

**BANKA
SLOVENIJE**
EVROSISTEM



**DELOVNI ZVEZKI BANKE SLOVENIJE/
BANK OF SLOVENIA WORKING PAPERS:**

**SPILLOVERS FROM PRUDENTIAL POLICIES
IMPLEMENTED AT CONSOLIDATED LEVEL:
EVIDENCE FROM THE EBA'S 2011 CAPITAL
EXERCISE AND ITS EFFECT IN SLOVENIA**

Selcuk Ozsahin

3/2020

Title/*Naslov*: Spillovers from Prudential Policies Implemented at Consolidated Level: Evidence from the EBA's 2011 Capital Exercise and its Effect in Slovenia

No./*Številka*: 3/2020

Published by/*Izdajatelj*: BANKA SLOVENIJE
Slovenska 35
1505 Ljubljana
tel.: 01/+386 1 47 19 000
<http://www.bsi.si>

The BANK OF SLOVENIA WORKING PAPERS collection is drawn up and edited by the Bank of Slovenia's Analysis and Research Department (Tel: +386 01 47 19 680; Email: arc@bsi.si). The views and conclusions expressed in the papers in this publication do not necessarily reflect the official position of the Bank of Slovenia or its bodies.

The figures and text herein may only be used or published if the source is cited.

Zbirko DELOVNI ZVEZKI BANKE SLOVENIJE pripravlja in ureja Analitsko-raziskovalni center Banke Slovenije (telefon: 01/47 19 680, e-pošta: arc@bsi.si).
Mnenja in zaključki, objavljeni v prispevkih v tej publikaciji, ne odražajo nujno uradnih stališč Banke Slovenije ali njenih organov.

<https://www.bsi.si/publikacije/raziskave-in-analize/delovni-zvezki-banke-slovenije>

Uporaba in objava podatkov in delov besedila je dovoljena z navedbo vira.

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani
[COBISS.SI-ID=305024768](https://nuk.ub.uni-lj.si/COBISS.SI-ID=305024768)
ISBN 978-961-6960-37-3 (pdf)

Spillovers from Prudential Policies Implemented at Consolidated Level: Evidence from the EBA's 2011 Capital Exercise and its Effect in Slovenia*

Selcuk Ozsahin[†]

January 30, 2020

Abstract

The 2011/2012 EBA capital exercise provides a unique policy experiment that was already exploited in several other studies. My focus on the cross-border effects through the subsidiaries of the EBA banks distinguishes this paper. By using loan-level data from the Slovenian credit register and employing an identification à la Khwaja and Mian (2008), I find that the introduction of the higher capital requirements with the exercise led the subsidiaries of the capital exercise banking groups in Slovenia to tighten their credit. I estimate a 1 p.p. shortfall at the consolidated level led to a reduction in the credit to non-financial companies by 2.7 to 4.6 p.p. (annualized) by these subsidiaries.

Keywords: macroprudential policy, policy spillovers, capital requirements, regulation, international banking

JEL Classification: JEL Codes: E58, F42, G15, G21, G28

*Disclaimer: The views expressed in this paper are solely the responsibility of the author and should not be interpreted as reflecting the views of the Bank of Slovenia.

[†]Bank of Slovenia. Email: selcuk.ozsahin@bsi.si

Povzetek

Kapitalska vaja EBA 2011/2012 ponuja edinstven eksperiment politik, ki je že bil uporabljen v številnih drugih študijah. Osredotočenost tega prispevka na čezmejne učinke prek podružnic bank EBA ga razlikuje od ostalih. Z uporabo podatkov na ravni posojil iz slovenskega kreditnega registra in z uporabo identifikacije kot v Khwaja in Mian (2008) ugotavljam, da je uvedba višjih kapitalskih zahtev z vajo povzročila, da so hčerinske družbe kapitalskih bančnih skupin v Sloveniji zaostrole kreditno aktivnost. Ocenjujem, da je zmanjšanje v višini 1 o.t. na konsolidirani ravni povzročilo zmanjšanje posojilne aktivnosti nefinančnim podjetjem med 2,7 in 4,6 o.t. (letno) s strani teh podružnic.

