EUROPEAN CENTRAL BANK

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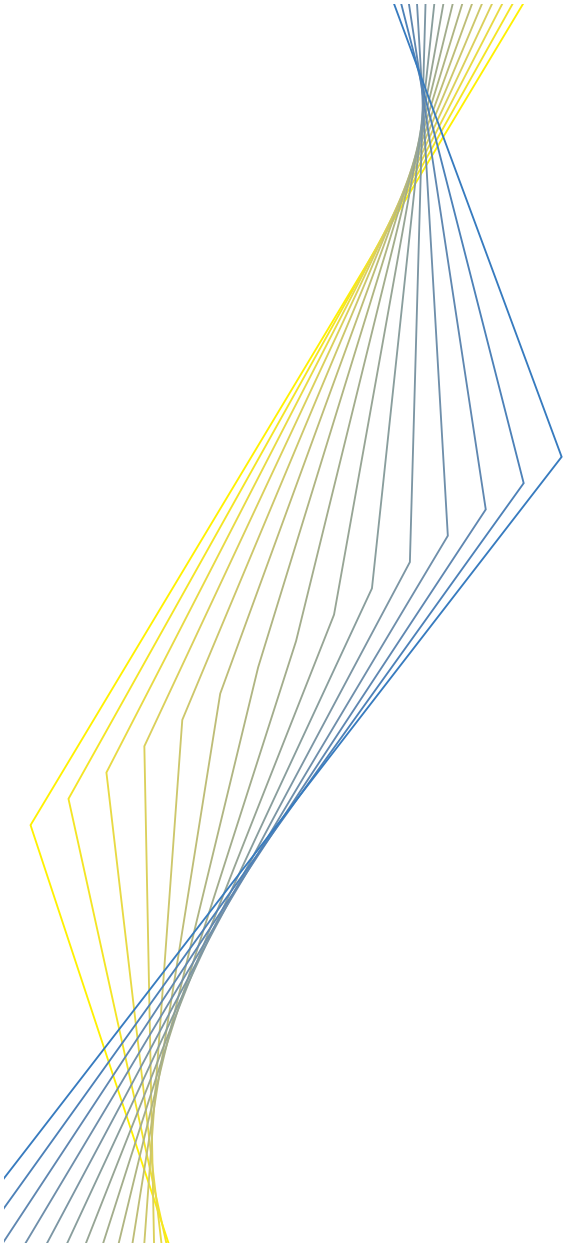

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THE CREDIT CHANNEL IN THE NETHERLANDS: EVIDENCE FROM BANK BALANCE SHEETS

BY LEO DE HAAN[1]

December 2001

1 *De Nederlandsche Bank (DNB), Econometric Research and Special Studies Department. This paper has been prepared within the Eurosystem's Monetary Transmission Network (MTN). I would like to thank the MTN members for helpful discussions and feedback, and especially Ignazio Angeloni, Gabe de Bondt, Michael Ehrmann, Jan Kakes, Anil Kashyap, Benoît Mojon, Marga Peeters, Elmer Sterken, and Jukka Topi for their valuable comments and suggestions.*

The Eurosystem Monetary Transmission Network

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

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

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

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Abstract

This study contributes to the empirical evidence on the lending channel in the Netherlands using individual bank data. The main conclusion is that a lending channel is operative in the Netherlands. However, it is only operative for unsecured and not for secured lending, possibly because loans with state guarantees get special treatment by banks. Effects of monetary tightening on unsecured lending are more negative for smaller, less liquid and less capitalised banks, in line with the lending channel theory. A contribution of this study is that it gives evidence that the monetary policy impact on bank lending also depends on the market segment in which a bank is active. The evidence suggests that the lending channel is not affecting lending to households as much as it is affecting lending to firms.

JEL classification : E51, E52, G21

Keywords: monetary policy transmission, bank lending

Non-technical summary

This study presents an empirical analysis of the role of banks in the monetary transmission process in the Netherlands, using individual bank data for the period 1990-1997. The principal focus is on the lending channel, *i.e.* the reaction of the loan supply to a monetary shock, particularly the differential response of certain types of banks. The idea behind this is that some types of banks are more capable than others to offset a monetary policy induced decrease in deposits (or an increase in the cost of funding), because they can find non-deposit funding easily or draw on their buffer of liquid assets.

The data used are consolidated balance sheet data for the Dutch banking population on a quarterly basis, covering 1990Q1-1997Q4. Previous studies for the Netherlands have so far been using the publicly available database BankScope, which has as disadvantages that the samples are biased towards large-sized banks, have an annual frequency and also include unconsolidated data.

The analysis makes a distinction between loans with and without state guarantees, households and firms, long-term and short-term, and demand versus time and savings deposits. Further, two devices are used to split the sample into several subsamples: first, banks' financial health (measured by size, liquidity and capitalisation) and, second, banks' market orientation (retail banking, wholesale banking and foreign banking). The relevance of the latter categorisation device is underpinned by a factor analysis on the sample.

The results for loan supply suggest that a lending channel is operative in the Netherlands. However, it appears to be important to make a distinction between bank loans with and without state guarantees. Particularly, there is strong evidence that the lending channel is only operative for unsecured bank debt. The results show that monetary tightening does not have any negative effect on secured bank lending. A reason could be that loans with guarantees get special treatment by banks. For unsecured debt the results are in accordance with expectations: there is a negative monetary policy effect on lending which is stronger for smaller, less liquid and less capitalised banks. This is in line with the lending channel theory according to which such banks are less able to attract non-deposit funds or use their buffer of liquid assets to shield their loan portfolios from monetary policy tightening.

The results from the factor analysis performed on the sample indicate that three types of banks can be distinguished: retail, wholesale and foreign banks. This outcome is used to assess whether the bank lending and deposit responses to monetary policy shocks depend on which market segment banks are operating in. The evidence suggests that the lending channel is not affecting lending to households as much as it is affecting lending to firms.

The results for deposit supply show that – especially time deposits – react positively to monetary policy tightening, which is inconsistent with the lending channel story that presumes a negative impact. This unexpected outcome can be related to the way monetary policy operations in the Netherlands were conducted at the time.

1 Introduction

This study presents an empirical analysis of the role of banks in the monetary transmission process in the Netherlands, using individual bank data for the period 1990-1997. The principal focus is on the reaction of the loan supply to a monetary shock, particularly the differential response of certain types of banks. The idea behind this is that some types of banks are more capable than others to offset a monetary policy induced decrease in deposits (or an increase in the cost of funding), because they can find non-deposit funding easily or draw on their buffer of liquid assets.

The standard explanation of the working of the lending channel is illustrated in Figure 1.[1] Monetary tightening conducted by *e.g.* open market operations, drains deposits from the banking system, which consequently has to cut its supply of loans (Figure 1a). When banks lower their supply of loans, bank-dependent firms and households have to diminish their expenditures, thereby reducing aggregate output. One of the preconditions for this bank lending effect is that banks are not able to shield their lending activities from negative monetary shocks completely and without cost by using security holdings as a buffer. Another precondition for the bank lending view to hold under these circumstances is that non-deposit funding is not a perfect substitute for deposit funding for the banks. Figure 1b shows how a drawing down on the securities portfolio and/or an increase in non-deposit funding can be used to finance a restoration of the loan supply after a monetary tightening. The bottom line is that these offsetting balance sheet movements on the asset and liabilities side make the net effect of monetary tightening on the loan supply uncertain, as shown in Figure 1c.

For the Netherlands there is some early evidence on the bank-lending channel from VAR analyses. This type of analysis generally indicates that the lending channel is not very relevant in the Netherlands from a macroeconomic viewpoint. According to Garretsen and Swank (1998), Van Ees *et al.* (1999) and Kakes (2000) the lending channel is partly offset because banks use their holdings of securities as a buffer to shield their loan portfolios from negative monetary shocks. However, the analysis by De Bondt (1999b) does not confirm this buffer function. A problem with credit aggregates is the distinction of supply

[1] The lending channel is one of two channels under the 'broad credit view' (Bernanke and Gertler, 1995). The other is the balance-sheet channel, referring to the influence of monetary policy on the credit worthiness of the borrowers. This paper focuses only on the lending channel.

Figure 1 Balance sheet of banks after monetary tightening

a. Bank lending channel at work

Loans	⇓	**Deposits**	⇓

b. Offsetting portfolio and liabilities responses

Loans	⇑		
Securities	⇓	**Non-deposits**	⇑

c. Total effect on loans uncertain

Loans	?	**Deposits**	⇓
Securities	⇓	**Non-deposits**	⇑

and demand effects. Searching for a means of identifying a loan-supply shift, the empirical literature has more recently shifted from VAR toward the analysis of cross-sectional differences in bank lending behaviour across different types of banks. This approach, using microdata on banks, follows Kashyap and Stein's (1995, 1997) research for the US. The results from the application of this approach to the Netherlands are somewhat mixed. De Bondt (1999a) finds some evidence for a credit channel in the Netherlands, while Schuller (1998) does not.

