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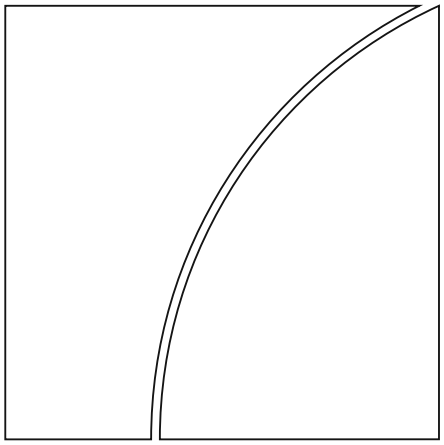

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by Gabriele Galati, Jan Kakes and Richhild Moessner

Monetary and Economic Department

July 2020

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Effects of credit restrictions in the Netherlands and lessons for macroprudential policy[1]

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Abstract

Credit restrictions were used as a monetary policy instrument in the Netherlands from the 1960s to the early 1990s. We study the effects of credit restrictions being active on the balance sheet structure of banks and other financial institutions. We find that banks mainly responded to credit restrictions by making adjustments to the liability side of their balance sheets, particularly by increasing the proportion of long-term funding. Responses on the asset side were limited, while part of the banking sector even increased lending after the installment of a restriction. These results suggest that banks and financial institutions responded by switching to long-term funding to meet the restriction and shield their lending business. Arguably, the credit restrictions were therefore still effective in reaching their main goal, i.e. containing money growth.

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1. Introduction

Macroprudential policy plays a key role in the current policy debate, but the experience with macroprudential instruments goes far back in time.[5] Some of the tools which are currently being used or proposed were originally used with microprudential objectives, while others were seen as monetary policy instruments to influence the supply of credit and growth.

Examples of these instruments include selective credit controls introduced in the United States in the 1950s with the aim of influencing the housing cycle, or direct credit ceilings (Grebler, 1960; Schreft, 1990; Elliot et al., 2013), and the special deposit scheme known as "the corset" introduced in the United Kingdom in the 1970s (Aikman et al., 2016). Another example is Sweden, where the Swedish Riksbank introduced domestic credit controls in the 1950s, which were supported by exchange controls (Jonung, 1993). The Banque de France used credit controls from 1948-73 (Monnet, 2014).

The above credit controls can be compared to macroprudential tools used in recent times to dampen the housing cycle or to constrain leverage. Moreover, the exchange controls introduced in the 1950s in Sweden can be compared to capital flow management tools geared towards financial stability risks (see Ostry et al., 2012) although there is no consensus on whether the latter fall within the perimeter of macroprudential instruments (CGFS, 2010; IMF 2011).

Credit restrictions were used in the Netherlands from the 1960s to the early 1990s (Van Ees et al., 1999). These credit restrictions were introduced with the monetary policy objective of pursuing price stability via their impact on the intermediate target of the money supply. In parallel, De Nederlandsche Bank (DNB, the Dutch central bank) also controlled the exchange rate of the guilder through the policy rate, at times in conjunction with capital controls, to support price stability.

Examining these historical experiences can be useful since theoretical models of macroprudential policy are still in their infancy, and empirical evidence on the effects of macroprudential instruments in advanced countries is still scarce.[6]

[5] For details, see the literature survey by Galati and Moessner (2013).

[6] See e.g. the reviews by Galati and Moessner (2018), Bruno et al. (2017) and Kahou and Lehar (2017). See also BIS (2018), Kim and Mehrotra (2019) and Meeks (2017).

We study the effects of credit restrictions being active on the balance sheet structure of banks and non-bank financial institutions. We also analyse the effects separately for different types of banks – commercial banks, cooperatives, saving banks and mortgage banks – and institutional investors, since credit restrictions were not applied uniformly across types of financial institutions. This allows a comparison between "treated" and "untreated" institutions. We can also investigate to what extent credit controls led to leakages through cross-sectoral substitution and regulatory arbitrage.

Two main results emerge. First, we find that when credit restrictions are active, the proportion of long-term funding increases for banks and other financial institutions affected by the restrictions but not for those that are not affected. Second, we find no negative effect of credit restrictions being active on overall credit growth. Those sectoral credit aggregates that do show a negative response are more than compensated by other sectors that show no significant or even a positive impact. Taken together, these results suggest that banks and financial institutions respond by switching to long-term funding to facilitate credit supply and still meet the restriction.

Our main conclusion is that although credit controls did not reduce credit growth, they were effective in helping monetary authorities to reach their main intermediate target of containing money growth (banks' long-term funding not being included in the definition of money supply). Moreover, the restrictions contributed to financial stability by making Dutch financial institutions more reliant on stable sources of funding, particularly in periods of rapid credit expansion.

Our analysis can be used to draw some parallels with macroprudential policies. Several modern macroprudential instruments are applied to banks and designed to affect credit supply and the composition of liabilities. Examples are the countercyclical capital buffer, systemic risk buffers and loan-to-value restrictions. Implications could also be drawn for the effect of the net stable funding ratio (NSFR) of Basel III, which encourages banks to better match their liabilities to the liquidity characteristics of their assets. Although the stated purpose of the credit restrictions were different in the 1960s–1990s, the effects of the measures then are of interest today.

The remainder of the paper is organised as follows. Section 2 provides an overview of the credit restrictions in the Netherlands. Section 3 introduces the data and empirical methodology. Section 4 presents the results, and Section 5 discusses lessons that can be drawn for macroprudential policy. Finally, Section 6 concludes.

2. Credit restrictions in the Netherlands

Between 1957 and 1991, DNB used two main monetary policy instruments: restrictions on net money creation by financial institutions and changes in the interest rate on promissory notes (Van Ees et al., 1999; Vanthoor, 2005). These credit restrictions were introduced with the monetary policy objective of influencing price stability (the "internal" value of the Dutch guilder) via their impact on the intermediate target of the money supply. In parallel, DNB controlled the exchange rate (the "external" value) of the guilder through the policy rate, at times in conjunction with capital controls.

