SVERIGES RIKSBANK
WORKING PAPER SERIES
392

The interaction between macroprudential and monetary policies: The cases of Norway and Sweden

Jin Cao, Valeriya Dinger, Anna Grodecka-Messi, Ragnar Juelsrud and Xin Zhang

July 2020

WORKING PAPERS ARE OBTAINABLE FROM

www.riksbank.se/en/research
Sveriges Riksbank • SE-103 37 Stockholm
Fax international: +46 8 21 05 31
Telephone international: +46 8 787 00 00

The Working Paper series presents reports on matters in
the sphere of activities of the Riksbank that are considered
to be of interest to a wider public.
The papers are to be regarded as reports on ongoing studies
and the authors will be pleased to receive comments.

The interaction between macroprudential and monetary policies: The cases of Norway and Sweden*

Jin Cao†
Valeriya Dinger‡
Anna Grodecka-Messi§
Ragnar Juelsrud¶
Xin Zhang‖

Sveriges Riksbank Working Paper Series
No. 392
This version: July, 2020

Abstract

To shed light on the interaction between macroprudential and monetary policies, we study the inward transmission of foreign monetary policy in conjunction with domestic macroprudential and monetary policies in Norway and Sweden. Using detailed bank-level data we show how Norwegian and Swedish banks' lending reacts to monetary policy surprises arising abroad, controlling for the domestic macroprudential stance and the interaction between monetary and macroprudential policies. In both countries, the domestic macroprudential policy helps mitigate the effects arising after foreign monetary surprises.

Keywords: monetary policy, macroprudential policy, policy interactions, bank lending, inward transmission, international bank lending channel
JEL-Classification: E43, E52, E58, F34, F42, G21, G28

*The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of Norges Bank or Sveriges Riksbank. We thank the Editors, two anonymous referees, participants in the Riksbank internal seminar and the IBRN meetings, especially our discussants Björn Imbierowicz and Özge Akıncı, for helpful comments.

†Norges Bank, e-mail: jin.cao@norges-bank.no.
‡University of Osnarbrück and and Leeds University Business School, e-mail: vdinger@uni-osnabrueck.de.
§Department of Economics, Lund University and Knut Wicksell Centre for Financial Studies, e-mail: anna.grodecka-messi@nek.lu.se.
¶Norges Bank, e-mail: Ragnar.Juelsrud@Norges-Bank.no.
‖Research Division, Sveriges Riksbank, e-mail: xin.zhang@riksbank.se.

1 Introduction

After the 2007-2009 global financial crisis, it is widely agreed that macroprudential policy is a necessary companion to monetary policy for ensuring macroeconomic stability (see Smets (2014); Finocchiaro and Grodecka (2018)). It has been shown for several countries that monetary policy transmission can be affected by macroprudential policies (see e.g. Kashyap and Stein (2000), Gambacorta and Mistrulli (2004), and Aghion and Kharroubi (2013)). Due to the complex nature of monetary and prudential policies, the effect of their interaction can be ambiguous. Theoretically, this could be because business cycles do not always coincide with credit cycles, which means that the two policies can, over time, either work in the same or opposite directions (Repullo and Suarez (2012)). According to Angelini et al. (2014), the ambiguity of the interaction between macroprudential and monetary policies can also be due to the varying degrees of cooperation between monetary and regulatory authorities. It is, therefore, not surprising that empirical estimations of the interaction between monetary and macroprudential policy typically find it to be statistically insignificant (Aiyar et al. (2016) and Dell'Ariccia et al. (2012)). However, more importantly, the analysis of the interaction between monetary and macroprudential policy mostly focuses on the domestic case, i.e., how domestic macroprudential policies interact with domestic monetary policy. This limitation is particularly important for small open economies that face substantial spillovers from foreign monetary policy.

In this paper, we revisit the topic but focus on the interaction between foreign monetary spillovers and domestic macroprudential policy. Specifically, we are interested in domestic economies' exposure to foreign monetary policy surprises and whether domestic macroprudential policies can shield the domestic economies from foreign monetary surprises. We also compare the effects of foreign monetary policy surprises to the ones of domestic monetary policies. We examine these questions using bank-level data from two small open economies, Norway and Sweden, which have both substantial share (about one-third for Norway and half for Sweden) of bank funding denominated in foreign currencies and are thus likely to be particularly prone to foreign monetary policy spillovers (Cao and Dinger (2018)). More specifically, we test how bank lending reacts to unexpected foreign monetary policy changes, focusing on spillovers from the U.S., the Euro Area and the U.K.

International monetary policy can affect domestic lending through at least two channels. First, the *international bank lending channel* (Bernanke and Blinder (1992); Bernanke and Gertler (1995)) presumes that following a contractionary monetary policy shock, internationally active banks may reduce their domestic lending due to higher funding cost abroad.

The second channel brought forward is the *portfolio channel* that has different predictions regarding domestic lending. A tightening of foreign monetary policy may reduce the creditworthiness of foreign borrowers and reduce their collateral values, which may induce banks to reshuffle their portfolios away from foreign assets and towards domestic assets (see Barbosa et al. (2018), Hills et al. (2019)), hence increase domestic lending. This channel has been also called the international substitution effect in Avdjiev et al. (2018).

We start our empirical analysis from running baseline regressions that are identical for Norway and Sweden. For both countries, we find that tighter domestic macroprudential and domestic monetary policies are associated with lower bank lending. We also find that a monetary contraction in the core is associated with an increase in domestic lending in Norway. The interaction between the considered policies is insignificant for Norway. For Sweden, we find either insignificant or mixed evidence on the prevailing channel in our baseline regressions. However, domestic macroprudential policies tend to significantly affect changes in lending arising after foreign monetary policy surprises.

We next examine the factors driving baseline results and explore country specific channels. In Norway the impact of foreign monetary policy spillovers is shaped not only by foreign monetary policy surprises, but also by the cost advantage of funding in foreign currency, which depends on the degree to which exchange rate dynamics do not neutralize interest rate differentials. Once we control for this cost advantage, the initial result pointing to the presence of portfolio channel in Norway disappears. This exercise illustrates that lending dynamics should not only be explored as a function of foreign monetary policy but could also depend on exchange rate dynamics. For Sweden, the domestic-foreign interest rate differential does not seem to play a crucial role. This may be because Swedish banks maintain an on average much more balanced portfolio in foreign currencies compared to their Norwegian counterparts. The fact that the forex cost advantage is less predictable in Sweden than in Norway might also explain the divergence of results in this direction. Indeed, we can further highlight the importance of foreign monetary policy surprises rather than the cost advantage for Sweden, by exploiting more granular data including monthly monetary surprises and the specific currency denominations of liabilities of the largest banking groups in Sweden. More specifically, we investigate the lending response of those institutions to foreign monetary surprises by accounting for their weighted institution-specific exposure to individual currencies and find that using the weighted currency exposures helps to uncover the international bank lending channel.

Overall, our results highlight the importance of macroprudential rules in shaping the effects of international monetary spillovers in Norway and Sweden. Even though the in-

ternational spillovers may have different specificities in the two countries, macroprudential policies have in both cases the potential to play a mitigating role.

Our paper relates to a large literature on the transmission of foreign monetary policy shocks. With regard to empirical studies on the presence of the bank lending and portfolio channels of foreign monetary policy shocks, Lindner et al. (2019) find limited evidence for the importance of foreign monetary policy transmission through banks for Austria and Germany. On the contrary, Hills et al. (2019) establish evidence for the bank funding and bank portfolio channel in the transmission of foreign monetary policies in Hong Kong and the U.K., as do Barbosa et al. (2018) for Ireland and Portugal. Auer et al. (2019) discuss the role of international portfolio channel for Switzerland. Gajewski et al. (2019) document the importance of bank lending in the transmission of foreign monetary policies for Chile, Korea and Poland. The international bank lending channel has also been confirmed for Italy and France in Schmidt et al. (2018). Argimon et al. (2019) look at the other side of the coin in their study for the Netherlands, Spain, and the U.S., showing that banks transmit domestic monetary policy internationally. This has been found true also for Canadian banks in Auer et al. (2019). For Norway, Cao and Dinger (2018) document the impact of foreign monetary policy, which determines the cost of bank funding in foreign currency, on domestic lending after controlling for exchange rate dynamics.

Our results contribute to this literature by showing that these are contingent not only on the surprise component of policy but also on predictable interest rate differentials controlling for exchange rate dynamics. The comparison between Norway and Sweden is indicative about the different channels through which monetary policy at the core can affect domestic lending.

Our paper complements the recent literature on the cross-border spillovers of prudential policy (Buch and Goldberg (2017) provides an extensive review on related studies), which finds that the effects of prudential instruments sometimes spill over borders through bank lending. We also contribute to the literature on the impact of the interaction between domestic monetary and prudential policies on bank lending, such as Forbes et al. (2017) who investigate how microprudential capital requirements interact with the Funding Lending Scheme in the UK, and Jonghe et al. (2020) who analyze how Pillar II capital requirements interact with monetary policy stance.

The paper proceeds as follows. Section 2 introduces the institutional framework by presenting some general information on the Norwegian and Swedish banking sectors as well as on the design of monetary and macroprudential policies in both countries. In Section 3 we discuss data. Section 4 introduces the baseline results for both countries, while Section 5 explores the channels that drive the interaction between monetary policy and macroprudential

regulation separately for Norway and for Sweden. Section 6 concludes.

2 Institutional background

2.1 The structure of the banking sectors

Both Norway and Sweden are bank-oriented economies characterized by a high degree of concentration. In Norway, the banking sector (banks and their subsidiaries) accounts for 80% of total domestic credit to households and businesses (as of 2017Q4), in Sweden a comparable number accounts to 45% (if we include mortgage institutions, the majority of which belongs to the banking groups, this number accounts to 95%, as of year-end 2015, see Sveriges Riksbank (2016)). Compared with other European countries, Norway's banking sector is not particularly large relative to total GDP. Norwegian banks hold total assets of approximately 220% of Norwegian GDP. The size of the Swedish banking sector is approximately 400% of GDP.[1]

Norwegian banks are classified as either savings banks or commercial banks. As of 2018Q1, there are 99 savings banks and 36 commercial banks in Norway; among the commercial banks twelve are foreign owned banks, including six subsidiaries and six branches. Commercial banks are limited liability companies. Foreign commercial banks are either subsidiaries or branches of mostly Swedish and Danish banks.[2] Savings banks ("sparebank") were originally established by Norwegian municipalities as independent entities without external owners, taking deposits and providing credit to local households and regional businesses. Nowadays the difference between savings banks and commercial banks is becoming smaller: Since 1987, savings banks have been permitted to raise external equity by issuing primary capital certificates (PCCs), although PCCs do not give their holders ownership over the bank's entire equity capital. In 2002 savings banks were given the option of converting to limited liability savings banks.[3] There is full equality under the law between savings banks

[1]This number potentially overestimates the size of the banking sector in Sweden as of 2020, since most Nordic banks had their headquarters in Sweden until October 1, 2018. After this date one of the major banks, Nordea, moved its headquarter to to Finland (Nordea (2018)), which resulted in a ratio of Swedish total banking assets to GDP of 300% without major changes in the operations of the Swedish banking system.

[2]The main difference between subsidiaries and branches of foreign banks is that the subsidiaries are subject to Norwegian regulatory authorities, while the branches are subject to the regulatory authorities of their home countries. Notwithstanding this difference, both types of foreign bank institutions are obliged to submit the same set of reports concerning their balance sheet and income statements to the Norwegian statistical authorities.

[3]So far only one savings bank, Gjensidige NOR, has done the conversion. Later it merged with the largest commercial bank in Norway, DNB NOR Bank ASA.

and commercial banks in terms of what business they may engage in.

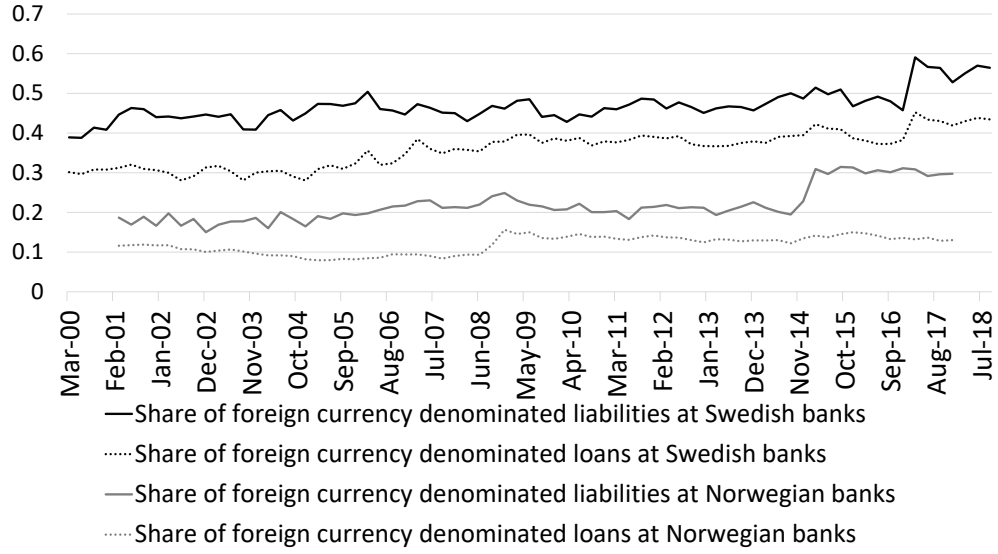
In Sweden, in addition to commercial banks (limited-liability banks) and savings banks, co-operative banks also exist. Savings banks are small banks operating in regional markets. They lack equity capital and have no shareholders, with all profits being retained as bank reserves. Co-operative banks are owned by the cooperatives' members. The focus of these banks' operations is on offering banking services to their cooperatives' members (Sveriges Riksbank (2018)). As of December 2018, 39 of 124 banks in Sweden belonged to the limited-liability category, there were 36 foreign owned banks (including 35 branches and one subsidiary), 47 savings banks and two co-operative banks (Swedish Bankers' Association (2019)).

