



Enterprises' financing structure and their response to monetary policy stimuli

An analysis based on the Deutsche Bundesbank's
corporate balance sheet statistics

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Discussion paper 9/96
Economic Research Group
of the Deutsche Bundesbank

November 1996

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ISBN 3-932002-32-6

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Summary

The traditional monetary policy transmission mechanism is based on the fact that, in the wake of a restrictive monetary policy stance, the interest rate rises and that therefore interest-rate-related variables, such as corporate asset formation, decline or increase less sharply than at the given interest rate. For some years now economists - especially in the Anglo-Saxon countries - have been discussing the credit channel approach, which embraces the credit supply as well as the interest rate channel. A crucial factor in this context is that information between the lender and the borrower is asymmetric. This primarily affects small enterprises, whose creditworthiness is, as a rule, not as good as that of large firms and which are heavily reliant on bank credit. The credit channel theory states that, for small enterprises, a stricter monetary policy stance results in a higher cost of borrowed funds than for larger enterprises or even in credit rationing. The result is that this group of enterprises cuts its asset formation particularly sharply.

A number of studies have confirmed the existence of the credit channel, particularly for the United States. By contrast, only few German studies to date have analysed the susceptibility of enterprises' investment behaviour to monetary policy stimuli in the context of the credit channel. The verification of this link is the subject of the present study. The Bundesbank's corporate balance sheet statistics serve as a database. These statistics include not only enterprises subject to disclosure requirements but also relatively small firms, which dominate the German corporate landscape. A simple descriptive-statistical approach was chosen for the evaluation owing to the limitation to group data and to periods with a restrictive monetary policy. To this extent, this research is a first contribution to the credit channel discussion in Germany.

The existence of the credit channel cannot be demonstrated empirically by means of the available source material for Germany, in contrast to the United States. Regardless of the period under review and the legal form of the firms, bank loans and other liabilities as well as the cost of credit provide no indication for any discrimination of smaller enterprises by banks in the wake of a restrictive monetary policy stance. Two aspects no doubt play a role in this context: the house bank principle, which is widespread in Germany, and the nature of

bankruptcy legislation and property law, which in Germany is more favourable to creditors than abroad, reduce the asymmetric distribution of information between banks and small firms.

The source material used constitutes a positive sample of enterprises, however. Owing to the construction of cylindered samples it comprises enterprises which are at least five years old, i.e. it contains no very young firms. Moreover, the data are derived from the annual accounts submitted in the context of rediscount business, which means that the enterprises sampled all have a relatively good creditworthiness. Even if, consequently, hardly any "marginal firms" are included in the source material, the rejection of the credit channel hypothesis for the core of the manufacturing sector ultimately seems to be quite justified owing to the specific institutional regulations in Germany.

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Enterprises' financing structure and their response to monetary policy stimuli - an analysis based on the Deutsche Bundesbank's corporate balance sheet statistics*

1. Introduction

Up to about the middle of the eighties the model of frictionless or perfect financial markets prevailed in macroeconomics. The financial system only had the character of a "veil". Both the traditional textbook IS/LM analysis and real business cycle models set out from this assumption. For over ten years now an extensive literature based on the market error of asymmetric information flows between lender and borrower¹ has been emerging which shows that the financial sphere certainly can influence real economic developments. The monetary policy transmission mechanism is also affected by this. Besides the usual interest rate channel, the so-called credit channel has a bearing. Interest-rate-related responses of economic agents are intensified by information-related restrictions of the credit supply. This mainly affects small enterprises whose creditworthiness is, as a rule, worse than that of large firms and which are particularly reliant on bank loans. A restrictive monetary policy stance then results not only in higher interest rates on securities but also in relatively higher costs of borrowed funds or even in credit rationing for small enterprises owing to moral hazard and adverse selection. The consequence is - according to the credit channel literature - that this group of firms has to cut its asset formation particularly sharply. Hence, monetary policy has a different effect on enterprises depending on their size. There were similar approaches during the fifties, but it was only in the context of the discussion on the credit channel that these ideas were given an extensive microeconomic foundation through the integration of information economics in the transmission mechanism.

The discussion on the credit channel is currently still in full swing and unlikely to be concluded for a long time.² This applies, in particular, to the studies which seek to verify

* I should like to thank J. Clostermann, R. Fecht, H. Friderichs, M. Kiesel, M. Scheuer, S. Schich, F. Seitz and A. Worms as well as the participants in a workshop at the Deutsche Bundesbank for their valuable suggestions and comments.

¹ This market error can be characterised as follows: "In financial markets, informational asymmetries are particularly pronounced. Borrowers typically know their collateral, industriousness, and moral rectitude better than do lenders; entrepreneurs possess 'inside' information about their own projects for which they seek financing." (Leland/Pyle, 1977, p. 371).

² An overview of the state of the discussion can be obtained from the account of proceedings "Channels of Monetary Policy" (Federal Reserve Bank of St. Louis, 1995) and from the Journal of Economic Perspectives (9, 1995).

the theoretical approach empirically and to ascertain its macroeconomic significance. So far a great number of US studies have found indications suggesting the existence of the credit channel; however, on closer examination, their validity is not completely convincing. The difficulty is, in particular, that an identification problem has to be solved. The credit channel argument is based on supply-side responses in respect of bank loans, whereas in the traditional approach the trend in bank loans is determined by demand. By contrast, the only observable factor is the "equilibrium" credit volume, in which supply and effective demand are identical.

For Germany there have only been a few studies to date which deal with the dependence of enterprises' behavioural responses on the financing structure; this applies above all to the linkage of this phenomenon to the monetary policy context. The verification or negation of this link is the subject of the present study. The Bundesbank's corporate balance sheet statistics serve as a database. These statistics are superior to other available databases both in terms of quality and volume. A particular advantage is the fact that these statistics cover not only large public limited companies - as is mostly the case in the literature - but also relatively small firms, which dominate the German corporate landscape and which are most likely to be affected by the existence of a credit channel, according to theoretical perceptions. Owing to the limitation to group data and to periods of a restrictive monetary policy stance, a simple descriptive-statistical approach was chosen for the empirical evaluation. Based as it is on the corporate balance sheet statistics, this study is to be seen as a first contribution to the credit channel discussion for Germany.

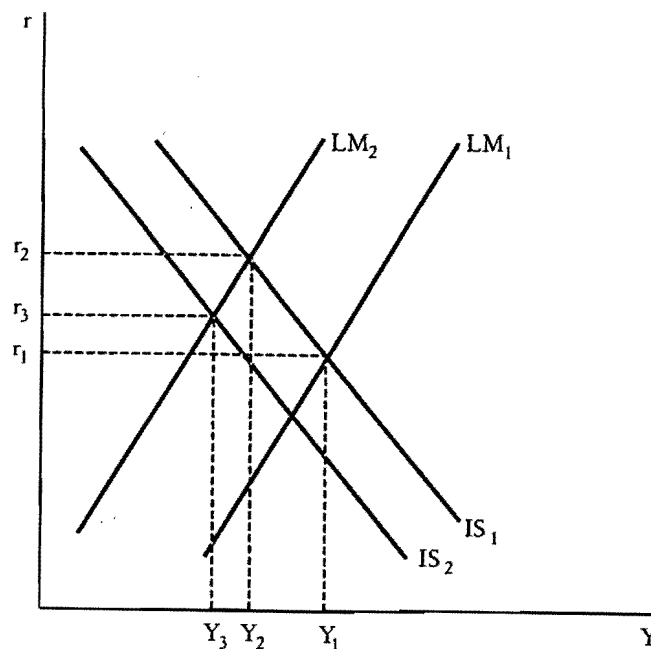
The study begins with a brief overview of the credit channel approach. First of all, the traditional textbook transmission channel is outlined so as to be able to elaborate the characteristics of the credit channel more clearly in section 3. Apart from the description of the theory, particular importance has been attached to the numerous empirical approaches which have so far been developed to solve the identification problem (section 4). Section 5 provides an empirical analysis on the basis of the Bundesbank's corporate balance sheet statistics. Following a detailed description of the data and methodology used, the periods 1978-82 and 1988-93 are examined to see whether the existence of the credit channel can be demonstrated for Germany. The final section critically discusses the results and considers possible approaches for further research in this field.

2. Conventional transmission mechanism

The traditional transmission mechanism known from macroeconomic textbooks, which is also known as the interest rate channel or money view channel,³ can be briefly described as follows: a reduction in the money stock, regarded as an exogenous variable, results in an increase in the interest rate which leads to a reduction in asset formation by virtue of the optimum condition that the interest rate equals the marginal productivity of capital. In line with this, interest-rate-related consumption declines as well. In the IS/LM diagram, this leads to a shift of the LM curve to the left - from LM_1 to LM_2 - given a movement along the IS_1 curve (see figure 1; for the IS_2 curve, see section 3.3). At least in the short term, without further price adjustments, monetary policy has a real impact since overall output declines from Y_1 to Y_2 . In these models there are only two financial assets, namely money and securities, with all other possible assets being regarded as perfect substitutes for securities. A further key characteristic is the assumption of a perfect capital market. This means, firstly, that the financial structure of enterprises has no significance for real decisions (Modigliani/Miller, 1958) and, secondly, that banks play only a passive role in economic activity (Fama, 1980). These properties are ultimately reflected in the idea that the supply of financial resources is completely elastic vis-à-vis the prevailing interest rate. Overall, the financial sphere has the character of a "veil".

Transmission and IS/LM model

Figure 1



³ Mishkin (1995) gives an overview of different transmission channels.

3. Credit channel approach

In the mid-eighties several US economists attempted to supplement the traditional monetary transmission channel by a microeconomically founded approach. This was triggered, in particular, by the observation that fixed asset formation and stockbuilding frequently responded strongly to restrictive monetary policy measures, although the central bank's interest rate changes tended to be small. A suitable basis for the explanation was a research theory which, since Jaffee/Russell (1976) and Stiglitz/Weiss (1981), had dealt with information problems in the financial markets. As a result, on the basis of asymmetric information between lender and borrower, both the existence of banks and the financing structure of economic agents were accorded significance for the real sphere; this means that the paradigm of the "veil" of the financial system and of the perfect capital market was abandoned.⁴ A key feature of the credit channel argument is that bank loans play an important role. They can no longer be regarded as a perfect substitute for securities but instead have to be integrated into the transmission process as an autonomous asset. Monetary policy measures no longer affect only the interest rates for securities but also the credit supply, i.e. the interest rate charged on bank loans.⁵ In this way a restrictive monetary policy stance may have a relatively great impact on asset formation, even though central bank interest rates rise only slightly. The basic features of the approach described here were already discussed in the fifties under the heading "availability doctrine", but the approach now has a much firmer microeconomic foundation since the "supply problems" are no longer specified exogenously.⁶ In terms of its intention, the credit channel theory is ascribable to new Keynesian macroeconomics, which seeks, in contrast to new classical macroeconomics and the real business cycle theory, to substantiate disequilibria or cyclical fluctuations, i.e. traditional Keynesian positions, by taking account of market failures, such as external effects, imperfect competition and asymmetric information.⁷ The literature on the credit channel meanwhile distinguishes two variants - the balance sheet channel and the bank lending channel - which are based on different mechanisms but ultimately have

⁴ The fundamental importance of the financial sphere has been repeatedly discussed since the fifties without ultimately predominating over the irrelevance hypothesis. Examples are Gurley/Shaw (1955, 1960), Minsky (1975) and Kindleberger (1978). A detailed overview of the "older" literature is given by Gertler (1988).

⁵ As Gertler/Gilchrist (1993, pp. 45-50) strongly emphasise, the credit channel is based on corresponding interest rate movements, with the result that the market is cleared, and/or on slow interest rate adjustments coupled with credit rationing.

⁶ A brief description of the availability doctrine and the basic features of the credit channel approach is given by Issing (1993, pp. 148-152).

⁷ Illing (1992) attempts to classify the various theoretical approaches.

similar effects. Before dealing with the economic policy implications, the two channels will initially be explained in greater detail.

3.1. Balance sheet channel

For the balance sheet channel, which is also called the "broad credit channel" or "financial accelerator" in the literature, the influence of monetary policy on the goodwill or net wealth of the firm is paramount.⁸ The theory postulates that a restrictive monetary policy reduces the (net) wealth or creditworthiness of the enterprise and thus its access to bank loans - either through credit rationing or a corresponding increase in lending rates. As a result, asset formation falls below the interest rate channel. The balance sheet channel primarily affects small enterprises because their financial position or creditworthiness is less favourable than that of large firms and because a further deterioration is likely to lead to financing bottlenecks. In the literature several possibilities are discussed to establish how monetary policy may affect the "net wealth" of a firm (see Mishkin, 1995). Probably the oldest variant can be ascribed to Fisher (1933) and describes an unexpected decline in the price level as a result of a restrictive monetary policy. The consequence is a rise in real debt or a fall in net wealth. Besides this, an increase in interest rates is frequently associated with a decrease in share prices, which likewise indicates a decline in net wealth. If goodwill is regarded as the present value of all future income surpluses, a higher interest rate (or discounting factor) reduces the net wealth and therefore the creditworthiness of the enterprise. A reduction in net wealth results in an increase of moral hazard and adverse selection. In order to absorb the associated risks, the lenders will have to intensify their credit assessment and monitoring activities, which is compensated for by an add-on to interest rates in the form of a premium.⁹ Figure 2 shows this for the microeconomic case. The firm's own funds are limited to volume E. Borrowed funds, which are needed to effect additional asset formation, are available in the case of the perfect capital market in unlimited amount at the interest rate r_1 ; r_1 corresponds at the same time to the opportunity cost of internal financing. At a given demand D and a credit supply curve S_{VK} , an investment volume I_{VK} results. If the market failure of asymmetric information is

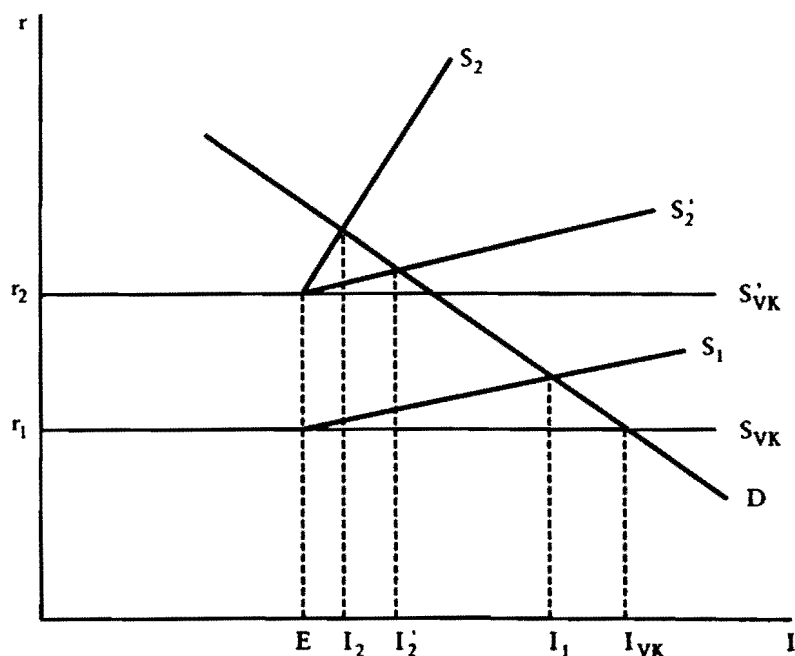
⁸ Analogous considerations are possible in respect of households. So far, however, the discussion has centred on the corporate sector (Bernanke/Gertler, 1995, pp. 44-45).

