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By *Sarah Vella, Sergi Basco, Maria Chiara Iannino*

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Regulatory Asymmetries and the Risk Composition of Credit Supply: Evidence from Cross-Border Banking

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Abstract

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JEL Classification: E58, G21, G28

Keywords: Regulatory asymmetries; Countercyclical capital buffer; Reciprocity; Cross-border banking; Credit supply

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1 Introduction

How do temporary regulatory asymmetries affect the allocation of credit and risk in integrated banking markets and which loans do they affect most? When capital requirements apply unevenly across intermediaries competing for the same borrowers, some lenders become relatively less constrained and may expand into market segments vacated by regulated banks. Whether such reallocation stabilises or destabilises the financial system depends not only on the volume of credit supplied but also on its risk composition and the characteristics of the banks that absorb it. A growing literature shows that tighter capital requirements affect credit supply and generate cross-border spillovers (Aiyar et al., 2014; Cerutti et al., 2017). However, less is known about whether temporary regulatory asymmetries across competing lenders affect the composition of credit supplied. Understanding this margin helps assess how macroprudential regulation affects the allocation and contractual composition of credit across lenders.

We study this question using the introduction of the countercyclical capital buffer (CCyB) in Norway and Sweden and the gradual implementation of reciprocity across jurisdictions. Norway and Sweden form a highly integrated banking market in which domestic and foreign banks compete for similar borrowers and participate in common syndicated loan markets.[1] We therefore treat the two countries as a common lending environment. Following the first positive CCyB announcement in 2013, Norwegian and Swedish banks were subject to the relevant buffer in full, while foreign banks were progressively brought within the requirement as reciprocity was phased in until 2019. This created a temporary regulatory asymmetry among lenders serving the same market and provides a setting to study incomplete reciprocity as a source of cross-border credit reallocation. Using syndicated loan data for non-financial firms in Norway and Sweden over 2010–2019, we examine whether foreign banks increase lending relative to domestic banks during this regulatory wedge, whether the differential is stronger in un-

[1]The Nordic banking system is characterised by substantial cross-border integration, with large banking groups operating across national boundaries through branches, subsidiaries and direct cross-border lending (Farelius and Billborn, 2016; FSB Regional Consultative Group for Europe, 2016).

Figure A.1 illustrates that Norway and Sweden experienced overlapping periods of elevated corporate indebtedness and macroprudential tightening during the sample period. In both countries, non-financial corporate debt increased relative to GDP over the years surrounding the initial CCyB announcements, while both countries progressively increased their CCyB rates, reaching 2.5% by 2019. These similarities, together with the presence of common cross-border banking groups, motivate treating Norway and Sweden as a common lending environment for the analysis of syndicated credit. Related empirical research also examines bank lending and macroprudential policy transmission jointly in Norway and Sweden (Cao et al., 2021).

secured lending and how it evolves as reciprocity arrangements expand. Our empirical strategy exploits variation across lenders serving the same borrowers, following Khwaja and Mian (2008) and combines this with a Difference-in-Differences (DiD) framework to isolate credit-supply responses from borrower-specific demand conditions. Our estimates capture the differential lending response arising from temporary differences in effective capital requirements between domestic and foreign banks, created by the incomplete implementation of CCyB reciprocity. We then examine whether the differential response varies between secured and unsecured lending and according to banks' pre-policy profitability.

We document three main findings. First, foreign banks contract lending less than domestic lenders following the CCyB announcement, resulting in a positive foreign–domestic lending differential of approximately 42.0% in the preferred specification during the period of incomplete reciprocity. Second, this differential response is concentrated in unsecured lending, where foreign banks contract lending by approximately 35.1%, compared with 64.9% for domestic banks. By contrast, we find no statistically significant foreign–domestic differential in secured lending. Third, the marginal-effects results suggest that the unsecured-lending differential is strongest among low-profitability banks. Domestic banks reduce unsecured lending more strongly following the announcement, while comparable foreign banks respond less negatively. However, the triple-interaction estimates do not establish statistically significant heterogeneity in the foreign-bank response by profitability. We interpret the stronger foreign–domestic differential in unsecured lending as consistent with a capital-cost channel, whereby the CCyB imposes higher Common Equity Tier 1 (CET1) capital requirements on exposures generating greater risk-weighted assets. This potentially strengthens the relative advantage of foreign banks during incomplete reciprocity.

Our paper contributes to the literature on bank capital regulation, cross-border spillovers and the composition of credit. Existing studies show that tighter regulation can reduce lending by directly affected banks and induce substitution towards less-constrained intermediaries (Aiyar et al., 2014; Cerutti et al., 2017; Chen and Friedrich, 2023). Related work shows that capital requirements can also affect the composition of bank lending (Jiménez et al., 2017; Auer et al., 2022). We bring these strands together by studying a common lending market in which competing banks temporarily face different effective capital requirements. Our results show that regulatory leakages operate not only through lending volumes, but also through credit composition. We also find that foreign-domestic differences in adjustment are not uniform across loan types.

2 Related Literature

Our paper relates first to the literature on the effects of capital requirements on bank credit supply. A broad body of evidence shows that tighter capital regulation can reduce lending as banks adjust their balance sheets, often through reductions in risk-weighted assets (RWA) rather than increases in equity (Behn et al., 2016; Bridges et al., 2014; Gropp et al., 2019; Juelsrud and Wold, 2020). This literature establishes that capital requirements affect the quantity of credit supplied, but generally focuses on the response of directly regulated banks.

A second strand examines whether these effects spill over across lenders and national regulatory boundaries. Aiyar et al. (2014) show that tighter capital requirements can induce substitution towards lenders outside the regulatory perimeter, while Cerutti et al. (2017) document broader cross-border responses to macroprudential tightening. Related studies show that the direction of cross-border lending responses depends importantly on the extent to which foreign banks are themselves subject to the destination country's prudential requirements (Damar and Mordel, 2017; Chen and Friedrich, 2023). This is particularly relevant for the CCyB, where reciprocity progressively brings foreign exposures within the same regulatory framework. Recent evidence also highlights additional margins of adjustment through multinational banking groups and internal capital markets (Imbierowicz et al., 2026).

A third strand studies how capital regulation affects the composition rather than only the volume of credit. Jiménez et al. (2017) show that macroprudential policy can alter the risk composition of bank lending, while Auer et al. (2022) document portfolio reallocation following changes in the CCyB. A third strand studies how capital regulation affects the composition rather than only the volume of credit. Jiménez et al. (2017) show that macroprudential policy can alter the risk composition of bank lending, while Auer et al. (2022) document portfolio reallocation following changes in the CCyB. Such adjustments may also involve changes in contractual protection. Using European syndicated loan data, Godlewski and Olszak (2025) find that tighter macroprudential policy is associated with a higher probability of collateralisation. This evidence highlights the importance of examining loan characteristics alongside lending volumes. However, a shift towards secured lending need not imply safer borrowers, since collateral use also reflects borrower creditworthiness and contracting choices (Benmelech et al., 2022). The distinction between credit composition and overall credit risk is therefore important when interpreting these adjustments.

Our contribution lies at the intersection of these three strands. We examine how

incomplete CCyB reciprocity affects the allocation and contractual composition of credit in a common lending market. Unlike studies focusing on directly regulated banks or aggregate cross-border flows, we compare domestic and foreign lenders serving common borrowers while facing temporarily different effective capital requirements. We assess whether the relative foreign-bank response is concentrated in unsecured lending, with profitability heterogeneity examined as a supplementary extension.

3 Motivation, Data and Identification

3.1 Motivation and Conceptual Framework

Reciprocity plays a crucial role in limiting *cross-border leakages* and maintaining a *level playing field*. This is particularly important in closely interconnected banking systems, where regulatory differences can affect the allocation of credit across jurisdictions (Basel Committee on Banking Supervision, 2017). When capital requirements such as the CCyB apply unevenly across lenders competing for similar borrowers, banks subject to lower requirements may gain a regulatory competitive advantage. Aiyar et al. (2014) describe the resulting substitution towards less-regulated lenders as *"leakages"*, while Reinhardt and Sowerbutts (2015) emphasise the associated *"competitive advantage"*. Related concepts appear in the international banking literature. Houston et al. (2012) discuss a potential *"race to the bottom"* in regulatory standards, while Cerutti et al. (2017) document *"avoidance"* through increased cross-border borrowing following domestic macroprudential tightening. These concepts capture a common mechanism. Credit may migrate towards institutions facing relatively less stringent regulatory constraints.

The CCyB provides a useful setting to study this mechanism because the requirement is linked to the geographic location of banks' credit exposures. In the absence of reciprocity, an increase in the host-country CCyB raises the capital requirement of domestic banks without necessarily imposing an equivalent requirement on foreign banks lending into the same market. This creates a temporary regulatory wedge between lenders serving comparable borrowers and may generate incentives for credit to shift towards the relatively less constrained institutions. Reciprocity removes this wedge by requiring foreign banks to apply the host-country CCyB rate to their exposures in that jurisdiction. The gradual introduction of reciprocity therefore provides a setting in which to examine the emergence of regulatory leakages and whether they weaken as

capital requirements become more aligned across lenders.

The regulatory wedge may affect not only the allocation of credit across lenders, but also the composition of lending. The relevant mechanism operates through the amount of CET1 capital required to support risk-weighted assets. Under the Basel framework, the CCyB capital requirement for bank i is:

$$K_i^{\text{CCyB}} = \bar{b}_i \text{RWA}_i, \qquad \bar{b}_i = \sum_c \omega_{ic} b_{ic}, \qquad \omega_{ic} = \frac{Q_{ic}}{\sum_h Q_{ih}}, \tag{1}$$

K_i^{CCyB} denotes the amount of CET1 capital that bank i is required to hold to meet its countercyclical capital buffer requirement. RWA_i denotes bank i's total risk-weighted assets, Q_{ic} denotes the credit risk capital charge associated with its relevant private-sector exposures in countries c and Q_{ih} denotes the corresponding charge in jurisdiction h.[2] The denominator $\sum_h Q_{ih}$ sums these charges across all jurisdictions in which the bank has relevant exposures.[3] The term b_{ic} denotes the CCyB rate that bank i is required to apply to its exposures in jurisdiction c, taking account of the reciprocity arrangements applicable to that bank. The bank-specific buffer rate, $\bar{b}_i$, therefore reflects the geographic distribution of relevant credit risk charges, while the resulting capital requirement is calculated against total RWA.

Because $\bar{b}_i$ is an average across jurisdictions, the CET1 required for an additional loan in jurisdiction c is governed by the rate b_{ic} that applies to that exposure, not by $\bar{b}_i$. Our setting concerns loans to Norwegian and Swedish borrowers, so we define $c = N$ for the host market and $b_{N,t}$ for the host-country rate. For a domestic bank, the CCyB for an additional domestic loan is $b_{N,t}$. For a foreign bank, the CCyB rate for an additional cross-border loan in Norway/Sweden depends on the reciprocity arrangements, hence $b_{iN,t}$ lies between zero and $b_{N,t}$. Here, b_{dom} and b_{for} denote the CCyB rates applicable to domestic and foreign banks' host-market exposures, respectively. Thus, we define the wedge facing a foreign bank i as:

$$\Delta_{it} = b_{dom} - b_{for} = b_{N,t} - b_{iN,t} \;\geq\; 0, \tag{2}$$

which is zero for domestic banks and for foreign banks under full reciprocity.

[2]The institution-specific CCyB rate is determined by the geographic distribution of banks' relevant private-sector credit exposures. However, the resulting buffer requirement applies to total risk-weighted assets, encompassing credit, market and operational risk.

[3]The term ω_{ic} denotes the geographic weight assigned to jurisdiction c, measured as the share of bank i's total relevant private-sector credit risk capital charges attributable to that jurisdiction.

Furthermore, let RWA_{ic} denote the risk-weighted assets on the relevant private-sector exposures in c underlying Q_{ic}, with Q_{ic} proportional to RWA_{ic}. Let $RWA_i^{priv} = \sum_h RWA_{ih}$ and $RWA_i^{oth} = RWA_i - RWA_i^{priv}$. The term RWA_i^{priv} represents RWA associated with the bank's relevant private-sector exposures across jurisdictions, while RWA_i^{oth} captures all remaining RWA, including other credit, market and operational risk exposures.

Differentiating equation (1) gives:

$$\frac{\partial K_i^{CCyB}}{\partial\, RWA_{ic}} = b_{ic} + \frac{RWA_i^{oth}}{RWA_i^{priv}} \left(b_{ic} - \bar{b}_i\right), \tag{3}$$

which equals b_{ic} when RWA_i^{oth} is small or the bank's rate is the same across jurisdictions. A new loan j of amount L_j and risk weight w_j requires about $b_{iN,t}\, w_j L_j$ of CET1. The CET1 advantage of a foreign bank over a domestic bank on that loan is approximately:

$$(b_c - b_{ic})\, w_j L_j = \Delta_{ic}\, w_j L_j. \tag{4}$$

The advantage is the product of the wedge, which varies across banks and over time with the phase-in of reciprocity and the loan's risk-weighted amount.[4] Collateral affects the second factor, the risk weight. Under the standardised approach, recognised financial collateral reduces the exposure value, under internal ratings-based (IRB) approaches (IRBA), collateral lowers loss given default (LGD) and, through this, the risk weight. Let $\kappa = w_U - w_S$ denote the difference in risk weight between an unsecured and a secured loan to the same borrower, holding probability of default (PD) and maturity fixed. For loans of the same size L_j, the foreign bank's CET1 advantage on the unsecured loan exceeds that on the secured loan by $\Delta_{it}\, \kappa\, L_j$, which is positive if and only if $\kappa > 0$.[5] If lending responds to the capital charge, the foreign-domestic differential in tranche amounts should then be larger for unsecured loans.[6]

[4] We abstract from the second term, which is positive for a bank whose host-country rate exceeds its average rate.

[5] This requires that the collateral qualify for regulatory recognition, collateral that does not qualify leaves $\kappa = 0$.

[6] The mechanism operates through the amount of CET1 required, not through a higher CCyB rate applied specifically to unsecured lending. Across borrowers, unsecured status does not imply a higher risk weight, since risk weights also depend on creditworthiness and maturity. Moreover unsecured loans are often extended to stronger firms (Benmelech et al., 2022). We do not claim we can test the above mechanism because of data limitations. The loan-security indicator in DealScan unfortunately does not establish whether collateral is recognised for regulatory purposes. Moreover, we do not observe

Thus, exposures generating greater RWA require a larger amount of CET1 capital at the same buffer rate. Thus, a higher CCyB creates a larger additional capital burden per currency of unsecured lending. The bank can actively manage the amount of extra capital required by both changing the geographical composition of exposure and by changing the composition of the RWA. If equity capital is costly or scarce, the more affected bank may therefore have an incentive to charge more for, or reduce, high-RWA lending, favour loans benefiting from recognised collateral and/or leave more unsecured lending to banks facing a smaller buffer requirement. Thus, incomplete reciprocity can change both the allocation of lending across banks and the balance between secured and unsecured loans, which we document in the empirical analysis. Our results will show that a higher CCyB creates a larger additional capital burden per currency of unsecured lending. Domestic banks facing the higher requirement therefore have an incentive to reduce unsecured lending more strongly. Foreign banks facing a smaller requirement can maintain more of that lending.

Collateral provides a potential channel through which capital requirements may affect the composition of lending. Conditional on comparable borrower risk and other loan characteristics, eligible collateral can reduce regulatory capital requirements by lowering loss given default or the relevant exposure amount, depending on the regulatory approach. Consequently, unsecured lending may be more sensitive to increases in capital requirements than secured lending. Differences in lending responses across these segments may therefore support this mechanism, although recorded collateral does not necessarily qualify for regulatory recognition. An unsecured loan may therefore generate more RWA per unit of lending than a comparable loan benefiting from recognised collateral. A given CCyB rate would then imply a larger capital requirement for the unsecured exposure. The distinction concerns the amount of CET1 required, rather than a higher CCyB rate applied specifically to unsecured lending.[7]

The CCyB ranges from 0 to 2.5 per cent of RWA and must be met with CET1 capital. Increases are generally subject to at least six months' advance announcement, while releases can take immediate effect (European Parliament and Council, 2013). Mandatory reciprocity was intended to promote competitive neutrality by applying equivalent

loan-level RWA. Thus, the results are consistent with this capital-cost motivation.

[7]Unsecured status does not necessarily imply a higher risk weight across borrowers, since capital requirements also depend on borrower creditworthiness, maturity and the regulatory approach. Furthermore, the loan-security indicator does not establish whether collateral qualifies for regulatory recognition. The empirical results can therefore be interpreted as consistent with this capital-cost mechanism, rather than as direct evidence of differences in loan-level RWA or regulatory capital requirements.

capital requirements to comparable exposures across jurisdictions. However, during the Basel III transition, implementation differed across countries, with approximately half of Basel Committee members indicating that they would not accelerate the mandatory reciprocity arrangements (Basel Committee on Banking Supervision, 2017). This generated a temporary asymmetry in effective capital requirements.

Norway was the first country to announce a positive CCyB rate globally. Norges Bank announced the buffer in December 2013, with its assessment informed by developments in credit, house prices, commercial property prices and wholesale funding (Norges Bank, 2013). Sweden followed in September 2014, when Finansinspektionen announced a 1 per cent CCyB amid concerns surrounding high household indebtedness and accumulated housing-market vulnerabilities. The Swedish activation was therefore a forward-looking macroprudential measure rather than a response to inadequate bank capital. The evolution of the CCyB and selected macro-financial indicators for Norway and Sweden is reported in Figure A.1 in the Appendix.[8]

The preceding discussion motivates three testable hypotheses. First, incomplete reciprocity creates a relative capital-cost advantage for foreign banks not yet subject to equivalent host-country buffer requirements. This may allow these banks to expand lending, or contract it less, relative to domestic lenders:

H1: Following the CCyB announcement, foreign banks increase lending relative to domestic banks during the period of incomplete reciprocity.

Second, if otherwise comparable unsecured exposures generate more RWA than secured exposures benefiting from recognised collateral, the capital-cost advantage is greater in the unsecured segment:

H2: Conditional on borrower quality and maturity, the post-announcement foreign-domestic lending differential is larger for loans that carry more regulatory RWA per unit of lending. We use the unsecured status of the loan as a proxy for higher RWA density.

Third, banks' pre-policy profitability may influence their capacity and incentives to

[8]Figure A.1 illustrates the evolution of the CCyB and selected macro-financial indicators in Norway and Sweden. Both countries experienced elevated corporate indebtedness and overlapping periods of macroprudential tightening, with CCyB rates reaching 2.5% by 2019. Although their credit-to-GDP gaps followed different trajectories, both countries progressively increased their capital buffer requirements during the sample period. The relevance of this common regulatory environment for corporate lending is further supported by the substantial presence of cross-border banking institutions. In Norway, foreign-owned subsidiaries and foreign bank branches accounted for approximately 34% of corporate lending in June 2015 (Norges Bank, 2015). This substantial foreign-bank presence highlights the potential for regulatory differences to affect the allocation of credit across domestic and foreign lenders operating in the Norwegian and Swedish banking markets.

adjust lending following the regulatory change. Profitability can support internal capital generation, while weaker profitability may strengthen incentives to seek higher returns. These potentially opposing channels motivate a test of heterogeneity without imposing an unambiguous direction:

H3: The post-announcement foreign–domestic lending differential varies with banks' pre-policy profitability.