The exposure of banks to assets or liabilities denominated in foreign currencies might be informative about the role played by foreign monetary policies in shaping domestic lending. Figure 1 presents the share of foreign currency denominated balance sheet items for Norwegian and Swedish banks in years 2000Q1-2018Q3 (for Norway the data is available for 2001Q1-2017Q4). The Figure makes clear that Swedish banks are much more engaged in foreign currency denominated operations in comparison to their Norwegian counterparts. As of 2017Q4, the share of foreign currency denominated liabilities at Norwegian banks accounted to 30%, while for Sweden the corresponding figure was 53%. For foreign currency denominated loans, in Norway, they account for merely 13% of banks' loans, while in Sweden for 42%.[4] In view of Figure 1, we expect that foreign monetary policy disturbances may play a more important role in influencing banking activities in Sweden compared to Norway. Given low share of loans in foreign currencies extended by Norwegian banks compared to their foreign-currency denominated liabilities, a currency-mismatch is to be expected, for which foreign exchange rate adjustments may play a role. In Sweden, foreign currency entries on the assets and liabilities side are generally well-matched and completely-hedged, which, on the other hand, may decrease the role of foreign monetary disturbances in the transmission mechanism. These hypotheses are tested in Section 5 of the paper.

The exposure to foreign-denominated assets and liabilities is not uniform across different bank types in Norway and Sweden and it is concentrated among the largest limited-liability

[4]The data for 2018Q4 for Sweden indicates that the move of Nordea to Finland substantially changed the banking landscape in Sweden. The shares of foreign currency denominated balance sheet items for Swedish banks went down substantially from October 2018. Still, these shares remain high and Swedish banks have relatively more exposure in foreign currencies than the rest of the financial market in Sweden, and a much higher exposure than the Norwegian banks. As of September 2018, the shares of f-d liabilities, f-d assets and f-d loans stood at correspondingly 56%, 51% and 43% for Swedish banks. In October 2018, the relevant shares went down to 45%, 39%, 34%. Clearly, these statistics are driven mostly by the largest four banks in Sweden.

Figure 1: Foreign currency denominated balance sheet items at Norwegian and Swedish banks 2000-2018



Source: Norges Bank and Sveriges Riksbank.

banks in both countries. Table 1 presents more details on the extent of banking sector concentration in Norway and Sweden, with focus on foreign-currency denominated (f-d) denomination of balance sheet items. The table illustrates that both Norway and Sweden have concentrated banking systems, with the concentration in Sweden being higher than the one in Norway. Also, in both economies, foreign-denominated assets are particularly concentrated in the largest banks. In Sweden, big four banks account for 88% of all foreign-denominated assets held at MFI's (monetary financial institutions, including banks, housing credit institutions and finance companies), in Norway: 76%. The concentration is even more striking if we take into account banks only: In Sweden, big four banks account for 96% of all foreign-denominated banks' assets, while for Norway this number is 89%. The share of foreign-denominated liabilities of the biggest four banks in all foreign-denominated MFIs' liabilities is 82% in Sweden, but only 51% in Norway, but when we compare this share for banks only, it is 95% in Sweden and 86% in Norway. Most of of Norwegian and Swedish banks' funding is denominated in EUR and USD. On the lending side, given the presence of mortgage companies in both countries, which account for a considerable share

of lending to households, the role of biggest banks is not so prominent. However, once foreign-denominated loans are taken into account, the high concentration becomes evident again: In Sweden, the foreign-denominated loans of the largest four banks account for 95% of all banks' foreign-denominated loans, while in Norway they represent 79%. Once we take into account the largest eight banks, it becomes clear that for Sweden, they almost cover the whole of banking assets and foreign-denominated balance sheet items. In Norway, the banking concentration is slightly lower and one needs to account for savings banks as well to get the whole picture.

Table 1: The banking structure in Norway and Sweden

	Norway			Sweden		
Variable	All banks	Top 4	Top 8	All banks	Top 4	Top 8
Share of assets in all MFIs' assets	72%	43%	51%	74%	60%	67%
Share of f-d assets in all f-d MFIs' assets	85%	76%	80%	92%	88%	90%
Share of assets in all banks' assets	100%	60%	71%	100%	81%	92%
Share of f-d assets in all f-d banks' assets	100%	89%	94%	100%	96%	98%
Share of f-d liabilities in all f-d MFIs' liabilities	59%	51%	56%	86%	82%	85%
Share of f-d liabilities in all f-d banks' liabilities	100%	86%	94%	100%	95%	98%
Share of loans in all MFIs' loans	65%	32%	39%	66%	52%	60%
Share of f-d loans in all f-d MFIs' loans	97%	77%	84%	89%	85%	86%
Share of loans in all banks' loans	100%	50%	61%	100%	79%	90%
Share of f-d loans in all f-d banks' loans	100%	79%	86%	100%	95%	96%

Source: Norges Bank and Statistics Sweden. *Notes:* MFI stands for monetary financial institutions, including banks, housing credit institutions and finance companies. 'f-d' stands for foreign-currency denominated. The presented numbers for Norway refer to 2017Q4 due to changes in Norwegian banking statistics from 2018 onwards. The numbers for Sweden are as of September 2018, before the move of Nordea to Finland.

2.2 Institutional design of monetary and macroprudential policies

In both countries the central bank (Norges bank and Sveriges Riksbank, respectively) are in charge of designing monetary policy with the goal of inflation targeting but also under consideration of the trade-off between reaching the inflation target and high and stable output and employment. The main policy instrument is the policy rate, which in Norway and Sweden is the rate on deposits by banks at the Norges Bank and Sveriges Riksbank respectively (repo rate).

In Norway the Ministry of Finance takes the responsibility of monitoring financial markets and drawing up regulations, while the operational tasks regarding making and implement-

ing prudential policies are divided between Finanstilsynet (Financial Supervisory Authority of Norway) and Norges Bank. Finanstilsynet supervises banks and other financial institutions to ensure regulatory compliance. The monetary authority, Norges Bank, also has the mandate of maintaining financial stability. However, Norges Bank focuses more on macroprudential policies, while Finanstilsynet works more on microprudential supervision. Macroprudential policies, such as countercyclical capital buffer (CCyB), loan-to-value (LTV) ratio, and debt service coverage ratio (DSR), are recommended by Norges Bank and approved by the Ministry of Finance before the implementation; microprudential requirements, such as individual bank capital requirements and sectoral capital requirements (e.g. risk weights on assets), are designated by Finanstilsynet.

In Sweden the macroprudential mandate lies with Finansinspektionen, the Swedish Financial Supervisory Authority (FSA), which is an institution independent on the central bank, Sveriges Riksbank. However, the two institutions meet regularly in the Financial Stability Council. Sveriges Riksbank is represented by the Governor in these meetings. The Financial Stability Council is a forum with representatives from the government (Ministry of Finance), the FSA, Riksgälden (the Swedish National Debt Office) and the Riksbank. The council meets regularly to discuss financial stability issues, the need for measures to prevent financial imbalances from building up and, in the event of a financial crisis, the need for crisis measures. The council has been established in 2013 and normally meets twice per year (Financial Stability Council (2018)).

3 Data

3.1 Macroprudential and monetary data

For both Norway and Sweden we use the same data source for the macroprudential index, as well as foreign monetary policy surprises.

In order to control for changes in the macroprudential stance, we use the quarterly data of Cerutti et al. (2017) for the macroprudential policy stance index that starts in 2000 and ends in 2017. The index is derived from IMF's Survey of Global Macroprudential Policy Instruments (GMPI); it is country-specific and summarizes the intensities of borrower-target instruments, such as loan-to-value (LTV), as well as financial institution-targeted instruments, such as concentration limits or leverage ratios. We proxy the macroprudential stance with an intensity measure of cumulated macroprudential actions over two years before the monetary policy surprise to account for time lags in the transmission of macroprudential

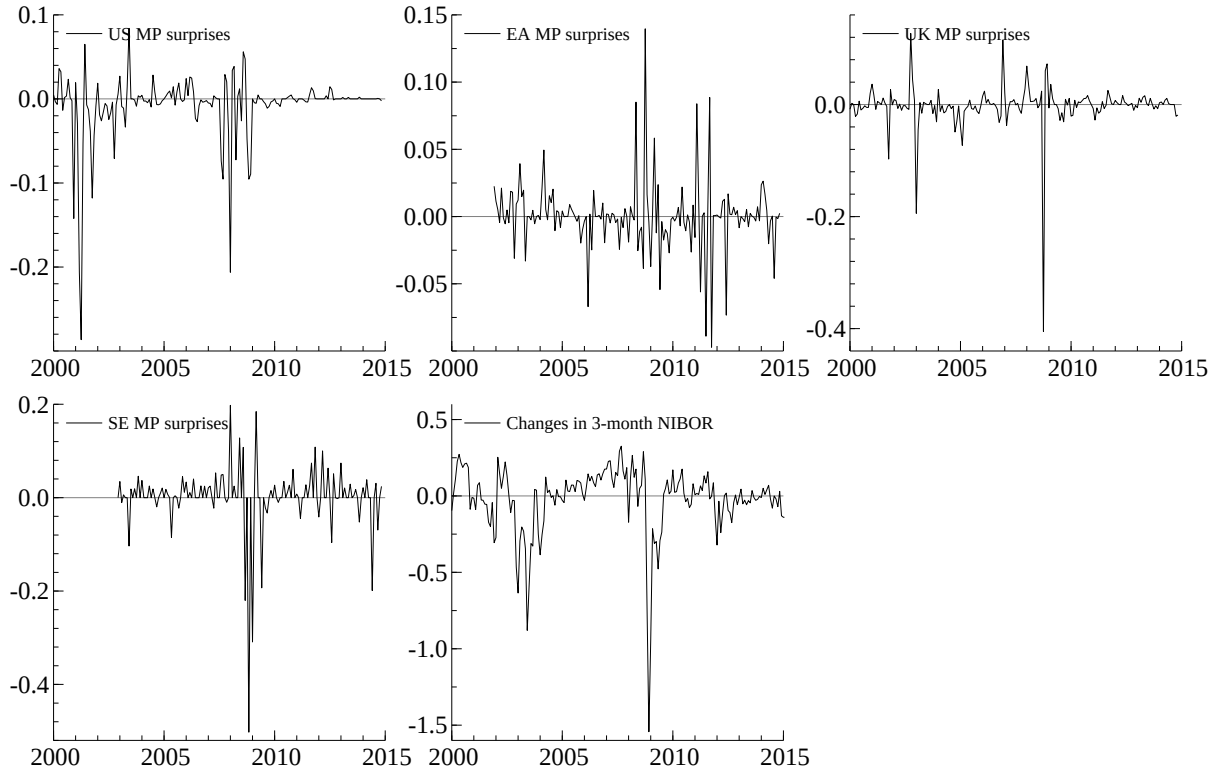


Figure 2: Monetary policy surprises from U.S., Euro Area, U.K., Sweden and a proxy for Norway.

Note: We use monthly monetary policy surprises data from Gürkaynak et al. (2005) for the U.S., Cesa-Bianchi et al. (2016) for the U.K., and Andrade and Ferroni (2018) for the euro zone. In addition, we use a monetary policy surprise series for Sweden as constructed in Rezende (2017). The sample period covers 2000–2014, but the starting date varies due to data availability.

policy. The macroprudential index by Cerutti et al. (2017) also contains information on changes in the usage of particular instruments.

We consider monetary policy surprises series from Gürkaynak et al. (2005) for the U.S., Cesa-Bianchi et al. (2016) for the U.K., and Andrade and Ferroni (2018) for the euro zone that is available for years 2000-2014. As such, our regressions span over the time period 2000-2014. Measures of monetary policy surprises are constructed using financial market-based measures of expectations about the policy instrument and are model-independent. In addition, for Sweden we use a monetary policy surprise series as constructed in Rezende (2017).[5]

[5]Rezende (2017) isolates the monetary policy rate surprises from the repo path factor with a similar setting as in Gürkaynak et al. (2005). The monetary policy surprise measure is comparable to the Kuttner

The macroprudential stance index does not vary much in our sample (see Figure A1 in Appendix A for the visualization of the index for Norway and Sweden), as the latest macroprudential policy changes in most countries happened after the Great Financial Crisis. The values of the monetary policy surprise measure, in turn, vary substantially across time as can be seen from Figure 2 which depicts the monthly monetary policy surprises from U.S., Euro Area, U.K. and Sweden. It appears that monetary policy surprises have similar pattern during the Financial Crisis. However, the whole sample correlation among the surprises' measures is quite low. The correlation coefficients between Swedish surprises and these three regions (U.S./Euro Area/U.K.) are -0.036, 0.079 and -0.0475. It confirms that the monetary surprises from different regions can be considered as orthogonal. In Norway, there is no publicly available monetary policy surprise series, so we use monthly changes in Norwegian Interbank Offering Rate (NIBOR) as a proxy instead, as is shown in Figure 2. The correlation coefficients between Norwegian proxy and three core economies (U.S./Euro Area/U.K.) are -0.016, -0.125, and 0.111, respectively.