⁹ In the case of credit rationing the interest rate does not respond at all or responds only marginally and, instead, the adjustment is made via the credit supply. Since the losses to be expected exceed the interest yield, the interest rate is not raised correspondingly, despite positive excess demand.

admitted, S_1 is the valid supply curve;¹⁰ owing to the higher equilibrium lending rate (compared with the securities rate), asset formation falls to I_1 . Given asymmetric information, the S_1 slope can be explained by the fact that in the case of outside financing moral hazard increases and is offset by higher interest rates. An increase in securities rates from r_1 to r_2 triggered by the central bank "normally" leads to a parallel shift in the credit supply curve. As a result of the higher interest rate, asset formation is reduced to I'_2 . If account is also taken of the decrease in net wealth, the credit supply curve S_2 is steeper. The costs incurred as a result of the information problems must be paid for in the form of a higher lending rate. The asset formation volume amounts to I_2 .¹¹ The costs of the financial accelerator can be seen in the fact that even less is invested than in the second-best state.

Credit channel in microeconomic terms

Figure 2



¹⁰ This argumentation largely follows Oliner/Rudebusch (1996a, pp. 4-5). Hubbard (1995, pp. 75-77) gives a formal exemplification of the balance sheet channel theory.

¹¹ This result can also be derived in the case of credit rationing if the lender restricts his credit supply to EI_2 - at the prevailing interest rate.

3.2. Bank lending channel

The bank lending channel is based on the assumption that small firms are largely reliant on bank loans, whereas large enterprises may obtain financial resources through several channels. Owing to asymmetric information, small enterprises, in particular, are unable to tap additional sources of finance through the issue of shares or securities. A restrictive monetary policy stance causes banks to cut down the imperfect substitutes loans and securities in the wake of a reduction in their deposit base. Since no alternative outside funds are available, the credit supply decreases and the cost of credit rises more sharply than the securities rate. The bank lending channel, too, can be illustrated by means of figure 2. S_1 is the credit supply curve given asymmetric information, the common basis of the bank lending and balance sheet channels. Owing to the unequal state of information, external financing is more expensive than internal financing. The perfect capital market is characterised by S_{VK} as a benchmark. An increase in securities rates from r_1 to r_2 as a result of a tighter monetary policy leads not only to a parallel shift of S_1 but to a spiralling as a result of the scarcer credit supply mentioned. The relevant supply curve is described by S_2 ; the amount of asset formation is I_2 at the prevailing equilibrium lending rate. In spite of different mechanisms, the bank lending channel and the balance sheet channel ultimately arrive at the same result. The bank lending channel is strongly disputed in the literature, however.¹² In particular, it is questioned whether, in the wake of financial innovations, the credit supply really can be rigorously restricted. For banks - and this is the prevailing argumentation in the United States - may increasingly decouple themselves from monetary policy by obtaining funds, for example, through certificates of deposit not subject to minimum reserve requirements so as to be able to continue to meet enterprises' requests for credit. To this extent, recent developments in the financial market sphere are likely to have at least resulted in a weakening of the bank lending channel theory. "In summary, because of financial deregulation and innovation, the importance of the traditional bank lending channel has most likely diminished over time" (Bernanke/Gertler, 1995, p. 42). Compared with the bank lending channel theory, which appears to be very "mechanistic", the balance sheet channel argument seems to be more convincing. In more recent articles, the bank lending channel - though in a slightly modified form - is treated as a special case of the balance sheet channel (see section 4.1). The creditworthiness of small banks (like that of small enterprises) declines more sharply in the case of a restrictive monetary policy than

¹² Compare the statements by Thornton (1994), Bernanke/Gertler (1995) and Morris/Sellon (1995).

that of large banks which, in turn, has an adverse impact on both the procurement of funds and lending.

3.3. The credit channel and its economic policy significance

An interesting aspect of the credit channel is that monetary policy no longer has a symmetric effect on economic agents but, for information-related reasons, a selective one; as a rule, small enterprises are likely to be affected more strongly by restrictions in the credit supply than large ones.¹³ Monetary policy may then even have regional effects owing to varying geographical locations of firms (see Carlino/DeFina, 1996). As a result of the asymmetric effects on the corporate landscape, interest rate subsidies and other government assistance for corporate loans, such as warranties and guarantees, may be understood as measures which - contrary to the usual opinion - do not necessarily "weaken" monetary policy on account of the lower cost of finance but instead may smoothen the selective effect of restrictive monetary policy stimuli (see Bernanke/Gertler, 1990, pp. 104-109).

Compared with the interest rate channel, the credit channel implies a stronger effect of monetary policy on real economic variables as a result of the additional restriction in the form of bank lending. In the IS/LM model this is reflected in the fact that a restrictive monetary policy not only results in a shift in the LM curve - as usual - but also in the IS curve since, in keeping with the microeconomic analysis, asset formation additionally depends on the lending rate or the availability of credit.¹⁴ Hence, output declines more sharply over the short term than in the model with the perfect capital market. In figure 1 this is reflected by a shift in the IS curve from IS_1 to IS_2 and in a fall in output from Y_2 to Y_3 . It is to be noted that such a reaction may also be evoked by other occurrences which have an adverse effect on bank lending, such as bank runs. To this extent, credit problems - triggered by any kind of shocks - fundamentally contribute to explaining cyclical fluctuations; monetary policy is ultimately only one possible variant for producing supply restrictions.¹⁵ Conversely, the credit channel at the same time provides a new interpretation

¹³ This selective effect of monetary policy on small and large enterprises was discussed by Galbraith (1957), Meltzer (1960), Bach/Huizenga (1961), Siber/Polakoff (1970) and Ou (1979).

¹⁴ Compare Bernanke/Blinder (1988) and Greenwald/Stiglitz (1990). For a comprehensive attempt at integrating imperfect financial markets in macroeconomic models, see Schlick (1994).

¹⁵ "At all events, taking account of imperfect information ... offers a promising new possibility of designing explanations for the links between monetary and real variables. Information problems are no doubt more than only insignificant disturbing factors in realising Walrasian equilibria." (Clemenz, 1987, p. 247). Tighter credit restrictions owing to asymmetric information also serve to explain financial crises such as the Great

of the Keynesian liquidity trap. Expansionary monetary policy measures do not lead to an increase in output if other factors effectively impede lending and the banks frustrate monetary policy through sluggish interest rate adjustments (see Gischer, 1988, p. 136).

The question of what responsibility monetary policy is assigned for business activity is ultimately at the centre of the economic policy implications of the credit channel approach. On the one hand, the ability to influence the economic situation tends to become greater as a result of the additional supply effect. This may lead to the call to handle a restrictive policy more cautiously so as to moderate the downswing. Conversely, the opportunities of stimulating business activity improve.¹⁶ On the other hand, the transmission channel becomes more complicated and less calculable owing to the interaction of information asymmetries and institutional conditions, with the result that it may seem expedient to refrain from fine-tuning measures. To this extent, the credit channel also provides a substantiation for a steady monetary policy (see Neuberger, 1994, p. 31; Neumann, 1995, p. 141).¹⁷

Depression (Bernanke, 1983) or the "credit crunch" during the 1990-1 recession in the United States (Hubbard, 1995, p. 63).

¹⁶ Even in the credit channel literature itself, however, there is disagreement about whether the credit channel may generate additional positive effects in a period of expansionary monetary stimuli (see Oliner/Rudebusch, 1996a, pp. 4, 9-10).

¹⁷ On the basis of a Keynes-oriented approach, a rejection of active anti-inflation policies can thus be derived. Illing (1992, pp. 195-198) speaks in this context of a theoretical foundation of regulatory policy by new Keynesian macroeconomics.

4. Empirical foundation of the credit channel

4.1. Approaches to solving the identification problem

On account of the phenomenon of information asymmetries, the extension of the traditional transmission mechanism to include the credit channel appears to be meaningful. However, the theoretical framework needs to be supplemented by an empirical foundation: firstly, in order to substantiate the credit channel hypothesis and, secondly, to be able to assess the macroeconomic significance of this new variant. Most of the studies which are to be found in the literature deal with the extent to which the credit channel can be verified empirically. The central problem is to identify whether the movement of credit can be explained by the demand side or by the supply side. The fact that there are now a great number of approaches using the most varied methods and data sources shows how difficult it is to tackle this identification problem. Owing to the lack of knowledge about supply-side credit restrictions gained through surveys, recourse must be had to indirect investigations based on evaluating statistics. In the first place, banking and corporate statistics are used; some studies also seek to obtain information on the credit channel on the basis of interest rate data. The following sections give a brief overview of the individual variants using exclusively US literature. Attempts have also been made to demonstrate the existence of the credit channel empirically for some other countries.¹⁸ Studies on the credit channel in Germany are then discussed in the subsequent section.

An example frequently cited to demonstrate the existence of the credit channel is the study by Bernanke/Blinder (1992). Using a VAR approach, they examined the behaviour of bank aggregates and overall economic variables in the wake of a restrictive monetary policy. They showed that in the United States bank loans declined perceptibly with a time lag of approximately three quarters. At the same time, a rise in unemployment was found. As deposits and securities holdings started to rise again - after a decrease in the first nine months, they interpreted these observations as evidence of the operation of the credit channel. "The fact that the timing of the responses of loans and unemployment to monetary policy innovations are so similar is circumstantial evidence that this channel is operative ..." (Bernanke/Blinder, 1992, p. 920).

¹⁸ For example, for Canada: Bank of Canada (1995), for the United Kingdom: Dale/Haldane (1993), for Italy: Buttiglione/Ferri (1994), for Japan: Hoshi/ Kashyap/Scharfstein (1991).

The conclusion by Bernanke/Blinder has met with severe criticism in the literature, however.¹⁹ After all, the response of bank loans might just as well have been triggered by the traditional interest rate channel. Rising interest rates imply lower asset formation and thus lower demand for credit - albeit with a certain time lag. In order to be able to distinguish between supply-side and demand-side reactions, a number of studies consider other forms of credit in addition to bank loans - as a measure of the effective demand for funds. If there are disturbances on the supply side, bank loans are likely to decrease relative to other borrowed funds.²⁰ On the other hand, the fact that all forms of credit decrease in the wake of a restrictive monetary policy, i.e. that their proportions remain constant, argues for the existence of the interest rate channel. This idea was taken up by Kashyap/Stein/Wilcox (1993) who monitored the movement of commercial paper in addition to that of bank loans. They showed that a restrictive monetary policy is associated with a decline in bank loans and a concurrent increase in commercial paper. This suggests that the corporate sector has a demand for credit which is not satisfied by the banks on account of supply restrictions.

One objection to the studies outlined so far is that they are based on aggregated data. Kashyap/Stein/Wilcox (1996) extended their study of 1993 by means of a disaggregated analysis at the corporate level so as to be able to make more differentiated statements.²¹ For small firms the ratio of bank loans to trade credits declined, whereas trade receivables increased in the case of large firms. The increase in commercial paper that was simultaneously observed ultimately served to finance the loans to small firms. The credit restrictions imposed by the banks were at least partly offset by means of credit operations between enterprises. In addition, Kashyap/Stein (1995) conducted similar investigations for small and large banks. The reason for this is that large banks, in particular, do not necessarily have to respond to a restrictive monetary policy by lowering their credit supply as they have alternative options and the net wealth of small banks decreases more sharply than that of large banks - as in the balance sheet channel scenario (see section 3.2). The authors confirm these hypotheses and show that the lending behaviour of banks differs according to their size.

¹⁹ Even the co-author Bernanke has meanwhile dissociated himself from the "circumstantial evidence" (see Bernanke/Gertler, 1995, p. 44).

²⁰ In most theoretical credit channel approaches, only bank loans and securitised debt are regarded as external financing. The corporate balance sheets show other forms of credit as well, however. These are predominantly intercompany loans such as trade credits. If the supply of bank loans is restricted, firms may try to resort to such "substitutes". For the information-theoretical preconditions of such responses, see section 5.2.3 (footnote 49).

²¹ That study resulted from a criticism of the aggregated analysis by Oliner/Rudebusch (1995, 1996b).

Most empirical studies on the credit channel use corporate data and examine the extent to which asset formation and stockbuilding are influenced by "financial variables". The starting point of this research was the study by Fazzari/Hubbard/Petersen (1988) who tested the significance of the cash flow for asset formation for various groups of enterprises using panel data (combined cross-sectional and longitudinal-sectional data). Subsequently, a great number of similar studies were carried out.²² They ultimately came to the conclusion that the elasticity of the liquidity parameter is distinctly higher and more significant for small enterprises than for large firms. Besides the estimation of an explicit asset formation function, there are also some studies, for example Hubbard/Kashyap (1992) and Whited (1992), which use the Euler equation to test whether investment behaviour depends on financial restrictions. This was triggered by a dispute about the extent to which the significance of liquidity variables actually reflects financing constraints. This can be avoided by testing the first-order condition derived from the "dynamic" optimisation calculation, i.e. the Euler equation. The advantage of this method is that no complete asset formation functions have to be specified.²³

Besides this core of corporate studies, further approaches are found in the literature which demonstrate the relevance of the financing structure and, moreover, establish a direct link with monetary policy measures. Gertler/Gilchrist (1994), for example, investigated stockbuilding via a simple descriptive-statistical means, using a VAR model and finally by estimating a function for stockbuilding.²⁴ As a result of all three approaches it is found that the stocks of small enterprises decrease considerably more sharply than those of large enterprises in the wake of a restrictive monetary policy. The different reaction of bank loans is identified as a cause. Parallel to the deterioration in the financial position, the trend in bank loans is much more restrained for small firms than for large ones. This result is interpreted as indicating that small enterprises are hit harder than large ones by a tightening of the monetary policy stance through credit supply restrictions and that therefore their stock levels respond more strongly as well.