Quantitative credit controls were for the most part applied to bank credit, irrespective of its sectoral allocation. These controls defined a maximum growth rate for an individual bank's outstanding credit, and were enforced if total bank credit growth exceeded a predetermined rate.

Initially, these controls applied to short-term credit only, under the assumption that long-term credit was fully financed by long-term funding (which was not included in the definition of money supply). Over time, as this assumption appeared not to hold, credit controls took the form of limits on "net long-term financial activity" by banks (defined as long-term lending minus long-term funding), an approach that bears resemblance to today's NSFR. Annex A presents a more detailed discussion of the formulation of credit restrictions over the period we consider.

Credit restrictions were not applied uniformly to all types of financial intermediaries. The first credit controls only applied to "general banks" (i.e. commercial banks and credit cooperatives), while over time the scope was broadened to savings banks and "near banks".[7] By contrast, institutional investors and mortgage banks provided a significant proportion of lending, but have never been subject to the restrictions because of their long-term funding profile. In our analysis, we exploit this fact by a comparing changes in balance sheets of "treated" and "untreated" institutions following the introduction or de-activation of credit restrictions.

There are both important differences and similarities between the Dutch central bank's experience with credit restrictions in the 1960s to 1990s on the one hand, and recent macroprudential policies on the other. One important difference concerns governance aspects. In

[7] Near-banks were defined as institutions, other than banks, that made it their business to attract short-term funds. These included several industrial companies, public utilities and financial institutions.

contrast to macroprudential measures that have been implemented in recent times, the above credit restrictions relied on a presumption of coordination and cooperation. Any restriction was implemented on the basis of consultation between the central bank and the financial sector, and some of the restrictions were informal and voluntary (Vanthoor, 2005).

An important similarity with the recent experience with macroprudential tools is that credit restrictions in the Netherlands were adopted in an environment of financial globalization and innovation. In the 1970s and 1980s, the Dutch financial sector experienced increasing competition, innovation and integration in global financial markets. These changes were supported by a gradual deregulation of domestic financial markets and a liberalisation of international capital flows (Hilbers, 1998). As a consequence, Dutch monetary authorities faced increasing challenges in meeting their objectives by targeting money supply. As in current circumstances, policymakers were confronted with two types of leakages. There was room for cross-country policy arbitrage, as restrictions in domestic credit expansion could be counteracted by foreign capital inflows. In addition, there was increasing room for arbitrage across parts of the domestic financial sector, as liberalization contributed to blurring the distinction between the traditional and shadow banking sectors.

The changing environment in the 1980s and 1990s prompted major changes in the policy regime in the Netherlands. Monetary authorities changed both their strategy – into a pure exchange rate targeting regime – and their instruments, with the policy rate as the only instrument. This regime remained in place between 1992 and the start of Economic and Monetary Union in 1999. In parallel, regulation and supervision by DNB was extended, in two main ways. First, the perimeter of regulation and supervision by DNB was extended from only general banks to the entire banking system (i.e. including also savings banks and mortgage banks) as well as "near banks" and mutual funds. This change can be compared to current efforts to increasingly extend the perimeter of macroprudential instruments from the banking sector to non-bank financial institutions. Second, the Act on Supervision of the Credit System was revised substantially in 1992, including the elimination of the requirement for the central bank to try and reach an agreement with the banking sector about monetary measures.

3. Data and methodology

We use quarterly balance sheet data of Dutch financial institutions to investigate the response to credit restrictions during the period 1957-1994. Most data are taken from publications by DNB and Statistics Netherlands. The timing of credit restrictions is based on DNB's Annual Reports and studies by Van Straaten (1989) and Van Ees et al. (1999). More detailed information on our data and definitions is provided in Annex B.

Financial institutions are grouped into general banks (comprising commercial banks and cooperative banks), savings banks, institutional investors and mortgage banks.[8] Table 3.1 presents key balance sheet items in 1980, and highlights several cross-sectoral differences over the entire sample period. More than half of commercial banks' private sector lending consists of short-term loans. For cooperative banks, short-term loans are about one fifth of total lending while the other categories almost exclusively focus on long-term lending (including mortgages). The importance of short-term funding shows a similar pattern: very high for commercial banks, much lower but still substantial for cooperative banks and very limited or virtually non-existent for the other categories. Domestic securities holdings, however, are highest for savings banks and institutional investors and very low for the other groups.

Some of the groups presented in Table 3.1 ceased to exist as separate categories during our sample period. In the early 1980s, commercial banks, cooperative banks and savings banks were all merged into the single category of general banks. At the end of the 1980s, mortgage banks were also no longer considered a separate class. This classification into subgroups was abandoned as the distinctions were blurred over the years, and regulation and supervision was harmonised. As a consequence, time series over the full sample period are only available for general banks and institutional investors.

[Table 3.1 Balance sheet variables: stylized facts]

On the basis of Table 3.1, one would expect that general banks, particularly commercial banks, were most affected by credit controls as

8 Two categories are not included: the government-owned Postal Cheque and Giro Services (subject to credit controls since 1970) and "near banks" (subject to credit controls since 1980). These categories were relatively small and data availability is limited.

they were subject to the restrictions over the entire period and largely short-term funded. Savings banks were only covered by the restrictions since 1969 and were mostly long-term financed, implying that the impact of restrictions is expected to be relatively modest. Institutional investors and mortgage banks were never subject to the restrictions but may still have responded to them, for instance by providing more credit to compensate for lower credit supply by general banks.