3.2 Data and Sample

Our sample consists of syndicated loans granted to Norwegian and Swedish non-financial firms by domestic (i.e. Norwegian and Swedish) banks and foreign (i.e. rest of the world) banks in the period 2010 to 2019. We extracted loan-level data from Dealscan and matched them with bank- and firm-level control data from S&P Global following Chava and Roberts (2008). Loan-level data covers facility amounts, syndicate shares, tenor maturity and security (Cerutti et al., 2015).[9] Information on the CCyB rates (announcement and implementation dates) is sourced from Norges Bank, Sveriges Riksbank, the European Systemic Risk Board (ESRB) database (European Systemic Risk Board, 2026) and the International Monetary Fund's (IMF) Integrated Macroprudential Policy (iMaPP) database (International Monetary Fund, 2025). Finally, country macroeconomic variables are obtained from the World Bank, the IMF and national statistical offices. The final sample consists of 38 banks and 889 loan tranches.

Syndicated loans are well suited to this setting to ensure that such exposures represent a considerable percentage of RWA when compared to other credit exposures. The facility active date is reported as the legal loan effective date. However, loan terms are typically negotiated well before this date. Thus, following the existing literature, we use the reported facility active date and backdate it by 90 days to approximate the contracting date. This adjustment accounts for approximately one month between the granting of the mandate and the start of syndication, followed by two months for the syndication and documentation process (Murfin, 2012; Giometti and Pietrosanti, 2022). We identify changes in lender and borrower names recorded in Dealscan between 2010 and 2019 and harmonise them to ensure that the same institution or firm is consistently identified over time. The sample is then filtered to retain Norway or Sweden as the recognised

[9]The all-in-drawn spread is omitted due to extensive missing values in the region and time frame of our research. This limits the ability to separate quantity adjustments from changes in loan pricing. If foreign banks passed on part of their regulatory advantage through lower spreads, some of the observed increase in tranche allocations may partly reflect borrowers responding to more favourable pricing.

operating country of the borrower. When multiple lead arrangers are present, the loan amount is divided proportionally across lead lenders following Giometti and Pietrosanti (2022).

Because missing tranche amounts had to be imputed, the sample is restricted to lead bank arrangers only. These lenders take primary responsibility for due diligence and borrower monitoring and serve as the primary channel through which regulatory constraints affect loan supply, consistent with existing literature (Chakraborty et al., 2018; Prilmeier, 2017; Schwert, 2018; Giometti and Pietrosanti, 2022; Ivashina, 2009). Lead lenders are classified following Bharath et al. (2011), using the *"Lead Arranger Credit"* field alongside role designations including *"Administrative agent"*, *"Agent"*, *"Lead arranger"*, *"Mandated Lead arranger"*, *"Arranger"* and *"Lead bank"*. Participants largely act as passive investors (Schwert, 2018). Tranche amounts per lender are computed using the aggregate tranche amount in USD, subsequently deflated to real terms using Consumer Price Index (CPI) data from the IMF.

We classify syndicated loan tranches into treated and control groups based on the geographic composition of their lead lenders prior to 12 December 2013 for Norway and Sweden. We classify loan tranches into two groups based on the geographic origin of their lead lenders. The treated group consists of tranches led predominantly by foreign banks (i.e., banks headquartered outside Norway and Sweden), while the control group consists of tranches led predominantly by Norwegian or Swedish banks. For tranches involving both domestic and foreign lead lenders, classification is based on the banking group with the highest cumulative lead share. Borrowers appearing in both groups are assigned to the group corresponding to the majority of their lenders' countries of origin.

3.3 Identification

Our identification strategy follows Khwaja and Mian (2008), exploiting variation in lending across banks to disentangle credit supply from borrower demand. We restrict the sample to borrowers obtaining credit from at least two lenders in both the pre- and post-announcement periods. In addition, syndicated loans provide a suitable setting for identifying credit-supply adjustments. First, syndicated loan structures provide a natural setting in which participant and lead arranger final shares primarily reflect supply-side adjustments. As Benincasa et al. (2022) demonstrate, final loan shares reflect supply shocks after the lead arranger negotiates initial terms with the borrower, meaning that variation in allocated amounts is driven by lender-side constraints rather than borrower demand. This identification logic is reinforced by Sufi (2007), who shows that lead

arrangers retain larger shares when information asymmetry is high, consistent with supply-side rationing rather than demand-driven allocation. Further supporting this, Ivashina and Scharfstein (2010) document that lead banks hold back shares when facing supply constraints during periods of stress. These particular syndicated loan market features imply that, even without borrower fixed effects, variation in allocated tranche amounts across lenders within the same deal largely reflects differences in credit supply rather than differences in borrower demand. The common borrower restriction requires each borrower to have at least two contemporaneous lenders, which reduces the available sample. To improve comparability between foreign and domestic banks, we additionally implement Propensity Score Matching (PSM) following Caliendo and Kopeinig (2008), based on banks' pre-policy CET1 capital ratios. This yields a matched sample of 92 bank-year observations. Matching on pre-policy CET1 improves comparability in initial capitalisation, which may affect banks' responses to higher buffer requirements. It is a supplementary step identification rests primarily on the lender-level comparison within the common-borrower sample, rather than on matching.[10]

We also follow the identification strategy of Khwaja and Mian (2008) and we construct an approximation of the Khwaja and Mian (KM) sample. This includes only borrowers which obtained credit from at least two lenders in both the pre- and post-announcement periods, ensuring that all borrowers in the *KM sample* are observed in both periods. Observing the same borrower across at least two lenders (within the same group) allows demand-side shocks to be differenced out, since any differential change in lending across lenders for the same borrower reflects credit supply rather than demand. Without this restriction, a post-announcement decline in loan size is observationally equivalent to a reduction in borrower demand. This restriction mitigates demand-side confounds by ensuring borrowers are not exclusively reliant on a single lender type. As an additional robustness check, the sample is expanded to include borrowers not satisfying the common borrower restriction, i.e. those without two contemporaneous lenders in both periods. The coefficient of interest remains positive and statistically significant, consistent with the KM sample results.

[10]The matching procedure and associated balance diagnostics are illustrated in Figure A.2 with further details reported in the Appendix.

4 Empirical Analysis

The empirical analysis proceeds in several steps. We first estimate a DiD model to assess how the regulatory asymmetry created by the phased introduction of CCyB reciprocity affects the log loan tranche amount supplied by foreign banks relative to domestic banks following the first positive CCyB announcement. We then investigate two channels through which this response may operate. First, we distinguish between secured and unsecured lending to examine whether the regulatory asymmetry affects not only the volume but also the risk composition of credit. Second, we examine heterogeneity by banks' pre-policy profitability to assess whether the lending response is concentrated among financially weaker foreign banks, which may have stronger incentives to adjust their risk-taking when facing a regulatory advantage. In the baseline analysis, the CCyB policy is proxied by a time indicator equal to one from the first positive CCyB announcement on 12 December 2013 onwards. We complement the baseline analysis with an event-study specification to trace the evolution of the foreign-bank lending differential over the phase-in of reciprocity. Finally, we conduct a series of robustness tests, including replacing the baseline treatment indicator with a continuous measure of the effective CCyB rate. The variable is constructed by first calculating the simple average of the announced CCyB rates for Norway and Sweden in each year. The resulting average CCyB rate is then multiplied by the minimum phase-in requirement faced by foreign lenders, yielding the effective CCyB rate in percentage terms.[11]

The analysis relies on cross-sectional differences in pre-policy exposure between two groups of banks, foreign banks and domestic banks. Following the logic of Khwaja and Mian (2008), the sample is restricted to borrowers borrowing from at least two lenders, allowing lending behaviour to be compared across lenders exposed to the same borrower demand conditions. As a robustness check, we also unrestrict the sample to all borrowers. Foreign lenders originate from jurisdictions with different capital requirements, supervisory frameworks and reciprocity arrangements. Foreign-bank status therefore does not imply a uniform regulatory environment or an absence of capital constraints. The relevant distinction is their exposure to the host-country CCyB requirement during incomplete reciprocity, rather than the overall stringency of their home-country regulation. The common-borrower approach improves comparability by examining lenders serving the same borrowers, but does not eliminate lender-side regulatory heterogeneity. Accordingly, we interpret the estimated foreign–domestic

[11] Refer to Table A.5 for an explanation of how the effective CCyB rate is calculated.

differential as an average response across heterogeneous foreign lenders, consistent with the regulatory-wedge mechanism rather than a direct estimate of each bank's capital-cost advantage. Equation 5 is used to estimate the baseline treatment effect and to assess the identifying assumptions underlying the DiD framework. The baseline DiD model is given by:

$$\log(L_{k,r,l,t}) = \alpha + \text{Foreign Bank}_k + \text{Time}_t + \beta_0 \left(\text{Foreign Bank}_k \times \text{Time}_t\right) + \beta_1 \mathbf{X}_t + \beta_2 X_{k,t} + \beta_3 X_{r,t} + \beta_4 X_{l,t} + \theta_j + \epsilon_{k,r,l,t} \quad (5)$$

where $L_{k,r,l,t}$ refers to the allocated loan tranche amount in USD by lender k to borrower r for loan facility l at time t, $\text{Foreign Bank}_k = 1$ if bank k is treated and 0 otherwise and $\text{Time}_t = 1$, referring to the *Post First Announcement* variable, for periods on and after the announcement date (12th December 2013). We control for macroeconomic fluctuations that may have coincided with the announcement of the first positive CCyB rate, where $X = \{X_{s,t}, X_{n,t}, X_{f,t}\}$. In particular, $X_{s,t}$ and $X_{n,t}$ capture time-varying macroeconomic characteristics of Sweden and Norway, respectively, while $X_{f,t}$ captures corresponding macroeconomic conditions in the foreign lender's home country. They include policy interest rates for both Norway and Sweden as proxies for monetary policies, the main foreign exchange rates (e.g. SEK/EUR), the location of the borrower and an indicator of other macroprudential policies implemented by both countries (net of any CCyB actions). $X_{f,t}$ controls for other macroeconomic variables, not captured by $X_{s,t}$ and $X_{n,t}$, respectively, which relate to the macroeconomic environment of the lender/treated group country. In particular, we include a banking crisis indicator, using the Banking-Crisis Intervention Database by Metrick and Schmelzing (2026). For each period t, the indicator is increased by one for each foreign lender home country classified as experiencing a banking crisis, so that it measures the number of foreign-bank home countries in crisis at that point in time. Another important control is a dummy to identify whether a foreign country is primarily following CRD IV and Basel III as an EU or European Economic Area (EEA) member or just Basel III as a Basel Committee on Banking Supervision (BCBS) member country. $X_{k,t}$ control for bank related variables mainly the net profit margin and bank leverage. $X_{r,t}$ is used to control for borrower characteristics mainly total equity, earnings before interest and tax (EBIT) and current ratio. $X_{l,t}$ captures whether a loan is secured or not. θ_j denotes the use of

fixed effects and $\epsilon_{i,t}$ refers to the error term.[12] The coefficient of primary interest, β_0, captures the differential response of foreign banks relative to domestic banks following the CCyB reciprocity announcement. A positive and significant β_0 would indicate that foreign lenders expanded credit more aggressively, or contracted it less, relative to their domestic counterparts, consistent with potential macroprudential regulatory advantage. Heteroskedasticity-Consistent 2 (HC2) Clustered-Robust 2 (CR2) standard errors (SEs) are used, clustered at the bank level (treatment level), where the HC2 bias-reduction correction is applied at the cluster rather than observation level.[13] Equation 5 is re-run to analyse the impact of CCyB reciprocity on the unsecured and secured lending channels.

We further investigate the impact of the CCyB policy looking at asymmetric changes in loan amount given secured vs. unsecured lending. Equation 5 is then estimated separately in two mutually exclusive subsamples defined by the loan security indicator in Dealscan. These include unsecured facilities (*Secured Lending* = *No*) and secured facilities (*Secured Lending* = *Yes*). This split allows the baseline DiD interaction term, *Post First Announcement* × *Foreign Bank* to be estimated separately for each lending channel. This tests whether the response of foreign lenders to the CCyB reciprocity announcement differs across collateralised and uncollateralised credit.

Equation 7 is subsequently re-estimated on the secured and unsecured lending subsamples separately, to assess whether the differential year-group effects for foreign lenders are driven by a particular lending channel. Further, we explore more carefully if the results are driven by bank profitability. We apply an augmented triple DiD specification where we interact that baseline previous DiD term with a binary indicator of bank-level financial strength, measured over the pre-policy window (2010–2013), yielding the following augmented model:

[12] θ_j denotes the fixed effects included in each specification, with j used as a placeholder for alternative structures considered throughout the analysis, such as borrower-industry and, in some specifications, time fixed effects. Bank fixed effects are excluded from the baseline because they are collinear with the lender-level *Foreign Bank* indicator. Borrower fixed effects are also not included, as most borrowers do not switch foreign-bank status over the sample period and, given the small Norwegian and Swedish syndicated loan market, their inclusion would substantially reduce the estimation sample and statistical power. Time fixed effects are excluded because the treatment is defined around a single announcement date, 12 December 2013, making year fixed effects highly collinear with the post-announcement indicator, especially given the limited number of tranche-level observations per year and group.

[13] Following de Chaisemartin and d'Haultfoeuille (2026), CR2 retains very good coverage even when the number of treated or control groups falls well below 40. In the Appendix several results are also presented using HC2 SE (unclustered) all of which confirm the results shown in the next section.

$$\begin{aligned}\log(L_{k,r,l,t}) = \alpha + \text{Foreign Bank}_k + \text{Time}_t + \text{High Bank Metric}_k \\ + \beta_0 \left(\text{Foreign Bank}_k \times \text{Time}_t\right) + \beta_1 \left(\text{Foreign Bank}_k \times \text{High Bank Metric}_k\right) \\ + \beta_2 \left(\text{Time}_t \times \text{High Bank Metric}_k\right) + \beta_3 \left(\text{Foreign Bank}_k \times \text{Time}_t \times \text{High Bank Metric}_k\right) \\ + \beta_4 \mathbf{X} + \beta_5 X_{k,t} + \beta_6 X_{r,t} + \beta_7 X_{l,t} + \theta_j + \epsilon_{k,r,l,t} \quad (6)\end{aligned}$$

where *High Bank Metric*$_k$ is a time-invariant indicator equal to one if bank k exceeds the sample mean of the relevant profitability measure computed over 2010–2013 and zero otherwise. All remaining terms are as defined in Equation 5. We apply two proxies for bank-level profitability. One uses the *return on assets* (ROA), defined as the average pre-policy ROA of bank k over 2010–2013, with *High ROA Bank*$_k$ = $\mathbf{1}[\overline{\text{ROA}}_{k,\,2010\text{–}2013} > \text{mean}]$. In the robustness tests, this is replaced with the *net profit margin*, constructed analogously as *High Profit Bank*$_k$ = $\mathbf{1}[\overline{\text{NPM}}_{k,\,2010\text{–}2013} > \text{mean}]$. In both cases the indicator is fixed at its pre-policy value to ensure that the triple interaction cleanly identifies heterogeneity in the treatment effect attributable to pre-existing bank characteristics rather than endogenous post-announcement adjustments. The coefficient of primary interest, β_3, captures the difference in the post foreign-domestic differential across profitability groups. A positive and significant β_3 would indicate that profitable foreign lenders expanded credit more aggressively, or contracted it less, relative to their lower-profitability counterparts. This follows the bank balance sheet channel in the transmission of macroprudential policy. These specifications are estimated separately for the unsecured and secured subsamples, allowing heterogeneity to operate differentially across lending channels.

To test whether year-group effects evolved differentially across foreign and domestic lenders and as a robustness test, we also implement an event study framework. Specifically, Time$_t$ is replaced by a set of two-year group indicators $\mathbf{1}[G_t = g]$ for $g \in \{2010\text{–}2011,\ 2014\text{–}2015,\ 2016\text{–}2017,\ 2018\text{–}2019\}$, with 2012–2013 serving as the base period, yielding:

$$\log(L_{k,r,l,t}) = \alpha + \text{Foreign Bank}_k + \sum_{g \neq 2012\text{–}2013} \gamma_g \cdot \mathbf{1}[G_t = g] + \sum_{g \neq 2012\text{–}2013} \beta_{0,g} \left(\text{Foreign Bank}_k \times \mathbf{1}[G_t = g]\right) + \beta_1 \mathbf{X} + \beta_2 X_{k,t} + \beta_3 X_{r,t} + \beta_4 X_{l,t} + \theta_j + \epsilon_{k,r,l,t} \quad (7)$$

where γ_g captures the average within-period deviation in $\log(L_{k,r,l,t})$ relative to the base period and $\beta_{0,g}$ identifies the differential effect for foreign lenders in each year group. The coefficients of primary interest, $\beta_{0,g}$, capture the differential response of foreign banks relative to domestic banks in each year group, compared with the omitted 2012–2013 base period. A positive and significant $\beta_{0,g}$ in the post-announcement periods would indicate that foreign lenders increased loan tranche amounts more strongly, or contracted them less, than domestic lenders relative to the pre-announcement differential, consistent with a regulatory advantage arising from incomplete CCyB reciprocity. The coefficient for 2010–2011 provides a pre-treatment comparison and is used to assess whether foreign and domestic lenders exhibited differential trends prior to the announcement. All remaining notation follows Equation 5.

5 Results

5.1 Regulatory Competitive Advantage

We start by presenting the pre-trend specifications and tests to assess whether foreign and domestic banks exhibited similar lending trends prior to the first positive CCyB announcement. This test provides support for the parallel-trends assumption underlying the DiD framework. The pre-trend specifications are estimated over 2010–2013, interacting year dummies with the treatment indicator across four control structures. Table 1 presents the pre-trend specifications. As reported in Table 1, all year-interaction dummies preceding the CCyB announcement are individually statistically insignificant, showing that the regulatory event is not anticipated in the loan amount trend. The result is confirmed by the joint Wald test (Table 2) and the parallel trend test (Figure 1). We fail to reject the null hypothesis.