The present study contributes to the empirical evidence of the bank-lending channel for the Netherlands, using individual bank data. The investigation concerns the response of both bank lending and deposits to monetary shocks, together with the differences in responses between several bank types (small and large, low and high liquidity, low and high capitalisation). The contributions of the present study are the following. First, consolidated data representing the Dutch banking population are used on a quarterly basis. Previous studies for the Netherlands have so far been using the publicly available database BankScope, which has as disadvantages that the samples are biased towards large-sized banks, have an annual frequency and also include unconsolidated data.[2] Second, the present study extends the analysis to several segments of the bank credit and deposit

[2] The previously mentioned authors, Schuller (1998) and De Bondt (2000), used data from BankScope. The latter selected consolidated data from this database. See Ehrmann *et al.* (2001) on the disadvantages of using BankScope for the present type of analysis.

market. Specifically, a distinction is made between loans with and without state guarantees, households and firms, long-term and short-term, and demand versus time and savings deposits. The relevance of such distinctions is underpinned by a factor analysis of the sample.

The paper is organised as follows. Section 2 describes the main macroeconomic developments in the Dutch bank credit and deposit market in the 1990s. Section 3 gives some facts about the banking structure in the Netherlands. Section 4 introduces the model. Section 5 discusses the data. Section 6 presents the econometric estimations, after which Section 7 concludes.

2 Macroeconomic developments in the 1990s

In the period between 1990 and 1997, the period under review in this study, the Dutch guilder was tied to the Deutsche mark. During the 1970s and 1980s, the Netherlands had gradually moved from a combination of money supply and exchange rate targeting toward full reliance on the peg to the mark as the benchmark for its monetary policy in the 1990s. The reason for the abandonment of money supply targeting was the increased competition, innovation and integration of the financial markets.[3] In the 1990s active credit control policies were no longer undertaken, unlike in previous periods. The exchange rate target was maintained by using the interest rate as an instrument. The short-term interest rate was still relatively high during the first years 1990-1991 but came down considerably between 1992 and 1997. Inflation stabilised since the beginning of the 1990s at a level of around 2%. Economic growth was 2.7% on average between 1990-1997 including one period of economic slowdown in 1991-1993 with an average growth rate of 1.7%.

Developments in the Dutch credit market during the 1990s have been remarkable in several respects. Figure 2a shows bank lending to the private sector over time, and a split-up between loans to non-financial firms and households, respectively. Households' bank borrowing consists mainly of mortgage loans. The 1990s witnessed an accelerating growth of mortgage lending to households, reaching 20% in 1997. Subsequently, there was some slowdown in growth but nevertheless growth rates remained well above 10%.

[3] See Wellink (1994) and Hilbers (1998).

Figure 2a
Bank lending to the private sector
Quarterly changes year-on-year

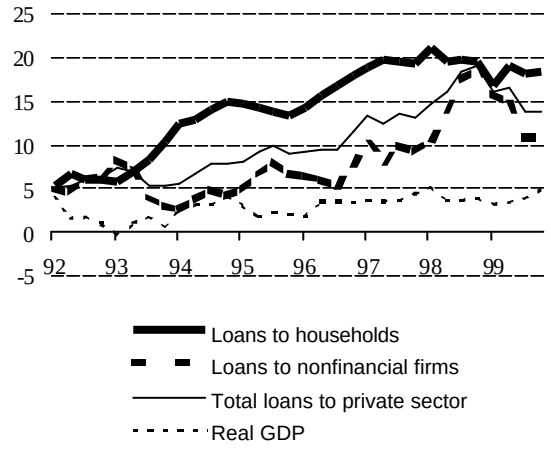
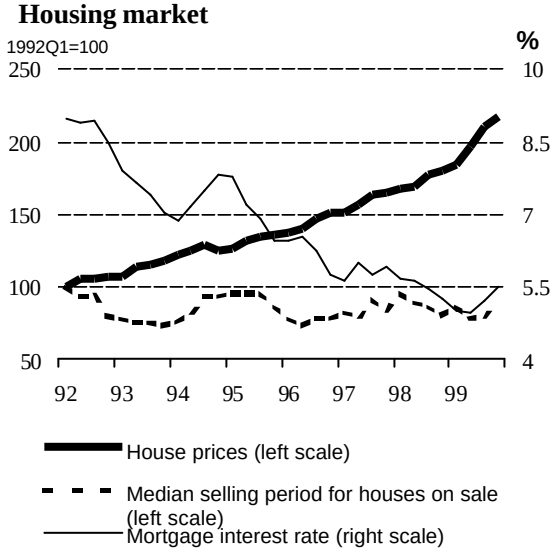


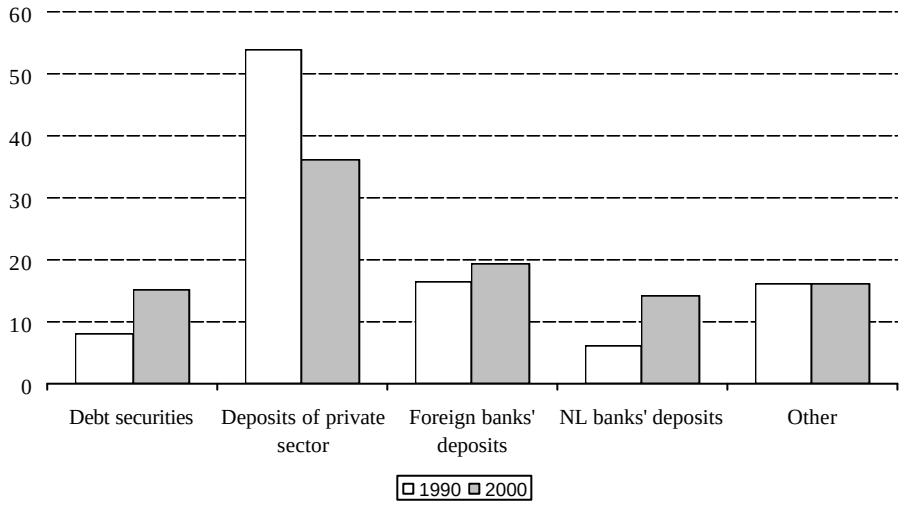
Figure 2b
Housing market



The rise in mortgage lending went hand in hand with a boom in Dutch housing prices.[4] House prices more than doubled during the 90s (Figure 2b), partly driven by a decrease in mortgage interest rates from around 9% to 5%. The demand push on the market for existing houses was reflected in a drop in the median selling period for houses on sale. Only Ireland saw a sharper house price inflation within the EU. However, the boom in the Dutch housing and mortgage markets has not only been caused by economic fundamentals such as income and interest rate developments. It has certainly also been triggered by the easing of banks' mortgage lending criteria. The institutions eased their mortgage acceptance criteria especially in the mid-90s. This mainly entailed the inclusion of second and temporary incomes in determining borrowing capacity and raising the permissible mortgage debt service-income ratio as well as the ratio of loans granted to the collateral value of the mortgaged properties. The low interest rate level combined with rising house prices made it possible to realise the surplus value of a home by taking out a second mortgage or by renegotiating and at the same time increasing existing mortgages without raising monthly housing costs. It is partly for this reason that the market for residential mortgages has been expanding vigorously. This explains why outstanding mortgage debt in the Netherlands, expressed as a percentage of GDP, is now at 65% among the highest in the EU, although the home ownership rate is still below the EU average, at 50%.

[4] The boom in the mortgage and house market has recently received much attention in De Nederlandsche Bank (DNB), see *e.g.* DNB (1999) and DNB (2000b).

Figure 3 Banks' liabilities structure
% of total



Bank lending to non-financial firms initially lagged behind that of mortgage lending, with growth rates of no more than a few percentage points above those of GDP. However, a clear acceleration took place in 1998, which could not be fully attributed to fundamental factors such as the low interest rate and the favourable economic developments. There are indications that the surge in lending to firms at the time was related to the financing of mergers, acquisitions and management buyouts.[5] Moreover, it appears that enterprises borrowed more to increase leverage. Business investment growth, at a stable rate of 6-8% since 1995, accounted less convincingly for the sudden rise in lending in 1998.

On the liabilities side there have also been some remarkable developments during the 90s.[6] Deposits of the private sector, measured as a percentage of the balance sheet total of the banking sector, decreased strongly (from 54% to 35%; see Figure 3). The deposits of households as a funding source of banks decreased from 24% to 16% of the balance sheet total. This drop reflected to a large extent the growing attractiveness of investments in shares and in mutual funds. While the growth of deposits of the private sector was lagging behind, the banks issued relatively more tradable debt securities. The latter's outstanding amount increased from 8% in 1990 to 15% in 2000, again in terms of the share of the balance sheet total. Another notable development on the liabilities side of the balance sheet was that banks attracted relatively more deposits from foreign banks: their outstanding amount increased from 14% to 19% of the balance sheet total.