3.2 Bank-level data

Table 2: Summary statistics for Norway

	Mean	SD	P25	Median	P75	N
	Panel A: all banks quarterly sample variables					
Δ total lending	0.022	0.038	0.004	0.019	0.034	6949
Δ lending to MFI	0.027	1.511	-.526	0.020	0.589	6883
Δ lending to NFC	0.024	0.133	-0.014	0.019	0.060	6710
Δ lending to HH	0.021	0.077	0.002	0.020	0.037	6745
Total Loans/Total assets	0.818	0.126	0.799	0.848	0.887	7212
Equity/Total assets	0.048	0.022	0.038	0.046	0.057	7211
Liquid assets/Total assets	0.065	0.052	0.031	0.054	0.085	7212
	Panel B: largest 6 banks quarterly sample variables					
Δ total lending	0.017	0.030	-0.000	.0160	0.035	131
Δ lending to MFI	-0.004	0.0.507	-0.131	0.016	0.206	131
Δ lending to NFC	0.020	0.091	-0.001	0.015	.044	131
Δ lending to HH	0.012	0.052	0.000	0.020	0.037	131
Total Loans/Total assets	0.690	0.177	0.645	0.731	.815	137
Equity/Total assets	0.023	0.019	0.004	0.021	0.034	137
Liquid assets/Total assets	0.096	0.079	0.034	0.083	0.114	137

Source: Statistics Norway. *Notes:* This table shows the summary statistics for all bank dependent variables and control variables from banks' balance sheets used in the empirical analysis. The sample covers all banks or the 6 largest banks and their subsidiaries over the 2002-2014 period. Balance sheet items are unconsolidated. The Δ denotes the log difference of the corresponding lending activities.

(2001) measure.

Table 3: Summary statistics for Sweden

	Mean	SD	P25	Median	P75	N
	Panel A: all banks quarterly sample variables					
Δ total lending	0.024	0.047	-0.004	0.020	0.047	2290
Δ lending to MFI	0.037	0.511	-0.167	0.003	0.230	2290
Δ lending to NFC	0.014	0.059	-0.014	0.009	0.042	2290
Δ lending to HH	0.023	0.041	-0.000	0.018	0.038	2290
Total Loans/Total assets	0.794	0.200	0.685	0.846	0.950	2290
Equity/Total assets	0.100	0.095	0.036	0.079	0.129	2290
Liquid assets/Total assets	0.083	0.107	0.000	0.046	0.136	2290
	Panel B: institutions in the 8 largest banking groups quarterly sample variables					
Δ total lending	0.022	0.048	-0.005	0.019	0.046	1024
Δ lending to MFI	0.029	0.512	-0.163	0.013	0.184	1024
Δ lending to NFC	0.012	0.051	-0.016	0.007	0.036	1024
Δ lending to HH	0.022	0.038	0.001	0.020	0.037	1024
Total Loans/Total assets	0.770	0.206	0.623	0.787	0.968	1024
Equity/Total assets	0.057	0.063	0.031	0.039	0.058	1024
Liquid assets/Total assets	0.083	0.108	0.000	0.009	0.155	1024
	Panel C: largest 8 banking groups monthly sample variables					
Δ total lending	0.008	0.035	-0.012	0.008	0.028	1542
Δ lending to MFI	0.004	0.251	-0.082	0.004	0.092	1542
Δ lending to NFC	0.006	0.026	-0.007	0.003	0.017	1542
Δ lending to HH	0.009	0.014	0.003	0.008	0.014	1542
Total Loans/Total assets	0.733	0.121	0.648	0.714	0.816	1542
Equity/Total assets	0.043	0.022	0.032	0.041	0.053	1542
Liquid assets/Total assets	0.152	0.085	0.106	0.145	0.190	1542

Source: Statistics Sweden and Sveriges Riksbank. *Notes:* This table shows the summary statistics for all bank dependent variables and control variables from banks' balance sheets used in the empirical analysis. The sample in panels A and B covers all banks and institutions in the banking groups or the financial institutions belonging to the eighth largest banking groups over the 2000-2014 period (on unconsolidated basis). The sample in panel C covers the largest eight banking groups on consolidated basis. The Δ denotes the log difference of the corresponding lending activities.

The Norwegian unconsolidated bank-level data is reported by the banks to Statistics Norway. Our sample runs from 2002Q1 to 2014Q4. The quarterly frequency allows us a better match with other variables such as monetary policy surprises and prudential regulation indices; further, it reduces the noise associated with very frequent loan volume observations. The sample is an unbalanced panel of 185 banks. Summary statistics of some key bank-level variables are shown in Panel A of Table 2. We study the largest 6 banks in a few regressions to check whether the baseline results are driven by the largest banks. The summary statistics for these banks are depicted in Panel B of Table 2.

The data used for Sweden in our analysis stem from several sources. We use unconsolidated bank- and institution-specific quarterly data for 55 financial institutions or the

consolidated monthly data for the eight largest banking groups in Sweden starting in 2000, provided by Statistics Sweden.[6] Sveriges Riksbank provides data on equity of considered institutions and Swedish macroeconomic variables. Panel A of Table 3 presents the summary statistics for the quarterly database for all banks (and financial institutions linked to banks, such as mortgage companies) used in the benchmark empirical section. Panel B of Table 3 presents the summary statistics for institutions in the largest 8 banking groups used in the same section. In the subsection 5.2, we use monthly consolidated data for the 8 largest banking groups to explore the banking group specific channels—their currency exposure differences. The currency exposures of considered banks are available at the group level from their financial reports. Panel C of Table 3 presents the summary statistics for the separate monthly sample.

4 The interaction between foreign monetary policy and macroprudential regulation: baseline results

We start by exploring the joint impact of foreign monetary policy and macroprudential regulation, applying the same empirical framework to the two countries. For this purpose, we estimate the following model:

$$\begin{aligned}\Delta Y_{b,t} &= \alpha_0 + \alpha_1 Macropru_t + \sum_{k=0}^{K} \alpha_{2,k} MP_{t-k}^{ctry} + \sum_{k=0}^{K} \gamma_{2,k} MP_{t-k}^{home} \\ &+ \sum_{k=0}^{K} \alpha_{3,k} MP_{t}^{ctry} \cdot Macropru_t + \sum_{k=0}^{K} \gamma_{3,k} MP_{t}^{home} \cdot Macropru_t \\ &+ \beta_1 X_{b,t-1} + \beta_2 Z_{t-1} + f_b + \delta_t + \epsilon_{b,t}. \end{aligned} \quad (1)$$

Here $\Delta Y_{b,t}$ measures the log change of domestic lending by bank b at quarter t.[7] $Macropru_t$ denotes the intensity of macroprudential regulation, measured by the macroprudential policy stance index designed by Cerutti et al. (2017). For both countries in all regression specifications, we use the two years cumulative definition for the macroprudential stance measure $Macropru_t$. MP^{ctry} denotes monetary policy surprises from period $t-k$ from country/region $ctry$. More specifically, we focus on surprises stemming from the U.S., the Euro Area and

[6] Statistics Sweden provides data on 55 major Swedish banks and financial companies. Given high banking concentration in Sweden and the dominating role of eight largest banks in foreign currency operations in Sweden (see Table 1), we use regressions for eight largest banking groups in section 5.2.

[7] In all our regressions presented in the paper, we winsorize the dependent variable at 5% and 95%. It helps to correct for issues related to outliers and missing observations in the bank lending variable.

the U.K.. MP^{home} denotes domestic monetary policy surprises from period $t-k$ from home country. Since the lagged monetary policy surprises have shown in preliminary tests no significant effect, we report here only the results using the contemporaneous monetary policy surprises ($k = 0$).[8]

X_{t-1} represents the vector of bank-level controls (loan-to-asset ratio, equity ratio, and liquid assets ratio), which are also taken with a one-quarter lag. The inclusion of these variables allows us to control for bank-specific factors, which have been shown to affect bank lending dynamics. In particular, controlling for bank capitalization using the equity ratio reflects the well-proven link between microprudential ratios and monetary policy transmission (see for example, Van den Heuvel (2002), Disyatat (2011), and Shin (2016)). Further, Z_{t-1} denotes a vector of additional macroeconomic controls. Specifically, we include GDP growth, inflation rate, stock index return (computed from Oslo Børs OBX Index (OBX) and OMX Stockholm 30 (OMXS30), respectively), house price growth (taken from Norges Bank's historical monetary statistics and Nasdaq OMX Valueguard-KTH Housing Index), as well as Chicago Board Options Exchange's Volatility Index (VIX). To avoid endogeneity concerns, we take one lag of these variables. $MP^{ctry} \cdot Macropru$ captures the interaction between foreign monetary policy surprises and domestic macroprudential policies. In order to control for the impact of domestic monetary policy, we include the domestic interactions between monetary and macroprudential policies, $MP^{home} \cdot Macropru$. Domestic monetary policy surprises for Sweden are drawn from Rezende (2017), while for Norway we simply use the change in 3-month NIBOR (Norwegian Interbank Offering Rate), since no monetary policy surprise series have been publicly available so far. In the baseline Table 4, we moreover provide the results with and without bank fixed effects, f_b, and with and without year fixed effects δ_t. We then proceed with the specification including bank fixed effects for the following tables. In all regressions in this section, we cluster the standard errors at the bank-quarter level. Including quarterly time fixed effects is not a feasible option since these will fully absorb the variation in the quarterly variables capturing macroprudential index and monetary policy surprises. The use of time-varying macroeconomic controls included in the vector Z_{t-1}, however, allows us to sufficiently control for relevant aggregate factors, which are potentially related to loan demand, thus achieving a better identification of loan supply.

Our choice of the model for estimating the relation between global monetary policy

[8] In a few robustness checks, we run a different regression specification in which we interpret MP^{ctry}_{t-k} as the sum of monetary policy from $t-k$ to t. It does not change the results and the contemporaneous surprises seem to have a stronger effects.

dynamics, macroprudential regulation and bank lending has been driven by the guidelines given by the IBRN (International Banking Research Network) methodological team. This choice allows a straight-forward comparability of the results presented in this paper to those obtained using data from other countries. The model is based on two main identification assumptions. First, it assumes that foreign monetary policy is not driven by domestic loan demand. This assumption is easy to justify given the fact that central banks in the core countries are unlikely to consider loan demand in other economies such as Sweden and Norway when setting their policy rates. The second crucial implicit identification assumption of this model is that any relation between macroprudential regulation and bank demand will vary only across time and not across banks and will therefore be picked by the time varying macroeconomic control variables. The choice of macroeconomic controls has been driven by the consideration of this assumption.

The results of the estimation of our initial specification which uses the sum of the three foreign monetary policy surprises (U.S., Euro Area and U.K.) as a surprise variable are reported in Table 4. This table contains three columns for each country. Columns (1) and (4) contain neither bank nor year fixed effects, columns (2) and (5) include only bank fixed effects, while columns (3) and (6) include both bank and year fixed effects. Estimates for a full list of control variables can be found in Appendix A, Table A1.[9]

These results suggest that generally, there are spillovers of foreign monetary policy to Norway. They seem to point to a portfolio channel, in the sense that contractionary surprises in foreign monetary policy are associated with higher volumes of domestic lending. We compute the marginal effect of the foreign and domestic monetary policies. We find that 1 percentage point higher foreign monetary policy surprises expands lending by 2-4 percentage points, depending on specification. In comparison, a 1 percentage point higher domestic monetary policy rate contracts lending by 0.6-0.8 percentage points. Both results are significant under the clustered standard errors. For Sweden, the results are more mixed and mostly insignificant, but we also find weak evidence of a portfolio channel, when we take into account both bank and year fixed effects in column (6). The marginal effects are com-

[9]The estimates are in line with standard banking theories. In both Norway and Sweden, bank lending is significantly driven by demand factors such as growth in house prices. In Norway, higher equity ratio leads to high bank lending (columns (2) and (3)), but the effect is not significant, probably due to the reason that bank lending is mostly sensitive to bank capitalization when a bank's capital ratio is (nearly) binding (evidence provided by Juelsrud and Wold (2020) using the same dataset from Norway) so that it is the tightness of banks' capitalization, rather than capital ratio itself, that drives bank lending. Unfortunately, we do not have information on individual bank's regulatory capital to construct the tightness measure. In Sweden, the effect of equity ratio is mostly insignificant (columns (5) and (6)), too, probably also due to the fact that banks' equity ratio is only available in yearly frequency so that it is less informative for quarterly bank lending.

puted at the mean of other covariates for Sweden. For our preferred specification without the year fixed effects presented in column (5), we find that 1 percentage point higher foreign monetary policy surprises contract lending by 0.2 percentage points. 1 percentage point higher Swedish monetary policy surprises reduce total lending by 0.3 percentage points. But both marginal effects are insignificant.

In general, the positive relation between the foreign surprise and lending in Norway and Sweden might be related not only to substitution in banks' portfolios but also to the fact that tightening of monetary policy in the core economies typically happens in times when the global economy booms which is associated with higher demand for commodities, thus a generally better macroeconomic dynamics, including higher demand for loans.

In case of both countries, domestic macroprudential policy has a restrictive effect on lending. We find both economically and statistically significant marginal effect from the macroprudential policy: A 1 unit increase in Norwegian macroprudental index contracts lending growth by 0.2-0.3 percentage points, while a corresponding change in the Swedish macroprudental index contracts lending growth by 0.2-0.4 percentage points. In case of Sweden, there is some evidence of the interaction between domestic macroprudential and foreign monetary surprises in column (6). However, as is shown in columns (3) and (6), including year fixed effects substantially limits the efficiency of the estimation with regard to the macroprudential index which is characterized by only very little variation within the years for both Sweden and Norway; therefore, in the rest of the paper, we focus on the specification with bank-fixed effects, i.e. specification presented in columns (2) and (5), excluding year fixed effects from our regressions.