As an alternative to the studies of the movements of different forms of credit, one may attempt to test for the credit channel by means of the trend in the cost of credit. In the case of credit supply restrictions, it is likely as a rule that lending rates will rise more sharply

²² Other studies, for example Sharpe (1994), examined the dependence of the level of employment on firms' financing structure.

²³ For a comprehensive comparison of the two approaches, see Chirinko (1993). For a critical discussion, see section 5.1.

²⁴ Oliner/Rudebusch (1996a) analysed the relevance of the financing structure in periods of a restrictive monetary policy by means of fixed asset formation.

than market rates²⁵ or even respond more slowly as a result of credit rationing. The idea is simple, but its empirical implementation is difficult. Statistics on bank lending rates are relatively poor and, in addition, other terms are stipulated in loan agreements besides interest rates, such as the amount of collateral and the possibilities of influencing business activity. "The problem is that the true 'price' of a bank loan is multidimensional, involving not only the contractual interest rate but a variety of other terms and conditions ..." (Bernanke, 1993, p. 58). Hence, interest rates may move in line with market rates, whereas other variables, which can hardly be monitored, are adjusted. This may mean that the "true" interest rate rises much more sharply. Various reasons are mentioned in the literature to explain why lending rates may actually respond more slowly than the market rate.²⁶ For example, in periods of a restrictive monetary policy banks raise their interest rates less than expected in order not to increase the insolvency risk of their customers; in expansionary periods, by contrast, the scope for cutting rates is not fully utilised by way of compensation. In their multi-country study Cottarelli/Kourelis (1994) showed that the fluctuation of interest rates depends on a great number of institutional factors and is not always attributable to the market failure of information asymmetries. Owing to the difficulties described, most other authors express the opinion that hardly any conclusions on the credit channel can be derived from published interest rate data (see Davis, 1995, p. 58).

Even if a number of studies suggest that the credit channel exists, this says little about its macroeconomic significance. Even for the United States there have been few investigations into this question and, moreover, they arrive at divergent results. McCallum (1991) found for the period 1950-85 that about half of the change in gross domestic product (GDP) caused by the restrictive monetary policy was attributable to credit rationing. By contrast, the relevance of the financial sphere for macroeconomic variables was considered to be rather small by Berger/Udell (1992) and Fuerst (1995). The former used microdata, namely just over 1 million credit agreements, for assessing credit rationing. They showed that, while there are supply restrictions on the part of the lenders, one cannot speak of a macroeconomically significant phenomenon. Finally, Fuerst integrated money market and financial market imperfections into a real business cycle model. However, the resulting fluctuations hardly differed from the results obtained with perfect markets.

Even if a number of studies show positive results for the existence of the credit channel for the United States, it would be premature to simply transfer such studies to other countries. It is precisely the institutional differences, such as the relationship between banks and

²⁵ In this context market rates are understood to mean money market and capital market rates.

²⁶ See Berger/Udell (1992, p. 1049).

enterprises, which may well influence the "operation" of the credit channel. An informative example of the relevance of national peculiarities is the study by Hoshi/Kashyap/Scharfstein (1991) for Japan. Firms which are organised in industrial associations ("Keiretsu") traditionally have very close relationships with their house bank. It is found that such enterprises are less affected by credit restrictions than enterprises outside the "Keiretsu".

4.2. Credit channel in Germany?

In contrast to the United States, there are only a few studies for Germany which investigate the relevance of the financing structure of enterprises and credit supply restrictions by banks. Both Frisse/Funke/Lankes (1993) and Winker (1996) stated that financial variables play an important role for corporate asset formation. Whereas the former used data of listed public limited companies from the industrial and distribution sectors and carried out a panel study similar to Fazzari/Hubbard/Petersen (1988),²⁷ a large number of approaches are found in Winker. What is interesting is the attempt to demonstrate credit rationing directly, i.e. by means of survey data on obstacles to innovation from the ifo innovation, investment and business surveys. It is difficult to assess, however, how reliable enterprises' answers concerning restrictions by banks are. In addition to the microeconomic confirmation of credit rationing, Winker tries to assess also the macroeconomic effects of this phenomenon. For this purpose, the aggregated credit supply and credit demand functions were estimated in a first step and it was shown that a positive excess demand of roughly 10 % of the credit volume existed in 1985. This had similar effects on macroeconomic asset formation. As a result of credit not granted, asset formation was about one-tenth lower than it would have been in the absence of rationing. It is to be critically noted that a positive excess demand was found for 1985 but not for 1981. According to Winker, the market cleared in 1981, despite very high central bank interest rates and the recession. Theoretical considerations would suggest the emergence of credit supply problems, particularly during such a phase.

Attempts were made to produce further evidence for the relevance of the financial sphere in Germany by evaluating the Bonn sample, which is based on the annual accounts of public limited companies from the industrial sector. Elston/Albach (1994) discussed the investment behaviour of firms which are designated as "bank-dependent" since banks were also shareholders in them. The so-called independent enterprises were then compared with this control group. For the period 1983-92 the authors demonstrated that liquidity variables influenced the investment behaviour of independent firms, whereas enterprises with close

²⁷ For the link between the labour demand function and the financing structure for Germany, see Frisse/Funke/Lankes (1992).

ties to their banks showed no financing restrictions. These results indicate that the structure of the German banking system is an aspect that should not be neglected. This was already pointed out by Cable (1985, pp. 129-130) in an earlier study for Germany: "Empirical estimates show that ... there is a significant, positive relationship between the degree of bank involvement in leading industrial companies and their financial performance." In a further study Audretsch/Elston (1994) classified enterprises by size categories (small, medium-sized, large). However, the results can hardly be used as evidence for the common hypothesis that small firms are most affected by credit rationing, for in the estimation period 1977-85 the liquidity parameter was highly significant and showed the highest value, particularly for the large public limited companies.

Neuberger (1994) tried, on the basis of credit and interest rate data, to analyse supply-side credit disturbances. She investigated the extent to which the trend in lending or lending rates can be explained by corporate insolvencies. Ultimately, no indication of a credit disturbance on the supply side, i.e. by banks, was found.

The studies quoted so far examined the significance of the financing structure from various angles. However, none of the studies locates this aspect directly in the monetary policy context, as is the case with foreign studies. An exception is the investigation by Tsatsaronis (1995) who tested the existence of the credit channel in periods of a restrictive monetary policy for the United States, the United Kingdom, Japan and Germany. By means of aggregated data and using different statistical methods, he concluded from the reactions of output, the money stock and the credit volume that there are hardly any indications of the existence of the credit channel for Germany. "... monetary policy in Germany seems to work mainly through the conventional 'money' channel." (Tsatsaronis, 1995, p. 167).

Owing to the different findings in the individual studies, the operation of a credit channel for Germany, in addition to the traditional interest rate channel, cannot be established unambiguously. Particularly studies based on corporate data show no direct link with monetary policy measures and can therefore give only initial indications of the phenomenon in question. In addition, owing to their limitation to listed public limited companies, the databases are not a representative yardstick for Germany. By contrast, as described at the beginning of the paper, the Deutsche Bundesbank's corporate balance sheet statistics offer the advantage that they include small and medium-sized firms as well as unincorporated enterprises. For according to the theoretical predictions, the credit channel is likely to affect precisely these firms. In the course of the present study the corporate balance sheet statistics will be evaluated with respect to this question for periods of restricted monetary stimuli. First, however, the methodology and the database are described.

5. Credit channel in the light of the corporate balance sheet statistics

5.1. Database and methodology

The Bundesbank's corporate balance sheet statistics are based on the annual accounts submitted in the context of rediscount business. The annual accounts are the basis of the statutorily prescribed examination of the creditworthiness of parties to bills of exchange. According to section 19 of the Bundesbank Act, the Bundesbank is required to purchase only bills "backed by parties known to be solvent". As a result, comprehensive source material in the form of profit and loss accounts and balance sheets is available only for economic sectors in which the trade bill is an important financing instrument. These sectors primarily include the manufacturing and construction sectors as well as the wholesale and retail trade. In the present study only the data for the manufacturing sector are used, however, since the database for this sector is the most comprehensive in the context of the Bundesbank statistics and, at the same time, statements can be made on the most significant and cyclically susceptible economic sector in Germany.²⁸

Since the literature on the credit channel deals primarily with restrictive monetary policy periods, this study is likewise confined to such periods. Accordingly, two cylindered samples for the years 1978-82 and 1988-93 were formed from the source material available to the Bundesbank; this means that the firms included in each sample submitted annual accounts to the Bundesbank for every year of the review period. In the first period the sample comprises 13,163 enterprises and in the second 10,027 firms. The two periods were chosen because clear monetary policy phases or monetary stimuli can be identified.²⁹ This assessment was based on the trend in central bank interest rates and on the statements made in the Bundesbank's Annual Reports on the orientation of monetary policy. This procedure follows the narrative approach of Romer/Romer (1989) and the approach taken by Bernanke/Blinder (1992) which used the Federal funds rate as a yardstick for monetary policy for the United States. Even if particularly the Romer/Romer approach to determining the stance of monetary policy has numerous shortcomings, such as a certain inaccuracy in assessing the start of monetary stimuli, both procedures are frequently used in

²⁸ In 1988, which is to serve as a reference year for the comparison of the Bundesbank sample with the overall survey (see footnote 37), for example, two-fifths of total turnover, one-third of gross value added and almost one-third of all persons employed in Germany were accounted for by the manufacturing sector. (In the present study reference is made only to the data for western Germany.)

²⁹ According to Duwendag et al. (1993, p. 228), monetary stimuli are defined as changes in monetary variables, such as the money stock and various types of interest rates.

the literature.³⁰ Moreover, it is not important in this context to split monetary policy phases precisely into very short intervals (months or quarters) because only annual data are available from the corporate balance sheet statistics.³¹

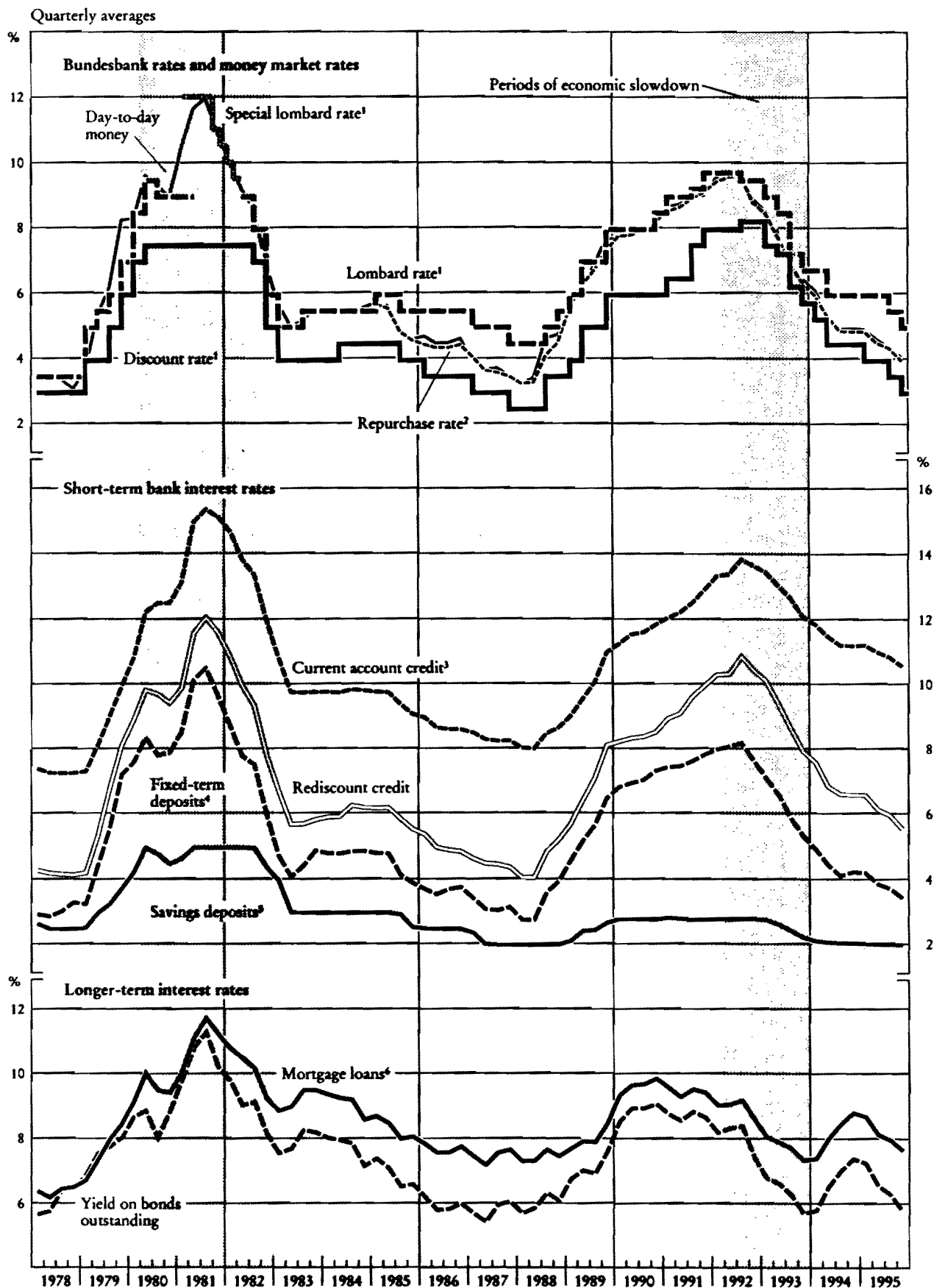
Apart from the lowering of the lombard rate in autumn 1980, a restrictive monetary policy stance was pursued in the periods 1979-81 and 1989-92, judging by the interest rate curves and the statements in the Annual Reports (see figure 3).³² Throughout 1982 and 1993 central bank interest rates declined; this means that there was a renewed reversal in monetary policy. Nevertheless, both years are included in the analysis because, owing to certain lag structures, the effects of the credit channel on real variables may still be found relatively late.³³ In 1978 central bank interest rates remained unchanged overall; in addition, a certain normalisation of economic activity was recorded. For that reason, that year will be used as a reference point for the discussion of certain firm-specific stylised facts. The year 1988 is to be interpreted in a similar way even though central bank interest rates were raised in the second half of the year owing to emerging inflationary risks. Owing to the time lags already mentioned, the influences on the firms' annual data are hardly noticeable, with the result that the real period under review does not start until 1989.