[5] DNB (2000a).
[6] DNB (2001).

3 Structure of the Dutch banking sector

Table 1 shows the structure of the banking sector in the Netherlands during the sample period 1990-1997. The table is constructed from the balance sheet data of 135 individual banks at that time reporting to the Dutch central bank for the compilation of national monetary statistics.

The sample consists of 107 commercial banks (including four co-operative banks), 17 savings banks, and 11 securities banks.[7] These three groups of banks aim at partly overlapping and partly different segments of the deposit and loan market.

- The commercial banks are involved in all market segments.[8] Among those are the largest banks in the Netherlands.
- Savings banks are typically smaller banks and are heavily involved in the retail market. They lend mainly to households (especially mortgage loans) and less to firms, compared to commercial banks, and they lend often with guarantees. In the Netherlands there is a system of municipal guarantees on mortgage loans for lower-income households, aimed to promote house-ownership. Also state guarantees are backing bank loans to semi-state owned companies such as hospitals. Savings banks hold relatively large portfolios of government securities. Savings banks fund their activities to a large extent with households' deposits, especially savings deposits.
- Securities banks on the other hand are more involved in the corporate market, especially in the pre-financing of the issuance and/or purchase of securities by firms. Securities banks hold their clients' securities as collateral.

One of the most striking characteristics of the Dutch banking sector is its high degree of concentration. In Table 1 the banks are divided into three size categories, small, medium and large. Small banks have sizes below the median, medium-sized banks from the median until the 95th percentile, and large banks above the 95th percentile.

- The seven largest banks take account of no less than 79% of the market, measured by their total assets. These banks have on average lower liquidity than the smaller sized banks. This lower liquidity concerns primarily the amount of interbank deposits and not the holdings of government securities. On the contrary, larger banks have larger portfolios of securities than smaller banks. The seven largest banks are really 'universal': they operate in both the wholesale and the retail market and have large amounts of households' deposits.

[7] Officially denoted as 'security credit institutions'.
[8] Therefore they are officially denoted as 'universal banks'.

- The 60 medium-sized banks hold 20% of the market. Their balance sheet structure is comparable to that of the whole sample.
- The 68 smallest banks, with a minor market share of 1%, are characterised by high capitalisation.

Due to the openness of the Dutch financial market, there are a lot of foreign banks: no less than 62 out of the total of 135.

- Foreign banks are relatively small, accounting for only 10.7% of the Dutch market.[9] These banks are typically involved in wholesale banking. They do not lend to households and neither do they attract deposits from them. Among their depositors are many foreign firms. With respect to regulation, it is important to make a distinction between subsidiaries, branches from the EU+ area and branches from outside the EU+ area.[10] In the sample there are 35 subsidiaries, 11 EU+ branches and 16 non-EU+ branches. Subsidiaries, being independent legal entities, fall fully under the supervision of the Dutch monetary authorities. Branches, on the other hand, fall under the sole supervision of the monetary authorities of their country of origin unless they are non-EU+ branches, which are monitored by the Dutch supervisor as well. Assuming that the monetary authorities in the EU+ area fully comply with the Basle capital rules, the Dutch monetary authorities do not monitor the solvency of these branches anymore, although they still monitor their liquidity.
- On average, the liquidity ratios of the domestic banks are lower compared to foreign banks. Capitalisation is comparable on average, although the capital ratios of EU+ branches are relatively low.

For the credit channel to be operative, banks must play a special role in the financing of the private sector. Bank finance is very important for firms in the Netherlands, especially for small firms.[11] Saunders and Schmeits (2001) classify the Netherlands, like Germany, as a bank-dominated financial system, with a small role of both equity and corporate bond markets. Other, non-bank forms of finance cannot easily substitute bank loans in many cases (especially for small firms and households). In the Netherlands there are close links between borrowers, both firms and households, and banks. Relationship lending is still quite important, although there is a trend towards 'transactions banking', especially with larger banks, as is also the case in the other EMU countries.

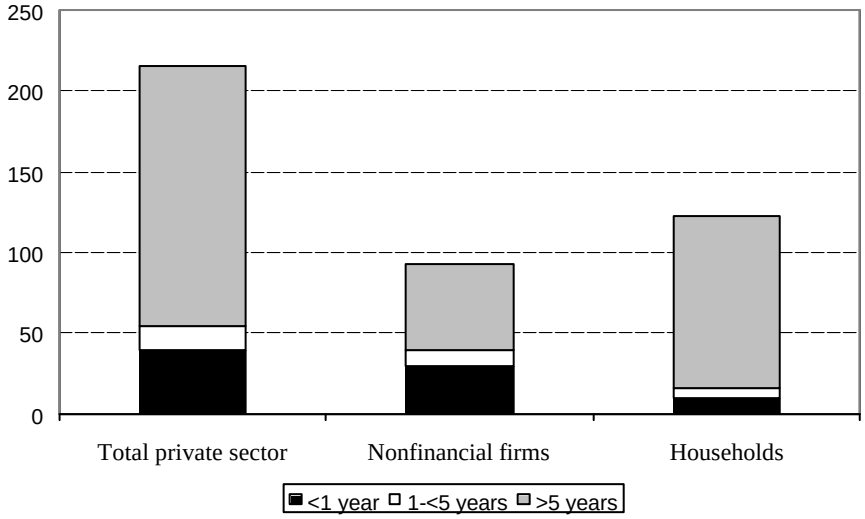
[9] The balance sheet data of the foreign banks only relate to their activities in the Netherlands.
[10] The '+' sign refers to the non-EU member states which belong to the so-called 'European Economic Area'.
[11] Although there is no exact information on this, as firm balance sheet information lack a distinction of long-term debt between bank and non-bank.

For the credit channel to work it is assumed that banks are subject to market forces. In this respect it is important to note that there are no state-owned commercial banks in the Netherlands. However, the government does give guarantees on specific bank loans. An important category is the municipal guarantees that stand surety for mortgage loans to low-income households. The state also acts as guarantor for loans to semi-state owned companies, such as hospitals. Therefore, loans with and without state guarantees are distinguished in the empirical part of this study.

Another special feature for the credit channel to operate is that there is a clear distinction, in terms of cost of funding, between insured deposit funding and non-insured non-deposit funding. In the Netherlands deposits of private persons are insured for up to € 20,000 per depositor per bank.

The speed with which banks can cut down on their loan portfolio after a monetary tightening depends among other things on the maturity of the outstanding bank debt. It is clear that banks can cut down on new loans quickly, but if the existing loan contracts are long-term, this drop in the inflow of new loans will have a smaller impact on the total amount of bank loans outstanding than when old loans roll over quickly. The maturity structure of bank loans outstanding to the total private sector is relatively long in the Netherlands. At the end of 2000, 75% of the total amount of bank loans had a maturity of more than five years (Figure 4). A third of the amount of loans to non-financial firms had a maturity shorter than one year, 10% one to five years, and 58% longer than five years. Loans to households are mostly long-term (87% longer than five years), since they consist

Figure 4 Bank loans by maturity
(End of 2000; billion euros)



of mortgage loans which are long-term by definition in the Netherlands. In view of the long maturity structure of bank loans, the speed with which the outstanding loan supply responds to monetary shocks is expected to be low. Short-term and long-term loans will be distinguished when investigating the monetary policy effects on lending in the empirical part of this study.

The banks take as collateral the houses that are financed with mortgage loans. For loans to firms there is some evidence from recent interviews with bank loan officers and account managers (Saunders and Schmeits, 2001). According to this information, credit spreads and collateral requirements appear to be relatively high in comparison to the UK, the US and Germany. The collateral requirements depend on the bankruptcy law and in particular priority rules for creditors. In the Netherlands, like the UK and Germany, bankruptcy laws appear to be relatively more 'creditor friendly' than in the US, and therefore collateral plays a more central role.