Table 1: Pre-trend Analysis

	Dependent variable: Log(Loan Tranche Amount)			
	(1)	(2)	(3)	(4)
Constant	3.404*** (0.278)	3.480*** (0.396)	3.651*** (0.510)	3.986*** (0.962)
2010	0.507** (0.209)	0.351* (0.205)	0.377 (0.303)	0.037 (0.241)
2011	0.431 (0.349)	0.341 (0.366)	0.039 (0.329)	0.038 (0.475)
2012	0.260 (0.227)	0.142 (0.237)	−0.174 (0.216)	−1.029** (0.434)
Foreign Bank	0.023 (0.318)	−0.108 (0.313)	−0.168 (0.278)	−0.341 (0.335)
2010 × Foreign Bank	−0.429 (0.285)	−0.282 (0.322)	−0.095 (0.257)	0.011 (0.365)
2011 × Foreign Bank	−0.339 (0.480)	−0.245 (0.515)	−0.014 (0.495)	0.659 (0.560)
2012 × Foreign Bank	−0.018 (0.434)	0.218 (0.598)	0.324 (0.842)	0.213 (1.557)
		Borrower Controls		
Current Ratio				−0.040 (0.096)
log(EBIT)				−0.045 (0.093)
log(Total Equity)				0.018 (0.126)
		Bank Controls		
Net Profit Margin		0.330 (0.424)	−0.005 (0.569)	−0.023 (0.713)
Leverage Ratio		0.004 (0.016)	−0.003 (0.017)	0.007 (0.017)
		Loan Control		
Secured		−0.117 (0.133)	0.034 (0.134)	−0.192 (0.273)
Industry FE	✗	✗	✓	✓
Borrower Controls	✗	✗	✗	✓
Bank Controls	✗	✓	✓	✓
Loan Controls	✗	✓	✓	✓
Observations	365	348	348	242
R^2	0.035	0.043	0.214	0.331

Notes: The table reports pre-trend regressions of the log loan tranche amount on year indicators, a foreign-bank indicator and their interactions over the pre-announcement period 2010–2013, using the full sample. The omitted year is 2013. The coefficients on *Year × Foreign Bank* test whether lending by foreign and domestic banks evolved differently prior to the first positive CCyB announcement on 12 December 2013. Column (1) reports the unconditional specification; Column (2) adds bank and loan controls; Column (3) additionally includes industry fixed effects; and Column (4) further includes borrower controls. Macroeconomic controls are omitted because they are collinear with the year indicators. Standard errors, reported in parentheses, are CR2-BM clustered at the bank level. Results are robust to CR0, CR1 and CR1S standard errors and to excluding observations falling between the Norwegian and Swedish first CCyB announcements. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table 2: Wald Test for Pre-Trend Interaction Terms

Test	F-statistic	DoF (Numerator)	DoF (Denominator)	p-value
HTZ	0.294	3	2.54	0.83

Notes: The table reports the HTZ Wald test for the pre-trend specification reported in Column (4) of Table 1. The null hypothesis is that all pre-period *Year × Foreign Bank* interaction terms are jointly equal to zero. Failure to reject the null provides support for the parallel-trends assumption underlying the DiD analysis.

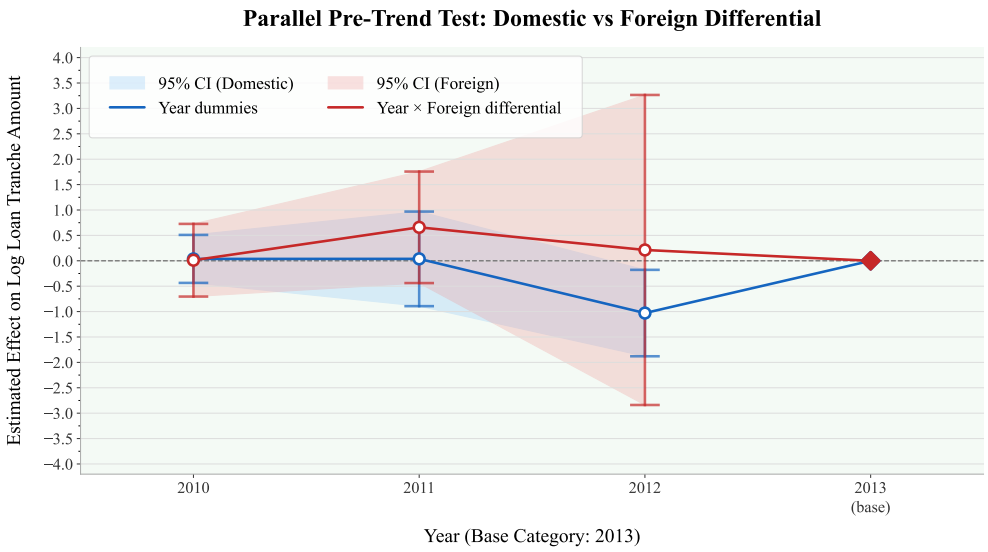


Figure 1: Parallel Pre-Trends: Domestic and Foreign Banks

Notes: The figure reports the pre-trend estimates from Specification (4) of Table 1 over the 2010–2013 pre-announcement period. The blue series plots the year coefficients for domestic banks relative to the omitted base year, 2013, while the red series plots the corresponding *Year* × *Foreign Bank* interaction coefficients, capturing the differential evolution of lending by foreign banks relative to domestic banks. The shaded areas and error bars report 95% confidence intervals. The 2013 coefficients are normalised to zero. The absence of statistically significant pre-announcement interaction coefficients provides support for the parallel-trends assumption.

To examine the dynamics of the lending response around the policy change, we complement the baseline DiD with an event-study specification in which the treatment effect is allowed to vary across two-year periods, with 2012–2013 serving as the omitted base period. Figure 2 reports the resulting *Foreign Bank* × *Year Group* interaction coefficients. The pre-announcement estimate for 2010–2011 is statistically indistinguishable from zero, providing support for the absence of differential pre-trends. Following the first CCyB announcement, the differential becomes positive and statistically significant, peaking in 2014–2015 and remaining positive through 2018–2019. The subsequent decline in the magnitude of the coefficient is consistent with the progressive phase-in of reciprocity reducing the initial regulatory advantage of foreign lenders.[14]

[14]The full event-study regression results (Table 8) are presented in the Robustness section.

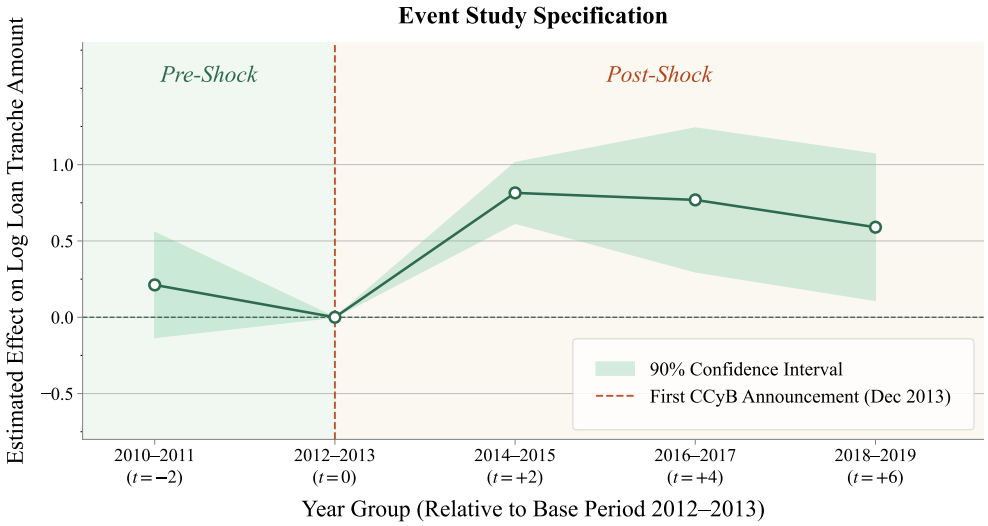


Figure 2: Event-Study Estimates

Notes: The figure reports the event study estimates from Specification (3) of Table 8, showing the *Year Group* × *Foreign Bank* interaction coefficients over the period 2010–2019. The omitted base period is 2012–2013, which is normalised to zero. Each coefficient measures the differential change in log loan tranche amounts supplied by foreign banks relative to domestic banks in the corresponding two-year period, compared with the 2012–2013 base period. The shaded bands report 90% confidence intervals. The vertical dashed line marks the first positive CCyB announcement in December 2013, separating the pre-announcement and post-announcement periods. Positive post-announcement coefficients indicate that foreign banks increased lending more, or reduced lending less, than domestic banks relative to the pre-announcement differential. Specification (3) includes industry fixed effects and borrower, bank, loan and macroeconomic controls. Confidence intervals are based on CR2-BM standard errors clustered at the bank level.

Next, looking at the full time period and full sample of banks and borrowers, we observe the relation between the log loan amount of deals in Norway and Sweden and the continuous effective CCyB rate in those countries (Table 3). We find that increases in the CCyB are associated with a reduction in syndicated loan tranche amounts, with the effective CCyB announcement variable returning a negative and statistically significant coefficient across three of four specifications. As regulators raise the CCyB, lenders face tighter capital requirements, which constrains their capacity to extend credit and leads to smaller loan allocations. This is consistent with the broader empirical literature (Auer et al., 2022; Chen and Friedrich, 2023; Gropp et al., 2019; Bedayo and Galán, 2024; Cerutti et al., 2017). The pre-trend results and these preliminary results lead to the following DiD analysis based on a clear identification of the credit supply impact of CCyB.

Table 3: Relation between CCyB rate and loan tranche amount, 2010–2019

	Dependent variable: Log(Loan Tranche Amount)			
	KM Sample		*Full Sample*	
	(1)	(2)	(3)	(4)
	CR2 SE	*HC2 SE*	*CR2 SE*	*HC2 SE*
Constant	0.913 (2.267)	0.913 (2.187)	2.551*** (0.616)	2.897*** (1.087)
Effective CCyB Announcement	−0.157** (0.065)	−0.157** (0.073)	−0.068** (0.029)	−0.087 (0.053)
		Borrower Controls		
log(Total Equity)	0.196* (0.119)	0.196*** (0.065)	0.204*** (0.034)	
Current Ratio	−0.196*** (0.075)	−0.196** (0.077)	−0.116*** (0.037)	
log(EBIT)	−0.059 (0.149)	−0.059 (0.081)	−0.081 (0.059)	
		Macroeconomic Controls		
Banking Crisis (lender-country level)	−0.053 (0.056)	−0.053 (0.113)	−0.003 (0.034)	−0.086 (0.095)
Other Macroprudential Policies (Sweden)	−0.056 (0.081)	−0.056 (0.137)	−0.002 (0.059)	−0.075 (0.051)
Other Macroprudential Policies (Norway)	0.008 (0.098)	0.008 (0.091)	0.099** (0.041)	0.301*** (0.046)
Policy Rate (Norway, country level)				0.776*** (0.106)
Gross Fixed Capital Formation (Norway)	−0.029* (0.017)	−0.029 (0.038)	0.021 (0.014)	0.060*** (0.012)
Real Exchange Rate (USD-SEK)	0.020 (0.021)	0.020 (0.020)	0.0003 (0.006)	0.002 (0.011)
Gross Fixed Capital Formation (Sweden)	−0.021 (0.044)	−0.021 (0.075)	0.018 (0.030)	−0.005 (0.022)
		Bank Controls		
Net Profit Margin	0.800*** (0.251)	0.800*** (0.260)	0.522* (0.267)	0.405* (0.213)
Leverage Ratio	−0.001 (0.009)	−0.001 (0.010)	0.012 (0.011)	−0.009 (0.009)
		Loan Controls		
Secured	0.256*** (0.093)	0.256** (0.118)	−0.169 (0.228)	−0.384*** (0.088)
Industry FE	✓	✓	✓	✓
Borrower Controls	✓	✓	✓	✗
Bank Controls	✓	✓	✓	✓
Loan Controls	✓	✓	✓	✓
Macroeconomic Controls	✓	✓	✓	✓
Observations	277	277	641	821
R^2	0.341	0.341	0.177	0.093

Notes: The KM sample follows Khwaja and Mian (2008) and restricts the analysis to borrowers observed with at least two lenders in both the pre- and post-announcement periods. The effective CCyB announcement measure captures the applicable CCyB rate after accounting for the gradual phase-in of reciprocity. This rate does not take into account the announcement period before 2016 due to the same effective rate during the announcement period; see Table A.5 for details. Columns (1) and (3) report CR2-BM standard errors clustered at the bank level, while Columns (2) and (4) report HC2 robust standard errors. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table 4 reports the results of Equation 5 of the loan amount regressed on *Post First Announcement* × *Foreign Bank* with the inclusion of controls and fixed effects. Columns (1)–(2) use the KM sample, while Columns (3)–(4) use the full sample. All specifications include industry fixed effects and bank, loan and macroeconomic controls. Columns (2) and (4) additionally include borrower controls. Across all specifications, the post-announcement coefficient is negative and statistically significant, indicating a decline in loan tranche amounts among domestic banks. However, looking at the

differential impact on foreign vs domestic credit, the interaction terms are positive and statistically significant. This result indicates that the first positive CCyB announcement by Norway is associated with a relative increase in cross-border loan tranche amounts by foreign banks compared to domestic banks.

The estimated differential is economically sizeable. In the preferred specification in Column (2) of Table 4, the interaction coefficient of 0.351 implies that the foreign-bank post/pre lending multiplier is approximately 42.0% larger than the domestic-bank multiplier. The corresponding estimate in the full sample with borrower controls is 48.3%. These estimates describe relative changes in allocated loan tranche amounts, conditional on the included controls, rather than increases of the same magnitude in aggregate cross-border lending. Although macroprudential tightening is generally expected to restrain credit, the observed positive association with larger loan sizes for foreign banks is supported both theoretically and empirically, primarily through the regulatory competitive advantage channel.[15]

During the first four years of implementation, the mandatory reciprocity feature was allowed to be introduced in host jurisdictions in increments. This could have generated a funding advantage for foreign banks undertaking cross-border lending, which is supported by the above results. Empirically, several studies support the regulatory advantage channels. The funding advantage can be passed to the borrowers in the form of higher lending (Aiyar et al., 2014; Reinhardt and Sowerbutts, 2015). Aiyar et al. (2014) show that foreign bank branches expand lending in response to regulation-induced contractions by domestically regulated banks. Chen and Friedrich (2023) show that large banks are able to shield a substantial part of their foreign activity through internal reallocation. Multinational banks have a larger investor base and are able to raise capital more easily than local banks (Reinhardt and Sowerbutts, 2015).

[15]To control for the potential that cross-border lending may be affected by the voluntary reciprocity of other macroprudential policies by *foreign* jurisdictions, this variable is interacted with the *"Foreign"* dummy. This is shown in the models presented in Section 5.1 in the Appendix. The interaction term is statistically insignificant, suggesting that voluntary reciprocity of other macroprudential policies do not drive the results.

Table 4: Baseline Regression Results

	Dependent variable: Log(Loan Tranche Amount)			
	KM Sample		*Full Sample*	
	No Borrower Controls	*With Borrower Controls*	*No Borrower Controls*	*With Borrower Controls*
	(1)	(2)	(3)	(4)
Constant	6.472*** (1.624)	5.127** (2.018)	6.791*** (1.582)	8.661*** (1.673)
Post Announcement	−0.786*** (0.276)	−0.559*** (0.174)	−1.012*** (0.150)	−0.960*** (0.189)
Foreign Bank	−0.200 (0.146)	−0.197 (0.170)	−0.254** (0.118)	−0.336** (0.132)
Post Announcement × Foreign Bank	0.336** (0.137)	0.351** (0.151)	0.377** (0.176)	0.394** (0.165)
Borrower Controls				
Current Ratio		−0.157*** (0.057)		−0.096** (0.041)
log(EBIT)		−0.008 (0.159)		−0.076 (0.056)
log(Total Equity)		0.136 (0.122)		0.183*** (0.034)
Macroeconomic Controls				
Banking Crisis (Lender-Country Level)	−0.117** (0.048)	−0.095*** (0.029)	−0.105*** (0.028)	−0.033 (0.031)
Other Macroprudential Policies (Sweden)	0.089 (0.074)	0.046 (0.061)	0.009 (0.033)	0.154** (0.063)
Other Macroprudential Policies (Norway)	0.315*** (0.066)	0.279*** (0.056)	0.334*** (0.055)	0.325*** (0.040)
Policy Rate (Norway, Country Level)	0.719*** (0.102)	0.648*** (0.081)	0.506*** (0.180)	0.501** (0.201)
Gross Fixed Capital Formation (Norway, Country Level)	0.052*** (0.015)	0.041** (0.016)	0.070*** (0.019)	0.081*** (0.013)
Real Exchange Rate (USD-SEK, Country Level)	−0.034** (0.014)	−0.029 (0.020)	−0.029** (0.014)	−0.061*** (0.016)
Gross Fixed Capital Formation (Sweden, Country Level)	0.071 (0.049)	0.072* (0.043)	0.029 (0.032)	0.095*** (0.025)
Bank Controls				
Net Profit Margin	0.617*** (0.229)	0.546*** (0.199)	0.398 (0.272)	0.365** (0.185)
Leverage Ratio	−0.005 (0.006)	0.002 (0.007)	−0.005 (0.011)	0.009 (0.010)
Loan Controls				
Secured	−0.177 (0.161)	0.135 (0.089)	−0.324*** (0.120)	−0.169 (0.185)
Time FE	✗	✗	✗	✗
Industry FE	✓	✓	✓	✓
Borrower Controls	✗	✓	✗	✓
Bank Controls	✓	✓	✓	✓
Loan Controls	✓	✓	✓	✓
Macroeconomic Controls	✓	✓	✓	✓
Observations	299	277	821	641
R^2	0.313	0.411	0.125	0.255

Notes: Post Announcement equals one for observations following the first positive CCyB announcement and zero otherwise, while *Foreign Bank* identifies lenders headquartered outside Norway and Sweden. The KM sample follows Khwaja and Mian (2008) and restricts the analysis to borrowers observed with at least two lenders in both the pre- and post-announcement periods. All specifications include industry fixed effects, bank controls, loan controls and macroeconomic controls; Columns (2) and (4) additionally include borrower controls. CR2-BM standard errors are clustered at the bank level. Results are robust to CR0, CR1 and CR1S clustered standard errors and to excluding the 8.34% of observations corresponding to the delay between Norway's and Sweden's first announcements. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

5.2 CCyB and Loan Collateralisation

Collateralisation is an economically meaningful dimension of loan risk because pledged assets provide a potential source of recovery following default, reducing loss severity for otherwise comparable exposures. Luck and Santos (2024) find that collateral lowers borrowing costs when comparing loans from the same bank to the same borrower at the same origination date. Where collateral qualifies for regulatory recognition, it may also reduce RWA and the associated CCyB capital requirement, as discussed in Section 3.1. In European syndicated lending, Godlewski and Olszak (2025) find that tighter macroprudential policy is associated with greater collateralisation, supporting its relevance as a margin of contractual adjustment.