³⁰ For an overview of the various approaches to classifying monetary policy, see Bernanke/Mihov (1995).

³¹ In the United States, by contrast, quarterly corporate balance sheets are available.

³² An analogous delimitation for Germany is obtained if the difference between long and short-term interest rates is taken as a basis.

³³ For the various partial lags and their duration, see Issing (1993, pp. 162-166).



1 Discount and lombard rates; end of quarter levels; between February 20, 1981 and May 6, 1982 the Bundesbank granted special lombard loans at specially fixed rates, if necessary, instead of lombard loans.- 2 Rate for open market operations in securities repurchase transactions (from 1984).- 3 Less than DM 1 million.- 4 Until May 1986 at agreed maturities of three months, amounts of less than DM 1 million; from June 1986 with agreed maturities of one up to and including three months, amounts of DM 100,000 to less than DM 1 million.- 5 At three months' notice.- 6 On residential real estate, effective interest rates; until May 1982, average computation from interest rate agreements of all types, with variable interest rate agreements predominating; from June 1982 mortgage loans exclusively at fixed rates for ten years; to this extent the comparability of the data is limited.

The corporate data available on the manufacturing sector are broken down by size category and legal form. These are group data and not microdata, i.e. there is only an average figure for each size category and balance sheet item.³⁴ The size (which - according to the credit channel theory - is decisive for the creditworthiness and the bank dependence of the enterprises) is classified by turnover.³⁵ Such a definition is not unproblematical, however, since there are overlaps with other corporate features which may distort the results. But such overlaps cannot be avoided either in other classification characteristics used in the literature, such as the age of the firm, access to the capital market, or the amount of dividend distributions.³⁶ Owing to the different accounting regulations and the liability of the private assets of sole proprietors and partnerships (which relativises the exclusive use of the level of the own funds ratio as a gauge of liable assets), a distinction is also made by legal form. In this context, it has to be borne in mind that, in terms of numbers, firms of dependent legal status dominate the corporate landscape in Germany and also predominate in the Bundesbank sample; these firms may behave differently from incorporated enterprises. Hitherto, studies of Germany, and sometimes of other countries, have had to be confined to the large incorporated enterprises because data for other firms were not available.

To assess the degree of representativeness of the data, it was necessary to compare the Bundesbank sample with statistics which reflect the universe. The Bundesbank database for 1988³⁷ comprises 3 % of the enterprises shown in the turnover tax statistics for the manufacturing sector; however, almost half of the turnover was accounted for by the firms in the Bundesbank sample. This suggests that large enterprises predominate. It has to be borne in mind, however, that the turnover tax statistics include numerous entities which are enterprises not obliged to draw up a balance sheet. The units covered by the corporate balance sheet statistics account for just over one-fifth of industrial firm loans recorded in the banking statistics. The ratio of short-term to long-term bank loans is 72 %, compared with 67 % in the banking statistics. Considerable differences are found in the size category

³⁴ Hence, it is implicitly assumed that all enterprises behave like the average within a given group.

³⁵ A distinction is made between the size categories "small" (turnover of up to DM 5 million), "medium-sized" (turnover of DM 5 to 50 million) and "large" (turnover of over DM 50 million). Alternatively, some authors use the balance sheet total as a criterion.

³⁶ For an overview of the various classification characteristics, see Bernanke/ Gertler/Gilchrist (1994). Possible errors of exogenously specified characteristics are reduced if discriminant variables from the original data are ascertained endogenously with the aid of cluster and discriminant analyses.

³⁷ Solely the year 1988 was used as a reference since the turnover tax statistics for 1978 are not directly comparable because of the modification of the industrial classification system in 1980. The two cylindrical samples of the Bundesbank sample were formed according to the classification valid as from 1980.

structure. According to the turnover tax statistics, just over 90 % of the tax payers have a turnover of less than DM 5 million; they have a share of just over 10 % in the manufacturing sector's total turnover. According to the Bundesbank data, only one-fifth of the enterprises, accounting for less than 1 % of the turnover, come into this category. In the Bundesbank sample the large firms with a turnover of over DM 50 million account for 23 % of the enterprises and almost 87 % of the turnover, while in the universe of the turnover tax statistics just over 1 % of the firms of this size generate 71 % of the turnover. Broken down by legal form, enterprises of dependent legal status come to 83 % and generate just over one-third of the turnover, according to the official statistics; in the Bundesbank's data these make up nearly 50 % of the firms and account for 23 % of the turnover. These brief statements show that the sample used here, as measured by the turnover tax statistics and the banking statistics, is of considerable size and reflects the range of enterprises better than comparable databases but that it also has a certain bias in favour of larger firms. The extent to which the findings for the credit channel are influenced by this will be discussed in the last part of this study.

As section 4 shows, there are in principle three methodological approaches to evaluating corporate data for information on the credit channel. The VAR approach or other time-series-based methods cannot be applied to the Bundesbank data since the number of observations is too small. In the United States this is possible because both relatively long data series and quarterly data are available. Consequently, the best approach would be to estimate an asset formation function by means of panel data. If the liquidity constraint is found to be significant, this is regarded in the literature on the credit channel as proof of its existence.³⁸ Although this is undisputed in theory, the empirical implementation is problematic, which is only partly attributable to the general difficulties in the statistical recording of investment behaviour. In particular, it is not clear what a liquidity variable, for example the cash flow, represents exactly. On the one hand, it represents the internally generated financial resources and, on the other, it is relatively closely correlated with the profit situation or turnover. This means that no unambiguous conclusion as to pure financing problems can be drawn from a significant influence of the liquidity variables and that, from this angle, the great number of studies with corresponding results are to be interpreted with caution. A way out of this dilemma is the estimation of the Euler equation - the first-order condition; however, this variant has some disadvantages, too. The

³⁸ In the case of a perfect capital market, by contrast, there can be no liquidity constraints for a firm since the supply of financial resources at the prevailing interest rate is completely elastic.

results react very sensitively to the model specification and to the size of the samples; moreover, the violation of the first-order condition need not necessarily be caused by financial constraints.³⁹

Owing to the aforementioned "technical" problems and the fact that group data were used, a simple descriptive-statistical approach has been chosen in the present study along the lines of Gertler/Gilchrist (1994). An attempt is made to solve the identification problem of whether bank loans show supply disturbances by considering the reactions of bank loans in individual size categories. A below-average trend in the case of small and medium-sized enterprises (SMEs) vis-à-vis large firms might indicate the existence of the credit channel. This - it is commonly argued - is the cause of the strong decline in fixed asset formation and stockbuilding of SMEs observed in the wake of a restrictive monetary policy. In addition to bank loans, all other forms of credit shown in the Bundesbank's source material are investigated, particularly supplier's credit and loans arising from participating interests (including proprietors' and partners' loans) to identify the actual demand for credit or the credit channel.⁴⁰ Whereas the inclusion of trade credits as an "auxiliary variable" is quite widespread in the literature, the explicit analysis of loans between affiliated enterprises or proprietors' and partners' loans has not yet been documented. The reaction of bank loans in relation to other liabilities is likely to be informative, too. If their proportion declines, this argues for the credit channel, according to Kashyap/Stein/Wilcox (1993, 1996). Apart from analysing the trend in credit, the study examined whether the trend in lending rates paid by enterprises (as far as they can be computed on the basis of the balance sheet data) supplies further information. Appropriate conclusions could be drawn if the interest level paid by small firms always developed differently from that paid by large enterprises. To this extent this study attempts to evaluate the available source material as comprehensively as possible for the detection of the credit channel.

³⁹ The various problems involved in estimating the asset formation function and the Euler equation were discussed by Fazzari/Petersen (1993) and Gilchrist/Himmelberg (1995).

⁴⁰ Bernanke (1993, p. 59) explicitly demanded that forms of credit other than bank loans should be included in the analysis.

5.2. Behaviour of firms in the period 1978-82

5.2.1. Economic situation

According to the relevant literature, the credit channel serves to explain an economic downswing as a result of a tighter monetary policy. To this extent, it appears to be sensible to analyse overall economic developments before empirically testing for the credit channel so as to locate the reactions of the individual relevant firm data within the cyclical and monetary context.⁴¹

After the recession had been overcome at the end of 1975, the German economy grew fairly strongly. In 1978 and 1979 growth amounted to 3 % and just over 4 %, respectively. In the producing sector output increased by as much as 5 % in 1979. At that time, the unemployment rate came to roughly 3 1/2 % of the labour force. Whereas at the beginning of the period under review consumer prices moved within an acceptable range, they rose sharply, at 4 %, in 1979 in the wake of the second oil price wave; in conjunction with a sharp expansion of the money stock, this led to several increases in the discount and lombard rates (to 6 % and 7 %, respectively). In 1980 consumer prices went up by 5 1/2 % and the index of import prices rose by as much as 15 %. The dramatic increase in the prices of petroleum and the global economic adjustment processes caused industrial output to stagnate and real GDP to grow by only about 1 %. In the first half of 1980 central bank interest rates reached a level of 7 1/2 % and 9 1/2 %, respectively. In the two subsequent years the economic downswing accelerated; in 1982 total and industrial output declined by as much as 1 % and just over 3 %, respectively. The unemployment rate reached almost 7 %. The curbing of inflation, associated with improved external conditions, made it possible, however, to lower central bank interest rates throughout the year. In May 1982 the special lombard rate, which had amounted to 12 % upon its introduction at the beginning of 1981 and which had already been lowered from the autumn of 1981, was replaced by the standard lombard; the latter had been reduced to 6 % by the end of the year, which corresponded to the level of mid-1979. In 1983 economic output rose again for the first time in three years (+ 1 1/2 %), and price increases had moderated noticeably, at 3 1/2 %.

This shows that the overall economic environment in 1978-82 corresponded to the conditions for the "operation" of the credit channel described in the literature. Before investigating the credit channel, some firm-specific characteristics that are relevant in terms of the new transmission approach will be analysed in greater detail.

⁴¹ A first impression is given by figure 3.

5.2.2. Stylised facts in 1978

**Incorporated enterprises (INCs) and sole proprietorships/
partnerships (SPs/Ps): selected balance sheet ratios in 1978¹**

Table 1

	Turnover up to DM 5 million		Turnover DM 5 million to DM 50 million		Turnover over DM 50 million	
	INCs	SPs/Ps	INCs	SPs/Ps	INCs	SPs/PS
Own funds	19.6	20.4	27.6	19.8	28.7	21.0
Short-term creditors						
Bank loans	12.6	13.8	9.0	9.8	4.0	8.0
Supplier's credit ²	19.9	19.0	14.9	17.1	8.2	13.2
Payments received on account	1.8	1.9	3.4	2.5	7.6	4.0
Other ³	13.6	7.5	13.9	8.9	14.9	9.9
Long-term creditors						
Bank loans	13.4	18.4	9.8	12.9	7.9	9.5
Creditors from participating interests	5.6	9.1	2.7	15.1	0.3	12.2
Other	4.5	4.7	3.5	3.7	6.1	3.0

1 % of balance sheet total.- 2 Including supplier's credit from affiliated enterprises.-
3 Including short-term creditors from participating interests.

In the first year of the period, 1978, it can be noted, on the liability side of the balance sheets of incorporated enterprises (INCs), that the own funds ratios rose distinctly with the size of the firms (see table 1.) This suggests a lower creditworthiness of small enterprises, in particular, which firms in turn - as a mirror image, so to speak - showed by far the greatest bank dependence; both are aspects on which the credit channel approach is premised. Whereas their bank loans amounted to 26 % of the balance sheet total, the figure was only 12 % in the case of firms with a turnover of over DM 50 million. In the case of SMEs the ratio of long-term to short-term bank debt amounted to almost 110 %, whereas large enterprises, at roughly 200 %, were clearly oriented to the longer term. Besides bank loans, trade credits play a major role. Including the relevant debtors on the asset side, all size categories of the manufacturing sector considered here were net creditors with regard

to supplier's credit; this was increasingly the case with rising turnover which, on balance, indicates the possibility of lending by large firms to small enterprises.⁴²

The database for 1978-82 included just over twice as many SPs/Ps as INCs (see table 2). The latter were much larger, however. They accounted for about three-quarters of total turnover, tangible fixed assets and stocks. The database was dominated by the large INCs; 8 % of the enterprises generated 70 % of turnover. The small SPs/Ps, which accounted for one-quarter of all firms, carried only very little weight economically. They achieved a share in the turnover of all enterprises of 1 ½ %, and their share in bank loans amounted to not quite 3 %.

Structure of the database in 1978¹

Table 2

	Number	Turnover	Tangible fixed assets	Stocks	Bank loans
Legal forms, total	100	100	100	100	100
up to DM 5 million	32.0	1.7	2.1	1.5	3.2
DM 5 to DM 50 million	54.3	17.5	16.4	16.5	21.5
over DM 50 million	13.7	80.8	81.6	82.0	75.2
INCs, total	30.7	74.1	75.4	75.0	68.0
up to DM 5 million	6.3	0.4	0.4	0.3	0.5
DM 5 to DM 50 million	16.4	5.7	5.0	6.0	6.5
over DM 50 million	7.9	68.0	70.1	68.9	61.0
SPs/Ps, total	69.4	26.0	24.8	25.1	32.0
up to DM 5 million	25.7	1.4	1.7	1.3	2.7
DM 5 to DM 50 million	37.9	11.8	11.4	10.7	15.1
over DM 50 million	5.8	12.8	11.5	13.1	14.2
1 % of legal forms, total.					

The essential difference between INCs and SPs/Ps in 1978 is the level of own funds. In the case of SPs/Ps the relevant ratio averaged only about 20 %, according to table 1, and hardly varied between the individual size categories.⁴³ At the same time, their dependence on banks was much greater; in the case of small firms it came to 32 % of the balance sheet total, and in the case of large firms to a still considerable 17 ½ %. Trade credits displayed a size-dependent pattern, though again all categories were net creditors. Long-term liabilities arising from participating interests, which in some cases exceeded long-term bank loans,

⁴² According to the corporate balance sheet statistics, the retail trade was a net debtor in respect of supplier's credit. This means that the manufacturing sector possibly granted loans to the retail trade.