4 Model

The empirical analysis of the role of banks in the monetary transmission process focuses on the reaction of the loan (and deposit) supply to monetary shocks. The question is whether there are certain types of banks that show a relatively strong decrease in lending and deposits after monetary tightening. The literature on the bank-lending channel has suggested several bank characteristics that determine how susceptible banks are to the lending channel:

- The size of a bank. Small banks encounter more asymmetric information problems on the capital market than large banks and therefore may find it more difficult to raise uninsured, *i.e.* non-deposit, funds in response to monetary tightening (Kashyap and Stein, 1995);
- The degree of liquidity. Liquid banks can draw on their reserves of cash and securities to protect their loan portfolio, while this is less possible for illiquid banks (Kashyap and Stein, 2000).
- The degree of capitalisation. Poorly capitalised banks have less access to non-deposit funds and are therefore forced to cut their loan supply by more than well-capitalised banks (Peek and Rosengren, 1995);

The econometric model that is employed in this study relates the growth of bank lending (or deposits) per individual bank at a particular time (quarter) to a monetary policy

indicator plus several control variables. The short-term interest rate is used as monetary policy indicator.[12] Control variables are added to the model to account for the influences of macro-economic developments on bank lending as well as the differential responses of different types of banks to such macroeconomic developments. Real GDP growth and inflation are included among the regressors as control variables. To enhance the possibility of identification of the effect of monetary policy shocks on the supply of credit, the focus is on the distribution of the lending responses over different bank types. This is the reason for including the already mentioned categorisation variables into the model: size, liquidity and capitalisation. The empirical models for loans and deposits are similar:

$$\begin{aligned}\Delta_4 \log m_{it} &= \sum_{j=1}^{L} a_j \Delta_4 \log m_{it-j} + \sum_{j=1}^{L} b_j \Delta_4 r_{t-j} + \sum_{j=1}^{L} g_j x_{it-j} \Delta_4 r_{t-j} + \sum_{j=1}^{L} l_j x_{it-j} \\ &+ \sum_{j=1}^{L} m_j \Delta_4 \log pc_{t-j} + \sum_{j=1}^{L} r_j x_{it-j} \Delta_4 \log pc_{t-j} + \sum_{j=1}^{L} d_j \Delta_4 \log y_{t-j} + \sum_{j=1}^{L} f_j x_{it-j} \Delta_4 \log y_{t-j} \quad (1) \\ &+ \sum_{q=1}^{3} s_q \mathrm{dum}_q + u_i + e_{it}\end{aligned}$$

with:

Δ_4 Lag-4 seasonal difference ($\Delta_4 x_t = x_t - x_{t-4}$);

log Logarithm;

m Loans, or deposits, respectively.

it Subscripts denoting bank i and quarter t, respectively; $i = 1, \ldots, N$ and $t = 1, \ldots, T$

r Monetary Policy indicator, measured by the Dutch short-term interest rate;

pc Consumer price index, to control for the influence of inflation.

y Real GDP, to control for the influence of real growth.

dum_q Quarterly dummy for q=1, 2 and 3, to control for any remaining seasonal effects.

u_i Individual bank effects.

e_{it} Error term.

$a, b, g, l, m, r, d, f, s$ parameters to be estimated.

x Bank characteristic variable, respectively: size (*Size*), liquidity (*Liq*) and capitalisation (*Cap*), defined as:

$$Size_{it} = \ln A_{it} - \frac{\sum_i \log A_{it}}{N}$$

[12] The interest rate is being criticised as a monetary policy indicator for not being wholly exogenous or unanticipated. A more exogenous indicator could be a residual from an identified VAR. Such a variable has been tried in this analysis but the results were poor.

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

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

The log of total assets, A_{it}, measures bank size. Liquidity is defined as the ratio of liquid assets L_{it} (cash, interbank deposits and government securities) to total assets. Capitalisation is given by the ratio of capital and reserves, C_{it}, to total assets. The three criteria are normalised with respect to their averages across all banks so that they sum up to zero over all observations. The interaction term $x_{jt-1}\Delta_4 r_{t-j}$ therefore averages to zero as well so that parameter b_j is directly interpretable as the overall monetary policy effect. In the case of size, the normalisation is not just over the sample mean over the whole sample period, but over the means per quarter as well, so that trends in bank size are removed.

The attention focuses on the estimated values for coefficients b and g. Monetary tightening is expected to lead to a decrease in lending. Large, liquid and well-capitalised banks are expected to be more able to shield their loan portfolio from monetary shocks by drawing on their liquid holdings of securities and/or by attracting non-deposit funding. Hence, g is expected to be positive. It is assumed that large, liquid and well-capitalised banks face the same loan demand schedule as small, less liquid and less capitalised banks. Therefore, a finding that banks in general cut lending after monetary tightening but that this cut is less substantial or even absent for large, liquid and well-capitalised banks can be interpreted as evidence of the lending channel.

The interpretation of the coefficients is partly similar for deposits. A monetary tightening is expected to lead to a decrease in deposits, hence b is again expected to be negative. However, the credit view does not give clear predictions as to the relationship between the size, liquidity or capitalisation of the bank on the one hand and the extent to which banks' deposits are drained by monetary tightening. This, therefore, seems to be more like an open issue.

5 Data

This section first discusses some data issues and then presents a further exploration of the sample structure using factor analysis. The latter helps to determine which classifications of banks may be relevant for the empirical part of this study.

5.1 Data issues

Data are taken from balance sheets of Dutch banks reporting to DNB for the compilation of aggregate monetary statistics. The sample used in this study covers the period between 1990Q4 and 1997Q4. The original, unbalanced panel dataset contains 143 banks. Due to mergers the number of banks in the unbalanced sample starts from 105 in 1990Q4 and slowly declines to 88 in 1997Q4 (see Figure 5). In 1998Q1, which coincides with the European harmonisation of the monetary statistics, the number of reporting banks drops sharply to a mere 25.[13] Moreover, the definitions of many balance sheet items were harmonised and the statistical unit changed from 'bank' to 'monetary financial institution' (MFI) at that time. This generated a statistical break in most balance sheet series. Therefore, we use the sample from 1990Q4 up to and including 1997Q4.

When possible, mergers and acquisitions were corrected backwards by aggregation of the

Figure 5 Number of banks included in monetary statistics

[13] According to the 'ESCB implementation package' a statistical coverage of at least 95% of the balance sheet total of the whole banking sector was agreed upon. In the Dutch case this meant that around 60 banks were no longer included in the monetary statistics which had previously aimed at 100% coverage.

merging banks. If not, the time series were curtailed so that the remaining series referred to one and the same bank. In ten cases, where there were multiple mergers in a row, banks had to be deleted from the sample completely. After this cleaning, the dataset counted 135 banks (which were used for Table 1).

Figure 5 shows that none of the separate quarter observations counted more than 110 banks, so it is clear that there are quite a number of banks entering and leaving the sample within a relatively short period. Therefore, additional banks were dropped for which the time-series were too short to be included in the econometric model estimation. More specifically, 45 banks for which the available time-series were shorter than 12 quarters were deleted from the sample. After this selection step the sample counted 99 banks. This sample will be used in the empirical Section 5.2, 6.2 and 6.3.

5.2 Factor analysis

Factor analysis may help to get a clearer picture of the partly hidden structure of the banking sector. The power of factor analysis is that it simplifies the complex and diverse relationships among different variables by uncovering the common dimensions that link them together, thus providing insight into the hidden structure of the data.[14]

A common factor is an unobservable, hypothetical variable that contributes to the variance of at least two observed variables. The equation of the common factor model is:

$$y_{ij} = \sum_{k=1}^{q} x_{ik} b_{kj} + e_{ij} \qquad (2)$$

y_{ij} is the ith observation on the observable variable j. x_{ik} is the value of the ith observation on the kth common factor. There are q common factors in this equation, which are conveniently assumed to be uncorrelated with each other. b_{kj} is the regression coefficient for predicting variable j using the kth common factor. e_{ij} are residuals and are defined to be uncorrelated both with each other and with the common factors. In matrix notation it reads:

$$Y = XB + E \qquad (3)$$

B is the factor pattern, which lends itself to interpretation of the meanings of the common factors, as we shall see.

[14] On factor analysis, see *e.g.* Mulaik (1972).

As variables we take a set of potential proxy variables for banks' susceptibility to the credit channel. First, the list of variables starts with the already mentioned proxies – bank size, capital ratio and liquidity ratio. However, liquid assets are split into their components: cash, securities, and interbank deposits. Second, the set of variables is extended with other variables, especially representing the market segment orientation: loans to households, loans to non-financial firms, loans under state guarantee, deposits of households, deposits of non-financial firms and deposits of foreigners, all scaled by total assets. The goal of factor analysis is to cluster these variables into factors on the basis of their correlations. Variables that are strongly correlated are formed into a first factor with the condition that this factor is not correlated to the second factor, and so on. To improve interpretation of the factor pattern that is obtained from the analysis, an orthogonal rotation is performed to obtain a simple structure so that the rotated factors become uncorrelated. This reduces the problem of having too many variables loading on one factor or a variable showing significant loading on more than one factor. A 'scree plot' method, an analysis of the 'eigenvalues' of the factors and several tests are employed to decide on how many factors to retain. Consequently, three factors have been retained in the analysis, together accounting for 95% of the common variance in the data. The resulting factor pattern is presented in Table 2. Substantial factor loadings, conveniently set equal to or higher than 0.13, are printed in bold letters for easier interpretation.