Nevertheless, collateralisation does not unambiguously rank overall credit risk. Benmelech et al. (2022) show that weaker firms are more likely to issue secured debt,

while Sufi (2007) highlights the role of lead-arranger monitoring in syndicated lending. We therefore interpret unsecured status as indicating less collateral-based protection, rather than necessarily higher borrower default probability. Our results capture changes in this dimension of credit composition without directly establishing higher expected losses or systemic risk. We therefore introduce in our analysis information on the level of collateralisation of the loans pre and post event, as a proxy for the riskiness profile of the loans.[16]

Following the announcement, foreign banks do not systematically change the likelihood that a loan is secured. This is indicated by the non-significant DiD interaction coefficient in the binary model reported in Table A.20. The full sample triple-interaction specification further shows a negative and marginally significant *Post* × *Foreign* × *Secured* coefficient, indicating a weaker foreign-bank response for secured loans; see Table A.21 in the Appendix.

We next examine whether the response of foreign banks differs according to loan collateralisation. Table 5 re-estimates the baseline DiD specification separately for unsecured and secured loans. Looking first at the post-announcement coefficients, domestic banks experience a statistically significant decline in unsecured lending, as shown by the negative *Post First Announcement* coefficient in Columns (1) and (2). By contrast, the corresponding coefficient for secured lending is positive and statistically significant in Column (4). Following the CCyB announcement, domestic banks exhibit a significant decline in unsecured loan tranche amounts, while secured tranche amounts increase. These findings suggest adjustments in lending amounts within each segment rather than direct portfolio reallocation, as the probability of collateralisation does not change significantly (Table A.20). However, concurrent sectoral shocks, particularly the 2014–2016 oil-price decline, may have contributed to these differences, given Norwegian banks' exposure to the oil and gas sector. Such a response is consistent with the portfolio-rebalancing channel documented by Juelsrud and Wold (2020). Banks facing higher risk-weighted capital requirements adjust by reducing the average riskiness of their assets rather than relying primarily on new equity issuance. In our setting, the

[16]Throughout this section, we use a Dealscan dummy indicating whether the loan is secured. Following Mueller et al. (2025), we also attempted to assess syndicated loans' collateralised loan obligation (CLO) eligibility as an alternative proxy, since CLO eligibility speaks more directly to whether the loan could be securitised or otherwise transferred off the originating bank's balance sheet. This distinction matters because, if domestic banks originate loans but subsequently securitise them, they no longer need to hold capital against those exposures. In that case, the regulatory constraint is circumvented not by foreign banks expanding lending, but by domestic banks offloading risk through the securities market. However, the London Stock Exchange Group (LSEG) LoanConnector database does not identify the originator bank and borrower associated with a particular CLO.

shift towards secured lending is consistent with domestic banks reducing their exposure to relatively riskier credit as capital requirements tighten.

Foreign banks exhibit a different response. The *Post First Announcement* × *Foreign Bank* interaction is positive and statistically significant for unsecured lending in Columns (1) and (2), but statistically insignificant for secured lending in Columns (3) and (4). Thus, the differential foreign-bank response is concentrated in the unsecured segment.[17] The unsecured-lending differential is particularly substantial. The interaction coefficient of 0.616 in Column (1) of Table 5 implies a foreign-bank post/pre lending multiplier approximately 85.2% larger than that of domestic banks. Holding other regressors fixed, the domestic post-announcement coefficient of -1.048 implies a decline of approximately 64.9%, while the combined implies a decline of approximately 35.1%. The relative foreign-bank expansion therefore reflects a smaller contraction in unsecured lending, rather than an absolute increase. These magnitudes indicate a substantial difference in adjustment across lenders, although they do not directly quantify the aggregate amount of credit reallocated between them.

5.3 Loan Collateralisation and Bank Profitability

The results above raise a natural question: which banks account for the relative increase in unsecured lending after the CCyB announcement? Low-profitability banks may have stronger incentives to increase risk-taking because weaker franchise value reduces the cost of distress and increases the attractiveness of higher-yield, riskier assets. However, the ability to act on this incentive should differ across domestic and foreign banks after the CCyB announcement. Domestic banks face the tighter capital requirement directly and may therefore be constrained from expanding riskier unsecured lending, whereas foreign banks remain relatively less constrained while reciprocity is incomplete. The combination of stronger risk-taking incentives and a temporary regulatory advantage therefore suggests that the increase in unsecured lending should be concentrated among low-profitability foreign banks. In the franchise value framework, banks with weaker profitability have less to lose from distress and therefore choose higher optimal levels of risk. To examine whether bank profitability moderates this effect, Table 6 augments Table 5 with triple interaction terms between the post-announcement indicator, the

[17] Unsecured lending offers less collateral-based protection than otherwise comparable secured lending, but does not necessarily involve borrowers with higher default probabilities. Since we do not observe defaults,

realised losses or subsequent loan performance, this finding indicates a change in credit composition rather than direct evidence of increased overall credit risk or systemic risk.

Table 5: Baseline Regression Results by Loan Collateralisation

	Dependent variable: Log(Loan Tranche Amount)	
	Secured Lending = No	*Secured Lending = Yes*
	(1)	(2)
Constant	4.980*** (1.453)	0.534 (3.287)
Post First Announcement	−1.048*** (0.378)	0.734*** (0.265)
Foreign Bank	−0.406 (0.276)	0.204 (0.351)
Post First Announcement × Foreign Bank	0.616** (0.255)	−0.318 (0.381)
Borrower Controls		
log(EBIT)	−0.056 (0.139)	−0.123 (0.093)
log(Total Equity)	0.241* (0.133)	0.152*** (0.054)
Current Ratio	−0.142*** (0.049)	0.050 (0.050)
Bank Controls		
Net Profit Margin	0.050 (0.213)	−0.081 (0.271)
Leverage Ratio	0.004 (0.019)	0.012 (0.012)
Macroeconomic Controls		
Banking Crisis (Lender-Country Level)	0.045 (0.102)	−0.017 (0.043)
Other Macroprudential Policies (Sweden)	0.204 (0.139)	−0.103 (0.100)
Other Macroprudential Policies (Norway)	0.088 (0.081)	0.384*** (0.098)
Policy Rate (Norway)	−0.107 (0.301)	1.285*** (0.161)
Gross Fixed Capital Formation (Norway)	0.022 (0.018)	0.051 (0.034)
Real Exchange Rate (USD-SEK)	−0.015 (0.017)	−0.003 (0.025)
Gross Fixed Capital Formation (Sweden)	−0.036 (0.041)	0.077** (0.037)
Time FE	✗	✗
Industry FE	✓	✓
Borrower Controls	✓	✓
Bank Controls	✓	✓
Macroeconomic Controls	✓	✓
Observations	430	211
R^2	0.521	0.654

Notes: The table reports baseline DiD estimates separately for unsecured and secured loan tranches. *Post First Announcement* equals one for observations following the first positive CCyB announcement and zero otherwise, while *Foreign Bank* identifies lenders headquartered outside Norway and Sweden. The coefficient on *Post First Announcement × Foreign Bank* captures the post-announcement foreign–domestic lending differential within each collateralisation subsample. Column (1) reports results for unsecured lending, while Column (2) reports results for secured lending. Both specifications include industry fixed effects and borrower, bank and macroeconomic controls. CR2-BM standard errors clustered at the bank level are reported in parentheses. Results are robust to excluding the 8.34% of observations corresponding to the delay between Norway's and Sweden's first announcements. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

foreign bank dummy and indicators for high-return-on-assets (ROA) and high-profit-margin banks (robustness test) respectively. This follows Equation 6.

The results suggest that profitability matters primarily for the response of unsecured lending. Among low-ROA banks, domestic banks reduce unsecured lending following the CCyB announcement, while foreign banks contract significantly less. As a result, the estimated foreign–domestic lending differential shifts from −16.5 per cent before the announcement to +28.4 per cent afterwards (Figure 3). The positive post-announcement estimate therefore does not imply that low-ROA foreign banks increase unsecured lending over time; rather, it reflects their smaller contraction relative to comparable domestic banks. The pattern is markedly weaker among high-ROA banks. Their post-announcement foreign–domestic differential is close to zero (−0.3 per cent), compared with −25.5 per cent before the announcement. A similar pattern is obtained when profitability is measured by net profit margin. The post-announcement foreign–domestic differential is approximately +27.4 per cent among low-profit-margin banks and close to zero (−0.1 per cent) among high-profit-margin banks.[18] These results indicate that the positive post-announcement foreign-bank differential in unsecured lending is concentrated among low-profitability banks. However, the triple interaction terms, *Post* × *Foreign* × *High ROA Bank* and *Post* × *Foreign* × *High Profit Bank*, are statistically insignificant. We therefore cannot conclude that the foreign-bank response differs significantly between low- and high-profitability banks. A statistically significant foreign–domestic differential among low-profitability banks, alongside an insignificant differential among high-profitability banks, does not itself establish that the two groups differ significantly. The triple-interaction estimates provide the relevant test of this difference. Accordingly, we interpret the marginal effects as a suggestive pattern rather than conclusive evidence that profitability moderates the lending response.

The results are considerably weaker for secured lending. Table 6 shows that the *Post First Announcement* × *Foreign Bank* coefficient is statistically insignificant under both profitability measures and the corresponding triple interactions with ROA and net profit margin are also statistically insignificant.[19] Although the marginal effects point to a negative post-announcement foreign–domestic differential among low-profitability banks of approximately −32.6% using ROA and −32.4% using net profit margin, these

[18] Refer to Figure 4 as a robustness test.

[19] Pre-trend results for secured lending are reported in Tables A.24 and A.25, whilst the HonestDiD sensitivity analysis in Figure A.6. The pre-treatment interaction terms are jointly insignificant ($F = 1.56$, $p = 0.545$). However, for secured lending the HonestDiD confidence interval includes zero even under the baseline specification.

estimates do not represent declines in foreign banks' secured lending over time. Given the statistical insignificance of the underlying interaction terms, there is no robust evidence that foreign and domestic banks adjust secured lending differently according to profitability. Overall, the results point to a clearer reallocation in the unsecured-lending segment. Low-profitability domestic banks contract unsecured lending more strongly, while comparable foreign banks contract less. This generates a positive foreign–domestic differential after the CCyB announcement. By contrast, the secured-lending results do not provide statistically robust evidence of differential adjustment by bank profitability.

Table 6: Triple DiD Regression Results

	Dependent variable: Log(Loan Tranche Amount)			
	Secured Lending = No		*Secured Lending = Yes*	
	(1)	(2)	(3)	(4)
Constant	3.227*** (0.214)	3.250*** (0.221)	3.122*** (0.255)	3.164*** (0.312)
Post First Announcement	−0.895*** (0.065)	−0.887*** (0.091)	−0.068 (0.281)	−0.106 (0.275)
Foreign Bank	−0.180* (0.096)	−0.176* (0.096)	−0.046 (0.360)	−0.058 (0.334)
Post First Announcement × Foreign	0.430*** (0.108)	0.419*** (0.102)	−0.348 (0.342)	−0.334 (0.318)
	Bank Heterogeneity			
High ROA Bank	0.222*** (0.040)		0.032 (0.062)	
Post First Announcement × High ROA Bank	0.164** (0.083)		−0.447 (0.512)	
Foreign × High ROA Bank	−0.114 (0.280)		0.494* (0.256)	
Post First Announcement × Foreign × High ROA Bank	−0.139 (0.258)		−0.691 (0.908)	
High Profit Bank		0.222*** (0.038)		−0.003 (0.050)
Post First Announcement × High Profit Bank		0.160 (0.103)		−0.417 (0.571)
Foreign × High Profit Bank		−0.115 (0.279)		0.554** (0.271)
Post First Announcement × Foreign × High Profit Bank		−0.128 (0.263)		−0.746 (0.940)
	Borrower Controls			
Log(EBIT)	−0.133** (0.060)	−0.133** (0.061)	−0.124 (0.139)	−0.117 (0.133)
Log(Total Equity)	0.254*** (0.032)	0.251*** (0.032)	0.168* (0.098)	0.160* (0.094)
Current Ratio	−0.157*** (0.029)	−0.158*** (0.029)	0.059 (0.066)	0.059 (0.066)
	Macroeconomic Controls			
Other Macroprudential Policies (Sweden)	0.185*** (0.063)	0.187*** (0.062)	−0.220 (0.134)	−0.216 (0.133)
Other Macroprudential Policies (Norway)	0.246*** (0.045)	0.243*** (0.045)	0.260*** (0.065)	0.271*** (0.067)
Gross Fixed Capital Formation (Norway)	0.060*** (0.009)	0.060*** (0.009)	−0.038 (0.024)	−0.037 (0.023)
Borrower Controls	✓	✓	✓	✓
Macroeconomic Controls	✓	✓	✓	✓
Bank Heterogeneity (ROA)	✓	✗	✓	✗
Bank Heterogeneity (Net Profit Margin)	✗	✓	✗	✓
Observations	461	461	216	216
R^2	0.371	0.371	0.249	0.249

Notes: The table reports triple DiD estimates of the effect of the first positive CCyB announcement on the log loan tranche amount, separately for unsecured loans in Columns (1)–(2) and secured loans in Columns (3)–(4). Bank profitability is measured using *High ROA Bank* in Columns (1) and (3) and *High Profit Bank* in Columns (2) and (4). The triple interaction *Post First Announcement × Foreign × High Profitability Bank* captures whether the post-announcement foreign–domestic lending differential varies with bank profitability. CR2-BM standard errors clustered at the bank level are reported in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

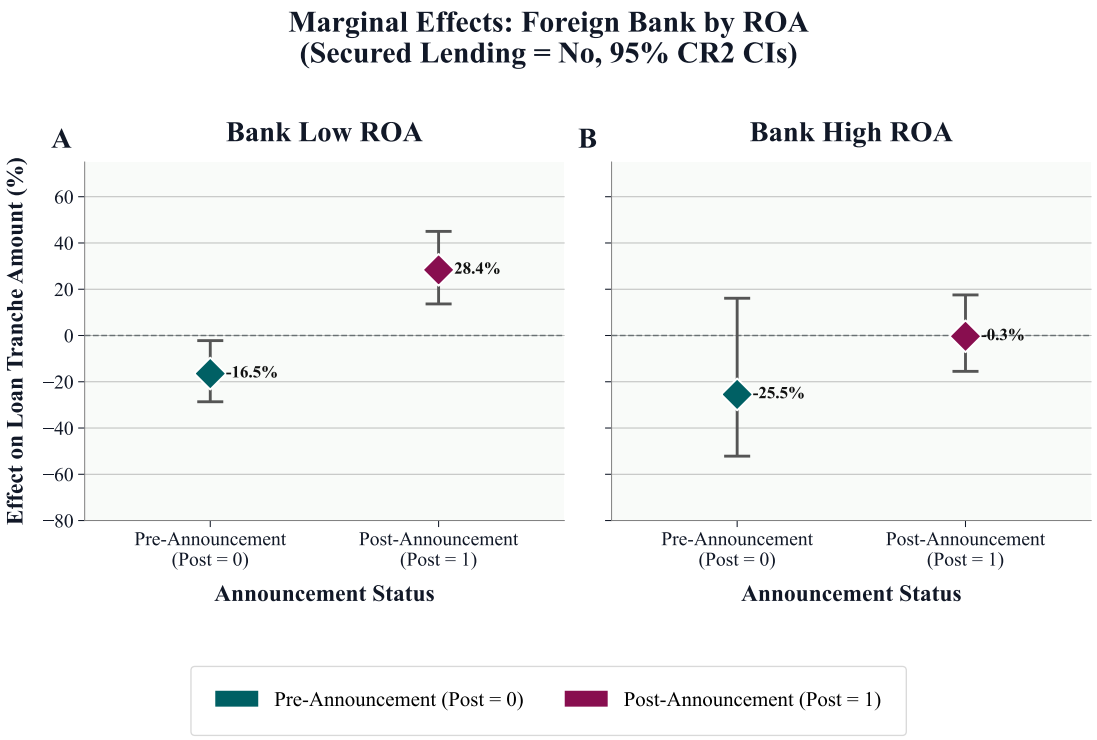


Figure 3: Marginal Effects for Unsecured Lending by Bank ROA

Notes: The figure reports the marginal effect of *Foreign Bank* relative to domestic banks for unsecured lending, separately for low- and high-ROA banks before and after the CCyB announcement. Bars indicate 95% CR2 confidence intervals.

6 Robustness Tests

We conduct several robustness checks to assess the sensitivity of our baseline results. First, we replace our treatment dummy variable with the effective CCyB as a continuous measure.[20] This specification allows the estimated effect to vary with the intensity of the CCyB tightening rather than treating the entire post-2013 period as a uniform treatment.[21] Across all four specifications in Table 7, the coefficient on *Average CCyB Announcement* × *Foreign Bank* is positive and statistically significant, consistent with the baseline results.

[20] Refer to Table A.5 in Appendix for a detailed explanation.

[21] The CRD IV Directive entered into force on 1 January 2014, overlapping with Norway's and Sweden's CCyB announcements. The observed lending differential may therefore partly reflect concurrent regulatory changes rather than the CCyB alone (European Parliament and Council, 2013).