⁴³ The own funds ratios of SPs/Ps are statistically understated, however, since - apart from limited partnerships - private assets are also part of the liable assets.

reached quite a considerable level.⁴⁴ In view of their ratio of long-term to short-term bank loans of just over 130 %, the SPs/Ps among the SMEs seemed to have a longer-term orientation than the small and medium-sized INCs; the opposite seemed to be true for the large SPs/Ps, at a value of 120 %.

With regard to the credit channel, the stylised facts described above suggest that small firms tend to be affected to a greater degree by monetary policy. Firstly, their bank dependence is greater and, secondly, their creditworthiness - at least in the case of INCs - is likely to be lower than that of large enterprises. At first sight, this reaffirms the theoretical assumptions. The following sections will examine whether this hypothesis can in fact be maintained for the subsequent years when monetary policy makers adopted a tighter stance. The clear differences in the case of own funds and bank loans seem to justify the separate treatment by legal forms. In addition, special attention will be paid to the other forms of credit, some of which reach considerable orders of magnitude.

5.2.3. Incorporated enterprises and the credit channel

As mentioned, the credit channel approach is based on the pronounced bank dependence and the lower creditworthiness of small enterprises compared with large ones. A restrictive monetary policy may cause a restriction of the credit supply which affects the size categories to varying degrees and which has a greater impact on small firms, in particular. The pattern of bank dependence was outlined in the preceding section, but only the own funds ratio in 1978 provided some information on creditworthiness. Since, however, the balance sheet channel theory focuses on the influence on goodwill and creditworthiness over time, this factor will first be examined on the basis of various ratios. Subsequently the behaviour of enterprises will be investigated. The study will examine whether size-specific patterns can be observed in fixed asset formation and/or stockbuilding, as in the United States. If this is confirmed, it will be clarified to what extent "credit problems" can be held responsible for this.

Enterprises' creditworthiness will be characterised by the usual variables own funds ratio, profit for the year and cash flow⁴⁵ as well as by the coverage ratio - the ratio of interest

⁴⁴ This is due, *inter alia*, to the fact that, for liability and tax reasons, withdrawals by limited liability partners are often made available again to their firms in the form of loans.

⁴⁵ In the context of the Deutsche Bundesbank's credit assessments (1992a), the own funds ratio (own funds/balance sheet total), the capital recovery rate (cash flow/capital input) and the profit-turnover ratio (profit for the year/turnover or total output) proved to be the most informative indicators. In the present study

paid to the profit for the year (including interest paid). This ratio, which represents nothing else than an interest coverage ratio,⁴⁶ is designated in US literature as a variable that is simple to compute and one by which the financial position of a firm can be adequately described by approximation⁴⁷.

Irrespective of which ratio is used, there is a graduation specific to the size category. In no group is the trend in the data so unfavourable as in the case of firms with a turnover of less than DM 5 million (see table 3). This actually resulted in a loss in 1982, although two years earlier - at the beginning of the recession - the profit-turnover ratio had amounted to just over 2 %. Generally speaking, in 1980 the tighter course of monetary policy since 1979 and the downswing starting in 1980 had little effect on the corporate balance sheets of INCs; from 1981 the ratios of SMEs especially were a sustained reflection of economic developments. By contrast, nearly all indicators improved in the case of firms with a turnover of over DM 50 million as early as 1982. The creditworthiness of the individual size categories thus developed as expected. The smaller the enterprises, the worse their financial position in the period 1979-82.

total output is used as a reference variable for the profit for the year and the cash flow. (Total output includes the change in stocks of own products and other internally produced real assets as well as turnover.)

⁴⁶ The higher the coverage ratio, the worse is the assessment of the firm's financial position.

⁴⁷ Gertler/Gilchrist (1994, p. 334) substantiated the use of this variable as follows: "We refrain from using indicators that measure assets directly because we have information only on book values. However, the coverage ratio is highly correlated with the other prominent balance sheet indicators. It is thus reasonable to view variation in the coverage ratio as proxying for movements in firms' overall financial positions."

	1979	1980	1981	1982	1982/1979 ⁴	
Up to DM 5 million						
Own funds ¹	18.0	18.2	16.3	14.0	-	4.0
Coverage ratio ²	42.2	49.3	84.6	126.8	+	84.6
Profit for the year ³	2.3	2.2	0.5	- 0.6	-	2.9
Cash flow ³	6.4	6.2	4.2	3.5	-	2.9
DM 5 to DM 50 million						
Own funds ¹	26.2	25.5	24.7	25.1	-	1.1
Coverage ratio ²	42.3	53.7	74.7	71.0	+	28.7
Profit for the year ³	1.8	1.5	0.7	0.9	-	0.9
Cash flow ³	5.2	4.5	4.4	4.9	-	0.3
Over DM 50 million						
Own funds ¹	28.5	28.5	27.6	28.0	-	0.5
Coverage ratio ²	41.5	49.5	65.9	64.1	+	22.6
Profit for the year ³	1.7	1.5	0.9	0.9	-	0.8
Cash flow ³	6.3	4.7	5.0	6.3		0.0
¹ % of balance sheet total.- ² Interest paid as % of profit for the year (including interest paid).- ³ % of total output.- ⁴ Change in percentage points.						

To show the reactions of firms to a restrictive monetary policy stance, most authors resort to fixed asset formation and stockbuilding. In contrast to what is claimed for the United States by Gertler/Gilchrist (1994), for example, the database used here does not provide any evidence that the stockbuilding of small enterprises declines more sharply than that of large firms in periods of tighter monetary stimuli. According to table 4, a general decline in stockbuilding was recorded between 1979 and 1981; in the last year under review here stocks were actually run down at a rate that was in fact somewhat more pronounced for medium-sized and large firms than for small enterprises. However, the size-specific behaviour described in the credit channel literature can be confirmed for tangible fixed assets (see table 4). Whereas in 1980 the stock of tangible fixed assets was increased fairly sharply in all size categories, this was only the case in the subsequent years in enterprises with a turnover of over DM 50 million. Their investment ratio was largely stable over the years, despite very high interest rates and despite the recession. From 1981 the net asset formation of SMEs slumped dramatically. The investment ratios declined by 0.6 percentage point in each case. The small enterprises in fact reduced their stock of tangible fixed assets rather sharply in 1982, which was ultimately also clearly reflected in the relevant balance sheet ratios. While in 1979 the ratio of tangible fixed assets to the balance sheet total had still amounted to 33 ½ %, it was barely 31 % three years later. This balance sheet ratio was much more stable in the case of medium-sized and large firms.

	1979	1980	1981	1982	1982/1979 ¹
Stockbuilding ²					
up to DM 5 million	0.8	0.3	0.5	- 0.4	- 1.2
DM 5 to DM 50 million	1.0	0.5	0.1	- 0.5	- 1.5
over DM 50 million	1.0	0.8	0.2	- 0.6	- 1.6
Fixed asset formation ³					
up to DM 5 million	0.9	1.0	0.4	- 0.5	- 1.4
DM 5 to DM 50 million	0.6	0.8	0.2	0.0	- 0.6
over DM 50 million	- 0.2	0.3	0.3	0.3	0.0 ⁴
1 Change in percentage points.- 2 Stockbuilding as % of total output.- 3 Net fixed asset formation as % of total output.- 4 Change in percentage points 1982/1980.					

Now we must assess to what extent the differing investment behaviour can be explained by credit restrictions - as evidence for the credit channel. A comparison of the growth rates in bank loans shows that up to and including 1980 - i.e. two years after the tightening of the monetary policy stance - loans increased very sharply at double-digit rates regardless of the size category (see table 5).⁴⁸ In the two subsequent periods the trend varied fairly sharply. For the medium-sized enterprises a virtual stagnation can be found, while at firms with a turnover of over DM 50 million loans initially expanded at + 13 %; in 1982 they declined perceptibly in absolute terms, which may be due to the fact that internal resources increased fairly strongly again. The small enterprises displayed a completely different trend. In 1981 bank loans grew even more strongly than in the years before and in 1982, too, a rise (albeit a smaller one) of 5 % was recorded. Since the analysis of the growth rates may be distorted owing to the sharply diverging levels of bank loans, it appears appropriate to include the relevant ratios to the balance sheet total. In the case of small firms the share of loans increased by almost 6 percentage points between 1979 and 1982, while it stagnated or rose only slightly in the case of the other size categories. The trend in bank loans was associated with an increase in the ratio of short-term to long-term loans throughout. For the SMEs the ratio reached a value of clearly above 100 %; for the large firms the ratio was nearly balanced in 1981, although the volume of long-term loans had been twice as large as that of short-term ones in 1978.

⁴⁸ These are the growth rates of nominal variables; this means that, depending on the movement of prices, positive growth rates may signify real declines.

	1979	1980	1981	1982	1982/1979 ²
Up to DM 5 million	+ 11 (26.6)	+ 10 (27.3)	+ 14 (30.4)	+ 5 (32.3)	(+ 5.7)
DM 5 to DM 50 million	+ 13 (19.4)	+ 11 (20.2)	+ 3 (20.4)	0 (20.5)	(+ 1.1)
Over DM 50 million	+ 2 (11.1)	+ 11 (11.5)	+ 13 (12.2)	- 8 (11.0)	(- 0.1)
1 Change from previous year in % (% of balance sheet total).- 2 (Change in percentage points).					

Kashyap/Stein/Wilcox (1996)⁴⁹ argued that in restrictive monetary policy periods large enterprises which have no problems in obtaining funds open up financial scope to small firms through trade credits if the latter face bank credit restrictions. According to the aforementioned statements, such restrictions are not evident in the Bundesbank database but supplier's credits may perhaps provide additional information. The trade creditors of small firms moved differently from those of medium-sized and large firms with the beginning of the recession in 1980. Whereas the trend in the latter remained positive until 1981 and did not decline in absolute terms until 1982, that of small firms had fallen already in 1980. The granting of trade credits to small firms appears to be handled relatively restrictively. On the asset side of the balance sheet trade debtors moved more or less in parallel with trade creditors, with the result that, on balance, no additional financing or lending through trade credit can be found in any size category. To this extent, at least for the manufacturing sector in Germany, there is nothing to suggest (contrary to the original assumption) that additional credit channels were opened through supplier's credits between 1979 and 1982.⁵⁰

In the period under review no size-specific behaviour could be observed for the item other creditors.⁵¹ Since the relevant claims⁵² showed a slightly rising trend and all categories

⁴⁹ Similar reactions were found for the United States by Meltzer (1960) and for the United Kingdom by Brechling/Lipsey (1963). For the different reasons why firms tend to be more willing to lend than banks, see Jaffee/Stiglitz (1990, pp. 879-880). From the point of view of information economics it is argued that information structures between firms can well be more efficient than between firms and banks.

⁵⁰ This tallies with a longer-term study of the Deutsche Bundesbank (1992b). The result was also confirmed for preceding periods (Timmermann, 1971).

⁵¹ These include other short-term creditors, creditors arising from participating interests and other long-term creditors.

⁵² These are the other short and long-term debtors; the debtors arising from participating interests were not shown separately in the period 1978-82.

were net debtors, net liabilities declined in general, and so there was no additional source of credit. On the liability side the available source material enabled a differentiation of long-term trade creditors by other creditors and loans arising from participating interests. This subdivision is of significance because it may be assumed that in the case of this form of credit asymmetric information flows will hardly be significant and that this type of credit is granted more willingly than bank funds. In the case of enterprises with a turnover of less than DM 5 million, creditors arising from participating interests increased slightly, while they remained relatively constant in the case of the other size categories. This might suggest that there was an additional source of credit for small INCs.⁵³ This source was no larger, however, than the increase in long-term bank loans, which grew much more sharply. If there were a "supply shortage" of bank credit to small INCs, it might be expected that particularly the loans between firms would grow at a relatively faster pace.

If, finally, the ratio of bank loans to all other loans is considered, no "takeover effect" could be found for firms with a turnover of less than DM 5 million in the sense of other forms of credit expanding more sharply than bank loans. The ratio rose steadily in favour of bank loans from just under 60 % to 74 % (see table 6). In the next size category the growth was much smaller and in the case of large enterprises the ratio remained largely constant. It can be concluded from this that the small enterprises can cover their additional financing requirements resulting from a decrease in own funds by bank loans and that they do not have to resort to alternative forms of credit. The results found here provide no indications for a discrimination of small firms in terms of bank lending; the

Incorporated enterprises: bank loans versus other loans¹

Table 6

	1979	1980	1981	1982	1982/1979 ²
Up to DM 5 million	57.7	61.5	69.6	73.5	+ 15.8
DM 5 to DM 50 million	49.6	52.0	51.7	53.1	+ 3.5
Over DM 50 million	29.9	32.0	34.0	31.1	+ 1.2
1 Bank loans as % of other loans. Other loans: creditors excluding bank loans and provisions.-					
2 Change in percentage points.					

undoubtedly size-specific investment behaviour by INCs cannot be explained by credit restrictions, in contrast to the findings in the US literature. Whether or not this may be true for the group of firms of dependent legal status, which is dominated by small and medium-

⁵³ Conceivably this may also involve an increase in proprietors' or partners' loans.

sized enterprises and is therefore of particular relevance for the credit channel argument, will be investigated in the following section.

5.2.4. Sole proprietorships/partnerships and the credit channel

Whereas the size-specific bank dependence of SPs/Ps was already documented in section 5.2.2, the trend in their financial position will now be examined over time. According to table 7, the own funds ratio of small enterprises dropped from 19 % to 13 % between 1979 and 1982 but this ratio declined only slightly, by 1 percentage point to just over 19 %, in the case of large enterprises. The trend in the coverage ratio was broadly similar. The profit for the year and the cash flow of firms with a turnover of less

Sole proprietorships/partnerships: creditworthiness from 1979 to 1982

Table 7

	1979	1980	1981	1982	1982/1979 ⁴	
Up to DM 5 million						
Own funds ¹	18.9	17.6	15.3	13.1	-	5.8
Coverage ratio ²	26.2	33.0	47.0	54.3	+	28.1
Profit for the year ³	5.9	5.4	3.9	3.2	-	2.7
Cash flow ³	10.5	10.1	8.5	7.8	-	2.7
DM 5 to DM 50 million						
Own funds ¹	18.3	17.4	16.2	15.6	-	2.7
Coverage ratio ²	25.2	32.6	45.3	47.3	+	22.1
Profit for the year ³	4.7	4.2	3.1	2.9	-	1.8
Cash flow ³	8.3	7.5	6.8	7.0	-	1.3
Over DM 50 million						
Own funds ¹	20.4	19.8	19.1	19.3	-	1.1
Coverage ratio ²	24.9	33.4	43.5	42.2	+	17.3
Profit for the year ³	4.5	3.8	3.1	3.1	-	1.4
Cash flow ³	8.1	6.9	6.5	7.5	-	0.6
1 % of balance sheet total.- 2 Interest paid as % of profit for the year (including interest paid).-						
3 % of total output.- 4 Change in percentage points.						

than DM 5 million fell in every year, whereas most ratios of the large firms were even more favourable in 1982 than a year before. On the basis of the ratios available, a clearly size-dependent trend in the creditworthiness can be confirmed. As for the INCs, a noticeable deterioration in the creditworthiness of the SPs/Ps can be found only from 1981, when central bank interest rates peaked and the cyclical downswing was in its second year.