After establishing the initial findings we zoom into the source of the monetary policy surprises and differentiate between surprises stemming from the U.S., from the U.K. and from the Euro Area. Here we also examine whether the results are sensitive to whether we use the full sample or focus on institutions in the largest banking groups (the 6 largest in Norway and the 8 largest in Sweden). The results of these estimations are presented in Table 5. For each country, this table includes two columns for the sum of the surprises, one using the full sample of banking groups and one using just banks in the largest banking groups (column (1) and (5) are just a replication of columns (2) and (5) of Table 4, presented here again for the sake of easier comparison), as well as two columns for each of the surprises stemming from the U.S., Euro Area and the U.K., again estimated respectively for the full sample of banks and for the largest banks only. The sum of foreign monetary policy surprise in Norway is consistent with the portfolio channel as documented in the previous table for the full sample. This is qualitatively opposite to the effects of changes in the domestic policy

rate. For the six largest banking groups the coefficient on the sum of foreign monetary policy surprises remains quantitatively unchanged but becomes imprecise. In case of Sweden, the sum of monetary policy surprises has an insignificant effect on lending, both in the full sample and for largest banking institutions. However, the signs are different, which may indicate that the largest banking groups in Sweden, mostly exposed to foreign currency changes due to their forex exposure, react differently to foreign monetary surprises, as opposed to the rest of the banks operating mostly domestically. For the top eight banking groups in Sweden, there is some evidence of domestic macroprudential policy interacting with the sum of surprises, even if the coefficient on the latter is insignificant. For Norway, even though largest banks have stronger exposure to international funding and thus to foreign monetary policy, our results show that the estimated coefficients are qualitatively the same, a result consistent with Cao and Dinger (2018) who show that smaller banks also adjust their lending to changes in global funding conditions. We assume that the lower statistical significance of the estimated coefficients for the subsample of only the largest banks is caused by the smaller number of observations. To confirm this assumption, in unreported test we re-estimate the model for randomly selected comparable number of smaller banks, achieving again similar results in terms of economic significance. For Sweden, we also further explore this issue using data at higher frequency in Section 5.2. The interaction between domestic macroprudential policies and foreign monetary surprises is mostly insignificant for both countries. However, both for Norway and Sweden, domestic macroprudential polices tend to have a restrictive effect on lending.

In Table 6 we investigate whether the relationship between foreign monetary policy surprises and domestic macroprudential policies varies across lending categories (for our whole sample). In particular, we differentiate between loans to monetary financial institutions (MFI), loans to non-financial corporations (NFC) and loans to households (HH). The results indicate substantial differences across the categories. More specifically, they illustrate that the positive effect of monetary policy surprises on the total lending volumes for Norway may be driven by the increased loans to financial institutions, at least if we focus on the euro-area surprises. U.S. monetary policy surprises on the other hand are negatively correlated with household lending, as is the domestic monetary policy rate. In Sweden, we find evidence of a negative effect of a U.S.-based surprise on lending to monetary financial institutions. This effect is counteracted by the domestic macroprudential policy. We also find that Swedish monetary surprises have a contractionary effect on lending to MFIs, and that the domestic macroprudential policy mitigates this effect. In the case of U.K. and euro-area surprises, the results for lending to MFIs point rather in the direction of the portfolio channel that

is counteracted by the domestic macroprudential policy. There is also evidence on the significant interaction between macroprudential policies and the effects of U.K.- and euro-area based monetary surprises on lending to non-financial corporations in Sweden.

Table 4: Baseline table

Notes: The table reports results of the benchmark regression, with quarterly data for all Norwegian and Swedish banks and financial institutions belonging to them (on unconsolidated basis). We use the sum of U.S., U.K. and Euro Area monetary surprises as the measure of foreign monetary policy surprises. The macroprudential policy stance is the two-year cumulative of the Cerutti et al. (2017) macroprudential policy index. The results hold if we replace the macroprudential policy to be a one-year cumulative value. The dependent variable is winsorized at 5% and 95%. We include additional controls such as the domestic interactions between monetary and macroprudential policies, one quarter lagged local macroeconomic conditions (GDP growth, inflation rate, stock index return, house price growth and VIX), and lagged bank-level controls (loan-to-asset ratio, equity ratio, and liquid assets ratio). For the home monetary policy, Sweden use the monetary policy surprises measure, while Norway use the change in 3-month NIBOR (Norwegian Interbank Offering Rate) as a proxy.

	Norway			Sweden		
	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total
MP^{sum}	0.038*	0.037*	0.026*	-0.002	0.003	0.040*
	(0.013)	(0.013)	(0.008)	(0.024)	(0.032)	(0.023)
Macropru	-0.003**	-0.004**	-0.002	-0.003***	-0.004***	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
MP^{sum} × Macropru	0.003	0.004	0.002	-0.003	-0.002	-0.037**
	(0.012)	(0.012)	(0.006)	(0.014)	(0.016)	(0.017)
MP^{home}	-0.006**	-0.006**	0.003	-0.005	-0.003	-0.026
	(0.002)	(0.002)	(0.002)	(0.014)	(0.017)	(0.019)
MP^{home} × Macropru	-0.002	-0.002	0.004	0.002	-0.000	0.017*
	(0.001)	(0.001)	(0.002)	(0.006)	(0.007)	(0.008)
N	6127	6125	6125	1879	1879	1879
R^2	0.132	0.252	0.278	0.040	0.141	0.154
Domestic interaction	YES	YES	YES	YES	YES	YES
Bank FE	NO	YES	YES	NO	YES	YES
Year FE	NO	NO	YES	NO	NO	YES
Controls	YES	YES	YES	YES	YES	YES

Bank-Quarter two-way clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Sum and individual surprises

Notes: The table reports results of the benchmark regression, with quarterly data for all Norwegian and Swedish banks and financial institutions belonging to them (on unconsolidated basis). We use the sum of U.S., U.K. and Euro Area monetary surprises, or U.S., U.K. and Euro Area monetary surprises separately as the measure of foreign monetary policy surprises. The macroprudential policy stance is the two-year cumulative of the Cerutti et al. (2017) macroprudential policy index. The results hold if we replace the macroprudential policy to be a one-year cumulative value. The dependent variable is winsorized at 5% and 95%. We include additional controls such as the domestic interactions between monetary and macroprudential policies, one quarter lagged local macroeconomic conditions (GDP growth, inflation rate, stock index return, house price growth and VIX), and lagged bank-level controls (loan-to-asset ratio, equity ratio, and liquid assets ratio). We run regression on both the large sample of all banks, and a smaller sample with only major banks in the country. For the home monetary policy, Sweden use the monetary policy surprises measure, while Norway use the change in 3-month NIBOR (Norwegian Interbank Offering Rate) as a proxy.

	Norway				Sweden			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total
MP^{sum}	0.037*	0.027			0.003	-0.007		
	(0.013)	(0.036)			(0.003)	(0.004)		
Macropru	-0.004**	-0.005	-0.003**	-0.003	-0.004***	-0.004**	-0.004***	-0.004*
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
MP^{sum} × Macropru	0.004	-0.006			-0.002	0.023*		
	(0.012)	(0.026)			(0.016)	(0.013)		
MP^{home}	-0.006**	-0.002	-0.007**	0.000	-0.003	-0.010	0.002	0.008
	(0.002)	(0.005)	(0.002)	(0.003)	(0.017)	(0.023)	(0.015)	(0.020)
MP^{home} × Macropru	-0.002	-0.000	-0.002	0.000	-0.000	-0.004	0.003	-0.004
	(0.001)	(0.006)	(0.002)	(0.005)	(0.007)	(0.009)	(0.007)	(0.013)
MP^{US}			0.001	0.097			0.100	0.014
			(0.015)	(0.100)			(0.074)	(0.149)
MP^{UK}			0.037	-0.032			-0.017	-0.056
			(0.019)	(0.033)			(0.043)	(0.047)
MP^{EA}			0.030	0.062			0.094*	0.163
			(0.031)	(0.047)			(0.051)	(0.095)
MP^{US} × Macropru			-0.020	-0.263			-0.095	0.031
			(0.021)	(0.130)			(0.061)	(0.100)
MP^{UK} × Macropru			0.000	-0.010			0.008	0.038
			(0.007)	(0.039)			(0.030)	(0.031)
MP^{EA} × Macropru			0.013	0.033			-0.028*	-0.020
			(0.010)	(0.025)			(0.016)	(0.032)
N	6125	118	6125	118	1879	799	1879	799
R^2	0.252	0.514	0.254	0.566	0.141	0.106	0.144	0.118
Sample	All	Top 6	All	Top 6	All	Top 8	All	Top 8
Domestic interaction	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO	NO
Controls	YES	YES	YES	YES	YES	YES	YES	YES

Bank-Quarter two-way clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Effect across different lending categories

Notes: The table reports results of the benchmark regression, with quarterly data for all Norwegian and Swedish banks and financial institutions belonging to them (on unconsolidated basis). We use the U.S., U.K. and Euro Area monetary surprises separately as the measure of foreign monetary policy surprises. The macroprudential policy stance is the two-year cumulative of the Cerutti et al. (2017) macroprudential policy index. The results hold if we replace the macroprudential policy to be a one-year cumulative value. The dependent variable is winsorized at 5% and 95%. We include additional controls such as the domestic interactions between monetary and macroprudential policies, one quarter lagged local macroeconomic conditions (GDP growth, inflation rate, stock index return, house price growth and VIX), lagged bank-level controls (loan-to-asset ratio, equity ratio, and liquid assets ratio). We run regression on the sample of all banks but for different categories of loans: lending to monetary financial institution(MFI), lending to non-financial corporations (NFC) and household (HH) lending. For the home monetary policy, Sweden use the monetary policy surprises measure, while Norway use the change in 3-month NIBOR (Norwegian Interbank Offering Rate) as a proxy.

	Norway			Sweden		
	(1)	(2)	(3)	(4)	(5)	(6)
	Δ MFI	Δ NFC	Δ HH	Δ MFI	Δ NFC	Δ HH
MP^{US}	1.125	0.048	-0.087***	-0.786*	-0.025	-0.048
	(0.844)	(0.050)	(0.013)	(0.392)	(0.077)	(0.045)
MP^{UK}	-0.054	-0.008	0.050	0.591**	-0.056	0.021
	(0.872)	(0.028)	(0.035)	(0.269)	(0.039)	(0.030)
MP^{EA}	2.255*	0.050	0.052	0.793*	-0.041	0.006
	(0.788)	(0.051)	(0.051)	(0.445)	(0.029)	(0.049)
Macropru	0.061*	-0.002	-0.004	-0.008	-0.004***	-0.003***
	(0.020)	(0.001)	(0.003)	(0.007)	(0.001)	(0.001)
MP^{US} × Macropru	-1.899	-0.033	-0.048	0.561*	0.049	-0.015
	(2.061)	(0.071)	(0.026)	(0.329)	(0.078)	(0.042)
MP^{UK} × Macropru	0.322	-0.034	-0.007	-0.344*	0.056**	-0.015
	(0.743)	(0.055)	(0.023)	(0.175)	(0.027)	(0.021)
MP^{EA} × Macropru	0.447	0.030	0.013	-0.357**	0.047***	0.000
	(0.550)	(0.028)	(0.010)	(0.160)	(0.015)	(0.013)
MP^{home}	0.211	0.007	-0.015**	-0.520***	0.007	0.013
	(0.141)	(0.007)	(0.003)	(0.158)	(0.020)	(0.013)
MP^{home} ∗ Macropru	0.146	-0.008	-0.003	0.190**	-0.011	-0.009*
	(0.089)	(0.005)	(0.002)	(0.088)	(0.009)	(0.005)
N	6073	5916	5962	1859	1871	1874
R^2	0.063	0.083	0.196	0.019	0.148	0.204
Domestic interaction	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO
Controls	YES	YES	YES	YES	YES	YES

Bank-Quarter two-way clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5 Exploring country-specific channels

The results of our baseline regressions presented in the previous section highlight the similarities of Norwegian and Swedish banks' lending response to domestic macroprudential and monetary policies, but they also point to some relevant differences. In this section, we zoom into country-specific channels to better understand our baseline results. For Norway, we focus on how the fact (documented in Cao and Dinger (2018)) that exchange rate dynamics does not fully offset monetary policy differentials affects the interaction between foreign monetary policy and macroprudential regulation. This channel is not a force for Sweden, since exchange rates roughly offset interest rate differentials. Therefore, for Sweden, we expect foreign monetary policy to have a more direct effect on lending. However, the baseline regressions for Sweden provided us with imprecise estimates and/or some mixed evidence on its direction. In what follows, we thus further document the interaction between monetary and macroprudential policy via banking groups' heterogeneous exposure to these policies in Sweden using more granular and higher frequency data.

5.1 Norway

The positive effect of foreign monetary policy surprise on Norwegian bank lending found in the previous section suggests that the portfolio channel dominates international bank lending channel. In this section, we explore how foreign monetary policy surprises translate into changes in Norwegian banks' FX funding cost and further affect bank lending.

Banks, as financial intermediaries, provide loans to borrowers via funding themselves, mainly from depositors and money markets. In a small open advanced economy like Norway, banks also obtain funding in foreign currencies from the international money market. They convert foreign currency funding into domestic currency — subject to the exchange rates — and provide domestic borrowers with loans denominated in domestic currency. The difference between the stance of domestic and foreign monetary policy generates interest rate differentials between domestic (Norwegian) and foreign money markets. If changes in exchange rates fully neutralize the interest rate differentials (or, the interest rate parity holds), banks would be indifferent between funding domestically and internationally; if not, banks would have the incentive to arbitrage and seek the funding source with a lower funding cost, especially when funding cost differentials are persistent.