To analyse formally the response of the Dutch banking sector to the credit restrictions, we estimate two baseline regressions:

$$y_t = A_1(L)X_t + B_1(L)cr_t^{active} + \varepsilon_t \quad (1)$$

$$y_t = A_2(L)X_t + B_2(L)cr_t^{tighten} + C(L)cr_t^{ease} + \varepsilon_t \quad (2)$$

where y_t is the real growth rate of a balance sheet variable (lending, long-term funding, securities holdings); X_t is a vector of macroeconomic control variables (industrial production growth; long-term government bond yields)[9]; cr_t^{active} is a credit restriction dummy, which equals one during periods when restrictions were in place and zero otherwise; $cr_t^{tighten}$ and cr_t^{ease} are dummies capturing the activation or de-activation of credit restrictions, which are equal to one in the quarters when restrictions were activated and de-activated, respectively, and zero otherwise. We consider different cases, where these dummies refer to all banks together, and where they refer separately to different types of banks. The credit restrictions never applied to some types of lenders – particularly institutional investors and mortgage banks – as they were by definition not involved with money creation, i.e. only attracted long-term funding. Equation (1) analyses the impact of credit restrictions being active on the real growth rate of bank balance sheet variables. Equation (2) tests the impact of the instalment versus the withdrawal of the restrictions, which may reveal asymmetric effects. All balance sheet and macroeconomic variables are included in real terms as annual growth rates.

In addition to balance sheet items, we examine other variables that likely played a role in financial institutions' response to credit restrictions. Net bond issues are a direct way to increase long-term funding, while changes in deposit rates are a way to influence clients' preferences to hold longer maturities. In addition, the response of

[9] For the real growth rates of balance sheet variables considered here, these are more relevant control variables than inflation.

money aggregates – M2 and the M2/GDP ratio - is important to assess the effectiveness of credit restriction policies. These variables are only available at the aggregate banking sector level and therefore do not allow us to investigate differences between subsectors.

It is important to take into account endogeneity. After all, credit restrictions were imposed by DNB as a response to monetary developments and may have been caused by (bank) balance sheet variables rather than the other way around. To address this endogeneity issue, we use a common approach in the literature and perform Two-Stage-Least-Squares regressions, using lagged explanatory variables as instrumental variables (IV).[10] As a robustness check, we also present impulse response functions generated by vector autoregression (VAR) models, which can be interpreted as unanticipated changes in credit restrictions.

4. Results

4.1 Regression analysis

Table 4.1 presents results for the sum of credit restriction coefficients of Equations (1) and (2) and the associated Wald tests. Panel A reports the results for lending to the private sector. Interestingly, credit restrictions being in place (Eq. 1) only have a significantly negative impact on lending by commercial banks. For cooperative banks and institutional investors, credit restrictions can even be associated with an increase in lending. For savings banks and mortgage banks, the impact of credit restrictions is insignificant. Asymmetric behaviour (Eq. 2) can only be observed for general banks and, in particular, cooperative banks: the increase in lending following an activation of credit restrictions is more significant than the slowdown after a withdrawal of restrictions.

Panel B presents the results for long-term funding. It shows that when credit restrictions are in place, all types of banks subject to them - commercial banks, cooperative banks and savings banks – increase their long-term funding (Eq. 1). Moreover, commercial and cooperative banks reduce long-term funding when restrictions are withdrawn while the activation dummy is insignificant (Eq. 2), which points to asymmetric responses. Institutional investors and mortgage banks do

[10] We also considered specifications with the liquidity ratio (M2/GDP) as an additional instrument, which was long considered an intermediate target for monetary policy. This leads to virtually identical results.

not significantly adjust long-term funding as a response to restrictions being in place (Eq. 1), although for mortgage banks the activation dummy indicates a positive response at the 10 percent significant level (Eq. 2).

Panel C presents the outcomes for securities holdings. Only for cooperative banks do we find evidence that securities holdings may have been used to deal with credit controls, as these significantly decline when restrictions are in place (Eq. 1) and increase when restrictions are eased (Eq. 2). For the other types of banks, securities holdings do not show any significant response to credit restrictions. Institutional investors' securities decline, which may have helped to facilitate their increase in lending supply.

A Sargan test of overidentifying restrictions supports the validity of instrumental variables in all regressions with the exception of the restrictions being in place dummy for savings banks' and institutional investors' securities holdings (Eq. 1).

[Table 4.1 Sum of coefficients on credit restrictions: balance sheet variables]

Table 4.2 presents a breakdown of lending into short-term and long-term loans. Results are only presented for general banks and savings banks, due to limited data availability of this breakdown for the other groups. Commercial banks' reduction in lending can be fully attributed to short-term loans, which can be more easily scaled back than long-term loans due to their shorter maturities. Similarly, the positive response of cooperative banks' lending is fully due to long-term loans. A Sargan test supports instrument validity for all regressions.

[Table 4.2 Sum of coefficients on credit restrictions: further breakdowns lending and securities]

Table 4.3 presents the results for the impact of credit restrictions on other variables than balance sheet items, using the specifications of Equations (1) and (2). These variables reflect bank behaviour and the effectiveness of credit restrictions as an instrument to influence monetary conditions.

Net securities issues by banks – mainly bonds – increase following the activation of restrictions and decline after de-activation (Eq. 2). This is in line with our finding that banks respond to credit restrictions by switching to more long-term finance. Apparently, banks actively issued securities to adjust their funding structure in order to meet credit restrictions.

Monetary aggregates show a negative response to restrictions being in place (Eq. 1). The response is significantly negative for both the liquidity ratio and M2 growth, implying that monetary expansion was contained when credit restrictions were in place. This finding suggests that credit restrictions were an effective instrument of monetary policy over the period considered.