Since stockbuilding displays no size-specific pattern over time, fixed asset formation will now be analysed in greater detail (see table 8). Here the SMEs and large firms differ

perceptibly. Between 1979 and 1981 the SMEs showed declining but positive investment ratios and therefore an increase in the stock of tangible fixed assets. In the subsequent year when the recession reached its low point, depreciation exceeded gross asset forma-

Sole proprietorships/partnerships: investment ratio¹

Table 8

	1979	1980	1981	1982	1982/1979 ²
Up to DM 5 million	1.7	1.2	0.5	- 0.3	- 2.0
DM 5 to DM 50 million	1.1	1.0	0.3	- 0.1	- 1.2
Over DM 50 million	0.5	0.6	0.2	0.0	- 0.5
1 Net fixed asset formation as % of total output.- 2 Change in percentage points.					

tion. The decline in investment ratios was particularly pronounced for small firms. By contrast, enterprises with a turnover of over DM 50 million expanded their capital stock over the entire period, even though the growth rates decreased. In 1982 this was perceptible, however, only in the stock variable (which is influenced by valuations) but not in the investment ratio. The share of tangible fixed assets in the balance sheet total increased slightly in that year, whereas it dropped considerably in the case of small firms.

As in the case of INCs, bank dependence, creditworthiness and fixed asset formation displayed the size-specific pattern typical of the credit channel. It remains to be examined to what extent bank lending restrictions can be held responsible for this. Short and long-term bank loans, taken together, displayed hardly any size-specific pattern in 1979 and 1980, according to table 9. The picture changed from 1981. There were only one-digit nominal increases, with the small firms still achieving higher rates than the large ones. In the entire period 1979-82 the size-dependent trend in credit is reflected very clearly in its share in the balance sheet total. In the case of firms with a low credit rating which depend strongly on bank credit, this share rose by 7 percentage points, compared with 3 percentage points in the case of medium-sized enterprises and barely ½ percentage point in the case of large firms. The maturities differed perceptibly from those of INCs. The large SPs/Ps expanded their ratio of short-term to long-term bank loans markedly to more than 100 %, whereas the other two size categories still preferred long-term credit, despite a rise in short-term loans. In spite of differing financing patterns, the trend in bank loans for firms of dependent legal status was similar to that of INCs. In both categories there was no indication that small firms are disadvantaged vis-à-vis large ones in the case of lending. As in section 5.2.3, the other forms of credit, too, will be considered as a yardstick for the actual demand for credit.

**Sole proprietorships/partnerships:
bank loans¹**

Table 9

	1979	1980	1981	1982	1982/1979 ²
Up to DM 5 million	+ 13 (33.3)	+ 11 (35.3)	+ 9 (38.2)	+ 6 (40.5)	(+ 7.2)
DM 5 to DM 50 million	+ 16 (23.8)	+ 12 (25.0)	+ 6 (25.9)	+ 4 (26.9)	(+ 3.1)
Over DM 50 million	+ 13 (18.0)	+ 13 (18.8)	+ 2 (18.4)	+ 1 (18.3)	(+ 0.3)
1 Change from previous year in % (% of balance sheet total). - 2 (Change in percentage points).					

The "rough" aggregate of other creditors and other debtors showed no pronounced size-specific pattern. As measured by the balance sheet total, creditors declined throughout while debtors moved in the opposite direction, with the result that, in net terms, creditors decreased (even slightly more sharply in the case of small enterprises than in the other categories). Long-term loans from participating interests likewise fell from 1979 to 1982; hence the growing long-term bank loans and the possibly easier availability of corporate loans or proprietors' and partners' loans do not suggest that the supply of the latter is limited for SMEs.

As in the case of the INCs, supplier's credits provide no indication for the SPs/Ps that a possible financing need is covered by this form of credit instead of bank loans. The patterns between the individual size categories differ, however. In the case of small firms the trade creditors and trade debtors declined already at the start of the economic downswing in 1980 but on the whole (net) creditors increased slightly. This is found for medium-sized firms as well, although the asset and liability sides of the balance sheet declined only from 1982. Since the large SPs/Ps even expanded their debtors in 1982, the balance might provide an indication of some lending to other size categories, but the additional financing scope was comparatively small compared with the expansion of bank loans.

If, finally, bank loans are measured against all other creditors, the results derived from the above statements are confirmed (see table 10). The other forms of credit were not used by enterprises as additional sources of finance in lieu of possibly restricted bank loans. Instead, the ratio of bank loans to other loans increased considerably, particularly for

SMEs, whereas it remained nearly constant for the large firms. This seems to indicate that the SMEs cover their need for external resources predominantly through the banks.

**Sole proprietorships/partnerships:
bank loans compared with other loans¹**

Table 10

	1979	1980	1981	1982	1982/1979 ²
Up to DM 5 million	78.7	85.9	94.0	99.3	+ 20.6
DM 5 to DM 50 million	49.9	53.4	54.9	57.8	+ 7.9
Over DM 50 million	42.6	45.3	43.3	43.9	+ 1.3

1 Bank loans as % of other loans. Other loans: creditors excluding bank loans and provisions.-
2 Change in percentage points.

5.2.5 Conclusion

If the trend in bank loans for all enterprises is considered, the decline of nearly 4 % in 1982 could be interpreted as an indication of a supply-determined reaction caused by a restrictive monetary policy and the recession. The disaggregated analysis chosen here shows, however, that the fall in bank loans was attributable mainly to the large INCs, which played a dominating role in terms of volume and to which, according to the asymmetrical information theory, the phenomenon of bank lending restrictions should least apply. This reveals how important the differentiated analysis by size categories and legal forms is. Although the databases for the INCs and the SPs/Ps differed in several respects,⁵⁴ similar results were obtained for the most important aspects. The creditworthiness and the asset formation responses displayed parallel size-specific patterns over time. The analysis of the trend in the various credit forms clearly shows that there was no discrimination against small firms in terms of bank lending - irrespective of the legal form. On the one hand, the growth rates were largest for firms with a turnover of less than DM 5 million and, on the other, the increase in the ratio of bank loans to all other loans was largest in the case of these firms. Another indication is the trend in long-term bank loans compared with creditors from participating interests and proprietors' and partners' loans. The extent to which this is attributable to typical institutional regulations in Germany or to other causes will be discussed at the end of this paper. First the period 1988-93 will be analysed in greater detail in line with the procedure adopted for the earlier period.

⁵⁴ Bearing in mind the credit channel argument the diverging levels of bank dependence and own funds should be mentioned. Irrespective of this, the differing structure of bank loans (short-term versus long-term) does not seem to influence the results either.

5.3. Asset formation and loans 1988-93

5.3.1. Overall economic environment

Whereas west German real GDP grew only moderately in the middle of the eighties, economic momentum increased from 1988. By 1991 output in western Germany had risen by an average of 3 ½ %, not least owing to the stimuli imparted by German reunification. The unemployment rate fell to 5.7 %, a level that had last been undershot ten years earlier. This trend was also reflected in consumer prices. Along with an accelerated monetary growth and external factors, the upward movement of prices which began in the course of 1988 was a factor in triggering the increase in the discount and lombard rates from 2 ½ % and 4 ½ %, respectively, to 3 ½ % and 5 ½ % in the second half of the year. The rise in consumer prices reached a provisional peak, at 4 %, in 1992 when the cyclical climate cooled perceptibly. GDP rose by only 1 ¾ %, and industrial output dropped by just over 1 %. In the ensuing year, when the price level rose again slightly, the economy slipped into a recession which hit the producing sector particularly hard (- 7.0 %). However, as early as 1994 a relatively strong economic recovery set in. Monetary policy makers continued the tighter course they had adopted in mid-1988 until the autumn of 1992. At that time the discount and lombard rates amounted to 8 ¾ % and 9 ¾ %, respectively. Central bank interest rates were lowered from September 1992 throughout 1993. Interest rates were cut in seven steps, and at the end of 1993 the key interest rates amounted to 5 ¾ % and 6 ¾ %, respectively.

As for the preceding period 1978-82, the financing structure in the first year of the period, 1988, will first be described.

5.3.2. Corporate structure in 1988

Table 11 shows that there were pronounced differences between all three size categories of the INCs on the liability side of corporate balance sheets. The own fund ratio, in particular, increased sharply with the size of the firms while the reverse was the case for the significance of bank loans - in line with the movement among INCs in 1978. For the small INCs, the share of bank loans in the balance sheet total came to nearly 30 %, but for the large ones to only 6 %. As regards the maturity, the large firms, with a ratio of

**Incorporated enterprises and sole proprietorships/partnerships:
selected balance sheet ratios in 1988¹**

Table 11

	Up to DM 5 million		DM 5 million to DM 50 million		Over DM 50 million	
	INCs	SPs/Ps	INCs	SPs/Ps	INCs	SPs/Ps
Own funds	14.7	14.6	20.3	13.6	30.1	19.0
Short-term creditors						
Bank loans	14.4	15.7	11.7	12.2	2.3	6.4
Supplier's credit	18.4	17.3	16.0	16.7	7.4	12.5
Payments received on account	2.0	1.5	3.4	2.6	7.9	3.8
Other ²	16.1	8.4	15.9	11.2	12.4	13.2
Long-term creditors						
Bank loans	15.2	23.6	10.7	15.9	3.6	8.9
Creditors from participating interests	4.5	10.3	3.8	14.2	1.8	12.5
Other	1.9	3.1	1.6	2.2	1.3	1.9
1 % of balance sheet total.- 2 Including supplier's credit between affiliated enterprises and short-term creditors from participating interests.						

long-term to short-term bank loans of just over 150 %, were oriented more strongly to the long term than the SMEs (almost 100 %). Apart from bank loans, trade credits and other short-term creditors⁵⁵ played an important role. As regards trade credits, all size categories were net creditors, with the medium-sized and large firms predominating. The data on short-term debtors from participating interests⁵⁶ - together with the size-specific structure of other creditors - permit the conclusion that large firms may have lent resources to SMEs.

In line with section 5.2, enterprises of dependent legal status will be analysed in addition to INCs. The small firms accounted for just over 9 % of all enterprises in both legal categories, although they played only a marginal role as far as turnover and other variables were concerned (see table 12). The large enterprises dominated the Bundesbank sample. The large INCs generated just over two-thirds of turnover while accounting for only one-eighth of all firms; only in the case of bank loans was their share distinctly lower, at 50 %. This influence of the large enterprises was not quite as pronounced in the case of SPs/Ps. Enterprises with a turnover of over DM 50 million, which accounted for 10 % of all firms, generated 16 % of total turnover; in the case of bank loans their weight was just over one-fifth. There were also clear differences between the two databases as regards balance sheet

⁵⁵ In the period 1988-93 this item included supplier's credit from affiliated enterprises.

⁵⁶ In contrast to the earlier period, in 1988-93 debtors from participating interests were explicitly shown on the asset side, while on the liability side only long-term creditors from participating interests were shown.

ratios. Although, according to table 11, the small INCs and the small SPs/Ps had almost the same own funds ratio, the medium-sized and large firms showed differences of 7 and 11 percentage points, respectively, between the two categories. The bank dependence of the two legal forms decreased with their sizes but was clearly greater for SPs/Ps than for INCs. The bank debt of the SPs/Ps was more strongly oriented to the long term than that of INCs. In the case of small SPs/Ps, the long-term orientation was most pronounced at a ratio of long-term to short-term loans of 150 %.⁵⁷

The two periods 1978-82 and 1988-93 were evaluated separately not least because the databases showed different structures and may therefore influence the results in respect of the credit channel. Strong structural shifts could be observed for both legal forms between the two initial years 1978 and 1988 (see tables 2 and 12). The significance of small firms declined dramatically in every respect.

Structure of the database in 1988¹

Table 12

	Number	Turnover	Tangible fixed assets	Stocks	Bank loans
Legal forms, total	100	100	100	100	100
up to DM 5 million	18.6	0.7	0.8	0.7	0.9
DM 5 to DM 50 million	58.5	12.7	12.3	13.6	27.0
over DM 50 million	22.9	86.6	86.9	85.6	70.8
INC, total	51.0	77.2	76.6	75.0	61.1
up to DM 5 million	9.2	0.4	0.3	0.4	0.8
DM 5 to DM 50 million	28.9	6.0	5.1	6.5	11.2
over DM 50 million	12.9	70.9	71.3	68.0	49.1
SPs/Ps, total	49.0	22.8	23.4	25.0	38.9
up to DM 5 million	9.3	0.4	0.5	0.5	1.3
DM 5 to DM 50 million	29.6	6.7	7.2	7.2	15.8
over DM 50 million	10.1	15.7	15.6	17.5	21.7

¹ Data in % of legal forms, total.

The "winners" were particularly the large SPs/Ps and the large INCs.⁵⁸ As regards the balance sheet data, a marked decline in the own funds ratios of SMEs was recorded

⁵⁷ For a detailed discussion of the differences in the capital structure of small and medium-sized enterprises of the two legal forms, see Deutsche Bundesbank (1993, pp. 34-38).

⁵⁸ This results, *inter alia*, from the fact that, despite the growth in turnover, fixed size categories were used for both observation periods and that the private limited company has gained increasing significance as a legal form.

irrespective of the legal form (see tables I and II). Bank dependence moved in the opposite direction. In 1988 the share of bank loans in the balance sheet total of SMEs was considerably larger than in 1978, although a movement in the opposite direction was found for the large enterprises - reflecting increasing disintermediation.⁵⁹ For both periods, however, the small unlimited-liability firms were indebted to the banks over a longer term than their large counterparts, whereas the opposite was the case with the INCs.