Table 7: Continuous CCyB Rate Results

	Dependent variable: Log(Loan Tranche Amount)			
	Full Sample			
	Without Macro Controls		*With Macro Controls*	
	(1)	(2)	(3)	(4)
	HC2 SE	*CR2 SE*	*HC2 SE*	*CR2 SE*
Constant	2.669*** (0.279)	2.669*** (0.279)	22.027*** (5.889)	22.027*** (6.240)
Average CCyB Announcement	−0.108 (0.067)	−0.108** (0.053)	−1.372*** (0.421)	−1.372*** (0.435)
Foreign	−0.336*** (0.116)	−0.336** (0.130)	−0.267** (0.131)	−0.267** (0.136)
Average CCyB Announcement × Foreign Bank	0.228*** (0.080)	0.228*** (0.084)	0.180** (0.085)	0.180** (0.088)
	Borrower Controls			
Current Ratio	−0.113*** (0.026)	−0.113*** (0.041)	−0.104*** (0.028)	−0.104** (0.042)
log(EBIT)	−0.070 (0.048)	−0.070 (0.070)	−0.114** (0.052)	−0.114* (0.062)
log(Total Equity)	0.213*** (0.040)	0.213*** (0.040)	0.223*** (0.041)	0.223*** (0.039)
	Bank Controls			
Net Profit Margin	0.520*** (0.189)	0.520* (0.269)	0.308* (0.185)	0.308* (0.167)
Leverage Ratio	0.013 (0.010)	0.013 (0.012)	0.010 (0.009)	0.010 (0.010)
	Macroeconomic Controls			
Banking Crisis (Lender-Country Level)			0.014 (0.030)	0.014 (0.027)
Other Macroprudential Policies (Sweden)			0.356*** (0.096)	0.356*** (0.106)
Other Macroprudential Policies (Norway)			0.398*** (0.064)	0.398*** (0.053)
Policy Rate (Norway, Country Level)			0.270 (0.177)	0.270 (0.245)
Gross Fixed Capital Formation (Norway)			0.132*** (0.030)	0.132*** (0.031)
Real Exchange Rate (USD-SEK)			−0.181*** (0.052)	−0.181*** (0.056)
Gross Fixed Capital Formation (Sweden)			0.076*** (0.026)	0.076*** (0.022)
	Loan Controls			
Secured	−0.165* (0.087)	−0.165 (0.175)	−0.210** (0.106)	−0.210 (0.189)
Time FE	✗	✗	✗	✗
Industry FE	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
Borrower Controls	✓	✓	✓	✓
Macroeconomic Controls	✗	✗	✓	✓
Loan Controls	✓	✓	✓	✓
Observations	641	641	641	641
R^2	0.180	0.180	0.237	0.237

Notes: The table reports estimates using the average announced CCyB rate as a continuous treatment measure. The coefficient on *Average CCyB Announcement* × *Foreign Bank* captures the differential response of foreign banks relative to domestic banks as the CCyB rate increases. Columns (1)–(2) exclude macroeconomic controls, while Columns (3)–(4) include them. HC2 and CR2-BM standard errors are reported in parentheses, with CR2-BM standard errors clustered at the bank level. See Table A.5 for the construction of *Average CCyB Announcement*. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Next, we present the results of the event study approach, following Equation 7, which allows us to comment on the phased introduction of mandatory reciprocity. Table 8 reports the results on the full sample, with and without macro control variables and with different estimation of standard errors. The post-announcement foreign–domestic lending differential is positive across all specifications, although statistical significance varies across columns and periods. When focusing on specifications (3) and (4) of Table 8, the strongest differential is in 2014–2015, followed by 2016–2017, consistent with the phased introduction of mandatory reciprocity. The effect weakens in 2018–2019, suggesting the regulatory advantage diminished as reciprocity requirements approached their ceiling.[22] Standard errors overlap across all three post-announcement groups, suggesting that the magnitude may not differ greatly between periods.[23]

Table 9 examines whether the lending differential is concentrated in secured or unsecured credit. The results show that the foreign-lender effect is driven mainly by the unsecured sample (in columns 1 and 2). For unsecured lending, shown in Table 9, the interaction terms remain positive and significant in 2014–2015, 2016–2017 and 2018–2019, although the coefficient declines over time. By contrast, the secured sample shows no statistically significant foreign-lender interaction in any post-announcement period. This suggests that while reciprocity may reduce the aggregate lending differential by 2018–2019, it does not fully eliminate the compositional distortion toward unsecured lending. In policy terms, reciprocity appears to be consistent with a persistent compositional differential in unsecured lending.

[22] As a robustness check, we extend the event study sample to 2024. The extended model confirms that the 2014–2015 effect is the cleanest result. We exclude the post-2019 period from the main analysis because identification becomes difficult. The sample is thin, the period coincides with the COVID-19 shock and the release of the CCyB in Norway and Sweden. Surviving deals also appear to be concentrated among large borrowers served by foreign banks, raising concerns about confounding and selection bias.

[23] A Wald test (HTZ, CR2) jointly evaluating the post-shock interactions of specification 2 yields F = 11.100 (df = 3/4.08, p = 0.020*), confirming that foreign banks experienced systematically larger loan tranche amounts than domestic banks following the first CCyB announcement (Table A.19).

Table 8: Event Study: Estimates of Year Group Effects, 2010–2019

	Dependent variable: Log(Loan Tranche Amount)			
	Full Sample			
	Without Macro Controls		*With Macro Controls*	
	(1)	(2)	(3)	(4)
	CR2 SE	*HC2 SE*	*CR2 SE*	*HC2 SE*
Constant	2.741*** (0.291)	2.741*** (0.299)	2.956*** (0.275)	2.956*** (0.306)
	Year Group Effects (Base: 2012–2013)			
2010–2011	0.146 (0.149)	0.146 (0.191)	0.176 (0.215)	0.176 (0.209)
2014–2015	−0.244 (0.153)	−0.244 (0.200)	−0.523*** (0.160)	−0.523** (0.226)
2016–2017	−0.490*** (0.188)	−0.490** (0.199)	−0.787*** (0.231)	−0.787*** (0.213)
2018–2019	0.233 (0.172)	0.233 (0.221)	−0.132 (0.178)	−0.132 (0.228)
	Year Group × Foreign Lender Interactions (Base: 2012–2013)			
2010–2011 × Foreign	−0.073 (0.175)	−0.073 (0.239)	0.212 (0.210)	0.212 (0.262)
2014–2015 × Foreign	0.604*** (0.129)	0.604** (0.242)	0.815*** (0.121)	0.815*** (0.249)
2016–2017 × Foreign	0.526** (0.222)	0.526** (0.248)	0.769*** (0.287)	0.769*** (0.260)
2018–2019 × Foreign	0.365* (0.214)	0.365 (0.259)	0.590** (0.292)	0.590** (0.271)
Foreign Lender	−0.481*** (0.096)	−0.481** (0.196)	−0.724*** (0.150)	−0.724*** (0.214)
	Borrower Controls			
log(Total Equity)	0.152*** (0.029)	0.152*** (0.024)	0.145*** (0.028)	0.145*** (0.024)
Current Ratio	−0.049*** (0.017)	−0.049*** (0.014)	−0.046*** (0.014)	−0.046*** (0.014)
	Macroeconomic Controls			
Other Macroprudential Policies (Norway)			0.172*** (0.049)	0.172*** (0.046)
Other Macroprudential Policies (Sweden)			0.069 (0.093)	0.069 (0.057)
Gross Fixed Capital Formation (Norway)			0.027** (0.013)	0.027** (0.013)
	Bank Controls			
Net Profit Margin	0.400* (0.240)	0.400* (0.211)	0.368** (0.171)	0.368* (0.218)
Leverage Ratio	0.013 (0.010)	0.013 (0.010)	0.013 (0.010)	0.013 (0.010)
	Loan Controls			
Secured	−0.199 (0.165)	−0.199** (0.095)	−0.244 (0.183)	−0.244** (0.099)
Industry FE	✓	✓	✓	✓
Borrower Controls	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
Loan Controls	✓	✓	✓	✓
Macroeconomic Controls	✗	✗	✓	✓
Observations	698	698	698	698
R^2	0.206	0.206	0.217	0.217

Notes: The table reports event-study estimates across two-year periods, with 2012–2013 as the reference period. The interactions *Year Group* × *Foreign Lender* capture the foreign–domestic lending differential relative to the base period. Columns (1)–(2) exclude macroeconomic controls, while Columns (3)–(4) include them. CR2-BM and HC2 standard errors are reported in parentheses. Results are robust to excluding the 8.34% of observations corresponding to the delay between Norway's and Sweden's first CCyB announcements. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table 9: Event Study: DiD Regression Results by Secured Lending Sample

	Dependent variable: Log(Loan Tranche Amount)	
Model	*Secured Lending = No*	*Secured Lending = Yes*
	(1)	(2)
Constant	3.401*** (0.726)	1.802*** (0.349)
	Year Group Effects	
2010–2011	−0.831*** (0.138)	1.171*** (0.365)
2014–2015	−1.211*** (0.232)	1.206*** (0.409)
2016–2017	−0.829*** (0.167)	0.540* (0.292)
2018–2019	−0.633*** (0.216)	0.972*** (0.196)
	Treatment	
Foreign Bank	−0.892*** (0.255)	0.595 (0.469)
	Foreign Bank × Year Group Interactions	
Foreign Bank × 2010–2011	0.459 (0.397)	−0.432 (0.489)
Foreign Bank × 2014–2015	1.184*** (0.305)	−0.852 (0.563)
Foreign Bank × 2016–2017	0.744** (0.324)	−0.538 (0.400)
Foreign Bank × 2018–2019	0.676** (0.330)	−0.391 (0.392)
	Borrower Controls	
Log(EBIT)	−0.005 (0.143)	−0.174 (0.135)
Log(Total Equity)	0.190 (0.125)	0.202** (0.081)
Current Ratio	−0.148*** (0.051)	0.017 (0.063)
	Bank Controls	
Net Profit Margin	0.046 (0.244)	0.078 (0.467)
Leverage Ratio	0.017 (0.016)	0.013 (0.010)
Industry FE	✓	✓
Borrower Controls	✓	✓
Bank Controls	✓	✓
Observations	430	211
R^2	0.508	0.638
Adjusted R^2	0.467	0.593

Notes: The table reports event-study estimates separately for unsecured loans in Column (1) and secured loans in Column (2), with 2012–2013 as the reference period. The interactions *Foreign Bank × Year Group* capture the foreign–domestic lending differential in each period relative to the base period. Columns report CR2-BM standard errors clustered at the bank level. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Using net profit margin as the profitability proxy yields a similar descriptive pattern. The estimated post-announcement foreign–domestic differential is +27.4 per cent among low-profit-margin banks and approximately zero (−0.1 per cent) among high-profit-margin banks. Given the statistically insignificant triple interaction, this pattern should be interpreted as suggestive rather than as evidence of significant heterogeneity.

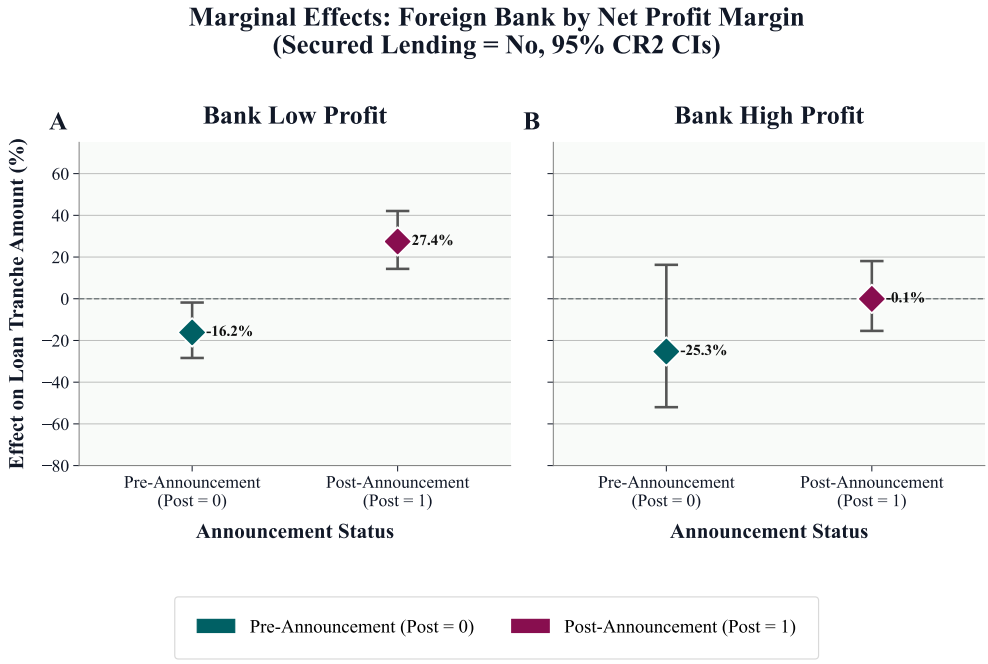


Figure 4: Unsecured Lending by Bank Profitability

Notes: The figure reports the marginal effects of foreign-bank status on unsecured loan tranche amounts before and after the first positive CCyB announcement, separately for banks with low and high pre-policy net profit margins. Panel A reports estimates for low-profitability banks, while Panel B reports estimates for high-profitability banks. Banks are classified according to their pre-policy net profit margin. The diamonds show the estimated marginal effects, expressed in percentage terms and the vertical bars report 95% confidence intervals based on CR2-BM standard errors clustered at the bank level. The pre-announcement period corresponds to *Post* = 0 and the post-announcement period to *Post* = 1. Estimates are obtained from the triple-interaction specification between *Post First Announcement, Foreign Bank* and bank profitability.

7 Concluding Remarks

This paper studies how temporary regulatory asymmetries affect the allocation and composition of credit in an integrated banking market. We exploit the introduction of the CCyB in Norway and the gradual implementation of reciprocity across jurisdictions, which temporarily created different effective capital requirements for banks competing for similar borrowers. Using syndicated loan data for non-financial firms in Norway and Sweden over 2010–2019, we compare the lending responses of domestic and foreign

banks within a DiD framework.

We find that foreign banks exhibit a more positive lending response than domestic banks following the first positive CCyB announcement, generating a positive foreign–domestic lending differential while reciprocity remains incomplete. This result is also supported when the treatment is measured using the effective CCyB rate. Importantly, the differential response is concentrated in unsecured lending, while we find no statistically significant foreign–domestic differential in secured lending. Temporary regulatory asymmetries therefore affect not only which banks supply credit, but also the composition of the credit supplied. These findings are consistent with a relative reallocation towards unsecured lending, which offers less collateral-based protection than otherwise comparable secured exposures. However, we do not directly observe borrower default risk, realised losses or subsequent loan performance. The results therefore identify a change in the contractual composition of credit, rather than establish an increase in overall credit risk or systemic risk.

The profitability results provide more suggestive evidence. Among low-profitability banks, domestic lenders reduce unsecured lending more strongly following the announcement, while comparable foreign banks respond less negatively. This generates a positive foreign–domestic differential in unsecured lending in the post-announcement period. By contrast, the corresponding differential is close to zero among high-profitability banks. However, the triple-interaction estimates do not establish statistically significant differences in the foreign-bank response across profitability groups.

These findings have implications for the design of CCyB reciprocity. When banks face different effective capital requirements, relatively less constrained lenders may partly offset the contraction in lending by more constrained institutions. Our results underscore that temporary regulatory asymmetries not only affect the allocation of credit across lenders but are concentrated in unsecured credit, suggesting a change in risk composition. Mandatory reciprocity is intended to reduce such regulatory asymmetries (Basel Committee on Banking Supervision, 2010b,a). More generally, the results suggest that the effectiveness of macroprudential regulation should be assessed not only through its effect on aggregate credit volumes, but also through how credit and risk are reallocated across lenders and loan types.

References

Aiyar, S., Calomiris, C. W., and Wieladek, T. (2014). Does macro-prudential regulation leak? Evidence from a UK policy experiment. *Journal of Money, Credit and Banking*, 46(s1):181–214.

Auer, R., Matyunina, A., and Ongena, S. (2022). The countercyclical capital buffer and the composition of bank lending. *Journal of Financial Intermediation*, 52:100965.

Basel Committee on Banking Supervision (2010a). Basel III: A global regulatory framework for more resilient banks and banking systems. Technical report, Bank for International Settlements, Basel.

Basel Committee on Banking Supervision (2010b). Guidance for national authorities operating the countercyclical capital buffer. Technical report, Bank for International Settlements, Basel.

Basel Committee on Banking Supervision (2017). Range of practices in implementing the countercyclical capital buffer policy. Consultative document, Bank for International Settlements, Basel.

Bedayo, M. and Galán, J. (2024). The impact of the countercyclical capital buffer on credit: Evidence from its accumulation and release before and during COVID-19. *Banco de España Working Paper*.

Behn, M., Haselmann, R., and Wachtel, P. (2016). Procyclical capital regulation and lending. *The Journal of Finance*, 71(2):919–956.

Benincasa, E., Kabas, G., and Ongena, S. (2022). There is no planet B, but for banks there are countries B to Z: Domestic climate policy and cross-border bank lending. Swiss Finance Institute Research Paper Series 22-28, Swiss Finance Institute.

Benmelech, E., Kumar, N., and Rajan, R. (2022). The secured credit premium and the issuance of secured debt. *Journal of Financial Economics*, 146(1):143–171.

Bharath, S. T., Dahiya, S., Saunders, A., and Srinivasan, A. (2011). Lending relationships and loan contract terms. *The Review of Financial Studies*, 24(4):1141–1203.

Bridges, J., Gregory, D., Nielsen, M., Pezzini, S., Radia, A., and Spaltro, M. (2014). The impact of capital requirements on bank lending. Working Paper 486, Bank of England.

Caliendo, M. and Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22(1):31–72.

Cao, J., Dinger, V., Grodecka-Messi, A., Juelsrud, R., and Zhang, X. (2021). The interaction between macroprudential and monetary policies: The cases of Norway and Sweden. *Review of International Economics*, 29(1):87–116.

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

Cerutti, E., Hale, G., and Minoiu, C. (2015). Financial crises and the composition of cross-border lending. *Journal of International Money and Finance*, 52:60–81.

Chakraborty, I., Goldstein, I., and MacKinlay, A. (2018). Housing price booms and crowding-out effects in bank lending. *The Review of Financial Studies*, 31(7):2806–2853.

Chava, S. and Roberts, M. R. (2008). How does financing impact investment? The role of debt covenants. *The Journal of Finance*, 63(5):2085–2121.

Chen, D. X. and Friedrich, C. (2023). The countercyclical capital buffer and international bank lending: Evidence from Canada. *Journal of International Money and Finance*, 139:102962.

Damar, H. E. and Mordel, A. (2017). International banking and cross-border effects of regulation: Lessons from Canada. *International Journal of Central Banking*, 13(S1):35–64.

de Chaisemartin, C. and d'Haultfoeuille, X. (2026). Is inference conditional on not rejecting a pre-test less reliable than unconditional inference? Working Papers hal-05598141, HAL.

European Parliament and Council (2013). Directive 2013/36/EU on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD IV). Official Journal of the European Union, L 176/338.

European Systemic Risk Board (2026). Capital conservation buffer. European Systemic Risk Board. Available at: https://www.esrb.europa.eu/national_policy/capital/html/index.en.html.

Farelius, D. and Billborn, J. (2016). Macroprudential policy in the Nordic-Baltic countries. *Sveriges Riksbank Economic Review*, (1).

FSB Regional Consultative Group for Europe (2016). Nordic experience of cooperation on cross-border regulation and crisis resolution. Technical report, Financial Stability Board.

Giometti, M. and Pietrosanti, S. (2022). Bank specialization and the design of loan contracts. SSRN Working Paper 4470135.

Godlewski, C. J. and Olszak, M. (2025). Macroprudential policy and corporate loans: Evidence from the syndicated loan market. *Journal of International Financial Markets, Institutions and Money*, 104:102223.

Gropp, R., Mosk, T., Ongena, S., and Wix, C. (2019). Banks response to higher capital requirements: Evidence from a quasi-natural experiment. *The Review of Financial Studies*, 32(1):266–299.

Houston, J. F., Lin, C., and Ma, Y. (2012). Regulatory arbitrage and international bank flows. *Journal of Finance*, 67(5):1845–1895.

Imbierowicz, B., Loeffler, A., Ongena, S., and Vogel, U. (2026). How CCyBs travel – internal capital markets & domestic borrowing. Discussion Paper 12/2026, Deutsche Bundesbank.

International Monetary Fund (2025). iMaPP Database. Available at: https://www.elibrary-areaer.imf.org/Macroprudential/Pages/iMaPPDatabase.aspx.

Ivashina, V. (2009). Asymmetric information effects on loan spreads. *Journal of financial Economics*, 92(2):300–319.

Ivashina, V. and Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, 97(3):319–338.

Jiménez, G., Ongena, S., Peydró, J.-L., and Saurina, J. (2017). Macroprudential policy, countercyclical bank capital buffers, and credit supply: Evidence from the spanish dynamic provisioning experiments. *Journal of Political Economy*, 125(6):2126–2177.