Finally, we investigate the response of banks' deposit interest rates, which are another potential instrument for banks to change their funding structure. One conjecture is that faced with credit restrictions, banks increase long-term deposit rates vis-à-vis short-term rates. Swank (1994) presents evidence that deposit markets over the 1957-1994 period were oligopolistic, which implies that banks had some pricing power. He also finds that banks raised interest rates on savings deposits when restrictions are in place, which may reflect that they indeed used this as a tool to increase long-term funding. Table 4.3 compares the responses of two-year and three-month savings rates. Both increase significantly when credit restrictions are in place – in line with Swank (1994) – and the spread between both rates widens. However, the spread of both rates vis-à-vis government securities with corresponding maturities only increases for the three-month rate and not for the two-year rate. This implies that longer-term deposit rates moved in line with corresponding market rates, which may indicate that long-term deposit rates were not actively used to stimulate clients to switch to longer-term deposits. Overall, the evidence whether banks used deposit rates to stimulate their clients to switch to longer-term deposit is mixed.

[Table 4.3 Sum of coefficients on credit restrictions: other variables]

4.2 Robustness checks

We repeated the analysis presented in the previous subsection using two sets of alternative variables. First, we included alternative macro controls: gross domestic product instead of industrial production and short-term interest rates instead of long-term interest rates. This has

virtually no impact on the regressions and Wald tests and does not change any of our findings.

Second, we considered other deposit interest rates – on current accounts and four-year deposits – to check whether banks used these to switch to more long-term funding as a response to credit restrictions. Some of the outcomes are different from the results in the previous section – the two-year-three-month spread no longer responds significantly, while the two-year-overnight spread significantly increases. Overall, this supports our finding that the response of deposit rates shows mixed results and does not allow strong conclusions about banks' use of price instruments to change their funding profile.

We also repeated the analysis by estimating VAR models consisting of the same variables we used in Equations (1) and (2). This allows us to investigate more dynamic interactions between variables and includes the credit restriction dummies in such a way that they can be interpreted as unanticipated shocks. The impulse responses are presented in Annex C. In general, the VAR estimation broadly confirms our conclusions so far.

First, long-term lending responds positively to credit restrictions, and in some cases in a more pronounced fashion than in Equations (1) and (2). This is particularly the case for commercial banks, which show a significant positive response of long-term lending to restrictions being activated and in place, and a significant negative response after restrictions are de-activated.

Second, the impulse response functions also confirm a switch towards more long-term funding when restrictions are in place, although this effect is only significant at the 10 percent level, whereas the Wald statistics from Equations (1) and (2) show significance at the 1 percent level.

Third, the impulse responses confirm that cooperative banks used their domestic securities holdings to deal with credit restrictions. These banks' response to restrictions being in place is significantly negative and the response to de-activation of restrictions is positive. Together with the shift to more long-term funding, these responses probably helped cooperative banks to shield their lending portfolios from the restrictions.

Finally, the results for other variables are broadly in line with the results of Equations (1) and (2). Credit restrictions are followed by an increase in banks' securities issuance and a decline in monetary variables. The responses of deposit rates again provide mixed evidence: the

differential between two-year and three-month rates increases when credit restrictions are in place, but also immediately after de-activation of restrictions.

4.3 Evaluation of the results

Several important findings stand out from our empirical exercise. One key finding is that most institutions subject to credit restrictions respond by adjusting the liability side of their balance sheet, rather than changing their assets. More specifically, commercial banks, cooperative banks and savings banks all shifted towards more long-term funding following the activation of a restriction. They increased net issues of securities, and there is some (albeit not fully conclusive) evidence that they changed deposit rates to encourage their clients to shift towards longer-term deposits.

Another key finding is that most categories of institutions did not respond to the restrictions by cutting back lending, the main exception being short-term lending by commercial banks. Lending by other banks and institutional investors even increased when restrictions were activated. Previous studies (Van Ees et al., 1999; Swank, 1994) also found that credit growth in the Netherlands did not respond significantly to a tightening of monetary conditions. Our analysis suggests that this aggregate non-response is the net result of heterogeneous reactions of lending by different financial groups.

Furthermore, we find limited evidence that financial institutions actively reduced their securities holdings to offset credit restrictions. Only for cooperative banks, there are indications for such behaviour. Van Ees et al. (1999) also find that banks do not use securities to deal with restrictions. Our finding is however in contrast with other studies that conclude that banks did use their securities holdings to absorb monetary policy shocks. In a qualitative survey by Swank (1994), banks indicate that they are inclined to draw down their securities following the activation of restrictions. Garretsen and Swank (1998) and Kakes (2000) find evidence that banks use their securities to deal with monetary tightening. Once way to reconcile these different findings is that banks may have used their securities as a liquidity buffer primarily in the more recent part of our sample (which is the focus of Swank, 1994) or as a response to interest-based monetary policy (which is the focus of the other two studies).

Our findings differ from studies on credit controls in other countries, which conclude that restrictions reduce bank lending in the United States (Elliott et al., 2013) and the United Kingdom (Aikman et

al., 2018). One explanation may be that in these countries, particularly in the United States, credit controls were linked to gross rather than net lending, i.e. without taking into account long-term funding. While the UK "corset" was linked to bank deposits and is therefore more comparable to Dutch credit controls, the Bank of England also imposed credit ceilings based on gross lending. In addition, Aikman et al. (2018) note that the scope for leakage was small because nearly all credit was intermediated by institutions covered by the controls.

Overall, the results show a plausible pattern across groups. Commercial banks were likely to be most affected by the restrictions and also show the most pronounced response on both sides of their balance sheets. Cooperative banks and savings banks were, in principle, less sensitive to the credit controls and could more easily deal with them without significant balance sheet adjustments. In general, banks have been able to shield most of their loans portfolios, which supports the notion observed by previous studies that the Dutch credit market can be considered a customer market (Swank, 1994; Van Ees et al., 1999). Moreover, excess demand for loans was accommodated by non-bank lenders – particularly institutional investors – that were not subject to credit restrictions and increased their lending when restrictions were in place.

