetary policy and bank lending", in G. Mankiw (ed.), *Monetary Policy*, University of Chicago Press, Chicago.

Kashyap, A. K. and J. C. Stein (1995): "The impact of monetary policy on bank balance sheets". *Carnegie-Rochester Series on Public Policy*, 42, pp. 151-95.

Kashyap, A. K., J. C. Stein and D. W. Wilcox (1993): "Monetary policy and credit conditions: evidence from the composition of external finance". *American Economic Review*, 83, pp. 78-98.

Morgan, D. P. (1993): "Asymmetric effects of monetary policy". *Federal Reserve Bank of Kansas City Economic Review*, 2nd quarter, pp. 21-33.

Morris, C. and G. Sellon (1995): "Bank lending and monetary policy: evidence on a credit channel". Federal Reserve Bank of Kansas City Economic Review, 2nd quarter, pp. 59-75.

Oliner, S. and G. Rudebusch (1995): "Is there a bank lending channel for monetary policy?" *Federal Reserve Bank of San Francisco Economic Review*, 2, pp. 3-20.

Oliner, S. and G. Rudebusch (1996): "Is there a broad credit channel for monetary policy?" *Federal Reserve Bank of San Francisco Economic Review*, 1, pp. 3-13.

Peñalosa, J. (1996): "The financial position of agents and monetary policy", in *Monetary Policy and Inflation in Spain*.

Pill, H. (1997): "Bank behavior and monetary policy in a small open economy". *Mimeo*, Graduate School of Business Administration, Harvard University.

Romer, C. D. and D. H. Romer (1990): "New evidence on the monetary transmission mechanism". *Brookings Papers on Economic Activity*, 1, pp. 149-213.

Thornton, D. (1994): "Financial innovation, deregulation and the 'credit view' of monetary policy". *Federal Reserve Bank of St. Louis Review*, January-February, pp. 31-49.

Tsatsaronis, C. (1994): "Is there a credit channel in the transmission of monetary policy? Evidence from four countries". *Mimeo*, Bank for International Settlements.

Vega, J. L. (1992): "El papel del crédito en el mecanismo de transmisión monetaria". Banco de España, Estudios Económicos, No. 48.