Juelsrud, R. E. and Wold, E. G. (2020). Risk-weighted capital requirements and portfolio rebalancing. *Journal of Financial Intermediation*, 41:100857.

Khwaja, A. I. and Mian, A. (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review*, 98(4):1413–1442.

Luck, S. and Santos, J. A. C. (2024). The valuation of collateral in bank lending. *Journal of Financial and Quantitative Analysis*, 59(5):2038–2067.

Metrick, A. and Schmelzing, P. (2026). Banking-crisis interventions across time and space. *The Review of Financial Studies*, 39(4):1054–1076.

Mueller, I., Nguyen, H., and Nguyen, T. (2025). Carbon transition risk and corporate loan securitization. *Journal of Financial Intermediation*, 63:101146.

Murfin, J. (2012). The supply-side determinants of loan contract strictness. *The Journal of Finance*, 67(5):1565–1601.

Norges Bank (2013). Criteria for an appropriate countercyclical capital buffer. Norges Bank Papers 1/2013, Norges Bank.

Norges Bank (2015). Financial stability report 2015. Technical report, Norges Bank, Oslo. Table 2, p. 46.

Prilmeier, R. (2017). Why do loans contain covenants? evidence from lending relationships. *Journal of Financial Economics*, 123(3):558–579.

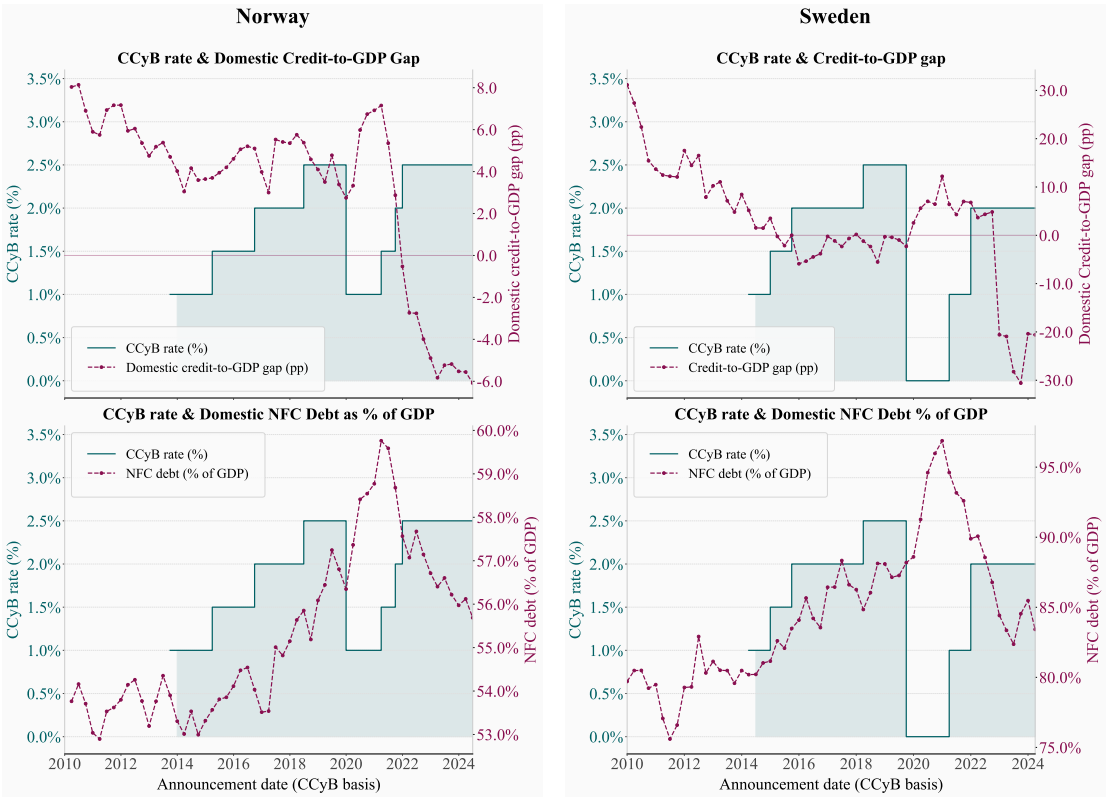
Reinhardt, D. and Sowerbutts, R. (2015). Regulatory arbitrage in action: Evidence from banking flows and macroprudential policy. Working Paper 546, Bank of England.

Schwert, M. (2018). Bank capital and lending relationships. *The Journal of Finance*, 73(2):787–830.

Sufi, A. (2007). Information asymmetry and financing arrangements: Evidence from syndicated loans. *Journal of Finance*, 62(2):629–668.

A Appendix

A.1 CCyB Dynamics in Norway and Sweden



(a) Norway (b) Sweden

Figure A.1: CCyB Indicators: Norway and Sweden

Notes: The figure reports the evolution of the CCyB rate and selected macro-financial indicators for Norway and Sweden. The upper panels plot the CCyB rate with the domestic credit-to-GDP gap, while the lower panels plot the CCyB rate with the domestic non-financial corporate (NFC) debt as a percentage of GDP. CCyB rates are shown according to their announcement dates. Panel (a) reports the indicators for Norway and Panel (b) for Sweden.

Source: Norges Bank and ESRB (CCyB rates), ECB (credit-to-GDP gap), Eurostat and ECB Quarterly Sector Accounts (macroeconomic series).

A.2 Matching Approach, Variables Used and Descriptive Statistics

Propensity Score Matching (PSM) is implemented following Caliendo and Kopeinig (2008) to construct a matched sample of foreign and domestic banks. Propensity scores are estimated using a logistic regression of foreign-bank status on banks' CET1

capital ratios, averaged over the pre-policy period prior to 12 December 2013. CET1 is the key regulatory capital variable through which the CCyB operates. One-to-one nearest-neighbour matching is then applied, with replacement, yielding a balanced matched sample of 92 bank-year observations, comprising 46 treated and 46 control observations. Figure A.2 illustrates the distribution of propensity scores, common support and post-matching balance between treated and control observations. The corresponding propensity-score estimation results and additional matching diagnostics are reported below.

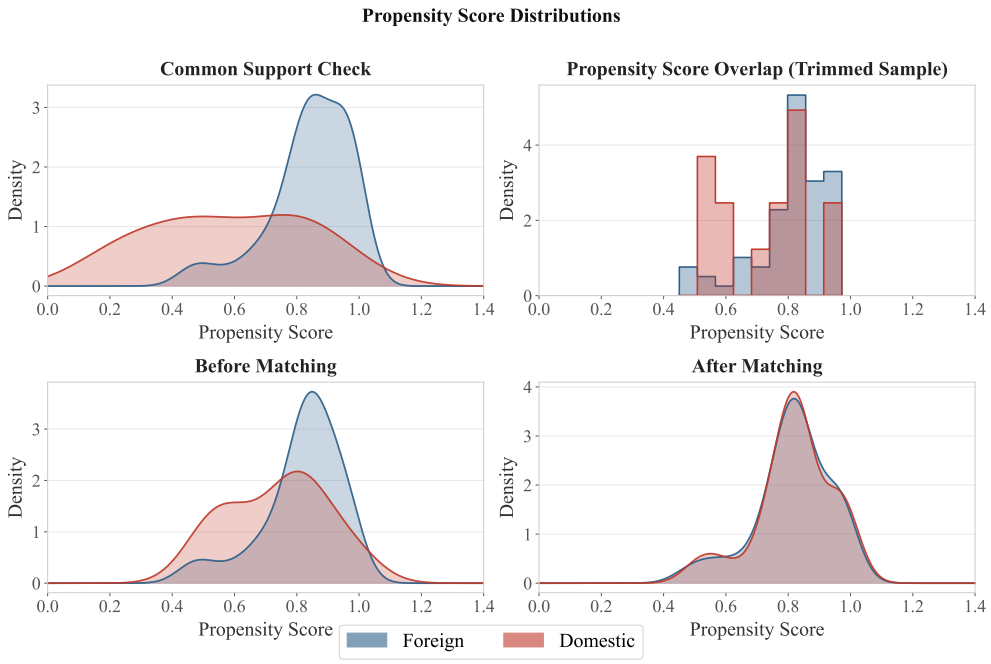


Figure A.2: Propensity Score Matching

Notes: The figure compares propensity score distributions for foreign and domestic banks using a kernel density estimation. The panels show common support, overlap in the trimmed sample and the distributions before and after matching.

Table A.3 reports summary statistics for borrower and macroeconomic characteristics across the pre- and post-announcement periods. Borrower characteristics remain broadly stable, with total equity increasing (6.04 to 6.40), EBIT largely unchanged (4.66 to 4.57) and the current ratio near constant (1.95 to 2.05). Although the average borrower financial characteristics remain relatively stable, the distribution of loan observations across borrower countries and industries changes between the pre- and post-announcement periods. The banking crisis index at the lender-country level declines markedly (1.48 to 0.72), reflecting easing financial stress in the post-period. Both

Table A.1: Variables

Variable	Units / Scale	Notes / Interpretation
Post-Announcement	Dummy (0/1)	Indicates whether the observation is after the announcement period.
Foreign Bank	Dummy (0/1)	Indicates a foreign bank.
Post-Announcement × *Foreign Bank*	Dummy (0/1)	Interaction between *Post-Announcement* and *Foreign Bank*.
Net Profit Margin	Ratio (0–1)	Net income divided by revenue; accounting performance measure.
Leverage Ratio	Ratio	Total debt divided by equity.
Banking Crisis (Lender-Country)	Dummy / Summation	Indicator if the lender's operating country experienced a banking crisis in a given year; summed if multiple countries.
Secured	Dummy (0/1)	Indicator for whether the loan is secured.
Policy Rate (Norway)	%	Annual policy rate of the Norwegian central bank.
Gross Fixed Capital Formation (Norway/Sweden)	% change (yearly)	Annual percentage change in gross fixed capital formation.
Real Exchange Rate (Sweden)	Index (base year = 2015)	Real exchange rate index for Sweden.
Other Macroprudential Policy (Sweden)	Standardised summation	Standardised sum of other macroprudential policies in Sweden.
Other Macroprudential Policy (Norway)	Standardised summation	Standardised sum of other macroprudential policies in Norway.
Log(Loan Tranche Amount)	Log of currency units	Dependent variable; log of the loan tranche amount.

Notes: The table summarises the definitions, units and interpretation of the main variables used in the analysis.

Table A.2: Summary Statistics by Foreign Bank Status and Announcement Period

	Pre-Announcement						*Post-Announcement*					
	Domestic Banks			*Foreign Banks*			*Domestic Banks*			*Foreign Banks*		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Loan Characteristics												
Log(Loan Tranche Amount)	3.83	1.10	194	3.62	0.86	226	3.47	0.96	239	3.70	1.00	230
Secured	0.53	0.50	194	0.43	0.50	226	0.34	0.48	239	0.23	0.42	230
Tenor/Maturity (months)	62.19	22.53	186	62.64	35.39	219	54.46	17.66	238	55.00	21.71	220
Bank Characteristics												
Net Profit Margin	0.06	0.17	194	0.09	0.13	226	0.21	0.11	239	0.07	0.23	230
Leverage Ratio	20.52	4.02	194	22.37	5.36	195	17.48	3.33	239	19.86	2.50	193

Notes: Summary statistics are reported by bank type and announcement period. SD denotes standard deviation and N the number of observations.

Table A.3: Summary Statistics: Borrower and Macroeconomic Characteristics

	Pre-Announcement			*Post-Announcement*		
	Mean	SD	N	Mean	SD	N
Borrower Characteristics						
log Total Equity	6.04	1.91	349	6.40	1.79	406
log EBIT	4.66	1.73	296	4.57	1.78	399
Current Ratio	1.95	2.91	356	2.05	2.74	405
Macroeconomic Characteristics						
Banking Crisis (lender-country level)	1.48	2.41	420	0.72	0.78	469
Other Macroprudential Policy (Sweden)	−0.49	0.97	420	0.43	0.81	469
Other Macroprudential Policy (Norway)	−0.59	0.67	420	0.52	0.96	469
Gross Fixed Capital Formation (Norway)	1.24	6.29	420	1.37	3.61	469
Policy Rate (Norway)	1.71	0.26	420	0.83	0.34	469
Gross Fixed Capital Formation (Sweden)	3.98	2.87	420	4.76	1.95	469
RER Sweden	107.76	2.25	420	100.86	3.63	469

Notes: Summary statistics are reported for the pre- and post-announcement periods. SD denotes standard deviation and N the number of observations.

Norwegian and Swedish macroprudential policy indices shift from negative to positive (Norway: -0.59 to 0.52; Sweden: -0.49 to 0.43), consistent with a broad tightening of the macroprudential policies coinciding with the CCyB announcement. The Norwegian policy rate falls notably (1.71 to 0.83), capturing the prevailing low interest rate environment post-2013, while the Swedish real exchange rate against the USD depreciates (107.76 to 100.86). Gross fixed capital formation increases modestly in both countries, suggesting continued investment activity throughout the sample period. These controls are included in the regression analysis to isolate the effect of the CCyB announcement from broader macroeconomic trends.

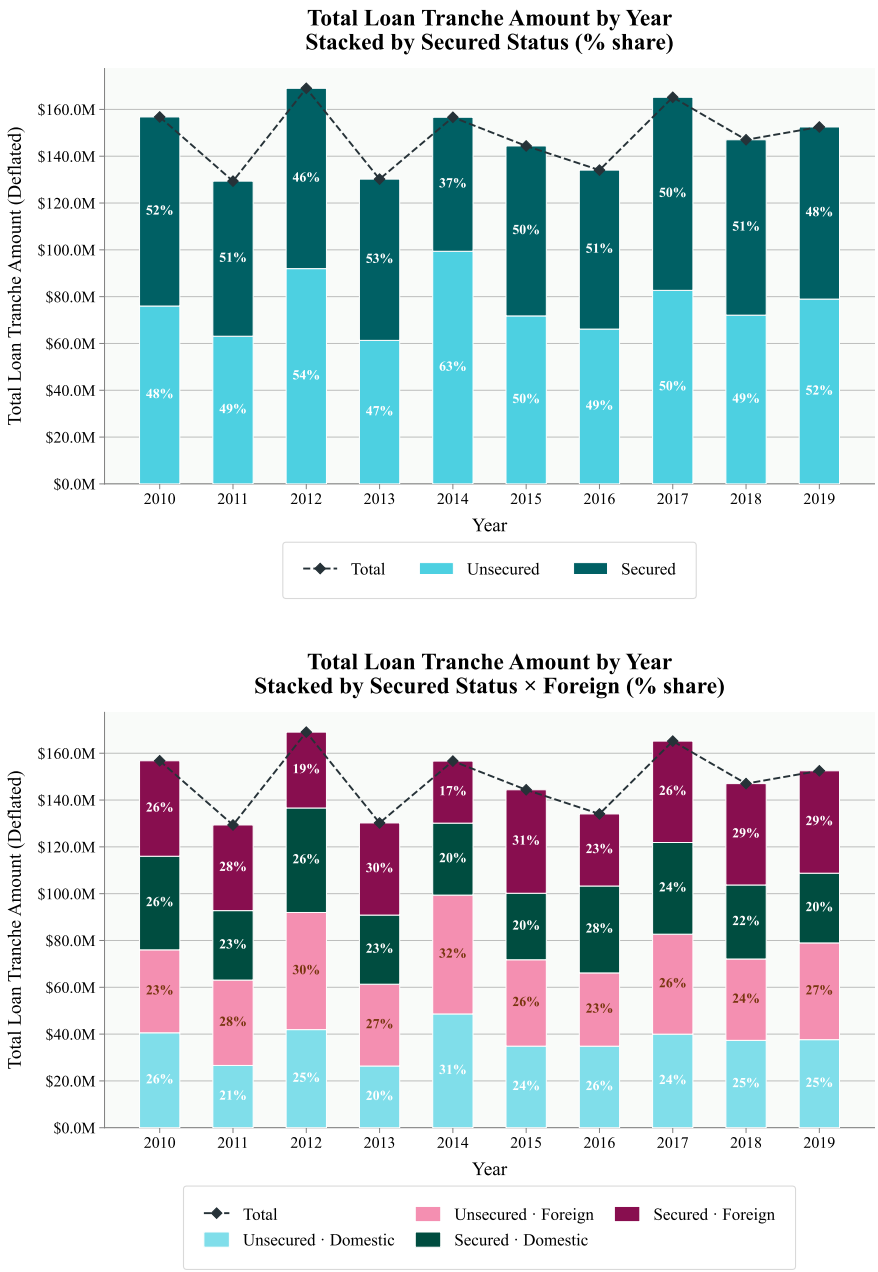


Figure A.3: Composition of Secured and Unsecured Lending

Notes: The top panel shows annual loan tranche amounts by secured status, while the bottom panel further distinguishes lending by domestic and foreign banks. Percentages indicate each category's share of total annual lending.

Total deflated loan tranche amounts remained broadly stable over the 2010–2019 period, with the secured and unsecured split broadly balanced over much of the sample. Disaggregating by foreign status reveals that domestic and foreign banks contributed roughly equally to both categories throughout, suggesting no systematic difference in

collateral requirements between the two groups.

The sample consists of 889 lender-parent observations spanning 17 countries, with Norway accounting for the largest share (374 observations), followed by France, Denmark and the United Kingdom. All jurisdictions implement Basel-based prudential standards, ensuring a common regulatory baseline.

Table A.4: Lender Parent Operating Country Distribution

Country	**Count**	**EU/EEA Member**	**Basel Member**
Norway	374	✓	✓
France	107	✓	✓
Denmark	87	✓	✓
United Kingdom	69	✓	✓
Netherlands	64	✓	✓
Sweden	59	✓	✓
Germany	56	✓	✓
Japan	20	✗	✓
United States	11	✗	✓
Italy	11	✓	✓
Belgium	8	✓	✓
Switzerland	7	✗	✓
Spain	7	✓	✓
Canada	4	✗	✓
South Africa	3	✗	✓
China	1	✗	✓
Australia	1	✗	✓
Total	**889**		

✓= member; ✗= non-member. The United Kingdom is classified as an EU/EEA member given that the country was a EU member for most of the sample period. Basel membership refers to compliance to Basel-based prudential regulations.

The average CCyB rate is calculated as the simple average of the announced CCyB rates for Norway and Sweden in a given year. The effective CCyB announcement (%) is calculated as the average CCyB rate multiplied by the minimum phase-in requirement for foreign lenders. The dashed line separates the pre-reciprocity period (2010–2015) from the reciprocity phase-in period (2016–2019).