5. Lessons for macroprudential policy

Credit restrictions that were used in the Netherlands from the 1960s to the early 1990s were geared towards a monetary policy objective - pursuing price stability by influencing the money supply. However, even though the banking system evolved over the past decades and the credit restrictions had a different purpose, we may still draw lessons from the experience with credit controls for macroprudential policy.

First, while testing formally whether the financial system as a whole became significantly more stable following the restrictions is beyond the scope of our paper, we find that the restrictions pushed banks into actions that should increase financial stability. In particular, we find that following the restrictions, banks shield their credit portfolios and are reluctant to cut lending following credit controls and instead tend to change their funding structure or to sell marketable assets. Similarly, the implementation of the countercyclical capital buffer may be effective by encouraging banks to accumulate extra capital rather than reduce lending.

Second, there can be substitution from banks to "non-treated" financial institutions, as reflected by the rise in institutional investors' lending following credit controls. This further strengthens our finding that it is hard to slow down overall credit growth: to the extent that banks are not able to shield their lending business, non-banks are likely to step in. Note that such leakage did not make credit controls ineffective: by encouraging banks to reduce short-term funding, they did effectively reduce money growth as intended. Likewise, macroprudential tools that do not succeed in curbing credit growth may still be effective by increasing the resilience of banks – e.g. through higher capital buffers – as imbalances grow.

Third, policymakers should be prepared to continuously update their policy frameworks. In response to changes in the financial landscape – financial innovation, financial globalisation and the growth of the shadow banking sector – the modalities of credit controls were frequently adjusted and the scope of restrictions was extended over time, by including more types of institutions and broadening the definition of credit subject to the controls (Hilbers, 1998). Drawing a parallel with modern macroprudential policy, as the financial system continues to evolve, macroprudential policymakers monitor and evaluate the effectiveness of their instruments and are prepared to update and improve them. In particular, targeting shadow banks is a key challenge for macroprudential policy.

6. Concluding remarks

Credit restrictions were used in the Netherlands from the 1960s to the early 1990s. We study the effects of credit restrictions on the behaviour of banks and other financial institutions. Our results suggest that banks responded by switching to long-term funding to facilitate credit supply and still meet the restrictions. Most categories of lending were not affected by credit controls or even increased following the implementation of restrictions. Arguably, the restrictions were effective in reaching their main goal, i.e. containing money growth.

Our results have important implications for macroprudential policies that work through bank balance sheets. Like in the case of credit controls, banks may prefer to respond to such instruments by adjusting their funding structure (e.g. building a capital buffer) rather than cutting back lending, which could improve the stability of banks.

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Tables

Table 3.1 Balance sheet variables: stylized facts (1989)

	General banks			**Savings banks**	**Inst. investors**	**Mortgage banks**
	Total	*Comm. banks*	*Coop. banks*			
Total lending to priv. sector						
Volume (NLG mn)	192235	118346	73889	27197	85983	35095
Proportion own assets (%)	49	43	64	61	41	89
Market share (%)	56	35	22	8	25	10
ST lending to priv. sector						
Volume (NLG mn)	78261	64860	13401	1343	517	-
Proportion own assets (%)	20	24	12	3	0.2	-
Market share (%)	98	81	17	2	0.6	-
Domestic securities						
Volume (NLG mn)	7097	3994	-	7271	19210	48
Proportion own assets (%)	2	1	-	16	9	0.1
Market share (%)	23	13	-	24	63	0.2
Domestic debt securities						
Volume (NLG mn)	6394	3400	-	7168	10812	-
Proportion own assets (%)	2	1	-	16	5	-
Market share (%)	30	16	-	34	51	-
ST funding						
Volume (NLG mn)	242583	206023	36560	3387	1240	2075
Proportion own assets (%)	62	75	32	8	1	5
Market share (%)	49	42	7	1	0	0
Available observations	1957-94	1957-83	1957-83	1957-83	1957-94	1957-89
Credit restrictions	1960-	1960-	1960-	1969-	No	No

Source: DNB (1985, 2000, 2003); DNB Annual Reports; de Greef et al. (1998); van Ees et al. (1999).

Table 4.1 Sum of coefficients on credit restrictions: balance sheet variables

	General banks						**Savings banks**		**Inst. investors**		**Mortg. banks[1]**	
	Total		*Comm. banks*		*Coop. banks*							
	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2
A Lending to priv. sector												
Restrictions in place (Eq 1)	0.02*	0.41	-0.05***	0.23	0.04***	0.57	0.00	0.75	0.02***	0.39	0.06	-0.02
Restrictions inst. (Eq 2)	0.08*	0.38	0.06	0.14	0.19***	0.54	0.04	0.74	0.00	0.31	0.27	-0.07
Restrictions withdr. (Eq 2)	0.02	0.38	0.02	0.14	-010*	0.54	-0.03	0.74	-0.04	0.31	-0.24	-0.07
No. obs		132		84		84		132		132		112
B Long-term funding												
Restrictions in place (Eq 1)	0.08***	0.29	0.08***	0.37	0.04***	0.21	0.02***	0.57	0.00	0.10	0.06	0.01
Restrictions inst. (Eq 2)	0.13**	0.05	0.16	0.29	0.07	0.06	0.04	0.49	-0.03	0.07	0.35*	-0.04
Restrictions withdr. (Eq 2)	-0.04	0.05	-0.24**	0.29	-0.11*	0.06	0.00	0.49	-0.04	0.07	-0.12	-0.04
No. obs.		132		84		84		132		132		112

Table 4.1 (cont'd) Sum of coefficients on credit restrictions: balance sheet variables