As suggested by Cao and Dinger (2018), for Norway, the foreign-domestic interest rate differentials are not fully neutralized by the exchange rate dynamics. Using the differentials between LIBOR and NIBOR, adjusted by the changes in USD / NOK spot / forward ex-

change rate, as a measure of the cost advantage of U.S. dollar funding (intrinsically, deviation of USD / NOK spot / forward exchange rate from what is predicted by uncovered interest rate parity (UIP) / covered interest rate parity (CIP)), we find that such cost advantage is persistently high for certain periods. For example, Figure 3 shows that such cost advantage (measured by deviation of USD / NOK spot exchange rate from UIP) can be persistently high for a substantially long time, such as early 2000s and after 2008. There are several reasons for the persistent cost advantage. One reason is that Norway is an oil-producing country and the global oil price largely drives the exchange rate of Norwegian krone. As a result, the exchange rate adjustments often do not fully revert the interest rate differentials. Another reason is that international investors have regarded Norway as a safe haven country. Therefore, international investors are often willing to pay a negative premium to hold Norwegian assets, especially during the turbulence time such as the 2007-2009 global financial crisis and 2012 European debt crisis. Cao and Dinger (2018) find that such a cost advantage is incentivizing Norwegian banks to borrow in foreign currencies, and it is a more suitable measure for international spillovers than the foreign monetary policy surprises. Avdjiev et al. (2019) also allow for hedging of currency positions and show that CIP deviations can also signal cost advantage of banks' FX funding.

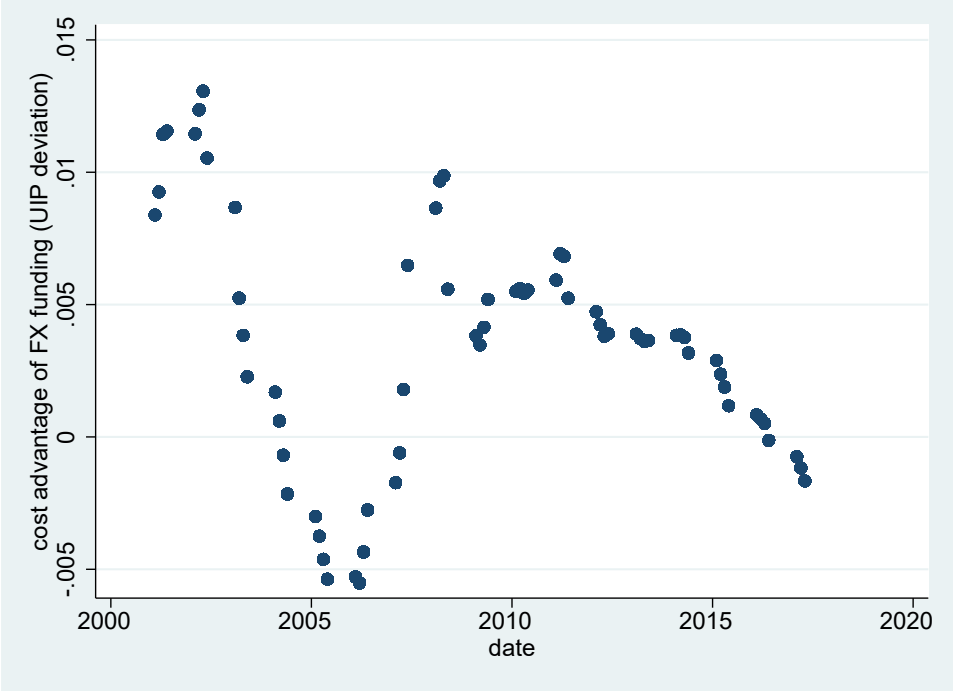
Using the cost advantage as a measure for international spillovers, we estimate the following equation that is augmented from the baseline regression:

$$\begin{aligned}\Delta Y_{b,t} &= \alpha_0 + \sum_{k=0}^{K} \alpha_{1,k} Macropru_{t-k} + \sum_{k=0}^{K} \alpha_{2,k} MP^{ctry}_{t-k} + \sum_{k=0}^{K} \gamma_{2,k} MPA^{foreign}_{t-k} + \sum_{k=0}^{K} \zeta_{2,k} MP^{home}_{t-k} \\ &+ \sum_{k=0}^{K} \alpha_{3,k} MP^{ctry}_{t-k} \cdot Macropru_t + \sum_{k=0}^{K} \gamma_{3,k} MPA^{foreign}_{t-k} \cdot Macropru_t \\ &+ \sum_{k=0}^{K} \zeta_{3,k} MP^{home}_{t-k} \cdot Macropru_t + \beta_1 X_{b,t-1} + \beta_2 Z_{t-1} + f_b + \epsilon_{b,t} \end{aligned} \quad (2)$$

in which the cost advantage measure, or, adjusted foreign monetary policy shocks, $MPA^{foreign}$, is the lagged percentage deviation of $t-k$ NOK / USD spot / forward exchange rate from what is predicted by UIP / CIP.[10] Information criteria AIC (Akaike Information Criterion) and SC (Schwarz Criterion) suggest the optimal lag $K = 1$. Further, besides using the accumulated prudential measures in the baseline regression that involve different prudential

[10]We do not have information on the currency decomposition of individual bank's FX liabilities. On aggregate, USD accounts for slightly more than 50% of banks' total FX liabilities, and EUR accounts for about 45%. Our results are robust if we compute $MPA^{foreign}$ using NOK / EUR exchange rate.

Figure 3: Advantage in foreign currency funding cost, Norway, measured by deviations from UIP



policies, here we also focus on the capital requirement that is a pillar in Norwegian regulatory framework. Note that a positive foreign monetary policy surprise corresponds to tightening foreign monetary policy which will correspond (ceteris paribus) to a negative change in the cost advantage.

If one bank borrows from spot FX market, then $MPA^{foreign}$ measured by deviation of NOK exchange rate from UIP reflects its cost advantage of its FX funding; in contrast, if the bank hedges its FX liabilities using FX swaps, then $MPA^{foreign}$ measured by deviation of NOK exchange rate from CIP — deducting the hedging cost (Du and Schreger (2016)) — reflects its cost advantage of its FX funding. Unfortunately, the share of hedged FX liabilities in each bank is not available in our data. Norges Bank's survey shows that on aggregate 50-70% of banks' FX liabilities are hedged, therefore, we measure $MPA^{foreign}$ by deviations from both UIP and CIP, and results of estimating equation (2) are shown in Table 7. In columns (1)-(3), $MPA^{foreign}$ is measured by deviations from UIP, while in columns (4)-(6), $MPA^{foreign}$ is measured by deviations from CIP.

The results of the estimation of the model are illustrated in Table 7. Columns (1) and (4) of this Table present the results controlling for the cost advantage in FX funding when esti-

Table 7: Inward transmission with cost advantage in FX funding ($MPA^{foreign}$ measured by deviations from UIP/CIP)

Notes: The table reports results of regression equation (2), with quarterly data for all Norwegian banks and financial institutions belonging to them (on unconsolidated basis). We use the sum of U.S., U.K. and Euro Area monetary surprises as the measure of foreign monetary policy surprises. The macroprudential policy stance is the two-year cumulative of the Cerutti et al. (2017) macroprudential policy index. The results hold if we replace the macroprudential policy to be a one-year cumulative value. The dependent variable is winsorized at 5% and 95%. We include additional controls such as the domestic interactions between monetary and macroprudential policies, one quarter lagged local macroeconomic conditions (GDP growth, inflation rate, stock index return, house price growth and VIX), and lagged bank-level controls (loan-to-asset ratio, equity ratio, and liquid assets ratio). For the home monetary policy, we use the change in 3-month NIBOR (Norwegian Interbank Offering Rate) as a proxy. We use two measures for cost advantage in FX funding, $MPA^{foreign}$: One is percentage deviation of NOK / USD spot exchange rate from what is predicted by UIP; the other is deviation of NOK / USD forward exchange rate from what is predicted by CIP, taking transaction cost into account (see Du and Schreger (2016)).

	$MPA^{foreign}$=UIP deviation			$MPA^{foreign}$=CIP deviation		
	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total
MP^{sum}	-0.033			-0.024		
	(0.020)			(0.018)		
Macropru	-0.004***	-0.003***		-0.003*	-0.003***	
	(0.000)	(0.000)		(0.001)	(0.001)	
Cap.Req.			-0.007***			-0.007***
			(0.001)			(0.001)
MP^{sum} × Macropru	0.017**			0.008		
	(0.005)			(0.013)		
MP^{home}	-0.003	-0.002	-0.003**	-0.006**	-0.003**	-0.005**
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
MP^{home} × Macropru	-0.002	-0.000		-0.005*	-0.004*	
	(0.001)	(0.001)		(0.002)	(0.002)	
MP^{home} × Cap.Req.			0.011			0.013**
			(0.007)			(0.003)
$MPA^{foreign}$	-0.007*	-0.007	-0.009	0.005	0.004	0.008*
	(0.003)	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)
$MPA^{foreign}$ × Macropru	0.002	-0.002		0.005	0.001	
	(0.004)	(0.001)		(0.004)	(0.002)	
$MPA^{foreign}$ × Cap.Req.			0.002			-0.010
			(0.003)			(0.004)
N	5907	6991	6991	6195	7533	7533
R^2	0.259	0.241	0.233	0.227	0.225	0.216
Domestic interaction	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO
Controls	YES	YES	YES	YES	YES	YES

Bank-Quarter two-way clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

mating the effect of foreign monetary policy surprises. These results suggest that controlling for the cost advantages substantially modifies our baseline result: Foreign monetary policy surprises now have the negative sign that is consistent with the existence of an international bank lending channel. The estimated coefficients are, however, statistically not significant. That is, controlling for the relative difference between the costs of funding in domestic and foreign currency, which also depends on exchange rate dynamics, is crucial when evaluating the international spillovers. The high correlation between the foreign monetary policy surprises and the cost advantages approximated via the UIP deviations results in low statistical significance of the estimated parameters (and in the case of the costs advantage in a positive coefficient), so we mostly highlight the results using the CIP deviations which signal a higher precision of the estimation. To avoid the problem of this correlations in columns (2) and (5), we drop foreign monetary policy surprises and can still achieve very similar results. This may imply that the impact of foreign monetary policy surprises is indeed largely captured by the cost advantages of banks' FX funding. Further, the cost advantage itself, measured by CIP deviations, has the expected positive impact on bank lending. Last but not least, we look at the potentially heterogeneous forms of macroprudential regulation and report in column (3) and (6) the results using only the strictness of capital regulation as a macroprudential tool. This specification again confirms the direction of the impact of domestic monetary policy and of capital rules but the interaction between capital rules and domestic monetary policy now suggests that stricter capital rules dampen the sensitivity of lending to domestic monetary policy.

Overall, in all specifications, domestic macroprudential policy significantly dampens bank lending, and tightening domestic monetary policy has a negative effect on bank lending. Foreign monetary policy surprises affect bank lending contingent on the dynamics of exchanges rates. Moreover, when controlling for foreign cost advantages, we gain sufficient precision to highlight the interaction between domestic monetary and macroprudential policies. Tighter macroprudential policies tend to amplify the domestic bank lending channel of monetary policy while capital requirements tend to dampen this channel.

The impact of FX funding cost advantage is not observed in the Swedish data, see column (1) of Table A2 in the Appendix A for the results. The reason is, as Figure 1 shows, that around 45% of loans issued by Swedish banks are denominated in foreign currencies (compared with around 10% by Norwegian banks), i.e., banks issue these loans without converting FX funding to SEK; therefore, foreign monetary policy surprises are more likely to pass through directly and exchange rate adjustments play a less important role. Furthermore, the series of FX funding cost advantage for Sweden, plotted in Figure A2 in Appendix A,

tends to be a random walk with the mean close to zero. For this reason, Swedish banks are less likely to arbitrage among funding sources so that FX funding cost advantage is less likely to drive bank lending.

In sum, the results of this subsection suggest that controlling for the cost advantages which arise for Norwegian banks when they use foreign currency funding substantially changes the estimated effect of foreign monetary policy surprises. Controlling for these advantages suggest the existence of some international bank lending channel effects, though these are generally not statistically significant.

5.2 Sweden

Tables 4, 5, 6, based on quarterly data for all banks and financial institutions as well as those belonging to the eight largest Swedish banks, suggest that in Sweden, domestic macroprudential policies significantly interact with foreign monetary surprises, but the latter demonstrate their impact on bank lending either through the international portfolio channel or the bank lending channel, depending on the source of the monetary surprise and the sector we look at.

In this section, we use more detailed data of higher frequency to further shed light on the transmission of foreign monetary surprises to Swedish banks' lending and its interaction with domestic macroprudential policies. We focus on data for the eight largest banking groups in Sweden that account for the majority of banks' assets in Sweden and the lion share of foreign-denominated assets and liabilities in Swedish financial institutions. Given the extent of their exposure to foreign currencies, we expect the transmission of foreign monetary policies to Sweden to occur mostly through these institutions. As we document in Table 1, the eight largest banks account for almost entire foreign-denominated balance sheet activity of financial institutions in Sweden. Somehow surprisingly, once we zoomed into the institutions belonging to top eight banking groups in Table 5, none of the coefficients on the response of lending to foreign monetary surprises was significant. We attribute that missing significance to the reduced sample size. To identify the model better, in this section, we use consolidated monthly data and hand-collected data on the individual foreign currency exposures of the banking groups that allow us to control more directly for their exposure to monetary policy surprises arising from a particular region. The summary statistics for the sample used in this section is presented in panel C of Table 3.[11] Most importantly, in this subsection, we use not only the balance sheet data at a monthly frequency, but also

[11] In this section, we use "banking group" and "bank" interchangeably.

monthly foreign monetary surprises, which helps us to identify the 'surprise' element of foreign monetary policies better.