Table A.5: CCyB Rates for Domestic and Foreign Lenders

	CCyB Announcement Rate (%)		**Average**	**Foreign:**	*Effective CCyB Announcement (%)*	
Year	**Norway**	**Sweden**	**CCyB Rate (%)**	**Phase-In Rate**	**Domestic**	**Foreign**
2010–2012	0	0	0	–	0	0
2013	1	0	0.5	–	0.5	0.5
2014	1	1	1	–	1	1
2015	1.375	1.375	1.375	–	1.375	1.375
2016	1.625	2	1.8125	25%	1.813	0.453
2017	2	2	2	50%	2	1
2018	2.25	2.25	2.25	75%	2.25	1.688
2019	2.5	2.5	2.5	100%	2.5	2.5

Notes: The average CCyB rate is based on the announced rates in Norway and Sweden. The effective foreign rate reflects the gradual phase-in of reciprocity, while domestic lenders face the full applicable rate.

A.3 Borrowers' Descriptive Statistics

Table A.6: Descriptive Statistics (Pre vs Post)

	Pre-announcement			Post-announcement		
	N	Mean	Median	N	Mean	Median
Log loan amount	211	3.612	3.634	397	3.622	3.767
Tenor maturity (months)	206	58.767	60.000	386	56.472	60.000

Notes: The sample is restricted to the 37 borrowers observed in both the pre- and post-announcement periods.

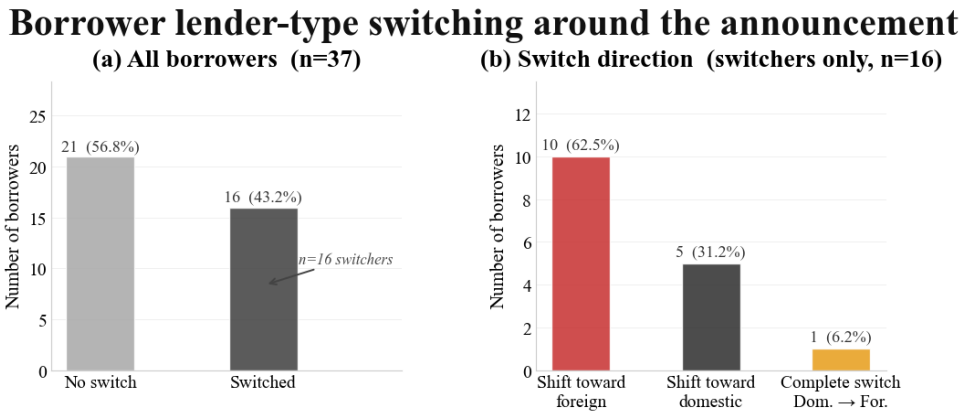


Figure A.4: Switching and non-switching characteristics

Notes: The figure shows the number and share of borrowers that switch lender type around the announcement and, among switchers, the direction of the switch.

Table A.7: Summary Statistics (Pre vs Post)

Variable	Category	N pre	N post
Secured	No	103	267
	Yes	108	130
Seniority type	Senior	209	397
	Junior Subordinated	2	0
Major industry group	Oil and Gas	61	31
	Healthcare	27	59
	Shipping	27	54
	Services	16	62
	Paper & Packaging	7	54
	Mining	14	30
	Agriculture	18	16
	General Manufacturing	9	20
	Construction	7	15
	Transportation	6	13
Country	Sweden	104	284
	Norway	107	113
Region	Western Europe	211	397
Total observations		211	397

Note: Sample restricted to the 37 borrowers observed in both periods. Top categories shown.

A.4 Switching Borrowers' Descriptive Statistics

Table A.8: Descriptive Statistics (Pre vs Post) — Shift Toward Foreign

	Pre-announcement			Post-announcement		
	N	Mean	Median	N	Mean	Median
Log loan amount	20	4.121	4.395	108	4.234	4.244
Tenor maturity (months)	20	59.900	64.000	108	50.528	60.000

Notes: The table compares loan characteristics before and after borrowers shift toward foreign lenders. Tenor is measured in months.

Table A.9: Summary Statistics (Pre vs Post) — Shift Toward Foreign

Variable	Category	N pre	N post
Secured	No	8	85
	Yes	12	23
Seniority type	Senior	20	108
Major industry group	Shipping	9	25
	Paper & Packaging	1	28
	Oil and Gas	3	24
	Wholesale	1	8
	Telecommunications	3	6
	Media	1	7
	General Manufacturing	1	6
	Construction	1	4
Country	Sweden	8	65
	Norway	12	43
Total observations		20	108

Notes: The table reports the composition of loans for borrowers shifting toward foreign lenders, by announcement period.

Table A.10: Descriptive Statistics (Pre vs Post) — Shift Toward Domestic

	Pre-announcement			Post-announcement		
	N	Mean	Median	N	Mean	Median
Log loan amount	26	3.542	3.727	25	3.654	3.675
Tenor maturity (months)	24	57.500	48.000	25	58.560	60.000

Notes: The table compares loan characteristics before and after borrowers shift toward domestic lenders. Tenor is measured in months.

Table A.11: Summary Statistics (Pre vs Post) — Shift Toward Domestic

Variable	Category	N pre	N post
Secured	Yes	24	21
	No	2	4
Seniority type	Senior	24	25
	Junior Subordinated	2	0
Major industry group	Healthcare	16	15
	Utilities	4	4
	Oil and Gas	4	4
	Real Estate	2	2
Country	Sweden	22	21
	Norway	4	4
Total observations		26	25

Notes: The table reports the composition of loans for borrowers shifting toward domestic lenders, by announcement period.

Table A.12: Descriptive Statistics (Pre vs Post) — Complete Switch: Dom. to For.

	Pre-announcement			Post-announcement		
	N	Mean	Median	N	Mean	Median
Log loan amount	1	3.199	3.199	9	5.673	5.673
Tenor maturity (months)	1	36.000	36.000	–	–	–

Notes: The table reports loan characteristics for borrowers switching completely from domestic to foreign lenders. Tenor is measured in months.

A.5 Non-Switching Borrowers' Descriptive Statistics

Table A.13: Descriptive Statistics (Pre vs Post) — No Switch: Domestic to Domestic

	Pre-announcement			Post-announcement		
	N	Mean	Median	N	Mean	Median
Log loan amount	34	3.610	3.694	69	3.475	3.535
Tenor maturity (months)	32	63.000	60.000	69	58.957	60.000

Notes: The table compares loan characteristics for borrowers remaining with domestic lenders. Tenor is measured in months.

Table A.14: Summary Statistics (Pre vs Post) — No Switch: Domestic to Domestic

Variable	Category	N pre	N post
Secured	Yes	32	44
	No	2	25
Seniority type	Senior	34	69
Major industry group	Agriculture	12	14
	General Manufacturing	8	14
	Transportation	6	13
	Shipping	4	13
	Services	2	8
	REITS	1	5
	Oil and Gas	1	2
Country	Norway	24	47
	Sweden	10	22
Total observations		34	69

Notes: The table reports the composition of loans for borrowers remaining with domestic lenders, by announcement period.

Table A.15: Descriptive Statistics (Pre vs Post) — No Switch: Mixed to Mixed

	Pre-announcement			Post-announcement		
	N	Mean	Median	N	Mean	Median
Log loan amount	65	3.797	3.809	176	3.211	3.597
Tenor maturity (months)	64	57.000	60.000	174	56.822	60.000

Notes: The table compares loan characteristics for borrowers retaining a mixed lender composition. Tenor is measured in months.

Table A.16: Summary Statistics (Pre vs Post) — No Switch: Mixed to Mixed

Variable	Category	N pre	N post
Secured	No	48	148
	Yes	17	28
Seniority type	Senior	65	176
Major industry group	Services	14	54
	Healthcare	11	44
	Mining	14	30
	Paper & Packaging	6	26
	Construction	6	11
	Shipping	2	7
	Business Services	6	2
	Agriculture	6	2
Country	Sweden	59	165
	Norway	6	11
Total observations		65	176

Notes: The table reports the composition of loans for borrowers retaining a mixed lender composition, by announcement period.

Table A.17: Descriptive Statistics (Pre vs Post) — No Switch: Foreign to Foreign

	Pre-announcement			Post-announcement		
	N	Mean	Median	N	Mean	Median
Log loan amount	65	3.305	2.981	10	3.341	3.428
Tenor maturity (months)	65	58.892	54.000	10	92.200	60.000

Notes: The table compares loan characteristics for borrowers remaining with foreign lenders. Tenor is measured in months.

A.6 Additional Results

A.6.1 Baseline Regression: Unclustered HC2 SEs

Table A.18: Baseline Regression Results

	Dependent variable: Log(Loan Tranche Amount)			
	Full Sample	*Restricted*	*Full Sample*	*Restricted*
	(1)	(2)	(3)	(4)
Constant	6.791*** (1.242)	6.472** (2.595)	8.661*** (1.389)	5.127 (3.483)
Post Announcement	−1.012*** (0.167)	−0.786** (0.349)	−0.960*** (0.194)	−0.559 (0.403)
Foreign Bank	−0.254** (0.106)	−0.200 (0.172)	−0.336*** (0.124)	−0.197 (0.175)
Post Announcement × Foreign Bank	0.377*** (0.138)	0.336* (0.180)	0.394*** (0.151)	0.351* (0.184)
		Borrower Controls		
Current Ratio			−0.096*** (0.028)	−0.157** (0.075)
log(EBIT)			−0.076 (0.052)	−0.008 (0.080)
log(Total Equity)			0.183*** (0.043)	0.136** (0.065)
		Macroeconomic Controls		
Banking Crisis (Lender-Country Level)	−0.105*** (0.028)	−0.117* (0.065)	−0.033 (0.031)	−0.095 (0.077)
Other Macroprudential Policies (Sweden)	0.009 (0.053)	0.089 (0.121)	0.154*** (0.058)	0.046 (0.159)
Other Macroprudential Policies (Norway)	0.334*** (0.046)	0.315*** (0.047)	0.325*** (0.045)	0.279*** (0.066)
Policy Rate (Norway, Country Level)	0.506*** (0.112)	0.719*** (0.132)	0.501*** (0.115)	0.648*** (0.125)
Gross Fixed Capital Formation (Norway)	0.070*** (0.013)	0.052** (0.023)	0.081*** (0.015)	0.041 (0.026)
Real Exchange Rate (USD-SEK)	−0.029** (0.012)	−0.034 (0.023)	−0.061*** (0.013)	−0.029 (0.032)
Gross Fixed Capital Formation (Sweden)	0.029 (0.023)	0.071 (0.054)	0.095*** (0.026)	0.072 (0.059)
		Bank Controls		
Net Profit Margin	0.398* (0.213)	0.617*** (0.237)	0.365* (0.187)	0.546** (0.230)
Leverage Ratio	−0.005 (0.009)	−0.005 (0.010)	0.009 (0.009)	0.002 (0.010)
		Loan Controls		
Secured	−0.324*** (0.085)	−0.177* (0.090)	−0.169* (0.101)	0.135 (0.113)
Time FE	✗	✗	✗	✗
Industry FE	✓	✓	✓	✓
Borrower Controls	✗	✗	✓	✓
Bank Controls	✓	✓	✓	✓
Loan Controls	✓	✓	✓	✓
Macroeconomic Controls	✓	✓	✓	✓
Observations	821	299	641	277
R^2	0.125	0.313	0.255	0.411

Notes: The table reports baseline DiD estimates using HC2 robust standard errors. *Post Announcement × Foreign Bank* captures the post-announcement foreign–domestic lending differential. Columns (1) and (3) use the full sample, while Columns (2) and (4) use the restricted sample. Results are robust to excluding the 8.34% of observations corresponding to the delay between Norway's and Sweden's first announcements. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

A.6.2 Event Study: Pre-trend results

Table A.19: Wald Tests for Joint Significance

		Wald Test (HTZ)		
Test	F-statistic	df (num.)	df (denom.)	p-value
Post-Shock: 2014–2015, 2016–2017, 2018–2019 × Foreign = 0	11.100	3	4.08	0.020*

Notes: The HTZ Wald test jointly tests the post-shock *Year Group* × *Foreign* interaction terms. CR2-BM standard errors are clustered at the bank level. $^{*}p < 0.05$.

A.6.3 Binary Response Models

Table A.20: Binary Response Models

Binary Response Models	*Dependent variable: Prob(Secured = 1)*			
	Full Sample		*Full Sample (With Controls)*	
	(1)	(2)	(3)	(4)
Constant	−0.422* (0.229)	−0.422** (0.175)	−1.970** (0.810)	−1.970*** (0.738)
Post First Announcement	0.051 (0.144)	0.051 (0.075)	0.047 (0.087)	0.047 (0.074)
Foreign Bank	−0.056 (0.089)	−0.056 (0.047)	−0.093 (0.081)	−0.093 (0.058)
Post First Announcement × Foreign Bank	−0.052 (0.138)	−0.052 (0.060)	0.002 (0.101)	0.002 (0.071)
		Borrower Controls		
log EBIT			0.022 (0.021)	0.022 (0.022)
log Total Equity			−0.083*** (0.025)	−0.083*** (0.020)
Current Ratio			−0.006 (0.012)	−0.006 (0.011)
		Loan Controls		
log(Tenor Maturity)	0.208*** (0.049)	0.208*** (0.034)	0.170*** (0.047)	0.170*** (0.039)
Covenants = Yes	0.530*** (0.076)	0.530*** (0.072)	0.531*** (0.108)	0.531*** (0.084)
log Allocated Tranche Amount	−0.051** (0.024)	−0.051*** (0.018)	−0.022 (0.037)	−0.022 (0.023)
		Bank Controls		
Net Profit Margin			−0.222* (0.114)	−0.222** (0.093)
Leverage Ratio			−0.002 (0.006)	−0.002 (0.004)
		Macroeconomic Controls		
Other Macroprudential Policies (Sweden)			0.006 (0.047)	0.006 (0.030)
Lender Crisis			0.046*** (0.016)	0.046*** (0.015)
Other Macroprudential Policies (Norway)			0.085* (0.044)	0.085*** (0.030)
Policy Rate Norway			0.040 (0.096)	0.040 (0.062)
Gross Fixed Capital Formation (Norway)			0.012* (0.006)	0.012* (0.007)
RER Sweden			0.022*** (0.008)	0.022*** (0.007)
Gross Fixed Capital Formation (Sweden)			−0.040*** (0.013)	−0.040*** (0.011)
Time FE (base year = 2010)	✓	✓	✗	✗
Industry FE	✗	✗	✓	✓
Bank Controls	✗	✗	✓	✓
Macroeconomic Controls	✗	✗	✓	✓
Borrower Controls	✗	✗	✓	✓
Loan Tranche Controls	✓	✓	✓	✓
Standard Errors	CR2	HC2	CR2	HC2
Observations	889	889	632	632

Notes: Columns (1) and (3) report CR2 standard errors clustered at the bank level, while Columns (2) and (4) report HC2 robust standard errors. Significance levels are based on two-sided normal p-values. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

A.6.4 Triple Interaction term with Secured Dummy

Table A.21: Regression Results

Models	*Dependent variable: Log(Allocated Tranche Amount)*		
	Full Sample		
	(1)	(2)	(3)
Constant	4.081*** (0.067)	8.897*** (1.836)	7.969*** (1.442)
Post First Announcement	−0.528*** (0.104)	−0.963*** (0.202)	−0.660** (0.325)
Foreign Bank	−0.402*** (0.143)	−0.350** (0.136)	−0.390* (0.215)
Secured Lending = Yes	−0.422*** (0.014)	0.098 (0.115)	−0.005 (0.089)
Post × Foreign	0.603*** (0.169)	0.486*** (0.135)	0.467** (0.212)
Post × Secured	0.193 (0.353)	−0.219 (0.242)	0.196 (0.137)
Foreign × Secured	0.291 (0.190)	0.233 (0.381)	0.505 (0.464)
Post × Foreign × Secured	−0.300 (0.585)	−0.809* (0.490)	−0.704* (0.361)
		Borrower Controls	
Log(EBIT)		−0.090 (0.062)	−0.068 (0.082)
Log(Total Equity)		0.190*** (0.036)	0.164** (0.076)
Current Ratio		−0.103** (0.045)	−0.114** (0.050)
		Bank Controls	
Net Profit Margin		0.168 (0.201)	0.074 (0.156)
Leverage Ratio		0.012 (0.011)	0.009 (0.012)
		Macroeconomic Controls	
Lender Crisis		−0.082 (0.051)	−0.037 (0.051)
Other Macroprudential Policies (Sweden)		0.124* (0.075)	0.089 (0.078)
Other Macroprudential Policies (Norway)		0.365*** (0.041)	0.286*** (0.054)
Policy Rate Norway		0.515*** (0.172)	0.683*** (0.143)
Gross Fixed Capital Formation (Norway)		0.090*** (0.013)	0.057*** (0.020)
Real Exchange Rate Sweden		−0.065*** (0.017)	−0.058*** (0.015)
Gross Fixed Capital Formation (Sweden)		0.126*** (0.027)	0.103*** (0.038)
Industry FE	✗	✗	✓
Borrower Control	✗	✓	✓
Bank Control	✗	✓	✓
Borrower Macroeconomic Country Controls	✗	✓	✓
Observations	889	646	646
R^2	0.037	0.271	0.499

Notes: The table estimates whether the post-announcement foreign–domestic lending differential varies between secured and unsecured loans. The triple interaction *Post* × *Foreign* × *Secured* captures this difference. CR2-BM standard errors clustered at the bank level are reported in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

A.6.5 Unsecured Lending Only

Table A.22: Pre-trend Regression Results

Models	*Dependent variable: Log(Loan Tranche Amount)*		
	Full Sample: Secured Lending = No		
	(1)	(2)	(3)
Constant	3.625*** (0.541)	3.953*** (1.223)	6.461*** (1.591)
2010			−1.015** (0.427)
2011			−1.266*** (0.457)
2012			−3.427*** (0.506)
2010 × Foreign			−2.383 (1.578)
2011 × Foreign			−2.115 (1.602)
2012 × Foreign			−3.151** (1.534)
Foreign	−0.225 (0.164)	−0.295 (0.221)	2.212 (1.565)
log(EBIT)	−0.038 (0.153)	0.057 (0.295)	−0.192 (0.263)
log(Total Equity)	0.096 (0.162)	0.152 (0.162)	0.040 (0.259)
Current Ratio	−0.257 (0.248)	−1.366*** (0.441)	−0.939 (0.675)
Net Profit Margin		−1.794** (0.852)	−1.384** (0.672)
Leverage Ratio		0.040** (0.018)	0.036* (0.019)
Industry FE	✗	✗	✓
Borrower Controls	✓	✓	✓
Bank Controls	✗	✓	✓
Observations	145	132	132
R^2	0.049	0.537	0.680

Notes: The table reports pre-trend estimates for unsecured lending. Specification (3) includes year effects and *Year* × *Foreign* interactions, whose joint significance is tested in Table A.23. Standard errors are reported in parentheses using CR SE. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table A.23: Wald Test for Joint Significance

Test	F-statistic	DoF (num)	DoF (denom)	p-value	Significance
HTZ	5.77	3	2.77	0.102	Not Significant

Notes: The HTZ Wald test jointly tests the *Year* × *Foreign* interaction terms in Specification (3) of Table A.22. The null hypothesis of joint insignificance cannot be rejected.