	General banks						**Savings banks**		**Inst. investors**		**Mortg. banks[1]**	
	Total		*Comm. banks*		*Coop. banks*							
	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2
C Domestic securities												
Restrictions in place (Eq 1)	-0.01	0.30	-0.01	0.11	-0.03*	0.43	0.04***	0.26	-0.09***	0.35	-	-
Restrictions inst. (Eq 2)	-0.01	0.26	-0.25	0.09	0.03	0.45	0.10*	0.16	-0.01	0.22	-	-
Restrictions withdr. (Eq 2)	-0.02	0.26	0.21	0.09	0.28***	0.45	0.07	0.16	-0.04	0.22	-	-
No. obs.		132		84		83		84		132		

Notes: The table reports results for the sum of coefficients on credit restrictions from estimating Equations 1 and 2 with IV over the sample periods indicated in Table 3.1. For institutional investors and mortgage banks, credit restrictions refer to those on general and savings banks. *, ** and *** indicate statistical significance at the 10, 5 and 1% level, respectively (Wald tests). [1] For mortgage banks, domestic securities holdings are negligible.

Table 4.2 Sum of coefficients on credit restrictions: further breakdowns lending and securities

	General banks						**Saving banks**	
	Total		*Comm.*		*Coop.*			
	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2	Coeff.	Adj. R^2
LT lending to the private sector								
Restrictions in place (Eq. 1)	0.06***	0.59	0.11	0.30	0.04***	0.71	-0.01	0.73
Restrictions installed (Eq. 2)	0.07	0.52	0.34	0.38	0.16***	0.67	0.05	0.71
Restrictions withdr. (Eq. 2)	-0.10*	0.52	-0.69**	0.38	-0.08	0.67	-0.01	0.71
No. obs		132		84		84		84
ST lending to the private sector								
Restrictions in place (Eq. 1)	-0.02	0.00	-0.07***	0.00	0.04	0.00	0.07	0.00
Restrictions inst. (Eq. 2)	0.09	0.15	0.05	0.23	0.37***	-0.02	0.60	0.20
Restrictions withdr. (Eq. 2)	0.16***	0.16	0.17**	0.19	-0.21*	-0.06	-1.05	0.17
No. obs		132		84		84		84

Note: The table reports results for the sum of coefficients on credit restrictions from estimating Equations 1 and 2 with IV over the sample periods indicated in Table 3.1. *, ** and *** indicate statistical significance at the 10, 5 and 1% level, respectively (Wald tests).

Table 4.3 Sum of coefficients on credit restrictions: other variables

	Financial volumes		**Interest rates**		
	Coefficient	Adj. R^2		Coefficient	Adj. R^2
Net securities issues banks			**3-month savings**		
Restrictions in place (Eq. 1)	0.001	0.07	Restrictions in place (Eq. 1)	0.803***	0.62
Restrictions installed (Eq. 2)	0.003*	0.04	Restrictions installed (Eq. 2)	-0.776	0.52
Restrictions withdrawn (Eq. 2)	-0.004**	0.04	Restrictions withdrawn (Eq. 2)	-0.360	0.52
No. obs		127			127
Liquidity quote (M2/GDP)			**2-year savings**		
Restrictions in place (Eq. 1)	-0.042***	0.26	Restrictions in place (Eq. 1)	0.953***	0.75
Restrictions installed (Eq. 2)	-0.071	0.12	Restrictions installed (Eq. 2)	1.097	0.61
Restrictions withdrawn (Eq. 2)	0.058	0.12	Restrictions withdrawn (Eq. 2)	1.794	0.61
No. obs		132			64
M2			**Spread 3mth deposits-3mth securities**		
Restrictions in place (Eq. 1)	-0.036***	0.23	Restrictions in place (Eq. 1)	0.971*	0.39
Restrictions installed (Eq. 2)	-0.040	0.10	Restrictions installed (Eq. 2)	-0.811	0.35
Restrictions withdrawn (Eq. 2)	0.055	0.10	Restrictions withdrawn (Eq. 2)	0.916	0.35
No. obs		132			127
			Spread 2yr deposits-2yr securities		
			Restrictions in place (Eq. 1)	-0.035	0.47
			Restrictions installed (Eq. 2)	1.044	0.49
			Restrictions withdrawn (Eq. 2)	2.774**	0.49
No. obs					64

Table 4.3 (cont'd) Sum of coefficients on credit restrictions: other variables

	Interest rates		
		Coefficient	Adj. R^2
	Spread 2yr -3mth deposits		
	Restrictions in place (Eq. 1)	0.579***	0.61
	Restrictions installed (Eq. 2)	1.060	0.49
	Restrictions withdrawn (Eq. 2)	0.791	0.49
No. obs			64

Note: The table reports results for the sum of coefficients on credit restrictions from estimating Equations 1 and 2 with IV over the sample period indicated in Table 3.1. *, ** and *** indicate statistical significance at the 10, 5 and 1%, level respectively (Wald tests).

Annex A Credit restrictions in the Netherlands, 1960-1991

The direct goal of credit restrictions was to contain the development of money aggregates as a proportion of national income. This so-called liquidity ratio was considered an intermediate target of monetary policy aimed at reducing inflationary pressure and, hence, stabilisation of the guilder.

Arguably, the term "credit restriction" does not fully acknowledge the fact that controls focused on *net* credit creation. Banks did not necessarily have to cut lending to meet the restriction but could also switch to more long-term funding – and our results show that they generally preferred to do so. Moreover, credit restrictions largely worked through price incentives, as banks that did not meet the restrictions were obliged to hold non-interest bearing deposits at DNB and could thus in principle choose to continue lending and pay the penalty.