Loans to households show the highest positive loading on the first factor, while loans to firms have a negative loading. The large positive loading of cash holdings indicates that these types of banks carry a lot of cash for daily operations. Households' deposits also carry a significant loading in this factor. Since these characteristics point towards banks being heavily involved in the retail market, the first factor is labelled 'Retail banks'. Deposits of firms and foreigners dominate the second factor – *i.e.* the depositors are mostly foreign firms. These characteristics are in accordance with the balance sheet composition of foreign banks (*cf.* Table 1), so the second factor is labelled 'Foreign banks'. The third factor is dominated by loans to firms and is labelled 'Wholesale banks'.

The results from the factor analysis complement the analysis of the composition of the banks' balance sheets in Section 3. The conclusion is that three types of banks can be distinguished: retail, foreign and wholesale banks. In the empirical Section 6 this distinction will be taken up when assessing monetary policy responses of different types of banks.

6 Estimation and results

In this section the results of the estimation of equation (1) are presented. Section 6.2 presents the results using the bank characteristic variables size, liquidity and capitalisation as defined in Section 4. In Section 6.3 the model is reestimated with the alternative three bank characteristic variables derived from the factor analysis in Section 5.2. But first, Section 6.1 discusses some econometric issues.

6.1 Econometrics

Due to the inclusion of lagged dependent variables in equation (1), ordinary least squares (OLS) estimation cannot be applied. Therefore, the generalised method of moments (GMM) estimator suggested by Arellano and Bond (1991) is used. This estimator yields more robust estimates, provided that the models are not subject to serial correlation of order two and provided that the set of instrument variables that are used are valid, which is tested for with the Sargan test. The Arellano-Bond estimator first-differences the equation in order to remove the individual bank effects and produces an equation that is estimable by instrumental variables. Lagged levels of the dependent and predetermined variables and differences of the strictly exogenous variables are used.

The instruments that are used, apart from the usual lags of the model variables, concern lagged values of the seasonal differences of the logs of the house price, the average selling period for houses on sale, real consumption and real investment expenditure. This controls for the strong relationship between the house and credit market developments during the 1990s in the Netherlands (*cf.* Section 2). The Sargan statistics indicate whether the instruments are valid. The maximum lag length L chosen is four for the dependent variable and three for all the other variables; more lags generated, on average, lower significance of the variables.

All output tables in the following two subsections (6.2 and 6.3) present long-term coefficients, which have been calculated from the sum of the coefficients of the three lags of the explanatory variables divided by one minus the sum of the coefficients of the four lags of the dependent variable. Corresponding p-values are given denoting their levels of significance. Separate coefficients for all the lags of the variables are not reported for reasons of space. In general, the first lags carry much weight. The numbers of observations and banks in the respective samples are also given. These numbers are lower

than the total number of banks in the original sample, which was 99 (see Section 5.1). The reason for this is that the panel data set is unbalanced, since some banks have longer time-series than others. Due to the inclusion of lags and taking fourth differences in the estimation, some banks completely drop out from the sample. Moreover, the numbers of banks are even lower when the model is estimated for subcategories of loans (for instance long-term loans, short-term loans). This is due to the fact that some banks do not have these types of loans on their balance sheet and drop out of the sample.

The instruments are also in lag-4 seasonal differences, where appropriate. The number of lags for the instruments were chosen on empirical grounds and set not too high in order to preserve as many observations. The Sargan statistics indicate that the instruments are valid, although there might be some "overfitting" (Sargan=1.00), which is not a real problem. The AR1 and AR2 tests indicate that first-order autocorrelation in the residuals is present, but that second-order autocorrelation is not. The presence of first order autocorrelation does not imply that the estimate are inconsistent. The presence of second order autocorrelation would imply inconsistency, though. Further checks on higher order autocorrelation, not reported here, were also negative. The tables below report estimates obtained using the two-step GMM estimator proposed by Arellano and Bond (1991). It is known that the two-step standard errors tend to be biased downward in small samples. For this reason, the one-step results are generally recommended for inference on the coefficients, although the two-step Sargan test is recommended for inference on model specification. However, many coefficients tend to become insignificant when using the one-step estimator, and for that reason the two-step estimation results are reported.[15]

6.2 Results with size, liquidity and capitalisation as bank characteristics

The results of the estimation of equation (1) for *loans* are presented in Table 3. The colums denoted by 'Size', 'Liquidity' and 'Capitalisation' give the results of the estimation of the equation including the three different bank characteristic variables bank size, liquidity and capitalisation, respectively. For comparison's sake, the first column also presents the results of the estimation without interacting with any of the bank characteristic variables.

The top panel of the table gives the long-term coefficients for total loans to the private nonfinancial sector, which include 47% of total assets of all banks in the sample. The

[15] The signs and relative magnitudes of the coefficients generally do not change much, so that the two-step evidence presented here can be considered indicative.

coefficient of the interest rate is negative in all four cases, though not significantly (at the 5% level) in the equation with liquidity and capitalisation. The coefficient for the interest rate is –4.8 in the loan equation with size, which means that an increase in the interest rate by one percentage point in the long run leads to a decrease in the amount of loans by 4.8%. In the equation without a bank characteristic variable the coefficient is smaller (–2.0) and in the equation with liquidity and capitalisation it is insignificant, as already mentioned. Turning to the coefficients of the interaction terms in the total loan equation, the expected positive sign is found to be significant for capitalisation only. Hence, there is no equation for total loans where both the coefficient of the interest rate and the coefficient of the interaction term are significant and have the signs that are to be expected from the lending channel theory.

Further investigation revealed that in the case of the Netherlands it is important to make a distinction between bank loans with and without state guarantees, when investigating the lending channel of monetary policy. The second and third panels in Table 3 present estimates for loans with and without state guarantees, or in other words secured and unsecured bank debt. Secured debt account for 10% of total assets of the banks in the sample, unsecured debt 37%. There are some striking outcomes. First, a significantly negative interest rate effect on lending is totally absent in the case of secured lending, while it is present in all cases for unsecured lending except in the equation with capitalisation as the interaction variable. Hence, monetary policy tightening does not appear to have any negative effect on secured bank lending. A reason could be that loans with guarantees get special treatment by banks. In fact, they earn a special interest rate, which is generally lower than the market rate. This reflects the lower credit risk on secured debt for which the government stands surety. Second, the expected positive coefficient of the interaction term is found to be significant for unsecured loans in all cases while for secured lending the interaction term has the opposite sign and is moreover not always significant. Third, the coefficients of the control variables ('Real GDP' and 'Prices'), when they are significant, are of opposite signs for secured and unsecured debt. For unsecured debt the coefficients have the intuitively expected positive sign, while for secured debt the sign is negative. Hence, secured lending moves counter to macroeconomic trends. The positive coefficients of real GDP are quite large for unsecured lending. This probably reflects the extraordinary high credit growth during the sample period, often exceeding the GDP growth rate, as mentioned in Section 2. All in all, these results show that in the case of the Netherlands it is highly important to look at unsecured bank credit, *i.e.* loans without any state guarantees, when investigating the lending channel of monetary policy. Therefore, in what follows the focus will remain on unsecured debt.

Table 4 goes into more detail by presenting the monetary policy effects on unsecured bank lending by maturity and by sector. The control variables are not reported here for reasons of space; their coefficients are qualitatively similar to those given for unsecured loans in Table 3. The top panel shows the effects on lending long-term and short-term[16] and the bottom panel for lending to households and firms. Overall, going into this detail seems to lead to some loss of statistical significance for a number of the monetary policy variables. However, where the coefficients are statistically significant they still have the theoretically expected signs, *i.e.* negative for the interest rate and positive for the interaction term. Combinations of a significant and negative coefficient for these two variables are only found in two cases, though (in the equation for unsecured long-term loans with capitalisation and the equation for unsecured loans to nonfinancial firms with liquidity).

Turning to the results of the estimation of equation (1) for *deposits*, Table 5, the first result that stands out is that total deposits react positively instead of negatively to monetary policy tightening. This effect is statistically robust, although its magnitude is relatively small. A one-percentage point increase in the short-term interest rate in the long run leads to an increase of total deposits by 0.1% to 0.6%, depending on which bank characteristic variable is in the model. Interestingly, this positive effect seems to be determined by the positive interest sensitivity of time deposits, which comprise 25% of total deposits and consistently show a significantly positive coefficient between 0.4 and 0.5. In the equations for demand and savings deposits the interest variable is not significant (at conventional levels). Hence, neither demand nor savings deposits appear to respond to monetary policy changes. An economic explanation could be that time deposits are held not so much for transaction motives as they are for precautionary motives. Therefore, the short-term interest rate is an argument that positively enters the demand for time deposits. In other words, the short-term interest rate performs as the own-rate of return on (short-term) time deposits instead of being a proxy for monetary tightness. Unfortunately it is not possible with the available data to distinguish between short-term and long-term time deposits to check whether this holds especially for short-term time deposits. Savings deposits, making out 50% of total deposits, are typically held by households as a store of wealth and kept for a longer time period. That may be the reason why it does not seem to be very sensitive to monetary policy.