Depending on the degree of exposure to a given currency, banks can be diversely affected by monetary policy surprises arising from a particular area. To explore this possibility, we specify a new measure of exposure to foreign surprises as a function of liability weight in respective foreign currencies. This gives us a natural separation of control and treatment groups as some of the banks do no operate in a particular region and it puts more weight to the banks that are more directly exposed to a given monetary surprise. We run a regression with the actual exposure of each bank multiplied with the monetary surprises from each region as in equation 3:

$$\begin{aligned}
\Delta Y_{b,t,m} &= \alpha_0 + \alpha_1 Macropru_t + \sum_{k=0}^{K} (\alpha_{2,k} {MP_{m-k}}^{ctry} Weight_{b,t-1}) \\
&+ \sum_{k=0}^{K} \alpha_{3,k} {MP_{m-k}}^{ctry} Weight_{b,t-1} \cdot Macropru_t \\
&+ \sum_{k=0}^{K} \gamma_{1,k} {MP_{m-k}}^{home} + \sum_{k=0}^{K} \gamma_{2,k} {MP_{m-k}}^{home} \cdot Macropru_t \\
&+ \beta_1 X_{b,m-1} + \beta_2 Z_{m-1} + f_b + \epsilon_{b,t,m}. \qquad (3)
\end{aligned}$$

$\Delta Y_{b,t,m}$ is the log change of domestic lending by banking group b at month m of year t, in different categories. The $Weight_{b,t-1}$ is the share of bank's liabilities in the corresponding currency in the last year (the currency decomposition is only observed at the annual frequency). The product of the channel weight and the monetary policy surprise is the key monetary policy spillover measure in the regression. The remaining variables are defined as in our baseline regressions in Section 4. We set $K = 0$. We cluster the standard errors at the bank-month level.

Panel A of Table 8 documents a significant negative impact of the sum of foreign monetary surprises on domestic lending to the MFIs. That decline in lending is counteracted by the domestic macroprudential policy. A similar result can be found for the euro-area specific surprises presented in panel B of Table 8, but the effect is weaker, without significance for the monetary policy surprises. The surprises from the U.K., in turn, have a negative effect on lending to households, and the ones originating from the U.S. have a negative impact on lending to households, suggesting a functioning international bank lending channel in this particular lending category. The interaction term of domestic macroprudential policies and the U.K.- and U.S.-originated monetary surprises is not significant for the household

Table 8: **Monthly policy interaction: weighted effects**

Notes: The table reports results of the regression with different currency channels, with monthly data on the largest 8 Swedish banking groups. The four columns correspond to the credit supplies to all Swedish borrowers, Monetary and Financial Institutions, Non-Financial corporations, and lastly the Households. We use the sum of currency weighted U.S., U.K. and Euro Area monetary surprises as the measure of foreign monetary policy surprises in panel A, and separate monetary policy surprises from EA, U.K. and U.S. in panel B, C and D. The Macroprudential policy stance is the two-year cumulative of the Cerutti et al. (2017) macroprudential policy index. The results hold if we replace the macroprudential policy to be a one-year cumulative value. The dependent variable is winsorized at 5% and 95%.

	(1) ΔTotal	(2) ΔMFI	(3) ΔNFC	(4) ΔHH
Panel A: Sum of monetary policy spillovers				
MP^{sum}	-0.093	-1.166*	0.084	0.008
	(0.127)	(0.598)	(0.090)	(0.062)
Macropru	-0.000	-0.005	-0.001	-0.001**
	(0.002)	(0.005)	(0.001)	(0.000)
MP^{sum} × Macropru	0.005	0.947***	0.097	-0.021
	(0.060)	(0.249)	(0.072)	(0.014)
Panel B: E.A. monetary policy spillovers				
MP^{ea}	-0.062	-2.582	0.092	0.097
	(0.153)	(1.504)	(0.089)	(0.060)
Macropru	-0.000	-0.005	-0.001	-0.001**
	(0.002)	(0.004)	(0.001)	(0.000)
MP^{ea} × Macropru	0.016	0.959**	0.069	-0.047***
	(0.079)	(0.403)	(0.062)	(0.009)
Panel C: U.K. monetary policy spillovers				
MP^{uk}	0.151***	5.413***	-0.052	-0.134***
	(0.012)	(0.627)	(0.090)	(0.037)
Macropru	-0.000	-0.005	-0.000	-0.001*
	(0.002)	(0.006)	(0.001)	(0.000)
MP^{uk} × Macropru	-0.178	5.130***	0.648***	0.133
	(0.097)	(1.017)	(0.042)	(0.071)
Panel D: U.S. monetary policy spillovers				
MP^{us}	-0.244**	-0.291	0.053	-0.171**
	(0.087)	(0.851)	(0.126)	(0.068)
Macropru	-0.000	-0.006	-0.001	-0.001**
	(0.002)	(0.005)	(0.001)	(0.000)
MP^{us} × Macropru	-2.609*	6.827	-0.305	-0.143
	(1.111)	(11.149)	(0.548)	(0.267)
Domestic interaction	YES	YES	YES	YES
Year FE	NO	NO	NO	NO
Bank FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES

Bankgroup-Month two-way clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

lending sector. However, we see the significant effect of the policy interactions in other sectors. Overall, this table suggests the prevalence of the bank lending channel for the eight largest banking groups in Sweden, driven mostly by the U.S.-originating monetary surprises. Results for U.K. indicate also the presence of the portfolio lending channel for some of the sectors, but these are unlikely to be of great economic importance given that Swedish banks are mostly exposed to USD and EUR.[12] Domestic monetary policy surprises, not reported in the Table 8 due to space limitations, tend to have a negative, albeit mostly insignificant, impact on bank lending. They significantly decrease lending to households, though. The interaction between the domestic macroprudential policy and the domestic monetary policy is mostly insignificant.

6 Conclusion

In this paper, we investigate the interaction between foreign monetary policy surprises and macroprudential policies in Norway and Sweden. As small open economies, Norway and Sweden are affected by monetary policies arising abroad through channels such as trade linkages and integrated financial market. This study presents weak evidence for the presence of international bank lending channel, once we properly account for the different mechanisms in considered countries. Moreover, we show that domestic macroprudential policies tend to interact with foreign monetary disturbances and mitigate their effects. Nonetheless, while considered in isolation, stricter macroprudential stance reduces domestic lending and so do stricter domestic monetary policies in both Scandinavian countries.

It is important to consider the special structure of the Norwegian and Swedish banking sectors when we interpret the findings in the paper. At first glance, the banking sectors of both countries seem similar, with a high banking concentration and largest banks engaged in foreign currency borrowing and lending. However, the Norwegian banking sector is relatively less concentrated, characterized by a few large, international, commercial banks with a large number of smaller, regional savings banks that play a crucial role in the regional economy. Norwegian and Swedish banks indeed both rely much on foreign currency funding, but Norwegian banks only issue a tiny share of loans denominated in foreign currencies. Swedish banks, in particular the largest ones, issue more foreign-denominated loans, but they seem to manage their foreign currency portfolios fairly well, maintaining on average a low imbalance

[12]We run the same regressions with unweighted monetary policy surprises. Most of the results are non-significant. This stresses the need of using more granular data including the channel variables in regressions run on a subsample of banks to obtain significant results, even if these banks are the ones most engaged in foreign-denominated operations. The regression table is available upon request.

in net currency positions, which are usually hedged. Despite the advanced currency management, it is still possible that foreign monetary policy surprises affect Swedish bank lending due to mismatches in maturities of different contracts. In fact, we find weak evidence of the international bank lending channel for Sweden, but a significant role of domestic macroprudenial policies in shielding the economy against decreases in bank supply associated with foreign monetary surprises. In Norway, domestic monetary policy and accounting for foreign exchange differentials seem to be more important for understanding banks' lending.

In this paper, we rely mostly on aggregate statistics for different lending categories and on balance sheet data, to study the interaction between monetary policy surprises and macroprudential policy stance. We cannot zoom into the distributional effects of various policies within the lending category. The transmission of monetary and macroprudential policies operates through different channels and may have diverse impact on specific market segments. Undoubtedly, some of the channels important for the transmission of monetary and macroprudential policies to bank lending can be only uncovered with the use of micro-data on lending. This offers room for future research with the contract-level data in Norway and Sweden.

References

Aghion, P. and E. Kharroubi (2013): "Cyclical macroeconomic policy, financial regulation and economic growth," *BIS Working Paper*.

Aiyar, S., C. W. Calomiris, and T. Wieladek (2016): "How does credit supply respond to monetary policy and bank minimum capital requirements?" *European Economic Review*, 82, 142–165.

Andrade, P. and F. Ferroni (2018): "Delphic and Odyssean Monetary Policy Shocks: Evidence from the Euro Area," *Fed Chicago Working Paper Series*.

Angelini, P., S. Neri, and F. Panetta (2014): "The interaction between capital requirements and monetary policy," *Journal of Money, Credit and Banking*, 46, 1073–1112.

Argimon, I., C. Bonner, R. Correa, P. Duijm, J. Frost, J. de Haan, L. de Haan, and V. Stebunovs (2019): "Financial institutions' business models and the global transmission of monetary policy," *Journal of International Money and Finance*, 90, 99 – 117.

Auer, S., C. Friedrich, M. Ganarin, T. Paligorova, and P. Towbin (2019):

"International monetary policy transmission through banks in small open economies," *Journal of International Money and Finance*, 90, 34 – 53.

Avdjiev, S., W. Du, C. Koch, and H. S. Shin (2019): "The dollar, bank leverage, and deviations from covered interest parity," *American Economic Review: Insights*, 1, 193–208.

Avdjiev, S., C. Koch, P. McGuire, and G. von Peter (2018): "Transmission of monetary policy through global banks: Whose policy matters?" *Journal of International Money and Finance*, 89, 67 – 82.

Barbosa, L., D. Bonfim, S. Costa, and M. Everett (2018): "Cross-border spillovers of monetary policy: What changes during a financial crisis?" *Journal of International Money and Finance*, 89, 154 – 174.

Bernanke, B. S. and A. S. Blinder (1992): "The Federal Funds Rate and the Channels of Monetary Transmission," *American Economic Review*, 82, 901–921.

Bernanke, B. S. and M. Gertler (1995): "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives*, 9, 27–48.

Buch, C. M. and L. S. Goldberg (2017): "Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network," *International Journal of Central Banking*, 13, 505–558.

Cao, J. and V. Dinger (2018): "Financial Globalization and Bank Lending: The Limits of Domestic Monetary Policy?" *Norges Bank Working Paper*.

Cerutti, E., S. Claessens, and L. Laeven (2017): "The use and effectiveness of macroprudential policies: New evidence," *Journal of Financial Stability*, 28, 203–224.

Cesa-Bianchi, A., G. Thwaites, and A. Vicondoa (2016): "Monetary policy transmission in an open economy: new data and evidence from the United Kingdom," *Bank of England Working Paper*.

Dell'Ariccia, G., D. Igan, L. Laeven, H. Tong, B. Bakker, and J. Vandenbussche (2012): "Policies for macrofinancial stability: How to deal with credit booms," *IMF Staff discussion note*, 7.

Disyatat, P. (2011): "The bank lending channel revisited," *Journal of Money, Credit and Banking*, 43, 711–734.

Du, W. and J. Schreger (2016): "Local currency sovereign risk," *Journal of Finance*, 71, 1027–1070.

Financial Stability Council (2018): "The financial stability council - a discussion forum for financial stability issues," `http://www.sou.gov.se/finansiella-stabilitetsradet/english-version/`, accessed: 2019-01-25.

Finocchiaro, D. and A. Grodecka (2018): "Financial frictions, financial regulation and their impact on the macroeconomy," *Sveriges Riksbank Economic Review*, 1.

Forbes, K., D. Reinhardt, and T. Wieladek (2017): "The spillovers, interactions, and (un)intended consequences of monetary and regulatory policies," *Journal of Monetary Economics*, 85, 1–22.

Gajewski, K., A. Jara, Y. Kang, J. Mok, D. Moreno, and D. Serwa (2019): "International spillovers of monetary policy: Lessons from Chile, Korea, and Poland," *Journal of International Money and Finance*, 90, 175 – 186.

Gambacorta, L. and P. E. Mistrulli (2004): "Does bank capital affect lending behavior?" *Journal of Financial Intermediation*, 13, 436–457.

Gürkaynak, R. S., B. Sack, and E. Swanson (2005): "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements," *International Journal of Central Banking*, 1.

Hills, R., K. Ho, D. Reinhardt, R. Sowerbutts, E. Wong, and G. Wu (2019): "The international transmission of monetary policy through financial centres: Evidence from the United Kingdom and Hong Kong," *Journal of International Money and Finance*, 90, 76 – 98.

Jonghe, O. D., H. Dewachter, and S. Ongena (2020): "Bank capital (requirements) and credit supply: Evidence from pillar 2 decisions," *Journal of Corporate Finance*, 60, forthcoming.

Juelsrud, R. E. and E. G. Wold (2020): "Risk-weighted capital requirements and portfolio rebalancing," *Journal of Financial Intermediation*, 41, forthcoming.

Kashyap, A. K. and J. C. Stein (2000): "What Do a Million Observations on Banks Say about the Transmission of Monetary Policy?" *American Economic Review*, 90, 407–428.

Kuttner, K. N. (2001): "Monetary policy surprises and interest rates: Evidence from the Fed funds futures market," *Journal of Monetary economics*, 47, 523–544.

Lindner, P., A. Loeffler, E. Segalla, G. Valitova, and U. Vogel (2019): "International monetary policy spillovers through the bank funding channel," *Journal of International Money and Finance*, 90, 161 – 174.

Nordea (2018): "Decision by Nordea's AGM 2018 on re-domiciliation of parent company," `https://www.nordea.com/en/press-and-news/news-and-press-releases/news-group/2018/Decision_on_re-domiciliation.html`, accessed: 2019-01-23.