In line with the stylised facts outlined above, the credit channel theory would lead us to expect that the small enterprises react more sensitively to restrictive monetary policy measures. In addition, firms might tend to provide greater indications for the existence of the credit channel in the observation period 1988-93 than in the period 1978-82 because the trend in creditworthiness and bank dependence suggests a more acute impact of monetary policy on corporate behaviour. As the approach adopted was the same as that described in section 5.2, only the most significant results will be discussed below.

5.3.3. Incorporated enterprises and the credit channel

As regards the financial position of INCs over time, all ratios analysed deteriorated for the SMEs in the period 1989-93, and this trend was most pronounced for small firms. This becomes immediately evident from the coverage ratios which, according to table 13, amounted to roughly 44 % in 1989 for both size categories. Several years later the small INCs showed a ratio of 127 % (which means that they did not even generate the interest paid), while the medium-sized firms had a ratio of 84 %. The firms with a turnover of over DM 50 million recorded only a very moderate deterioration of their financial position; only in 1993 was a slight "slippage" of the own funds ratio registered. Despite unfavourable underlying conditions, the cash flow indicator even displayed a positive trend from 1992. This confirms the result derived for the earlier period, namely that in phases of a restrictive monetary policy the impact on creditworthiness increases inversely to the size of the enterprises. It should be noted that this trend was again recorded in the context of an economic downswing.

Just like bank dependence and creditworthiness, fixed asset formation showed a size-specific trend (see table 14).⁶⁰ The small INCs increased their tangible fixed assets sharply

⁵⁹ For the longer-term trend in own funds and bank creditors, see Deutsche Bundesbank (1992b, pp. 26-27).

⁶⁰ For stockbuilding no size-dependent reactions typical of the credit channel could be found.

until 1991 but reduced their asset formation with the start of the economic downswing, which is also reflected in the negative investment ratio in 1993. By contrast, the net asset formation of enterprises in the two other size categories was positive in 1992 as well, with rising shares of tangible fixed assets in the balance sheet total. From 1993, however, the medium-sized and large firms, too, could not avoid reducing their capital stock. The credit-channel-specific indicators displayed a pattern which was largely in line with that described in section 5.2. Since, however, asset formation responded more strongly in the period 1988-93 than before, supply restrictions by the banks may perhaps now be confirmed as an explanation. As before, bank loans of the individual size categories will be considered in a first step.

Incorporated enterprises: financial position

Table 13

	1989	1990	1991	1992	1993	1993/1990 ⁴	
Up to DM 5 million							
Own funds ¹	14.5	14.0	13.7	12.7	10.3	-	3.7
Coverage ratio ²	44.2	47.9	59.5	82.4	126.7	+	78.8
Profit for the year ³	2.1	2.0	1.4	0.5	0.6	-	2.6
Cash flow ³	6.4	6.3	5.6	5.6	3.1	-	3.2
DM 5 to DM 50 million							
Own funds ¹	19.7	19.2	19.3	19.2	18.5	-	0.7
Coverage ratio ²	43.9	49.5	57.4	75.9	83.9	+	34.4
Profit for the year ³	1.8	1.7	1.3	0.7	0.4	-	1.3
Cash flow ³	5.7	5.6	5.4	5.3	5.0	-	0.6
Over DM 50 million							
Own funds ¹	30,0	30.5	30.4	30.4	29.7	-	0.8
Coverage ratio ²	29.2	32.8	39.5	53.7	68.5	+	35.7
Profit for the year ³	2.1	2.1	1.8	1.3	0.7	-	1.4
Cash flow ³	7.9	7.2	6.9	7.6	8.6	+	1.4
¹ % of balance sheet total.- ² Interest paid as % of profit for the year (including interest paid).- ³ % of total output.- ⁴ Change in percentage points.							

	1989	1990	1991	1992	1993	1993/1990 ³
Asset formation ratio¹						
up to DM 5 million	1.2	1.6	0.9	0	- 0.8	- 2.4
DM 5 to DM 50 million	1.5	1.3	1.2	0.6	- 0.2	- 1.5
over DM 50 million	0.6	1.0	1.1	0.8	- 0.3	- 1.3
Bank loans²						
up to DM 5 million	+ 6 (28.1)	+ 9 (27.8)	+ 9 (29.3)	+ 6 (31.5)	+ 2 (33.0)	(+ 5.2)
DM 5 to DM 50 million	+ 15 (23.2)	+ 14 (24.0)	+ 13 (25.5)	+ 3 (26.1)	+ 1 (26.7)	(+ 2.7)
over DM 50 million	+ 16 (6.4)	+ 6 (6.4)	+ 10 (6.7)	+ 2 (6.6)	- 2 (6.4)	(0.0)
1 Net fixed asset formation as % of total output.- 2 Change from previous year in % (% of balance sheet total).- 3 Change in percentage points.						

Until 1991, the peak of the high-interest-rate phase, bank loans were comparatively expansionary (both in absolute and relative terms) for all size categories; subsequently the increase decelerated, and in 1993 bank loans even fell absolutely for large firms. The small enterprises continued to fare best. Total short and long-term loans grew by 6 % and 2 % in nominal terms; their share in the balance sheet total rose by nearly 4 percentage points compared with 1991. Hence, at least in this cross comparison, no discrimination against small enterprises in lending could be found. The trend in bank debt was associated with an increase in the ratio of short-term to long-term loans to over 100 % for all size categories; in 1988 this ratio had been not quite two-thirds for INCs with a turnover of over DM 50 million.

The other relevant liabilities, trade credits and other creditors, likewise provide no indication that possible credit requirements may have been covered through these channels rather than bank loans. The ratio of bank loans to all other forms of credit increased very distinctly for the SMEs, while the ratio remained largely constant for the large firms throughout the years under review. A pointer to credit rationing might be given by the subitem long-term creditors from participating interests. Their share in the balance sheet total increased slightly for small firms, whereas it tended to decline for the two larger groups. This suggests that in contractionary periods small firms also obtain credit from affiliated enterprises. Since, however, large firms' debtors from participating interests did not increase this might be due to loans by partners and proprietors. There was still no "overtake effect", however, since long-term bank loans gained much more in importance, which means that credit institutions are the preferred source of finance of INCs. Although -

as outlined above - the conditions for the emergence of the credit channel were fairly favourable, no indications of its operation could be found in the period 1988-93.

5.3.4. Sole proprietorships/partnerships and the credit channel

The results found for INCs hold true for enterprises of dependent legal status as well. During the period 1989-93 the creditworthiness of small enterprises was affected most (see table 15). In the last year of that period the own funds ratios of the SMEs even fell below the 10 % mark.⁶¹ Firms in all three size categories expanded their capital stock until 1992; in 1993, when the full force of the recession was felt, the stocks of tangible fixed assets were reduced, as is shown in table 16. Irrespective of whether it is measured by the percentage change in tangible fixed assets, the balance sheet ratio or the investment ratio, the effect on investment behaviour was most pronounced in the case of firms with a turnover of less than DM 5 million. Like the INCs, firms having legal capacity reduced their asset formation more sharply than at the beginning of the eighties.

Sole proprietorships/partnerships: creditworthiness ratios from 1989 to 1993

Table 15

	1989	1990	1991	1992	1993	1993/1990 ⁴	
Up to DM 5 million							
Own funds ¹	13.8	13.7	12.5	10.6	8.2	-	5.5
Coverage ratio ²	30.1	30.7	37.3	48.6	65.4	+	34.7
Profit for the year ³	5.9	6.4	5.4	4.0	2.2	-	4.2
Cash flow ³	11.4	11.7	11.0	10.4	7.7	-	4.0
DM 5 to DM 50 million							
Own funds ¹	12.8	12.3	11.7	11.1	9.9	-	2.4
Coverage ratio ²	28.6	30.9	34.8	45.6	54.2	+	23.3
Profit for the year ³	4.4	4.4	4.1	3.1	2.3	-	2.1
Cash flow ³	8.6	8.8	8.7	8.4	7.6	-	1.2
Over DM 50 million							
Own funds ¹	18.3	17.5	17.3	16.7	16.5	-	1.0
Coverage ratio ²	22.4	25.0	30.3	35.6	39.0	+	14.0
Profit for the year ³	4.7	4.8	4.1	3.7	3.2	-	1.6
Cash Flow ³	8.7	9.1	8.9	9.2	9.7	+	0.6
¹ % of balance sheet total.- ² Interest paid as % of profit for the year (including interest paid).- ³ % of total output.- ⁴ Change in percentage points.							

Bank loans showed positive growth rates for all size categories throughout the period 1989-93 (see table 16); until 1991 the growth rates of small enterprises were lowest, but

⁶¹ In 1982 their corresponding own funds ratios had been 13.1 % and 15.6 %, respectively.

two years later they were distinctly higher than that of firms with a turnover of over DM 50 million. Measured by their share in the balance sheet total, bank loans of small firms actually increased most sharply over the entire period under review. This can be rated as evidence that bank lending is not squeezed to the disadvantage of small firms, as is claimed in the credit channel literature. All enterprises increased their ratio of short-term to long-term loans but only the SMEs remained predominantly long-term-oriented as in the first year of the period under review 1988.

**Sole proprietorships/partnerships:
asset formation and bank loans**

Table 16

	1989	1990	1991	1992	1993	1993/1990 ³
Asset formation ratio¹						
up to DM 5 million	1.2	2.0	1.4	0.4	- 1.1	- 3.1
DM 5 to DM 50 million	1.4	1.4	1.3	0.5	- 0.2	- 1.6
over DM 50 million	1.2	1.4	1.1	0.7	- 0.1	- 1.5
Bank loans, total²						
up to DM 5 million	+ 6 (39.0)	+ 8 (39.5)	+ 9 (41.9)	+ 8 (45.4)	+ 4 (48.3)	(+ 8.8)
DM 5 to DM 50 million	+ 13 (28.9)	+ 11 (29.3)	+ 10 (30.7)	+ 6 (32.5)	+ 3 (34.0)	(+ 4.7)
over DM 50 million	+ 17 (16.3)	+ 13 (16.7)	+ 12 (17.5)	+ 13 (18.9)	+ 1 (19.0)	(+ 2.3)
1 Net fixed asset formation as % of total output.- 2 Change from previous year in % (% of balance sheet total).- 3 Change in percentage points.						

Neither supplier's credits nor other creditors gave any indication of an "overtake effect". Gross trade credits fell for all firms; this was accompanied by a largely parallel trend in the corresponding debtors. The long-term creditors from participating interests declined for all size categories. By contrast, the long-term bank loans of small enterprises increased distinctly. The trend in the ratio of bank loans to other credits, which may also be used as an indicator of the operation of the credit channel, showed a pronounced rise for the small firms. This rise was so strong that in 1993 bank loans exceeded other creditors by almost 30 %; five years previously, the ratio had been nearly even. This is also to be seen as evidence of the bank dependence of small firms, which can be seen to increase over time. The contrary would have to be expected according to the credit channel theory.

5.3.5. Conclusion

The proposition that asset formation of small enterprises declines more sharply in restrictive monetary phases can be clearly confirmed for the INCs and SPs/Ps in the period 1988-93. For neither legal form, however, was there any size-specific discrimination in bank lending. Neither the trend in bank loans in a cross comparison nor the ratio of bank loans to other credits showed corresponding patterns. Compared with the findings for 1978-82, these results are largely similar,⁶² although the two databases differed considerably regarding the financial position and the bank dependence of the firms analysed.⁶³ The descriptive method chosen for observing the individual forms of credit in the various size categories thus seems to have reached the limits of its informative value. All that remains is to examine whether information on restrictions of credit for small firms can be derived from the movement of the size-specific interest rates. Here, too, only data from the Bundesbank's corporate balance sheet statistics for the manufacturing sector were evaluated.

5.4. Comparison of firm-specific cost of credit

According to the credit channel approach, any size-specific discrimination against firms should also be reflected in the interest rates levied on bank loans. Either interest rates should increase far more sharply for small enterprises than market rates in the wake of a restrictive monetary policy and the associated supply shortages, or else they should actually move more slowly owing to credit rationing. The approach usually adopted in the literature is geared to published interest rates, which for the reasons already mentioned (see section 4.1) can hardly supply informative results. This section is based on interest rates derived from corporate data. The interest rates of enterprises with a turnover of over DM 50 million were used as the control variable as they could be expected to be relatively undistorted and most nearly in line with market conditions because large firms are probably least affected by asymmetric information. It is then investigated whether the cost of credit of other size categories systematically differs from the "reference interest rates" over time. This is examined for the periods of rising interest rates (1978-81 and 1988-91) and for each legal form. It has to be borne in mind that only average rates, not marginal interest rates,

⁶² The bank loans of all firms increased slightly, however, in 1993 against 1992, whereas they fell in 1988 compared with 1987.

⁶³ Regarding the maturity of the debt structures there are hardly any deviations between the two periods under review.

could be ascertained; this reduces the informative value since it is not exactly the interest rate for a credit unit of additional demand that can be determined - as would be desirable in theory.⁶⁴

The average interest rate is determined from the ratio of interest paid to interest-bearing creditors. Interest-bearing creditors include bank loans, loans from participating interests and all other creditors. The method of calculation shows that the average interest rate is a somewhat problematic variable. Unlike creditors, interest paid cannot be split into short-term and long-term. Liabilities themselves are a very heterogeneous variable. They include items for which it is not known whether any interest was charged at all and, if so, what amount. Particularly loans from participating interests, which include proprietors' and partners' loans, are likely to be the subject of "window-dressing" by accountants, and the other credits include items such as tax liabilities and unpaid wages and salaries. Finally, creditors are only available as end-of-year levels and not as averages for the year; regarding the maturity, too, no further differentiation beyond short-term and long-term is possible.

According to table 17, a clear size-specific graduation of average interest rates could be found for both legal forms in 1978. The smaller the enterprise, the higher was the average interest rate. The differentiation was even more pronounced for the SPs/Ps than for the INCs. This graduation suggests the existence of premiums in line with the theory of asymmetric information, but it can also be explained by other factors. Possible causes are the negotiating strength of the firms or the existence of fixed costs for the credit agreement, which in the case of small loans, must be paid for through higher interest rates. The debt structure of the individual size categories - short-term versus long-term loans, the share of bank loans in interest-bearing creditors⁶⁵ - offers no explanation for the differences in credit costs. The relatively low level of average lending rates in comparison with market rates in the corporate balance sheet statistics may be due, *inter alia*, to the fact that no interest was paid on various components included under interest-bearing creditors - which seems likely.