1 Introduction

The European Banking Authority (EBA) introduced its capital exercise in 2011 with the aim to restore confidence in the EU banking sector against the backdrop of the aggravating sovereign debt risks in Europe. Several studies have pointed at the almost quasi-natural nature of this policy experiment, and studied it to achieve a better design of capital-based policies¹. One of the marked features of the exercise was its cross-country dimension, as the EBA targeted the major and internationally active European banking groups. In this paper I focus on the cross-border dimension and study the impact of the exercise on bank lending through the subsidiaries of the banking groups in Slovenia.

The EBA² announced the capital exercise in October 2011. Magnitude of the required increases in the capital ratios and the timing were unexpected: Major European banking groups, selected according to their respective shares in national banking sectors, were required to increase their core tier 1 (CT1) capital ratios to 9% by June 2012 at the highest consolidation level. The new requirement was considerably higher than the 5% requirement at the June 2011 stress test. Besides, the banks were provided with a short time window, about nine months, to comply in the face of a deepening sovereign debt crisis.

In this this paper I research the impact of the capital exercise in Slovenia through the Slovenian subsidiaries of the bank groups that were targeted by the EBA. The fact that the exercise was not anticipated, and bank groups were not selected regarding their preconditions, provides a unique research setting for quantifying the causal effects. Using firm-loan level data and employing an identification strategy à la Khwaja and Mian (2008), which constitutes a standard approach in the empirical banking literature, I found the exercise led the subsidiaries to reduce their credit supply. As such, I document that the EBA's exercise in 2011 had procyclical effects in Slovenia through affiliates of the targeted international banks, where the signs of a distress in the banking sector and financial crisis were already visible.

Bank capital regulation and the minimum requirements aim to ensure the solvency of the banks and limit excessive risk-taking. Better capitalisation also provides systemic benefits in times of stress against the negative externalities caused by bank distress and failures. Nonetheless, the benefits need to be weighed against the costs. The costs are related to lessened provision of bank credit, particularly in the short run, which would materialize when banks adjust to the new and higher capital ratio requirements

¹The papers by Mesonnier and Monks (2015) and Gropp et al. (2019) on the EBA's capital exercise are discussed later in this paper.

²The EBA, an EU agency set up by the European Parliament and Council of the European Union charged with the task of setting harmonised prudential rules for financial institutions throughout the EU member states, announced the capital exercise in the form of a Recommendation. According to EU regulation (Regulation (EU) No 1093/2010, Article 16(3)), national supervisory authorities must make every effort to comply with EBA guidelines and recommendations.

by asset-side adjustments, rather than adding new capital. While the benefits can be expected to outweigh the costs in normal times (e.g. as discussed in Admati et al. (2013)), the reduction in credit in a downturn may have adverse effects on the real economy and financial system through feedbacks. As such, introducing stringent requirements procyclically could become self-defeating³.

The critical issue of how banks adjust in response to higher capital requirements has been a subject of theoretical and empirical research. While the funding structure irrelevance theory states that firms' funding costs are invariant to the funding structure (Modigliani and Miller, 1958), in practice for banks frictions such as deposit guarantees and preferential taxing schemes for debt make equity the costlier form of funding (Admati et al., 2013). And, according to the 'pecking order theory of finance', issuing new equity to outside investors is considered to be the least attractive option for the banks' incumbent shareholders (Myers and Majluf, 1984)⁴. However, instead of asset-side adjustments, the banks may choose the option to add new capital, particularly through retained earnings, by reducing or suspending paying out dividends from profits⁵. The viability of both capital-side channels of adjustment, the ability to issue equity and find investors in the market or raising capital internally, would be related to the state of the economy.