[16] Short-term is defined as maturity up to two years, long-term two years and more. This maturity split was only available from the pre-harmonised statistics on which this analysis is based. The maturity splits in the harmonised statistics are at one and five years, respectively, giving a maturity structure as shown in Figure 4.

The positive effect of the interest rate on deposits is inconsistent with the lending channel story that presumes a negative impact of monetary tightening on deposits (see Section 1). However, it should be pointed out in this respect that this part of the standard lending channel story reflects the practice in the US, where the Fed is conducting monetary operations by performing open market operations. In the Netherlands, open market operations were not common practice during the sample period (1990-1997). At that time the central bank of the Netherlands achieved monetary tightening by making Dutch banks deposit larger amounts of liquid assets at the central bank and by increasing the costs against which the banks could borrow back liquid assets. Hence, Dutch monetary policy did not affect the liability side of the banks' balance sheet as is the case in the US, but affected the assets side. The rise of the interest rate in the money market, caused by such monetary tightening, increased the attractiveness of notably time deposits for households and firms. So it could happen that the deposits of the private sector increased while at the same time the central bank took out sufficient reserves to squeeze the liquidity position of the banks. The findings regarding the deposit equation are therefore not totally unexpected in the Dutch case and need not necessarily undermine the support for the bank-lending channel provided by the estimates for loans.

The interaction coefficients, when significant, give information on which types of banks tend to increase deposits in times of monetary tightness. Large and liquid banks appear to make less effort to attract total deposits than banks with high capitalisation (being typically smaller banks). The findings for time deposits are however not consistent with this as they indicate that large banks manage to attract most time deposits under those circumstances.

The results concerning the links between the deposit growth and the control variables deserve some clarification. Both real GDP growth and inflation seem to have a significantly negative effect on deposit growth. This outcome can be explained by the decreasing significance of deposits as a source of bank funding in the Netherlands during the period considered, see Section 2. The control variables apparently account for this trend.

6.3 Results with the three factors as bank characteristics

In Section 5.2 a factor analysis showed that the banks in the sample could be split into three categories: retail banks, wholesale banks and foreign banks. This result will be used in this subsection to assess whether the bank lending and deposit responses to monetary

shocks depend on which market segment banks are operating in. The factors derived from the factor analysis lend themselves to be used as bank characteristic variables, to interact with the monetary policy variable.[17] The values of these factors measure the extent to which a particular bank can be characterised exclusively as a retail bank, a foreign bank or a wholesale bank.

It should be noted beforehand that the research question in this subsection is different compared to the previous one. It is unlikely that the signs of the coefficients of the three factors (that are the new interaction variables in the equation) can be predicted *a priori* on the basis of the lending channel theory. For example, the theory does not predict whether banks dealing with households cut down their loan supply differently after monetary tightening than banks dealing with firms do. The research question posed here is just whether there is evidence that banks in different market segments respond differently to monetary policy. This is an interesting question because it gives insight into the distributional effects of monetary policy over the different groups of bank borrowers (households and firms). The control variables in the model should account for most of the differential loan demand effects, so that this experiment may shed some light on the question whether, for instance, monetary policy affects bank dependent households differently than it affects firms.

Table 6 presents the results for *loans*. The three columns represent the equations with factor 1, 2 and 3 as the bank characteristic variables. The top panel presents the long-term coefficients for total unsecured loans, with splits into long-term and short-term loans in the second panel and into households and firms in the bottom panel. Looking at the coefficients of the interest rate, it appears that in general bank lending is affected negatively by monetary tightening. However, the significance of the negative interest rate coefficient is consistently higher for lending to firms than it is for lending to households. This indicates that bank dependent households are affected less by monetary tightness than bank dependent firms. The values of the estimated coefficients for the interaction terms in the equation for total loans are often not significant. They are only significant for short-term and long-term loans when the interaction variable is factor 3, which stands for the extent to which a bank is a wholesale bank. The interaction term is positive for short-term loans and negative for long-term loans. This suggests that banks specialising in lending to firms cut their long-term lending by more and cut their short-term lending by less than banks operating in other market segments.

[17] The means of common factors over all observations are already zero by definition, so that normalisation is not necessary.

Table 7 presents the results for *deposits*. The outcomes confirm the earlier findings that deposits respond positively to interest rate increases, and that this positive response is driven by time deposits.

The question may arise whether it would not be more straightforward to measure market orientation by the original observable variables, on which the unobservable common factors have been based (*e.g.*. loans to firms/assets, loans to households/assets). The answer is that it may be more straightforward but not be more appropriate. First, it should be noted that the fact that the factor loading for loans to firms in factor 3 is 0.99 (Table 2) does not mean that this variable is the only contributing variable to that factor. Remember that the factor pattern has been simplified optically by rotation in order to facilitate economic interpretation, but this does not mean that the coefficients in the factor pattern matrix can be interpreted simply as the weights of a linear relationship. Second, and more fundamentally, the reason for using the factors is that they take account of the interrelationships between the different variables. For example, factor 1 shows that retail banks do not only lend mainly to households but also hold relatively large cash balances and attract relatively more households' deposits. A one-dimensional classification variable such as loans to households would imply throwing this information away. Third, a general advantage of factor analysis is that it defines categories of banks that exclude each other. In other words, a bank with a high value for factor 1 will not also have a high value for the other factors. This is an advantage which the use of one-dimensional classification variables normally do not have, although in the case of loans to households versus loans to firms this characteristic would also be present.

7 Conclusion

This study contributes to the empirical evidence on the lending channel in the Netherlands, using individual bank data. The analysis focuses on the differential response of the loan and deposit supply to monetary policy changes across several bank categories. Two categorisation devices are used in this study: first, banks' financial health (measured by size, liquidity and capitalisation) and, second, banks' market orientation (retail banking, wholesale banking and foreign banking).

The results for loan supply suggest that a lending channel is operative in the Netherlands. However, for the Netherlands it appears to be important to make a distinction between

bank loans with and without state guarantees. Particularly, there is strong evidence that the lending channel is only operative for unsecured bank debt. The results show that monetary tightening does not have any negative effect on secured bank lending. A reason could be that loans with guarantees get special treatment by banks. For unsecured debt the results are in accordance with expectations: there is a negative monetary policy effect on lending which is stronger for smaller, less liquid and less capitalised banks. This is in line with the lending channel theory according to which such banks are less able to attract non-deposit funds or use their buffer of liquid assets to shield their loan portfolios from monetary policy tightening.

The results show that deposits – especially time deposits – react positively to monetary policy tightening, which is inconsistent with the lending channel story that presumes a negative impact. This unexpected outcome can be related to the way monetary policy operations in the Netherlands were conducted at the time.

A contribution of this study is that it gives evidence that the monetary policy impact on bank lending also depends on the market segment in which a bank is active. The evidence suggests that the lending channel is not affecting lending to households as much as it is affecting lending to firms. This could reflect partly the special circumstances in which the market for mortgage credit found itself during the 90s. There were also supply factors causing an extraordinary strong trend in mortgage lending at the time, which possibly makes it very difficult to filter out any interest rate effects on lending supply.

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Table 1 Selected balance sheet data, by bank type, size and nationality 1990-1997