Repullo, R. and J. Suarez (2012): "The procyclical effects of bank capital regulation," *The Review of Financial St6tudies*, 26, 452–490.

Rezende, R. B. D. (2017): "The interest rate effects of government bond purchases away from the lower bound," *Journal of International Money and Finance*, 74, 165 – 186.

Schmidt, J., M. Caccavaio, L. Carpinelli, and G. Marinelli (2018): "International spillovers of monetary policy: Evidence from France and Italy," *Journal of International Money and Finance*, 89, 50 – 66.

Shin, H. S. (2016): "Bank capital and monetary policy transmission," *Panel remarks at The ECB and its Watchers XVII conference*.

Smets, F. (2014): "Financial Stability and Monetary Policy: How Closely Interlinked?" *International Journal of Central Banking*, 10, 263–300.

Sveriges Riksbank (2016): *The Swedish financial market 2016*.

——— (2018): *Financial Stability Report*, 2.

Swedish Bankers' Association (2019): "Banks in Sweden," `https://www.swedishbankers.se/en-us/the-swedish-bankers-association-in-english/the-swedish-banking-market/banks-in-sweden/`, accessed: 2018-07-03.

Van den Heuvel, S. (2002): "Does bank capital matter for monetary transmission?" *Economic Policy Review*, 8, 259–265.

A Appendix

Figure A1: Cumulated macroprudential index (Cerutti et al. (2017))

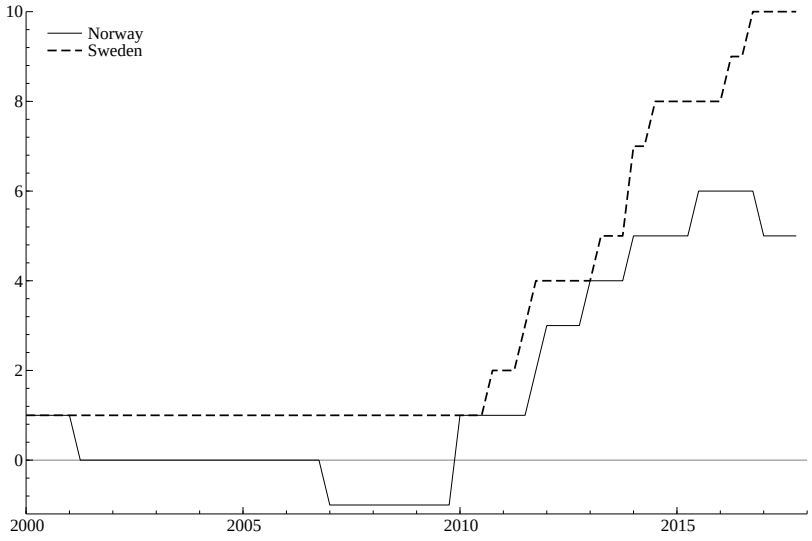


Table A1: Baseline table: extended

Notes: The table reports results of the benchmark regression, with quarterly data for all Norwegian and Swedish banks and financial institutions belonging to them (on unconsolidated basis). We use the sum of U.S., U.K. and Euro Area monetary surprises as the measure of foreign monetary policy surprises. The macroprudential policy stance is the two-year cumulative of the Cerutti et al. (2017) macroprudential policy index. The results hold if we replace the macroprudential policy to be a one-year cumulative value.The dependent variable is winsorized at 5% and 95%. We include additional controls such as the domestic interactions between monetary and macroprudential policies, one quarter lagged local macroeconomic conditions (GDP growth, inflation rate, stock index return, housing price increase and VIX), and lagged bank-level controls (loan-to-asset ratio, equity ratio, and liquid assets ratio). For the home monetary policy, Sweden use the monetary policy surprises measure, while Norway use the change in 3-month NIBOR (Norwegian Interbank Offering Rate) as a proxy.

	Norway			Sweden		
	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total	Δ Total
MP^{sum}	0.038*	0.037*	0.026*	-0.002	0.003	0.040*
	(0.013)	(0.013)	(0.008)	(0.024)	(0.032)	(0.023)
Macropru	-0.003**	-0.004**	-0.002	-0.003***	-0.004***	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
MP^{sum} × Macropru	0.003	0.004	0.002	-0.003	-0.002	-0.037**
	(0.012)	(0.012)	(0.006)	(0.014)	(0.016)	(0.017)
MP^{home}	-0.006**	-0.006**	0.003	-0.005	-0.003	-0.026
	(0.002)	(0.002)	(0.002)	(0.014)	(0.017)	(0.019)
MP^{home} × Macropru	-0.002	-0.002	0.004	0.002	-0.000	0.017*
	(0.001)	(0.001)	(0.002)	(0.006)	(0.007)	(0.008)
Equity Ratio	-0.047	0.169	0.112	-0.092***	-0.076	-0.085
	(0.037)	(0.085)	(0.064)	(0.032)	(0.097)	(0.100)
Loan / Asset	-0.015	0.011	-0.006	0.018	-0.020	-0.021
	(0.008)	(0.010)	(0.010)	(0.018)	(0.048)	(0.045)
Liquidity Ratio	-0.002	0.019	0.014	0.049*	0.053	0.057
	(0.015)	(0.015)	(0.015)	(0.028)	(0.063)	(0.062)
GDP	-0.014	-0.023	-0.035	-0.002	-0.002	0.002
	(0.089)	(0.081)	(0.023)	(0.001)	(0.002)	(0.003)
Inflation	0.001	0.001	-0.000	-0.421	-0.465	-0.368
	(0.001)	(0.001)	(0.001)	(0.402)	(0.434)	(0.418)
House Price	0.147**	0.153**	0.147**	0.131**	0.117*	0.131**
	(0.036)	(0.037)	(0.032)	(0.057)	(0.062)	(0.057)
Stock Return	-0.048***	-0.046***	-0.024***	-0.047	-0.048	0.003
	(0.005)	(0.005)	(0.002)	(0.029)	(0.031)	(0.040)
VIX	-0.001***	-0.001**	-0.000**	-0.000	-0.001*	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
N	6127	6125	6125	1879	1879	1879
R^2	0.132	0.252	0.278	0.040	0.141	0.154
Domestic interaction	YES	YES	YES	YES	YES	YES
Bank FE	NO	YES	YES	NO	YES	YES
Year FE	NO	NO	YES	NO	NO	YES

Bank-Quarter two-way clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A2: **Policy interaction: total effects**

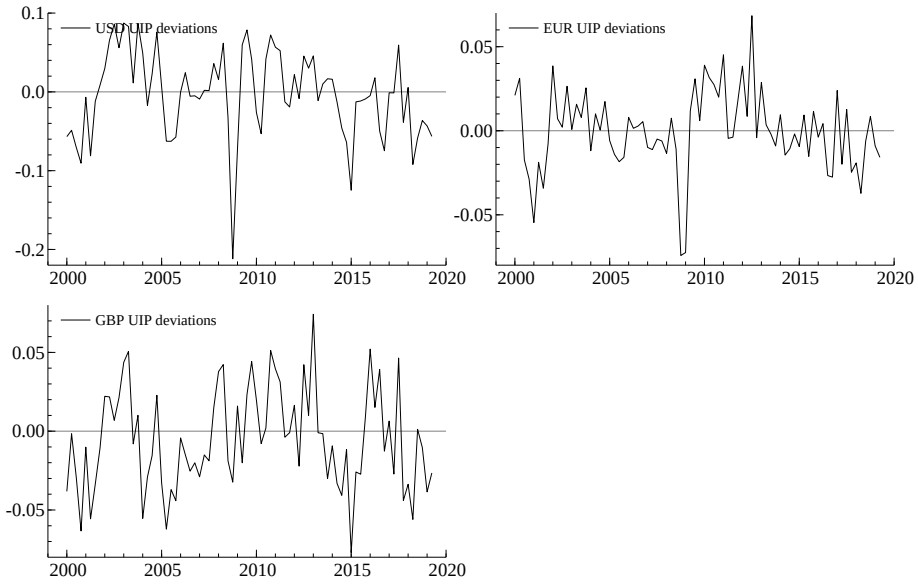
Notes: The table reports results of the benchmark regression, with quarterly data of 39 Swedish banking groups between 2000 and 2014 (unconsolidated data). The five columns correspond to the credit supplies to all Swedish borrowers, Monetary and Financial Institutions, Non-Financial corporations, and lastly Households. We use the sum of UIP deviations (MPA^{sum}) of SEK against USD, GBP and Euro as the measure of foreign monetary policy impacts. The macroprudential policy stance is the two-year cumulative of the Cerutti et al. (2017) macroprudential policy index. The results hold if we replace the macroprudential policy to be a one-year cumulative value. The dependent variable is winsorized at 5% and 95%.

	(1) ΔTotal	(2) ΔMFI	(3) ΔNonFin	(4) ΔHH
MPA^{sum}	-0.041	-0.336	-0.045**	0.034*
	(0.030)	(0.278)	(0.020)	(0.017)
Macropru	-0.004***	-0.006	-0.004**	-0.004***
	(0.001)	(0.009)	(0.002)	(0.001)
MPA^{sum} × Macropru	-0.016	0.126	0.000	-0.025***
	(0.012)	(0.103)	(0.010)	(0.007)
MP^{se}	0.001	-0.196	-0.007	-0.004
	(0.022)	(0.145)	(0.020)	(0.011)
MP^{se} × Macropru	0.004	0.028	0.005	-0.002
	(0.009)	(0.081)	(0.010)	(0.005)
N	1887	1867	1880	1882
R^2	0.145	0.019	0.150	0.202
Domestic interaction	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	NO	NO	NO	NO
Controls	YES	YES	YES	YES

Bank-Quarter two-way clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A2: Advantage in foreign currency funding cost, Sweden, 2000-2017



Earlier Working Papers:

For a complete list of Working Papers published by Sveriges Riksbank, see www.riksbank.se

Estimation of an Adaptive Stock Market Model with Heterogeneous Agents *by Henrik Amilon*	2005:177
Some Further Evidence on Interest-Rate Smoothing: The Role of Measurement Errors in the Output Gap *by Mikael Apel and Per Jansson*	2005:178
Bayesian Estimation of an Open Economy DSGE Model with Incomplete Pass-Through by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani	2005:179
Are Constant Interest Rate Forecasts Modest Interventions? Evidence from an Estimated Open Economy DSGE Model of the Euro Area *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2005:180
Inference in Vector Autoregressive Models with an Informative Prior on the Steady State *by Mattias Villani*	2005:181
Bank Mergers, Competition and Liquidity *by Elena Carletti, Philipp Hartmann and Giancarlo Spagnolo*	2005:182
Testing Near-Rationality using Detailed Survey Data *by Michael F. Bryan and Stefan Palmqvist*	2005:183
Exploring Interactions between Real Activity and the Financial Stance *by Tor Jacobson, Jesper Lindé and Kasper Roszbach*	2005:184
Two-Sided Network Effects, Bank Interchange Fees, and the Allocation of Fixed Costs *by Mats A. Bergman*	2005:185
Trade Deficits in the Baltic States: How Long Will the Party Last? *by Rudolfs Bems and Kristian Jönsson*	2005:186
Real Exchange Rate and Consumption Fluctuations follwing Trade Liberalization *by Kristian Jönsson*	2005:187
Modern Forecasting Models in Action: Improving Macroeconomic Analyses at Central Banks *by Malin Adolfson, Michael K. Andersson, Jesper Lindé, Mattias Villani and Anders Vredin*	2005:188
Bayesian Inference of General Linear Restrictions on the Cointegration Space *by Mattias Villani*	2005:189
Forecasting Performance of an Open Economy Dynamic Stochastic General Equilibrium Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2005:190
Forecast Combination and Model Averaging using Predictive Measures *by Jana Eklund and Sune Karlsson*	2005:191
Swedish Intervention and the Krona Float, 1993-2002 *by Owen F. Humpage and Javiera Ragnartz*	2006:192
A Simultaneous Model of the Swedish Krona, the US Dollar and the Euro *by Hans Lindblad and Peter Sellin*	2006:193
Testing Theories of Job Creation: Does Supply Create Its Own Demand? *by Mikael Carlsson, Stefan Eriksson and Nils Gottfries*	2006:194
Down or Out: Assessing The Welfare Costs of Household Investment Mistakes *by Laurent E. Calvet, John Y. Campbell and Paolo Sodini*	2006:195
Efficient Bayesian Inference for Multiple Change-Point and Mixture Innovation Models *by Paolo Giordani and Robert Kohn*	2006:196
Derivation and Estimation of a New Keynesian Phillips Curve in a Small Open Economy *by Karolina Holmberg*	2006:197
Technology Shocks and the Labour-Input Response: Evidence from Firm-Level Data *by Mikael Carlsson and Jon Smedsaas*	2006:198
Monetary Policy and Staggered Wage Bargaining when Prices are Sticky *by Mikael Carlsson and Andreas Westermark*	2006:199
The Swedish External Position and the Krona *by Philip R. Lane*	2006:200