The EBA's capital exercise took place in the context of depressed activity, and although the EBA urged in its Recommendation (EBA, 2011) that the banks and national authorities first use private resources and acquire new capital instead of reducing lending its timing made the exercise susceptible to adverse procyclical effects. Figure 1.1 presents the evolution of credit in Slovenia and the euro area around the implementation of the capital exercise. It shows that despite the early upward trend the volume of credit fell in the euro area by 2011 Q4, and in Slovenia there was already an ensuing credit crunch prior to the introduction of the capital exercise and the non-performing loans (NPLs) were mounting up.

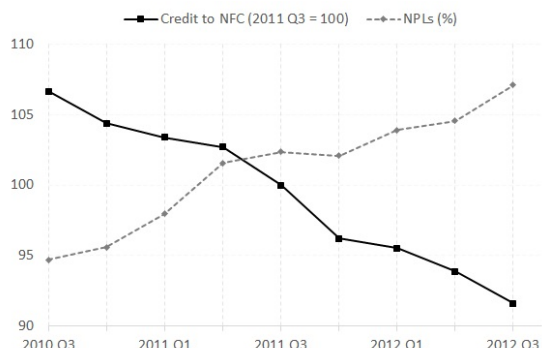
³In fact, the recognition of the endogeneity of the risk (as opposed to the exogenous conception in microprudential policy), which is the own impact of financial institutions on financial stability, has led the macroprudential perspective to emerge as a new policy area (Borio, 2003).

⁴Admati et al. (2018) shows that the distortions to capital structure choices and, incentives against issuing new equity, can be more severe in the presence of debt overhang. Empirical evidence in line with this theoretical prediction is provided in Gropp et al. (2019).

⁵In the case of the retained earnings option, banks can choose to boost their profits by increasing their lending spreads, although this option may also lead to lower credit by reducing loan demand at higher rates. Since equity is a costlier form of finance for banks for the reasons cited above, banks would like to pass on the new costs depending on their market power and to the extent they target a certain rate of return on their equity. Asset-side adjustments may involve reducing loans, rebalancing loan portfolios towards assets with less regulatory risk weights (e.g. by replacing loans to firms with loans to households or with government securities) or asset sales to pay down debt. Nonetheless, there is evidence, provided in Cohen and Scatigna (2016) covering a sample of large banks from advanced and emerging economies, that in the period following the financial crisis banks did increase their capital ratios through equity issuance, cuts in dividends and increases in retained earnings. Cohen and Scatigna (2016) also document that the European banks were the only group for which most of the increase in the capital ratio resulted from lower risk-weighted assets rather than higher capital. However, the authors find that the credit growth by European banks was not slower than the rest of the sample when profitability and existing capital are controlled for.

Figure 1.1: Provision of bank credit in Slovenia and euro area and the Slovenian NPLs around the introduction of the EBA’s capital exercise in 2011 Q4

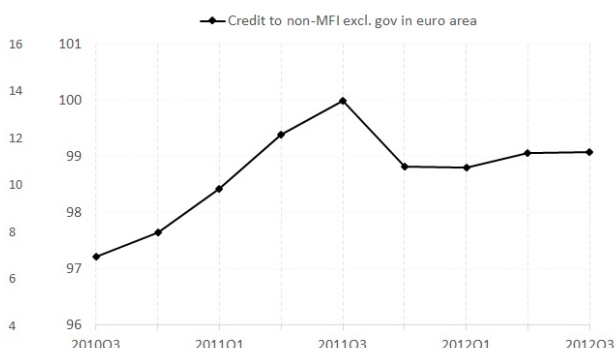
a. Credit to non-financial corporations (2011 Q3 = 100) and NPLs (%) in Slovenia



Note: Slovenian banks’ outstanding credit stock (left axis) and their overall NPL ratios (right axis).

Source: Bank of Slovenia data, own calculations.

b. Credit to non-monetary financial institutions and non-gov. in euro area (2011 Q3 = 100)



Note: Outstanding credit stock by euro area banks, indexed to 100 at 2011 Q3.