	Assets in € mln (Market share %)	Percent of total assets										
		Liquidity				Loans to households	Loans to firms	Loans to private sector with state guarantee	Deposits of households	Deposits of firms	Deposits of foreigners	Capital and reserves
		Total	*Of which:* Cash	Inter-bank deposits	Government securities							
Whole sample 135 banks	5,645	44.4	0.2	37.8	6.4	8.9	24.2	6.5	17.3	20.8	9.0	10.9
	328 (100%)	40.8	0.0	32.6	4.0	0.1	15.3	0.4	0.2	15.3	3.2	6.1
Type:												
107 Commercial banks [a]	6,843	45.8	0.2	39.6	6.0	7.0	25.0	5.7	13.0	18.9	9.7	10.9
	491 (99.4%)	43.4	0.0	35.8	3.9	0.1	20.7	0.1	0.1	14.8	3.7	5.4
17 Savings banks	265	34.6	0.5	22.6	11.5	33.8	11.8	17.0	72.8	12.5	2.1	9.2
	141 (0.4%)	33.1	0.6	22.1	6.2	39.7	11.6	18.7	73.3	11.1	0.7	7.3
11 Securities banks	104	41.4	0.0	37.2	4.3	1.0	29.3	3.2	0.4	46.4	9.0	13.0
	53 (0.2%)	41.3	0.0	35.6	1.1	0.0	28.4	0.1	0.0	49.3	5.6	9.2
Size:												
7 Largest banks	81,897	22.8	0.3	17.0	5.6	18.2	33.8	11.5	23.0	19.1	7.5	4.5
	78,660 (78.8%)	23.5	0.3	15.3	6.1	17.1	31.8	6.6	16.9	21.2	5.0	4.3
60 Medium-sized banks	2,490	45.1	0.1	38.2	6.8	9.4	21.1	4.6	15.6	21.1	7.2	5.6
	1,504 (20.2%)	44.0	0.0	35.9	5.4	0.5	17.1	0.0	0.5	17.1	3.8	4.4
68 Smallest banks	121	46.2	0.3	39.8	6.0	7.5	26.1	7.7	18.2	24.5	10.9	16.7
	93 (1.0%)	42.0	0.0	33.7	2.0	0.0	18.6	1.2	0.0	18.6	1.9	9.1
Nationality:												
73 Domestic Banks	10,275	34.1	0.2	26.0	7.8	17.5	23.4	11.0	34.2	19.4	4.3	10.9
	347 (89.3%)	32.1	0.0	22.5	5.4	6.3	19.3	5.8	22.5	14.5	1.5	6.7
62 Foreign banks	1,191	54.3	0.2	49.2	5.0	0.7	24.9	2.1	1.0	22.1	13.4	10.9
	317 (10.7%)	55.4	0.0	49.5	2.6	0.0	19.5	0.0	0.0	17.1	6.3	5.2
Of which:												
35 Subsidiaries	1,427	48.0	0.2	41.1	6.6	0.9	27.5	1.4	1.2	18.6	11.0	11.7
	439 (7.3%)	48.1	0.0	42.0	4.5	0.0	25.2	0.0	0.0	16.1	5.9	5.8
11 EU+ Branches	1,545	68.9	0.0	65.9	3.0	0.3	22.5	4.3	0.4	30.4	18.4	5.4
	986 (2.3%)	76.0	0.0	70.6	1.1	0.1	12.2	0.0	0.0	18.2	5.6	1.9
16 Non-EU+ Branches	447	58.7	0.1	55.8	2.8	0.3	21.1	2.3	0.8	24.4	15.5	12.9
	178 (1.1%)	63.0	0.0	58.8	1.5	0.0	15.8	0.0	0.0	21.1	8.5	5.3

Explanatory note: Each cell gives two figures: the first figure is the mean, the second the median.
a) The group of 'commercial banks' comprises four co-operative banks.

Table 2 Factor pattern

Factor number *Factor label*	**Factor 1** *Retail banks*	**Factor 2** *Foreign banks*	**Factor 3** *Wholesale banks*
Size	-0.009	-0.027	0.004
Capital/assets	-0.027	-0.021	-0.006
Cash/assets	**0.291**	0.074	0.067
Interbank deposits/assets	-0.080	0.081	-0.023
Securities/assets	-0.006	-0.033	0.000
Loans to firms/assets	**-0.157**	-0.009	**0.992**
Loans to households/assets	**0.532**	0.015	0.128
Secured loans/assets	0.059	-0.017	0.015
Deposits of households/assets	**0.149**	-0.043	0.038
Deposits of firms/assets	0.110	**0.503**	0.004
Deposits of foreigners/assets	0.054	**0.435**	-0.006
Cumulative proportion of common variance	0.527	0.765	0.950

Number of banks = 99; Number of observations = 2519.

Table 3 LOANS TO PRIVATE SECTOR: TOTAL, WITH AND WITHOUT GUARANTEE

Two-step GMM estimates

	Bank characteristic = None			**Bank characteristic = Size**			**Bank characteristic = Liquidity**			**Bank characteristic = Capitalisation**		
	Coeff.	*p*-value		Coeff.	*p*-value		Coeff.	*p*-value		Coeff.	*p*-value	
Total loans to private sector (47% of total assets)												
Real GDP	-1.560	***	0.001	1.353		0.278	-2.027	**	0.050	-2.569	*	0.051
Bank characteristic × GDP				3.922	***	0.000	-35.39	***	0.000	-171.87	***	0.000
Prices	1.995	***	0.004	3.724	**	0.019	1.896		0.420	-2.220	*	0.084
Bank characteristic × Prices				-0.219		0.707	-28.74	***	0.000	-58.86	***	0.000
Bank characteristic				-0.592	***	0.000	2.653	***	0.000	9.481	***	0.000
Interest rate	-2.011	***	0.000	-4.849	***	0.000	-1.798	*	0.091	-0.969		0.141
Bank characteristic × Interest rate				-0.462		0.504	5.645		0.365	94.71	***	0.000
p-values: AR1, AR2, Sargan	0.001	0.874	1.000	0.001	0.869	1.000	0.000	0.949	1.000	0.001	0.857	1.000
Number of banks, observations	98		1563	98		1563	98		1563	98		1563
Loans with guarantee to private sector(10% of total assets)												
Real GDP	-25.93	***	0.000	-23.25	**	0.043	-33.58	**	0.012	-21.39		0.189
Bank characteristic × GDP				18.14	***	0.005	53.76		0.295	-74.229		0.626
Prices	-14.35	***	0.000	-8.637		0.284	-17.43		0.487	-19.81	*	0.083
Bank characteristic × Prices				-1.814		0.503	80.41	**	0.035	3.110		0.982
Bank characteristic				-0.884	***	0.001	-3.215	*	0.072	5.197		0.439
Interest rate	13.83	***	0.000	20.15	***	0.002	13.68		0.387	-0.449		0.959
Bank characteristic × Interest rate				-13.42	***	0.006	-102.75	*	0.092	-162.06		0.393
p-values: AR1, AR2, Sargan	0.059	0.690	1.000	0.127	0.626	1.000	0.079	0.949	1.000	0.075	0.814	1.000
Number of banks, observations	54		725	54		725	54		725	54		725
Loans without guarantee to private sector(37% of total assets)												
Real GDP	17.13	***	0.000	18.20	***	0.000	13.91	***	0.000	6.338	***	0.005
Bank characteristic × GDP				-2.621	*	0.074	-49.12	***	0.000	-336.42	***	0.000
Prices	5.661	***	0.000	4.658	*	0.065	1.044		0.717	4.700		0.285
Bank characteristic × Prices				1.441		0.192	-72.29	***	0.000	80.594	**	0.038
Bank characteristic				-0.410	***	0.000	4.037	***	0.000	8.942	***	0.000
Interest rate	-10.39	***	0.000	-10.91	***	0.000	-7.395	***	0.000	-2.411		0.173
Bank characteristic × Interest rate				1.852	**	0.021	24.29	***	0.001	202.67	***	0.000
p-values: AR1, AR2, Sargan	0.002	0.609	1.000	0.002	0.684	1.000	0.001	0.735	1.000	0.002	0.909	1.000
Number of banks, observations	95		1478	95		1478	95		1478	95		1478

*/**/*** denotes significance at the 10% / 5% / 1% level.

Table 4 LOANS TO PRIVATE SECTOR WITHOUT GUARANTEE, BY MATURITY AND SECTOR
Two-step GMM estimates

Bank characteristics:	**Size**			**Liquidity**			**Capitalisation**		
	Coeff.		*p*-value	Coeff.		*p*-value	Coeff.		*p*-value
By maturity:									
Short-term loans without guarantee to private sector(11% of total assets)									
Interest rate	-7.552	***	0.000	-2.068		0.172	-0.015		0.994
Bank characteristic × Interest rate	1.853		0.236	28.10		0.124	217.2	***	0.000
p-values: AR1, AR2, Sargan	0.000	0.498	1.000	0.000	0.664	1.000	0.000	0.796	1.000
Number of banks, observations	95		1449	95		1449	95		1449
Long-term loans without guarantee to private sector (26% of total assets)									
Interest rate	-5.627		0.208	-5.875		0.377	-25.05	***	0.000
Bank characteristic × Interest rate	1.640		0.645	78.55	***	0.000	199.2	***	0.000
p-values: AR1, AR2, Sargan	0.006	0.436	1.000	0.005	0.381	1.000	0.006	0.760	1.000
Number of banks, observations	67		1070	67		1070	67		1070
By sector:									
Loans without guarantee to households (14% of total assets)									
Interest rate	-5.296	*	0.063	-0.481		0.916	-8.196		0.581
Bank characteristic × Interest rate	1.082		0.599	31.29		0.223	-269.6		0.441
p-values: AR1, AR2, Sargan	0.001	0.177	1.000	0.001	0.198	1.000	0.001	0.119	1.000
Number of banks, observations	62		962	62		962	62		962
Loans without guarantee to non-financial firms (23% of total assets)									
Interest rate	-8.529	***	0.000	-7.377	***	0.000	-2.331		0.268
Bank characteristic × Interest rate	0.016		0.985	35.22	**	0.012	249.3	***	0.000
p-values: AR1, AR2, Sargan	0.001	0.833	1.000	0.001	0.827	1.000	0.001	0.891	1.000
Number of banks, observations	95		1468	95		1468	95		1468

*/**/*** denotes significance at the 10% / 5% / 1% level.