Over time, the modalities and scope of credit restrictions were frequently adjusted. Initially, only short-term credit to the private sector was included, under the assumption that long-term credit was financed with long-term funding and therefore less relevant for money creation. In 1965, however, net long-term credit (i.e. long-term credit minus long-term funding) was added as an informal restriction. From 1977 onwards, total money creation (i.e. total credit minus long-term funding) was used as the basis for the restrictions.

Several other modalities have been changed over time to fine-tune the restrictions. Controls were not just switched on and off, but could be eased or further tightened. Moreover, the penalty for banks that did not meet the restrictions – i.e. the requirement to hold non-bearing deposits – could be adjusted. In the 1970s, there was a complementary measure to stop encouraging borrowing through media advertising. In our empirical analysis, we did not take into account all these modalities, as they have typically been in place for short periods and are often hard to quantify.

The scope was also extended by broadening the definition of institutions that were subject to the restrictions. Initially, only commercial banks and credit cooperatives were included but over time this was extended to savings banks (1969), the government's Postal Cheque and Giro Services (1970) and so-called "near banks" (1980). This reflected a blurring of sectoral differences within the banking sector. In the 1980s, the official distinction between types of banks was cancelled and all banks were merged into one single category. Some types of lenders – particularly institutional investors and mortgage banks – were

never subject to the restrictions as they were by definition not involved with money creation, i.e. only attracted long-term funding.

Whereas most restrictions were imposed as direct, quantitative limitations on (net) credit supply, in two cases they were defined in a more indirect way through a pricing mechanism. An indirect approach is more market consistent and easier to implement as a macro measure while allowing some individual banks – that are prepared to pay the price – to grow faster than others.

Another aspect is the extent to which restrictions were imposed as a formal requirement or, alternatively as an informal measure of gentlemen's agreement between DNB and the banking sector. As already mentioned, in the 1960s the restrictions on net long-term credit were initially introduced as an informal measure. Likewise, the restriction in 1986-1987 was an informal measure.

Two types of credit controls aimed at specific sectors: restrictions on consumer credit and restrictions on credit to local governments. We did not include these two restrictions in our analysis, which were only implemented over part of our sample period and which involved relatively small credit volumes. Moreover, the restriction on consumer credit was imposed not by DNB but by the Dutch government, and not motivated by monetary considerations.

In its 1991 Annual Report, DNB discusses several trends that had made credit restrictions less effective over time. The long-term relationship between money supply and national income had become increasingly unstable; domestic money creation had become less relevant given the importance of foreign capital flows; and the exchange rate had become a dominant policy target. DNB concluded that the monetary cash reserve – then the instrument to implement credit controls – would be deployed with great caution and only in very special circumstances.

Table A.1 Overview of credit restrictions

Period	Scope: restriction	Scope: institutions	Other characteristics
1961-1965	Short-term credit to private sector	Commercial banks, credit cooperatives	Direct, formal
1965-1967	Extension: informal restriction net long-term credit	Idem	Direct, mixed formal / informal
1969-1971	Idem	Extension: savings banks	Direct, mixed formal / informal
1977-1981	Idem	1980: extension "near banks"	Direct, formal
1986-1987	Idem	Idem	Direct, informal (gentlemen's agreement)
1973-1979	*Liquidity reserve regulation*		*Indirect, formal (not activated)*
1989-1990	*Monetary cash reserve*		*Indirect, formal*

Annex B Data sources and definitions

Financial firms' balance sheet data

Quarterly balance sheet data for general banks, commercial banks, cooperative banks, savings banks and institutional investors have been taken from two ad hoc statistical publications by De Nederlandsche Bank (1985, 2003). Data on cooperative banks – also denoted as agricultural banks – have been generated indirectly by taking for each variable the difference between general banks and commercial banks (commercial and cooperative banks together comprise general banks). Statistical breaks due to changes in definitions have been removed by multiplicative corrections (in most cases, this is facilitated by the fact that DNB has documented the impact of a change in definitions by presenting one observation under both the old and the new definition).

Balance sheet data for mortgage banks have been taken from several sources. For most of the period we consider, quarterly observations on mortgage and other lending has been taken from a monthly publication by Statistics Netherlands, called "Maandstatistiek Financiewezen". Other balance sheet variables are only available at an annual frequency and taken from Statistics Netherlands as well as an ad hoc publication by DNB (2000); these annual data have been translated into a quarterly frequency using cubic spline interpolation. For observations since the early 1980s, we complemented the data with quarterly publications on mortgage banks by DNB that started in 1980s.

Other time series

Data on financial firms other than balance sheet variables (debt securities issues, deposit interest rates) have been taken from DNB (1985) and DNB (2003). Macro data (industrial production, gross domestic product, interest rates, liquidity ratio, money growth) have been taken from DNB and Statistics Netherlands.

Credit restriction data

The credit restriction dummies are based on statements by DNB in its Annual Reports as well as previous studies (De Greef et al., 1998; Van Ees et al., 1999). We do not make a distinction between types of credit restrictions or the institutions covered in specific years. As indicated in Section 2, the modalities of the restrictions were changed frequently (quantitative vs price-based, formal vs informal) and the coverage was

extended over time. Taking into account how the restrictions evolved may provide additional insights, but also makes the analysis more complex.

The restriction dates are reported in Table B.1. Note that we assume that the 1973-1979 liquidity reserve regulation was never activated. This instrument actually implied liquidity requirements, but these were formulated at a "mild phase" level, meaning that they were not binding for the banking system as a whole. The idea was that, in times of excessive credit growth, a "severe phase" regime would be activated with stricter requirements. However, this regime was never implemented because of concerns that this would exert too much upward pressure on interest rates and the exchange rate.