Price Setting Transactions and the Role of Denominating Currency in FX Markets *by Richard Friberg and Fredrik Wilander*	2007:201
The geography of asset holdings: Evidence from Sweden *by Nicolas Coeurdacier and Philippe Martin*	2007:202
Evaluating An Estimated New Keynesian Small Open Economy Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2007:203
The Use of Cash and the Size of the Shadow Economy in Sweden *by Gabriela Guibourg and Björn Segendorf*	2007:204
Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns *by Sophie Claeys and Koen Schoors*	2007:205
Optimal Monetary Policy under Downward Nominal Wage Rigidity *by Mikael Carlsson and Andreas Westermark*	2007:206
Financial Structure, Managerial Compensation and Monitoring *by Vittoria Cerasi and Sonja Daltung*	2007:207
Financial Frictions, Investment and Tobin's q *by Guido Lorenzoni and Karl Walentin*	2007:208
Sticky Information vs Sticky Prices: A Horse Race in a DSGE Framework *by Mathias Trabandt*	2007:209
Acquisition versus greenfield: The impact of the mode of foreign bank entry on information and bank lending rates *by Sophie Claeys and Christa Hainz*	2007:210
Nonparametric Regression Density Estimation Using Smoothly Varying Normal Mixtures *by Mattias Villani, Robert Kohn and Paolo Giordani*	2007:211
The Costs of Paying – Private and Social Costs of Cash and Card *by Mats Bergman, Gabriella Guibourg and Björn Segendorf*	2007:212
Using a New Open Economy Macroeconomics model to make real nominal exchange rate forecasts *by Peter Sellin*	2007:213
Introducing Financial Frictions and Unemployment into a Small Open Economy Model *by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin*	2007:214
Earnings Inequality and the Equity Premium *by Karl Walentin*	2007:215
Bayesian forecast combination for VAR models *by Michael K. Andersson and Sune Karlsson*	2007:216
Do Central Banks React to House Prices? *by Daria Finocchiaro and Virginia Queijo von Heideken*	2007:217
The Riksbank's Forecasting Performance *by Michael K. Andersson, Gustav Karlsson and Josef Svensson*	2007:218
Macroeconomic Impact on Expected Default Freqency *by Per Åsberg and Hovick Shahnazarian*	2008:219
Monetary Policy Regimes and the Volatility of Long-Term Interest Rates *by Virginia Queijo von Heideken*	2008:220
Governing the Governors: A Clinical Study of Central Banks *by Lars Frisell, Kasper Roszbach and Giancarlo Spagnolo*	2008:221
The Monetary Policy Decision-Making Process and the Term Structure of Interest Rates *by Hans Dillén*	2008:222
How Important are Financial Frictions in the U S and the Euro Area *by Virginia Queijo von Heideken*	2008:223
Block Kalman filtering for large-scale DSGE models *by Ingvar Strid and Karl Walentin*	2008:224
Optimal Monetary Policy in an Operational Medium-Sized DSGE Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson*	2008:225
Firm Default and Aggregate Fluctuations *by Tor Jacobson, Rikard Kindell, Jesper Lindé and Kasper Roszbach*	2008:226
Re-Evaluating Swedish Membership in EMU: Evidence from an Estimated Model *by Ulf Söderström*	2008:227

The Effect of Cash Flow on Investment: An Empirical Test of the Balance Sheet Channel *by Ola Melander*	2009:228
Expectation Driven Business Cycles with Limited Enforcement *by Karl Walentin*	2009:229
Effects of Organizational Change on Firm Productivity *by Christina Håkanson*	2009:230
Evaluating Microfoundations for Aggregate Price Rigidities: Evidence from Matched Firm-Level Data on Product Prices and Unit Labor Cost *by Mikael Carlsson and Oskar Nordström Skans*	2009:231
Monetary Policy Trade-Offs in an Estimated Open-Economy DSGE Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson*	2009:232
Flexible Modeling of Conditional Distributions Using Smooth Mixtures of Asymmetric Student T Densities *by Feng Li, Mattias Villani and Robert Kohn*	2009:233
Forecasting Macroeconomic Time Series with Locally Adaptive Signal Extraction *by Paolo Giordani and Mattias Villani*	2009:234
Evaluating Monetary Policy *by Lars E. O. Svensson*	2009:235
Risk Premiums and Macroeconomic Dynamics in a Heterogeneous Agent Model *by Ferre De Graeve, Maarten Dossche, Marina Emiris, Henri Sneessens and Raf Wouters*	2010:236
Picking the Brains of MPC Members *by Mikael Apel, Carl Andreas Claussen and Petra Lennartsdotter*	2010:237
Involuntary Unemployment and the Business Cycle *by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin*	2010:238
Housing collateral and the monetary transmission mechanism *by Karl Walentin and Peter Sellin*	2010:239
The Discursive Dilemma in Monetary Policy *by Carl Andreas Claussen and Øistein Røisland*	2010:240
Monetary Regime Change and Business Cycles *by Vasco Cúrdia and Daria Finocchiaro*	2010:241
Bayesian Inference in Structural Second-Price common Value Auctions *by Bertil Wegmann and Mattias Villani*	2010:242
Equilibrium asset prices and the wealth distribution with inattentive consumers *by Daria Finocchiaro*	2010:243
Identifying VARs through Heterogeneity: An Application to Bank Runs *by Ferre De Graeve and Alexei Karas*	2010:244
Modeling Conditional Densities Using Finite Smooth Mixtures *by Feng Li, Mattias Villani and Robert Kohn*	2010:245
The Output Gap, the Labor Wedge, and the Dynamic Behavior of Hours *by Luca Sala, Ulf Söderström and Antonella Trigari*	2010:246
Density-Conditional Forecasts in Dynamic Multivariate Models *by Michael K. Andersson, Stefan Palmqvist and Daniel F. Waggoner*	2010:247
Anticipated Alternative Policy-Rate Paths in Policy Simulations *by Stefan Laséen and Lars E. O. Svensson*	2010:248
MOSES: Model of Swedish Economic Studies *by Gunnar Bårdsen, Ard den Reijer, Patrik Jonasson and Ragnar Nymoen*	2011:249
The Effects of Endogenuos Firm Exit on Business Cycle Dynamics and Optimal Fiscal Policy *by Lauri Vilmi*	2011:250
Parameter Identification in a Estimated New Keynesian Open Economy Model *by Malin Adolfson and Jesper Lindé*	2011:251
Up for count? Central bank words and financial stress *by Marianna Blix Grimaldi*	2011:252
Wage Adjustment and Productivity Shocks *by Mikael Carlsson, Julián Messina and Oskar Nordström Skans*	2011:253

The timing of uncertainty shocks in a small open economy *by Hanna Armelius, Isaiah Hull and Hanna Stenbacka Köhler*	2016:334
Quantitative easing and the price-liquidity trade-off *by Marien Ferdinandusse, Maximilian Freier and Annukka Ristiniemi*	2017:335
What Broker Charges Reveal about Mortgage Credit Risk *by Antje Berndt, Burton Hollifield and Patrik Sandåsi*	2017:336
Asymmetric Macro-Financial Spillovers *by Kristina Bluwstein*	2017:337
Latency Arbitrage When Markets Become Faster *by Burton Hollifield, Patrik Sandås and Andrew Todd*	2017:338
How big is the toolbox of a central banker? Managing expectations with policy-rate forecasts: Evidence from Sweden *by Magnus Åhl*	2017:339
International business cycles: quantifying the effects of a world market for oil *by Johan Gars and Conny Olovsson l*	2017:340
Systemic Risk: A New Trade-Off for Monetary Policy? *by Stefan Laséen, Andrea Pescatori and Jarkko Turunen*	2017:341
Household Debt and Monetary Policy: Revealing the Cash-Flow Channel *by Martin Flodén, Matilda Kilström, Jósef Sigurdsson and Roine Vestman*	2017:342
House Prices, Home Equity, and Personal Debt Composition *by Jieying Li and Xin Zhang*	2017:343
Identification and Estimation issues in Exponential Smooth Transition Autoregressive Models *by Daniel Buncic*	2017:344
Domestic and External Sovereign Debt *by Paola Di Casola and Spyridon Sichlimiris*	2017:345
The Role of Trust in Online Lending *by Christoph Bertsch, Isaiah Hull, Yingjie Qi and Xin Zhang*	2017:346
On the effectiveness of loan-to-value regulation in a multiconstraint framework *by Anna Grodecka*	2017:347
Shock Propagation and Banking Structure *by Mariassunta Giannetti and Farzad Saidi*	2017:348
The Granular Origins of House Price Volatility *by Isaiah Hull, Conny Olovsson, Karl Walentin and Andreas Westermark*	2017:349
Should We Use Linearized Models To Calculate Fiscal Multipliers? *by Jesper Lindé and Mathias Trabandt*	2017:350
The impact of monetary policy on household borrowing – a high-frequency IV identification *by Maria Sandström*	2018:351
Conditional exchange rate pass-through: evidence from Sweden *by Vesna Corbo and Paola Di Casola*	2018:352
Learning on the Job and the Cost of Business Cycles *by Karl Walentin and Andreas Westermark*	2018:353
Trade Credit and Pricing: An Empirical Evaluation *by Niklas Amberg, Tor Jacobson and Erik von Schedvin*	2018:354
A shadow rate without a lower bound constraint *by Rafael B. De Rezende and Annukka Ristiniemi*	2018:355
Reduced "Border Effects", FTAs and International Trade *by Sebastian Franco and Erik Frohm*	2018:356
Spread the Word: International Spillovers from Central Bank Communication *by Hanna Armelius, Christoph Bertsch, Isaiah Hull and Xin Zhang*	2018:357
Predictors of Bank Distress: The 1907 Crisis in Sweden *by Anna Grodecka, Seán Kenny and Anders Ögren*	2018:358

Diversication Advantages During the Global Financial Crisis *by Mats Levander*	2018:359
Towards Technology-News-Driven Business Cycles *by Paola Di Casola and Spyridon Sichlimiris*	2018:360
The Housing Wealth Effect: Quasi-Experimental Evidence *by Dany Kessel, Björn Tyrefors and Roine*	2018:361
Identification Versus Misspecification in New Keynesian Monetary Policy Models *by Malin Adolfson, Stefan Laseén, Jesper Lindé and Marco Ratto*	2018:362
The Macroeconomic Effects of Trade Tariffs: Revisiting the Lerner Symmetry Result *by Jesper Lindé and Andrea Pescatori*	2019:363
Biased Forecasts to Affect Voting Decisions? The Brexit Case *by Davide Cipullo and André Reslow*	2019:364
The Interaction Between Fiscal and Monetary Policies: Evidence from Sweden *by Sebastian Ankargren and Hovick Shahnazarian*	2019:365
Designing a Simple Loss Function for Central Banks: Does a Dual Mandate Make Sense? *by Davide Debortoli, Jinill Kim and Jesper Lindé*	2019:366
Gains from Wage Flexibility and the Zero Lower Bound *by Roberto M. Billi and Jordi Galí*	2019:367
Fixed Wage Contracts and Monetary Non-Neutrality *by Maria Björklund, Mikael Carlsson and Oskar Nordström Skans*	2019:368
The Consequences of Uncertainty: Climate Sensitivity and Economic Sensitivity to the Climate *by John Hassler, Per Krusell and Conny Olovsson*	2019:369
Does Inflation Targeting Reduce the Dispersion of Price Setters' Inflation Expectations? *by Charlotte Paulie*	2019:370
Subsampling Sequential Monte Carlo for Static Bayesian Models *by David Gunawan, Khue-Dung Dang, Matias Quiroz, Robert Kohn and Minh-Ngoc Tran*	2019:371
Hamiltonian Monte Carlo with Energy Conserving Subsampling *by Khue-Dung Dang, Matias Quiroz, Robert Kohn, Minh-Ngoc Tran and Mattias Villani*	2019:372
Institutional Investors and Corporate Investment *by Cristina Cella*	2019:373
The Impact of Local Taxes and Public Services on Property Values *by Anna Grodecka and Isaiah Hull*	2019:374
Directed technical change as a response to natural-resource scarcity *by John Hassler, Per Krusell and Conny Olovsson*	2019:375
A Tale of Two Countries: Cash Demand in Canada and Sweden *by Walter Engert, Ben Fung and Björn Segendorf*	2019:376
Tax and spending shocks in the open economy: are the deficits twins? *by Mathias Klein and Ludger Linnemann*	2019:377
Mind the gap! Stylized dynamic facts and structural models *by Fabio Canova and Filippo Ferroni*	2019:378
Financial Buffers, Unemployment Duration and Replacement Labor Income *by Mats Levander*	2019:379
Inefficient Use of Competitors' Forecasts? *by André Reslow*	2019:380
How Much Information Do Monetary Policy Committees Disclose? Evidence from the FOMC's Minutes and Transcripts *by Mikael Apel, Marianna Blix Grimaldi and Isaiah Hull*	2019:381
Risk endogeneity at the lender/investor-of-last-resort *by Diego Caballero, André Lucas, Bernd Schwaab and Xin Zhang*	2019:382
Heterogeneity in Households' Expectations of Housing Prices – Evidence from Micro Data *by Erik Hjalmarsson and Pär Österholm*	2019:383
Big Broad Banks: How Does Cross-Selling A Affect Lending? *by Yingjie Qi*	2020:384
Unemployment Fluctuations and Nominal GDP Targeting *by Roberto Billi*	2020:385

FAQ: How do I extract the output gap? *by Fabio Canova*	2020:386
Drivers of consumer prices and exchange rates in small open economies *by Vesna Corbo and Paola Di Casola*	2020:387
TFP news, stock market booms and the business cycle: Revisiting the evidence with VEC models *by Paola Di Casola and Spyridon Sichlimiris*	2020:388
The costs of macroprudential deleveraging in a liquidity trap *by Jiaqian Chen, Daria Finocchiaro, Jesper Lindé and Karl Walentin*	2020:389
The Role of Money in Monetary Policy at the Lower Bound *by Roberto M. Billi, Ulf Söderström and Carl E. Walsh*	2020:390
MAJA: A two-region DSGE model for Sweden and its main trading partners *by Vesna Corbo and Ingvar Strid*	2020:391

Sveriges Riksbank
Visiting address: Brunkebergs torg 11
Mail address: se-103 37 Stockholm

Website: www.riksbank.se
Telephone: +46 8 787 00 00, Fax: +46 8 21 05 31
E-mail: registratorn@riksbank.se