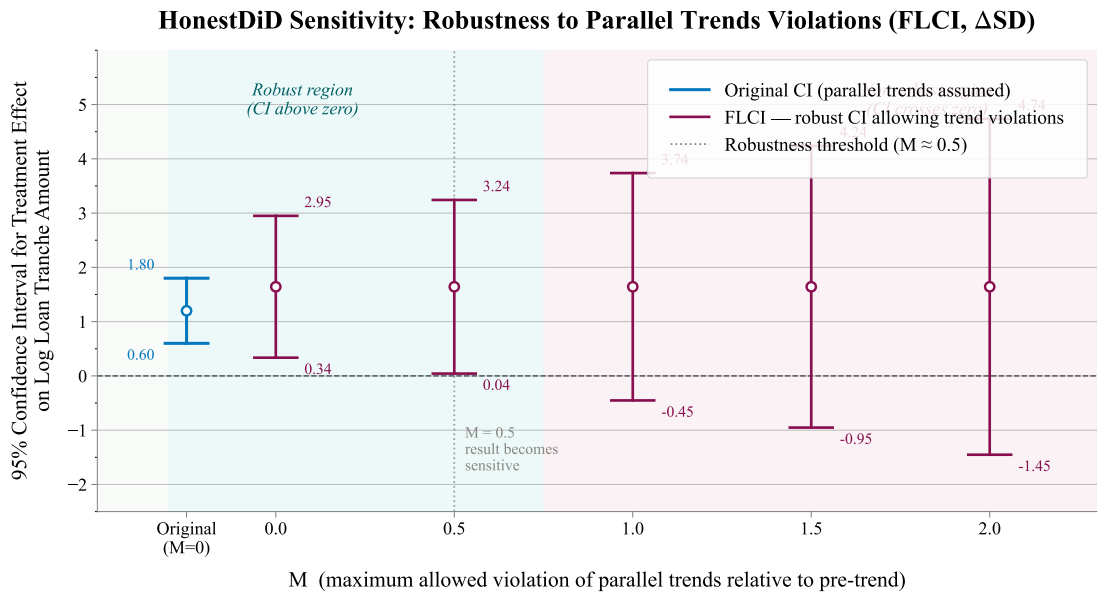


Figure A.5: HonestDiD Sensitivity Analysis for Unsecured Lending

Notes: The figure assesses the sensitivity of the estimated treatment effect to violations of parallel trends. FLCI denotes Fixed-Length Confidence Interval, while Δ^{SD} denotes the smoothness restriction on second differences of the trend violations. The confidence interval remains above zero for small violations up to approximately $M = 0.5$.

A.6.6 Secured Lending Only

Table A.24: Pre-trend Regression Results

Models	*Dependent variable: Log(Loan Tranche Amount)*		
	Secured Lending = Yes		
	(1)	(2)	(3)
Constant	3.015*** (0.722)	3.394*** (1.146)	2.158* (1.115)
2010			0.484 (0.316)
2011			1.406*** (0.291)
2012			−0.307 (0.417)
Foreign	−0.147 (0.248)	0.016 (0.368)	0.407 (0.400)
Foreign × 2010			−0.764*** (0.288)
Foreign × 2011			−0.335 (0.561)
Foreign × 2012			1.887*** (0.653)
	Borrower Controls		
log EBIT	0.097 (0.080)	−0.021 (0.055)	−0.165** (0.075)
log Total Equity	−0.031 (0.145)	−0.025 (0.122)	0.142 (0.096)
Current Ratio	0.231*** (0.060)	0.030 (0.080)	−0.170** (0.067)
	Bank Controls		
Net Profit Margin		−0.775 (0.785)	−0.163 (0.710)
Leverage Ratio		0.024 (0.021)	0.013 (0.013)
	Macroeconomic Control		
EU/EEA Lender	−0.110 (0.407)		
Industry FE	✗	✗	✓
Lender-Country Group (EU/EEA vs Basel)	✓	✗	✗
Borrower Control	✓	✓	✓
Bank Control	✓	✓	✓
Observations	111	110	110
R^2	0.091	0.358	0.535

Notes: The table reports pre-trend estimates for secured lending. Specification (3) includes year effects and *Foreign* × *Year* interactions, whose joint significance is tested in Table A.25. CR2-BM standard errors clustered at the bank level are reported in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table A.25: Wald Test for Joint Significance

Test	F-stat	df (num)	df (denom)	p-value	Significance
HTZ	1.56	3	0.848	0.545	Not Significant

Notes: The HTZ Wald test jointly tests the *Foreign* × *Year* interaction terms in Specification (3) of Table A.24. The null hypothesis of joint insignificance cannot be rejected.

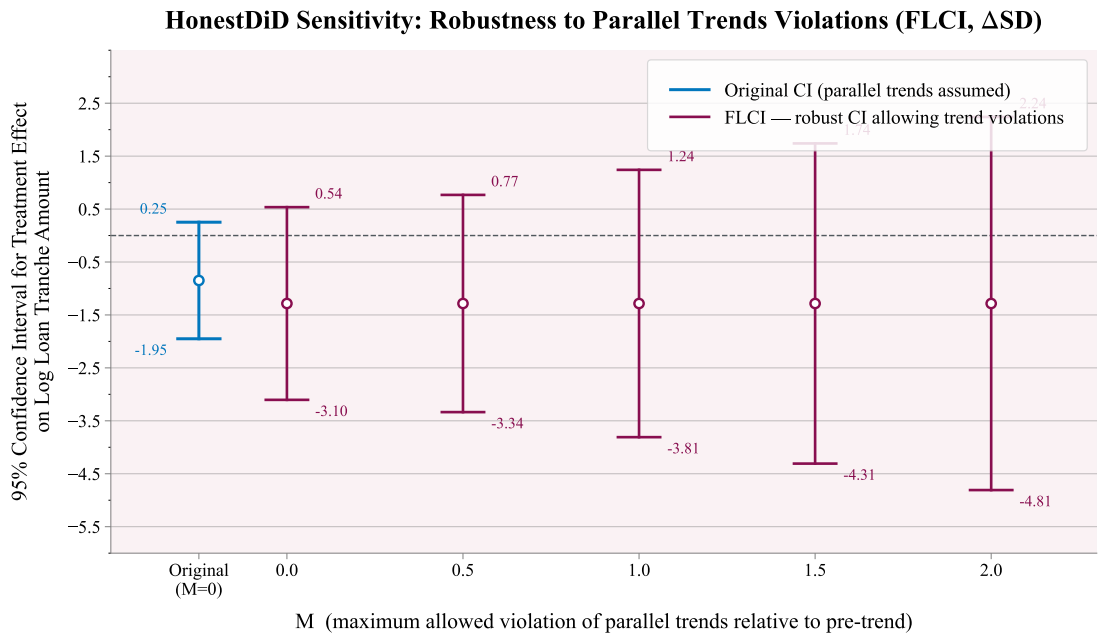


Figure A.6: HonestDiD Sensitivity Analysis for Secured Lending

Notes: The figure assesses the sensitivity of the estimated treatment effect to violations of parallel trends. FLCI denotes Fixed-Length Confidence Interval, while Δ^{SD} denotes the smoothness restriction on second differences of the trend violations. The confidence interval includes zero even under the baseline specification.

A.6.7 CCyB Announcements by other countries

Table A.27 controls for concurrent CCyB announcements by other countries in the sample. Five countries, the UK, France, Belgium, Denmark and Germany, announced positive CCyB rates prior to 2019, though below the 1 per cent threshold set by Norway and Sweden. The *Post-Announcement* coefficient remains negative and significant across both specifications. The *Post-Announcement* × *Foreign Bank* interaction remains positive and significant, suggesting that the regulatory advantage result is not driven by broader regulatory tightening elsewhere in the sample.

A.6.8 Other Reciprocation Measures

Among the lender countries in the sample that formally reciprocated other Swedish or Norwegian macroprudential measures, all did so exclusively in relation to residential mortgage risk weights. Denmark reciprocated both the Norwegian Finanstilsynet's tighter IRB mortgage model requirements (DK.RECI.99, 2014) and the Swedish Article 458 institution-specific 25 per cent risk weight floor on retail exposures secured by

Table A.26: Event Study: DiD Regression

Model	*Dependent variable: Log(Allocated Tranche Amount)* *Secured Lending = Yes*
	(1)
Constant	1.802*** (0.349)
	Year Group Effects
2010–2011	1.171*** (0.365)
2014–2015	1.206*** (0.409)
2016–2017	0.540* (0.292)
2018–2019	0.972*** (0.196)
	Treatment
Foreign	0.595 (0.469)
	Foreign × Year Group Interactions
Foreign × 2010–2011	−0.432 (0.489)
Foreign × 2014–2015	−0.852 (0.563)
Foreign × 2016–2017	−0.538 (0.400)
Foreign × 2018–2019	−0.391 (0.392)
	Borrower Controls
Log(EBIT)	−0.174 (0.135)
Log(Total Equity)	0.202** (0.081)
Current Ratio	0.017 (0.063)
	Bank Controls
Net Profit Margin	0.078 (0.467)
Leverage Ratio	0.013 (0.010)
Industry FE	✓
Borrower Control	✓
Bank Control	✓
Observations	211
R^2	0.638
Adjusted R^2	0.593
Residual Std. Error	0.646 (df = 187)
F Statistic	14.313*** (df = 23; 187)

Notes: The table reports event-study estimates for secured lending, with 2012–2013 as the reference period. *Foreign × Year Group* captures the foreign–domestic lending differential in each period relative to the base period. CR2-BM standard errors clustered at the bank level are reported in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table A.27: Announcement variable for other countries

	Dependent variable: Log(Loan Tranche Amount)	
	Full Sample	*KM Sample*
	(1)	(2)
Constant	8.365*** (1.513)	4.980*** (1.891)
Foreign	−0.336** (0.131)	−0.196 (0.169)
Post-Announcement	−0.959*** (0.186)	−0.533*** (0.172)
	Borrower Controls	
Current Ratio	−0.094** (0.040)	−0.155*** (0.058)
log EBIT	−0.075 (0.056)	−0.011 (0.160)
log Total Equity	0.181*** (0.034)	0.137 (0.123)
	Bank Controls	
Net Profit Margin	0.400** (0.179)	0.587*** (0.196)
Leverage Ratio	0.009 (0.010)	0.002 (0.007)
	Loan Controls	
Secured	−0.168 (0.184)	0.137 (0.088)
	Macroeconomic Controls	
Banking Crisis (lender-country level)	−0.034 (0.031)	
Banking Crisis (lender-country level, Restricted)		−0.096*** (0.028)
Gross Fixed Capital Formation (Norway)	0.080*** (0.013)	0.041** (0.016)
Gross Fixed Capital Formation (Sweden)	0.094*** (0.025)	0.071* (0.043)
Policy Rate (Norway)	0.496** (0.212)	0.666*** (0.067)
RER Sweden	−0.058*** (0.014)	−0.028 (0.019)
	Macroprudential Policy	
Other Macroprudential Policy (Norway)	0.330*** (0.040)	0.280*** (0.057)
Other Macroprudential Policy (Sweden)	0.152** (0.063)	0.040 (0.059)
	Announcement Variables	
UK Announcement	0.276** (0.110)	0.233*** (0.019)
Denmark Announcement	0.197** (0.081)	0.085 (0.184)
France Announcement		−0.094 (0.194)
	Interaction Terms	
Post-Announcement × *Foreign Bank*	0.378** (0.168)	0.348** (0.147)
Industry FE	✓	✓
Bank Controls	✓	✓
Borrower Controls	✓	✓
Loan Controls	✓	✓
Macroeconomic Controls	✓	✓
Observations	641	277
R^2	0.256	0.412
SE	CR2	CR2

Notes: The table reports robustness estimates controlling for CCyB announcements in other countries. *Post-Announcement* × *Foreign Bank* captures the foreign–domestic lending differential following the first CCyB announcement. Column (1) uses the full sample and Column (2) the KM sample. CR2-BM standard errors clustered at the bank level are reported in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Swedish immovable property (DK.RECI.706, 2019). Belgium (BE.RECI.665) and France (FR.RECI.712) each reciprocated the same Swedish Article 458 measure, with de minimis thresholds of SEK 5 billion, EUR 500 million and SEK 5 billion respectively, all becoming active in 2018–2019. None of these measures address corporate credit risk weights or large exposure limits relevant to non-financial companies. In this paper, the borrower in the sample is restricted to lending to non-financial firms. Hence, these reciprocated measures are of limited direct relevance. Since every measure operates through residential mortgage risk weights, they affect only the Swedish retail mortgage books of reciprocating banks, leaving corporate lending capacity mechanically unaffected through this regulatory channel. Denmark (9.79 per cent), France (12.0 per cent) and Belgium (0.9 per cent) together represent approximately 22.7 per cent of lender observations in this sample. The one theoretical concern is that higher mortgage risk weights could induce capital reallocation away from corporate lending. However, given the limited cross-border mortgage exposures most lenders would hold in Sweden, material balance sheet reallocation effects are unlikely.

During 2010–2019, Norway and Sweden each engaged in a modest number of formal reciprocation decisions when considering the lenders' countries in the sample used, primarily targeting residential mortgage exposures. Norway reciprocated the Belgian IRB risk weight add-on (2019) and the French large exposure limit on highly indebted non-financial corporations (2019). Sweden reciprocated the French large exposure measure (2019, limited to banks such as SEB, SHB and Swedbank) and an earlier Norwegian IRB mortgage model requirement (2014, now inactive), while formally choosing non-reciprocation for the Belgian risk weight measure. For the purposes of this study, the practical reach of these measures into the sample is limited. The French large exposure measure, reciprocated by both Norway (NO.RECI.663) and Sweden (SE.RECI.688), applies only to highly indebted large non-financial corporations resident in France, a narrow segment that represents a small share of cross-border lending activity. Despite France accounting for 12 per cent of lender-country observations, the measure's restrictive targeting criteria mean that few lending relationships are likely directly constrained. All other reciprocated measures involve Belgium (0.9 per cent), making them effectively insignificant in the sample. The Norwegian reciprocation of Sweden's Article 458 risk weight floor (NO.RECI.664) carries the greatest potential bilateral relevance given Norway's dominant 42.1 per cent lender share and Sweden's 6.6 per cent presence, but its scope is confined to IRB banks' Swedish residential mortgage portfolios specifically. Overall, macroprudential spillovers through formal

reciprocation channels are unlikely to constitute a meaningful confounder in the paper's analysis when compared to the mandatory CCyB reciprocation.

A.6.9 Other Macroprudential policies in Norway and Sweden

A central identification concern is whether the estimated effects reflect the influence of coincident macroprudential actions rather than the CCyB itself. To address this, the broader policy regulations over the sample period are documented, drawing on the IMF iMaPP database. Both countries were active macroprudential policy users throughout the decade. The most significant concurrent actions fall into three categories. First, both countries tightened broad-based capital requirements such as the capital conservation buffer during 2013–2015 under the Basel III framework. These actions largely occur concurrently with the CCyB tightening cycle, though where the two coincide they cannot be cleanly separated and may attenuate our estimates. Second, Norway implemented a suite of household-targeted instruments, including loan-to-value caps, debt-service-to-income limits and mortgage lending restrictions which are not expected to directly impact lending to non-financial firms, though indirect effects through aggregate demand or collateral values cannot be entirely ruled out. Third, Sweden introduced surcharges on its systemically important financial institutions in 2014 and tightened them in 2016, with no direct Norwegian equivalent. To the extent these surcharges independently constrained Swedish bank lending, they represent a potential source of confounding for Swedish firms. Table A.28 interacts the iMaPP sum index of other macroprudential actions, net of CCyB, with the foreign bank indicator, separately for Norway and Sweden. Across all four specifications, neither interaction term is statistically significant, confirming that the core results are driven by the CCyB announcements rather than concurrent macroprudential tightening.

Table A.28: Other Macroprudential Policies in Norway and Sweden

	Dependent variable: Log(Loan Tranche Amount)			
	Full Sample		*KM Sample*	
	(1)	(2)	(3)	(4)
Constant	4.341*** (0.763)	3.972*** (0.619)	0.555 (1.456)	0.611 (1.560)
Foreign	−0.120 (0.075)	−0.105 (0.078)	0.069 (0.093)	0.072 (0.109)
	Borrower Controls			
Current Ratio	−0.103** (0.040)	−0.107*** (0.040)	−0.197*** (0.049)	−0.201*** (0.047)
log EBIT	−0.110* (0.058)	−0.118** (0.057)	−0.055 (0.153)	−0.060 (0.155)
log Total Equity	0.218*** (0.037)	0.223*** (0.036)	0.172 (0.122)	0.179 (0.125)
	Bank Controls			
Net Profit Margin	0.199 (0.220)	0.167 (0.205)	0.375 (0.252)	0.385 (0.234)
Leverage Ratio	0.011 (0.009)	0.009 (0.009)	0.005 (0.006)	0.005 (0.007)
	Loan Controls			
Secured	−0.225 (0.194)	−0.221 (0.191)	0.200** (0.101)	0.211** (0.102)
	Macroeconomic Controls			
Banking Crisis (lender-country level)	−0.014 (0.036)	−0.024 (0.034)	−0.128*** (0.041)	−0.130*** (0.043)
Gross Fixed Capital Formation (Norway)	0.068*** (0.012)	0.073*** (0.013)	−0.002 (0.008)	0.001 (0.007)
Gross Fixed Capital Formation (Sweden)	0.066*** (0.021)	0.069*** (0.020)	−0.034* (0.018)	−0.030 (0.018)
Policy Rate (Norway)	0.739*** (0.191)	0.758*** (0.183)	0.624*** (0.115)	0.653*** (0.090)
RER Sweden	−0.027*** (0.008)	−0.023*** (0.006)	0.019 (0.015)	0.017 (0.016)
	Macroprudential Policy			
Other Macroprudential Policy (Norway)	0.255*** (0.065)	0.296*** (0.035)	0.154* (0.082)	0.186*** (0.040)
Other Macroprudential Policy (Sweden)	0.073 (0.057)	0.106 (0.067)	−0.139** (0.061)	−0.129* (0.072)
	Interaction Terms			
Other Macroprudential Policy (Norway) × Foreign Bank	0.076 (0.080)		0.092 (0.081)	
Other Macroprudential Policy (Sweden) × Foreign Bank		−0.102 (0.087)		−0.006 (0.075)
Industry FE	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
Borrower Controls	✓	✓	✓	✓
Loan Controls	✓	✓	✓	✓
Macroeconomic Controls	✓	✓	✓	✓
Observations	641	641	277	277
R^2	0.224	0.225	0.417	0.415
SE	CR2	CR2	CR2	CR2

Notes: The table reports estimates of the effects of other macroprudential policies in Norway and Sweden on loan tranche amounts, including interactions with *Foreign Bank*. Columns (1)–(2) use the full sample and Columns (3)–(4) the KM sample. CR2-BM standard errors clustered at the bank level are reported in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

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