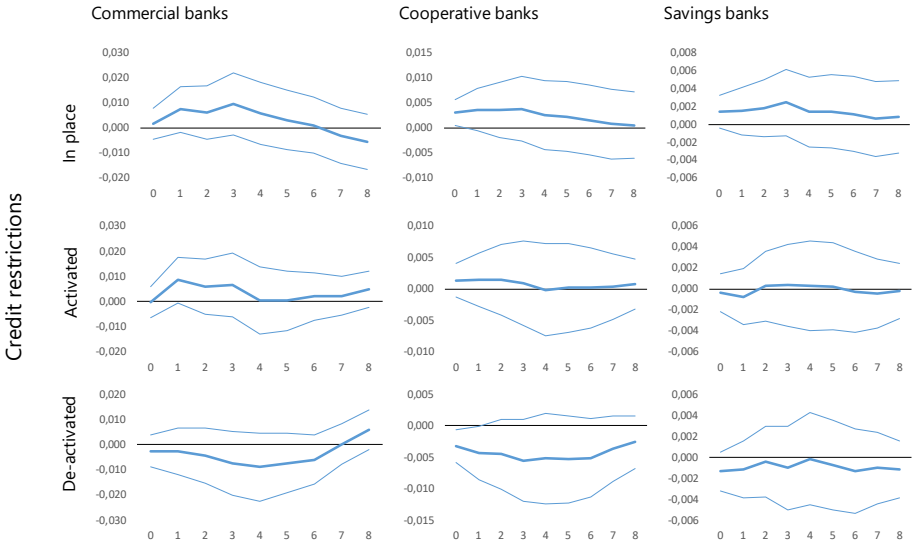
Table B.1 Restriction periods

Restriction	Start	End
1	1961Q2	1963Q1
2	1963Q3	1967Q2
3	1969Q1	1972Q3
4	1977Q2	1981Q3
5	1986Q2	1988Q1
6	1989Q3	1990Q2

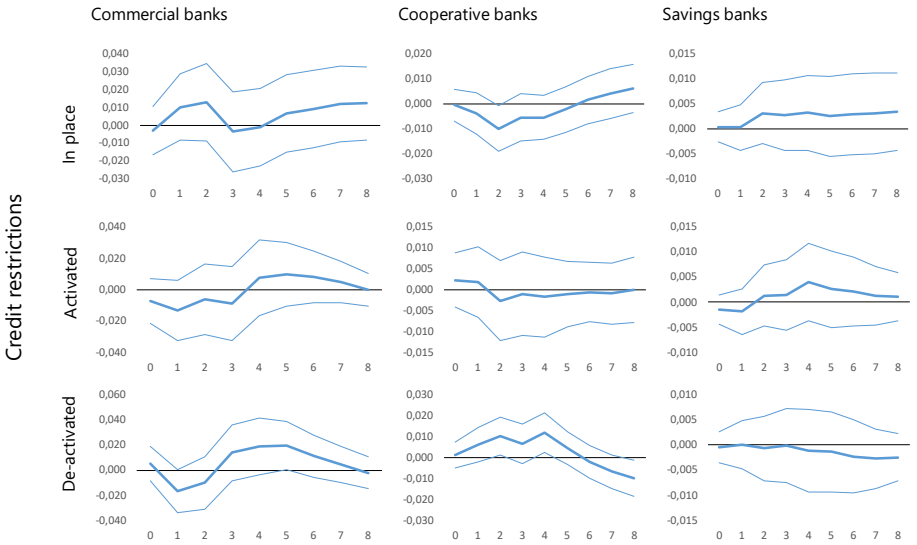
Annex C Impulse response analysis

We estimated a series of vector autoregression (VAR) models, using the same variables that we included in Equations (1) and (2). We only focus on the main variables and on institutions that were subject to credit restrictions. Each VAR consists of the macro controls (industrial production, long-term interest rate), one of the three credit restriction dummies (cr_t^{active}, $cr^{tighten}$ and cr_t^{ease}) and one of the left-hand variables in Equations (1) and (2). Responses of the latter to credit restrictions are presented below. Innovations in credit restrictions are identified by imposing a causal ordering, with the response variable ordered last.

Long-term funding

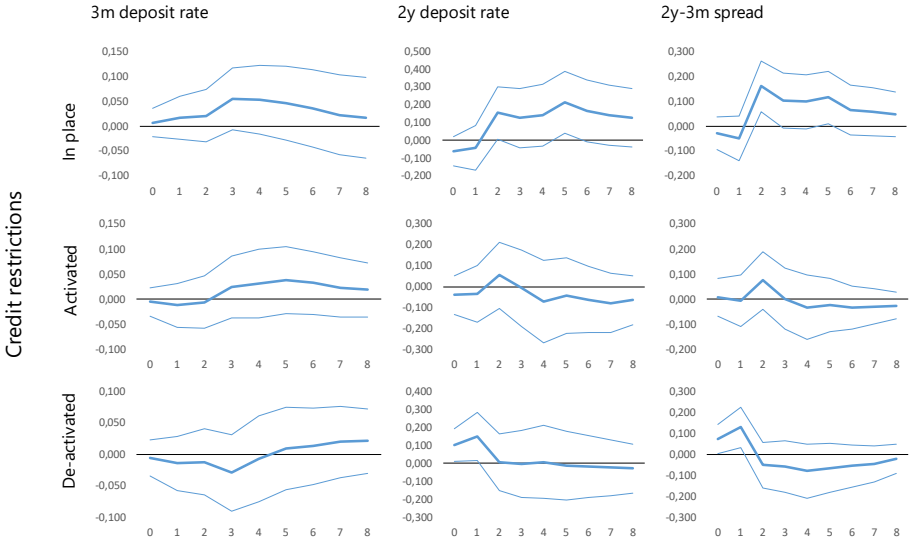


Domestic securities



Other variables: debt securities issuance and monetary developments

Other variables: deposit interest rates



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