Table 5 DEPOSITS OF THE NON-FINANCIAL PRIVATE SECTOR, BY TYPE

Two-step GMM Estimates

Bank characteristics:	**Size**			**Liquidity**			**Capitalisation**		
	Coeff.		*p*-value	Coeff.		*p*-value	Coeff.		*p*-value
Total deposits (40% of total assets)									
Real GDP	-0.995	***	0.000	-1.517	***	0.000	-1.057	***	0.000
Bank characteristic × GDP	-0.355	***	0.000	5.777	***	0.000	5.000	***	0.000
Prices	-0.555	***	0.000	-0.637	***	0.000	-0.572	***	0.000
Bank characteristic × Prices	0.206	***	0.000	-1.065	***	0.000	-2.297	**	0.037
Bank characteristic	-0.049	***	0.000	-0.130	***	0.000	0.129	***	0.000
Interest rate	0.142	***	0.000	0.471	***	0.000	0.563	***	0.000
Bank characteristic × Interest rate	-0.044	***	0.001	-1.741	***	0.000	2.723	***	0.000
p-values: AR1, AR2, Sargan	0.000	0.831	1.000	0.000	0.937	1.000	0.000	0.916	1.000
Number of banks, observations	99		1628	99		1628	99		1628
Of which:									
Demand deposits (9% of total assets)									
Interest rate	3.953		0.403	6.066		0.251	2.840		0.729
Bank characteristic × Interest rate	3.836	*	0.094	7.446		0.728	-129.2		0.460
p-values: AR1, AR2, Sargan	0.000	0.809	1.000	0.000	0.955	1.000	0.000	0.933	1.000
Number of banks, observations	82		1320	82		1320	82		1320
Time deposits (10% of total assets)									
Interest rate	0.407	***	0.000	0.527	***	0.000	0.475	***	0.000
Bank characteristic × Interest rate	0.509	***	0.000	-1.659	***	0.000	-1.225	***	0.000
p-values: AR1, AR2, Sargan	0.000	0.510	1.000	0.000	0.453	1.000	0.000	0.509	1.000
Number of banks, observations	99		1628	99		1628	99		1628
Savings deposits (21% of total assets)									
Interest rate	-2.996		0.355	3.360	*	0.091	1.186		0.818
Bank characteristic × Interest rate	-2.113		0.677	-15.45		0.683	17.10		0.904
p-values: AR1, AR2, Sargan	0.026	0.613	1.000	0.039	0.252	1.000	0.044	0.348	1.000
Number of banks, observations	54		764	54		764	54		764

*/**/*** denotes significance at the 10% / 5% / 1% level.

Table 6 LOANS TO PRIVATE SECTOR WITHOUT GUARANTEE, BY MATURITY AND SECTOR

Two-step GMM estimates

Bank characteristics:	**Factor 1** *Retail bank* Coeff.		*p*-value	**Factor 2** *Foreign bank* Coeff.		*p*-value	**Factor 3** *Wholesale bank* Coeff.		*p*-value
Total loans without guarantee to private sector (37% of total assets)									
Real GDP	19.54	***	0.000	19.00	***	0.000	15.30	***	0.000
Bank characteristic × GDP	-1.498		0.780	-14.64	***	0.000	1.881		0.160
Prices	2.667		0.163	13.72	***	0.000	3.485		0.218
Bank characteristic × Prices	-4.418	**	0.039	-12.86	***	0.000	15.19	***	0.000
Bank characteristic	0.125		0.451	0.445	***	0.000	-0.584	***	0.000
Interest rate	-9.532	***	0.000	-13.55	***	0.000	-9.269	***	0.000
Bank characteristic × Interest rate	-3.621		0.435	1.013		0.720	-0.049		0.976
p-values: AR1, AR2, Sargan	0.001	0.675	1.000	0.001	0.447	1.000	0.000	0.780	1.000
Number of banks, observations	95		1478	95		1478	95		1478
By maturity:									
Short-term loans without guarantee to private sector (11% of total assets)									
Interest rate	-7.158	***	0.001	-3.172		0.123	-4.476	**	0.011
Bank characteristic × Interest rate	4.620		0.316	1.938		0.646	8.129	**	0.051
p-values: AR1, AR2, Sargan	0.000	0.467	1.000	0.000	0.329	1.000	0.000	0.872	1.000
Number of banks, observations	95		1449	95		1449	95		1449
Long-term loans without guarantee to private sector (26% of total assets)									
Interest rate	-5.855	*	0.100	-8.048	*	0.060	-14.20	***	0.006
Bank characteristic × Interest rate	-1.025		0.922	1.926		0.562	-27.18	***	0.000
p-values: AR1, AR2, Sargan	0.007	0.478	1.000	0.004	0.525	1.000	0.004	0.170	1.000
Number of banks, observations	67		1070	67		1070	67		1070
By sector:									
Loans without guarantee to households (14% of total assets)									
Interest rate	-0.294		0.952	-6.132	**	0.034	-5.215	**	0.063
Bank characteristic × Interest rate	-3.671		0.561	3.099		0.551	-3.104		0.539
p-values: AR1, AR2, Sargan	0.001	0.179	1.000	0.001	0.164	1.000	0.001	0.200	1.000
Number of banks, observations	62		962	62		962	62		962
Loans without guarantee to non-financial firms (23% of total assets)									
Interest rate	-8.701	***	0.000	-7.688	***	0.000	-7.325	***	0.000
Bank characteristic × Interest rate	-1.036		0.531	1.021		0.631	0.826		0.715
p-values: AR1, AR2, Sargan	0.000	0.714	1.000	0.000	0.699	1.000	0.000	0.852	1.000
Number of banks, observations	95		1468	95		1468	95		1468

*/**/*** denotes significance at the 10% / 5% / 1% level.

Table 7 DEPOSITS OF THE NON-FINANCIAL PRIVATE SECTOR, BY TYPE

Two-step GMM Estimates

Bank characteristics:	**Factor 1** *Retail bank* Coeff.		*p*-value	**Factor 2** *Foreign bank* Coeff.		*p*-value	**Factor 3** *Wholesale bank* Coeff.		*p*-value
Total deposits (40% of total assets)									
Real GDP	-1.383	***	0.000	-1.353	***	0.000	-1.465	***	0.000
Bank characteristic × GDP	0.039		0.622	0.779	***	0.000	-0.643	***	0.000
Prices	-0.712	***	0.000	-0.725	***	0.000	-0.825	***	0.000
Bank characteristic × Prices	0.669	***	0.000	-0.536	***	0.000	-0.256	***	0.000
Bank characteristic	-0.070	***	0.000	-0.019	***	0.000	0.031	***	0.000
Interest rate	0.463	***	0.000	0.486	***	0.000	0.459	***	0.000
Bank characteristic × Interest rate	-0.219	***	0.000	-0.133	***	0.002	0.950	***	0.000
p-values: AR1, AR2, Sargan	0.000	0.902	1.000	0.000	0.885	1.000	0.000	0.918	1.000
Number of banks, observations	99		1628	99		1628	99		1628
Of which:									
Demand deposits (9% of total assets)									
Interest rate	5.099		0.124	6.934	*	0.095	3.292		0.464
Bank characteristic × Interest rate	0.666		0.958	-4.692		0.213	11.77		0.101
p-values: AR1, AR2, Sargan	0.000	0.984	1.000	0.000	0.904	1.000	0.000	0.866	1.000
Number of banks, observations	82		1320	82		1320	82		1320
Time deposits (10% of total assets)									
Interest rate	0.344	***	0.000	0.505	***	0.000	0.513	***	0.000
Bank characteristic × Interest rate	0.224	***	0.000	-0.245	***	0.000	0.276	***	0.000
p-values: AR1, AR2, Sargan	0.000	0.496	1.000	0.000	0.516	1.000	0.000	0.492	1.000
Number of banks, observations	99		1628	99		1628	99		1628
Savings deposits (21% of total assets)									
Interest rate	5.600	**	0.031	1.140		0.771	-0.546		0.917
Bank characteristic × Interest rate	-5.656		0.329	-9.948	**	0.044	-24.01	**	0.022
p-values: AR1, AR2, Sargan	0.021	0.026	1.000	0.055	0.820	1.000	0.044	0.978	1.000
Number of banks, observations	54		764	54		764	54		764

*/**/*** denotes significance at the 10% / 5% / 1% level.

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