⁶⁴ Generally, the difference between the annual average interest rates likewise provides no precise approximation for the marginal cost of credit.

⁶⁵ The structure of creditors could play a role because, according to figure 3, the interest rates for current account credits are higher than for long-term loans or because, in the case of bank loans, it can certainly be assumed that the firms incur interest costs.

Movement of average lending rates from 1978 to 1981¹

Table 17

	1978	1979	1980	1981	1981/1978 ²	
INCs						
up to DM 5 million	5.95	6.38	8.13	9.74	+	3.79
DM 5 to DM 50 million	5.54	5.97	7.79	9.50	+	3.96
over DM 50 million	5.49	5.80	7.21	8.96	+	3.47
SPs/Ps						
up to DM 5 million	6.24	6.71	8.46	10.09	+	3.85
DM 5 to DM 50 million	5.46	5.92	7.56	9.14	+	3.68
over DM 50 million	5.23	6.02	7.77	9.49	+	4.26
¹ Interest paid as % of interest-bearing creditors (= creditors excluding supplier's credit, payments received on account and provisions).- ² Change in lending rates in percentage points.						

With the rise in central bank interest rates from 1979, the average interest rates paid by INCs of all size categories likewise increased steadily up to and including 1981, the peak of the interest rate trend at the time. For the SMEs the increase was markedly sharper, at almost 4 %, than for the large firms (+ 3 ½ %). This might be regarded as an indication of a supply shortage for firms with weaker creditworthiness and a strong dependence on banks, in line with the credit channel theory. Exactly the reverse trend was found for the SPs/Ps, however, among which enterprises with a turnover of over DM 50 million ultimately had to pay higher interest rates than the medium-sized firms. This matches neither the trend in financial ratios nor the trend in the structure of creditors. The slightly sluggish interest rate adjustment for the SMEs might suggest credit rationing; it appears rather implausible, however, to simultaneously give higher premiums as the reason for the reaction of the small and medium-sized INCs. Furthermore, such a "dual" argumentation contradicts the consistent base structure for 1978.

If the period 1988-92 is considered, there was initially a size-dependent differentiation of interest rates both for INCs and for SPs/Ps in 1988, although the interest rate differences were larger in the case of firms of dependent legal status (see table 18). Up to the peak of the interest rate phase in 1992, the cost of credit for the two legal forms did not move in parallel, however; the trend even deviated distinctly from the observation period 1978-81. In the case of INCs, the rise increased with the size category, so that ultimately the structure of 1988 almost levels out. For the SPs/Ps interest rates rose irrespective of the size by 2.6 to 2.7 percentage points. These diverging trends, which argue both for and against a discrimination against small enterprises, cannot plausibly be explained by the trend in the debt structure or the creditworthiness ratios.

	1988	1989	1990	1991	1992	1992/1988 ²	
INCs							
up to DM 5 million	5.98	6.55	7.29	7.87	8.55	+	2.57
DM 5 to DM 50 million	5.38	6.20	7.09	7.71	8.54	+	3.16
over DM 50 million	4.81	5.45	6.37	6.85	8.34	+	3.53
SPs/Ps							
up to DM 5 million	6.38	6.97	7.76	8.36	9.09	+	2.71
DM 5 to DM 50 million	5.38	5.98	6.77	7.29	8.04	+	2.66
over DM 50 million	4.98	5.58	6.45	7.08	7.60	+	2.62
1 Interest paid as % of interest-bearing creditors (= creditors excluding supplier's credit, payments received on account and provisions).- 2 Change in lending rates in percentage points.							

The analysis of the average interest rates at first appears rather promising for the initial years 1978 and 1988. The clearly size-specific structure could indeed be explained by means of premiums charged to firms with a weaker creditworthiness. However, other interpretations are possible, with the result that no clear conclusion can be drawn as to a discrimination as predicted by the credit channel theory. Once the analysis is extended to the "hot" monetary policy phases, any consistency in the initial years is lost. Nearly all variants of changes in interest rates occur; the result is that neither credit rationing nor rising interest rates as a result of a tighter supply can be confirmed. On the whole it can be said that the attempt to draw conclusions on the credit channel from the cost of credit on the basis of the balance sheets is just as unsuccessful as the approach adopted in the literature hitherto. Ultimately the available data are not precise enough to allow an exact clarification of the facts. The interest rate reactions cannot supply any additional information for the analysis of credit movements.

6. Conclusions and outlook

The credit channel theory says that restrictive monetary policy measures operate not only via the interest rate effect but, in addition, via restrictions on the credit supply side which - over and above market interest rate levels - lead to rising lending rates and/or credit rationing with a correspondingly sluggish interest rate adjustment. Owing to their greater bank dependence and weaker creditworthiness, this is likely to affect primarily small enterprises. The approach to testing the credit channel theory adopted in the present study with the aid of the Bundesbank's corporate balance sheet statistics is based on a cross comparison of the movement of bank loans between firms of the individual size categories and on the movement of bank loans against other forms of credit; furthermore, size-specific reactions of interest rates for corporate loans were examined. The credit channel theory has precise response anticipations for all these aspects. Past findings for the United States and in some cases other countries in favour of the credit channel are very impressive, but they cannot be confirmed for the manufacturing sector in Germany. Irrespective of the period under review and the legal form of the firms, bank loans and other creditors provide no indication of any discrimination by banks against small enterprises.⁶⁶ Supply-induced selective effects of monetary policy, which might serve as an argument, say, for interest rate subsidies to cushion structural distortions, are thus not identifiable. Hence, the credit channel offers no explanation for the fact that the fixed asset formation of small firms responded more strongly than that of large firms in the periods analysed. In the aggregate, this means that the extent of the economic downswings in 1980-2 and 1992-3 can scarcely be attributed to credit restrictions induced by monetary policy in the sense of the credit channel approach. To this extent, the results obtained here are in line with the analyses by Neuberger (1994) and Tsatsaronis (1995) who, using econometric methods and overall economic data, found no indications of supply disturbances by banks.

The results derived in this study contradict numerous studies for other countries. Three aspects seem to be particularly relevant for explaining this difference: institutional conditions in Germany, characteristics of the source material and shortcomings of the evaluation method.

⁶⁶ Strictly speaking, it cannot be ruled out that the potential demand for credit, which cannot be measured, exceeds actually observable credits to small enterprises and that therefore credit was rationed. Nor can any clear statements be made on possible size-specific premiums which may have formed part of the cost of credit, since the interest rate reactions derived from the corporate balance sheets show no systematic and interpretable pattern.

The asymmetric distribution of information and the associated credit restriction as a result of a deterioration of creditworthiness, which are the premises on which the balance sheet channel is based, can be reduced by various institutional structures within the financial system.⁶⁷ Such structures include, in particular, the relationship between banks and borrowers. In Germany the house bank principle is one of the mainstays for the SMEs, in particular.⁶⁸ Traditionally there are very close links between the two agents, and financial transactions, including private transactions, are predominantly or even exclusively settled via the house bank.⁶⁹ Owing to long-standing relations, this results, firstly, in a good knowledge of the situation of the firm and, secondly, banks have a certain overview of the private financial position. This is of particular importance in the case of firms of dependent legal status which, according to the corporate balance sheet statistics, have a very low own funds ratio and whose proprietors are also personally liable. Compared with many other countries, there is a further difference in the nature of property law and bankruptcy legislation. Both are designed relatively favourably for creditors in Germany. In contrast to other countries, real collateralisation is possible without special formal requirements and, moreover, loan collateral is very largely acknowledged in the event of insolvency, whereas abroad it is frequently not the interests of the secured creditors which are to the fore.⁷⁰ It follows from this that banks, especially house banks, can limit their losses in the event of bankruptcy and are able to grant their loans "at smaller risks" than in countries where no such regulations exist. The house bank principle and the relevant legal regulations reduce the information asymmetries between lenders and borrowers; in this way they moderate the non-neutrality (which can be theoretically substantiated) of the financial sector in respect of economic activities. As a result, the credit channel, and especially the balance sheet channel, may not be effective in Germany because the financial system "cushions" moral hazard and adverse selection by the mechanisms described above. As mentioned in section 3.2, the "transfer" of the bank lending channel hypothesis is also affected by institutional factors. The more highly developed the financial markets are, the less significant this

⁶⁷ For the theoretical argumentation, see Neuberger (1994) and Petersen/Rajan (1994).

⁶⁸ Owing to the possibility (which is excluded in other countries) for credit institutions to acquire participating interests in large enterprises, there are also relatively close relationships between banks and large enterprises in Germany (see Cable, 1985; Allen/Gale, 1995).

⁶⁹ It is to be assumed, however, that even small and medium-sized enterprises normally have several connections with credit institutions other than their house bank. In some of the literature a declining significance of the house bank relationship is derived from this (see Fischer, 1990).

⁷⁰ The scale of collateralising in Germany is likely to be very large. According to a study by Drukarczyk/Duttle/Rieger (1985), 80 % of the credit agreements and 70 % of the credit volume - with reference to short and medium-term loans - are collateralised. It is to be assumed that the share of collateral for long-term loans is even higher.

influence is likely to be. This situation applies above all in the United States, whereas the following is true for Germany: "Financial markets in Germany are relatively undeveloped compared to most other industrial countries." (Allen/Gale, 1995, p. 183). Accordingly, the bank lending channel should in fact operate very strongly in Germany. As in the case of the balance sheet channel, however, the house bank principle may have a moderating effect for the banks hold potentially liquid assets or sell securities in order to be able to satisfy enterprises' requests for credit (see Gertler/Gilchrist, 1993, p. 47). It is to be assumed that good customers, in particular, benefit from such buffers offered by their house banks and are therefore not faced with additional supply restrictions.

Although the house bank principle and comprehensive collateralising options reduce credit supply restrictions, it is questionable whether new, young firms benefit from this as well. To this extent, the credit channel might operate in that segment. This group of enterprises is not represented in the Bundesbank's source material, however, for, owing to the cylindered sample structure used, enterprises are at least five or six years old, irrespective of the size category (see section 5.1). This implies, furthermore, that the probability of insolvency is much smaller for enterprises included in the Bundesbank statistics than it is for young firms and that therefore a restriction of the credit supply by banks is on average less likely despite declining creditworthiness over time.⁷¹ Even though the database does not include these enterprises and thus distorts the degree of representativeness, the "error" in respect of the credit channel is difficult to assess. Small firms, which as a rule is the category in which young firms are found, have only a very small economic weight even in the universe, as is shown by the turnover tax statistics. It is therefore questionable whether steep economic downswings (which the advocates of the credit channel seek to explain) can be substantiated by means of such a special segment.⁷² The statistics used select not only by age but also systematically by size and creditworthiness, although all three features overlap. The dominance of larger enterprises becomes immediately evident from a comparison with the relevant data from the turnover tax statistics (see section 5.1). As regards creditworthiness, trade bills are accepted by the Bundesbank only from firms with a good credit rating. This means that, for prudential reasons, the commercial banks take care to submit only high-quality bills of exchange to the Bundesbank so as to avoid rejection.

⁷¹ For the link between age and insolvency, see, for example, Angele (1996).

⁷² Irrespective of their relevance to the transmission mechanism, credit restrictions for young firms are a major economic policy problem in the context of structural change. The German house bank system, which institutionalises lending to "old" customers, may even have a negative impact, owing to a possible braking effect, on the process of change in the corporate landscape (see Audretsch, 1995).

For that reason, commercial banks grant bill-based loans primarily to good customers. It follows from the age of the firms, the size and the bill of exchange practices that the balance sheet statistics present a special selection of enterprises. Although they represent the core of the corporate landscape of the manufacturing sector, they do not embrace the marginal segments.⁷³ In order to reduce this "quality bias" and to be able to analyse the credit channel more precisely, there are various possibilities for improving the database. The inclusion of new, young firms requires supplementary analyses of data which are available to banks which promote business start-ups. In addition, surveys among borrowers and lenders might provide information on the amount of collateral and on credit rationing, i.e. about the "true" interest rate or the potential demand for credit, on which the official statistics contain no direct data. Finally, besides corporate data, the Bundesbank's borrowers statistics could be evaluated. For one thing, that would obviate the need to confine the analysis to the manufacturing sector as all corporate loans are included; for another, the quarterly data available are more sensitive to monetary stimuli than the annual data from the corporate balance sheets. A further option would be to evaluate the balance sheets of banks. Following Kashyap/Stein (1995), the credit patterns of small and large banks could be investigated; size-specific lending might provide indications of the existence of a credit channel.

Apart from the data selection, a further bias might result from the methodology used. Although data disaggregated by size categories and legal forms as well as types of credit are used, there is a danger of a considerable loss of information owing to the use of group data; moreover, the analysis was confined to the observation of rates of change or the trend in specific ratios. There is a good theoretical basis for interpreting the figures, but the procedure necessarily implies limitations on the informative value of the results. An improvement may be possible by means of microeconomic analysis. Even if the results of the panel studies have not yet been able to provide convincing proof of the existence of the credit channel, it appears sensible to pursue this approach both theoretically and empirically. Perhaps the results obtained here can be formulated more precisely by estimating the size-specific investment behaviour. The use of corporate data in Germany has the disadvantage that the applicability of time-series-analytical methods is very limited. Owing to the limitation to annual data and the numerous structural breaks, the number of consistent points of observation is relatively small; moreover, the informative value of a

⁷³ This is confirmed by the below-average insolvency risk of firms represented in the Bundesbank's source material compared with all German enterprises (see Deutsche Bundesbank, 1992a).

long time series would be extremely distorted owing to the survivor bias.⁷⁴ The borrowers statistics can be of some help as the quarterly data at least permit a time series analysis.

The above statements show that there may be various reasons why this study could not confirm the credit channel hypothesis for Germany. Although there is a distinct bias of corporate data in favour of firms of good creditworthiness, it must be remembered that the Bundesbank's corporate balance sheet statistics are more comprehensive than all other databases available. In particular, they contain a great number of small firms and also unincorporated enterprises. Moreover, the result can be underpinned in terms of institutional economics. Institutional regulations reduce credit restrictions by banks which may result from the market failure of asymmetric information; the rejection of the credit channel theory for the core sector of the German economy - the manufacturing sector - therefore appears to be quite justified.

⁷⁴ This applies if, as with a cylindered sample, every enterprise is included in the sample in every year.

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