Source: <http://sdw.ecb.europa.eu>

Mesonnier and Monks (2015) investigated if EBA’s capital exercise led to a credit crunch in the euro area. Using bank level data and controlling demand at the country level, the authors found that the EBA exercise had procyclical effects in terms of credit supply. At the same time, their estimate is at the lower range of the effects of regulatory capital shocks on credit growth found in the empirical literature⁶. Gropp et al. (2019) find the effect on the constrained banks, employing a difference-in-difference matching estimator and utilizing loan-level data to control for demand, was actually large⁷. Gropp et al. (2019) estimate that the exercise banks with shortfalls reduced their credit supply of syndicated loans by 17 p.p. relative to unconstrained banks, and that resulted in lower growth for firms that were reliant on the treated banks⁸. Both papers point at the risks associated with capital regulation that focuses on capital ratios, especially when the adjustment has to happen in times of distress, and the potential benefits from targeting capital levels instead⁹.

⁶Mesonnier and Monks (2015) estimate that forcing a banking group to increase its CT1 capital by 1 percent of risk-weighted assets was associated with a decrease of 1.2 percentage points (annualized) in their credit supply compared to that of banks in unconstrained groups. Mesonnier and Monks (2015) state that the estimated impact is at the lower end of the estimates in the empirical literature and the difficulty in disentangling the effects of this regulatory capital shock from other events happening during this period, like the accommodative policies in the Eurosystem (e.g. ‘longer term refinancing operations’), might have influenced their results.

⁷The EBA selected the banks into the exercise according to an explicit selection rule that is based on bank size, aiming to cover at least 50% of the national banking sectors in each EU Member State, and the banks were included in descending order of their market shares. This country-specific selection threshold yielded an overlap between banks selected and not selected across the countries (such rule assigns similar banks across the member states into different treatment status). Exploiting this rule, Gropp et al. (2019) employ a matching methodology to match banks from the treatment group to banks from the pool of the control group to ensure results are not driven by the differences between the treatment and control banks. They next move to the issue of disentangling credit supply from credit demand with the loan-level data, and use country-industry firm cluster fixed effects to absorb the demand-side variation.

⁸Gropp et al. (2019) find that the banks adapted to the requirements mainly by reducing their risk-weighted assets (in particular, their credit exposures to corporate and retail clients) rather than increasing their levels of CT1 capital. They estimate that the exercise banks increased their levels of CT1 capital, but the control group raised their CT1 capital by the same magnitude.

⁹Citing the Supervisory Capital Assessment Program conducted by the U.S. Federal Reserve in 2009 as an example.

In this paper, I explore the international dimension of the EBA's capital exercise. At the time Slovenia was hosting the subsidiaries of five EBA exercise bank groups, of which four were assigned shortfalls. The sample consists of two periods, 2011 Q3 and 2012 Q2 (the last quarter before the introduction of the exercise, and the date the banks were required to comply with the target) and it covers all 21 banks that were operating in Slovenia during the sample period (listed in Table A.2.1 in Appendix), which includes the two domestic Slovenian banks that participated in the exercise directly¹⁰. As noted above, the fact that the EBA's capital exercise was not anticipated and that the banks were selected to join the exercise sample not regarding their other preconditions, like their health, makes it possible to establish the causal link from the increase in the capital requirement to the bank outcomes. The new requirements were also high enough to become binding and had heterogenous effects across the exercise banks.

I estimate that the EBA exercise led the subsidiaries of the shortfall banks in Slovenia to contract their credit. A 1 p.p. shortfall at the consolidated level led to a reduction in the credit to non-financial corporations (NFCs) by 2.7 to 4.6 p.p. (annualized) by the shortfall banks' subsidiaries, relative to the Slovenian domestic banks and the foreign-owned banks that were not involved in the exercise. These results show that the introduction of the higher capital ratio requirements with the EBA's capital exercise led these banks to tighten their credit standards and contributed to the credit crunch in Slovenia. A complementary analysis on the real effects and firm outcomes suggests the firms that were borrowing from the subsidiaries of the EBA exercise banks could not compensate for the credit reduction and on average were able to borrow less.

My results are relevant to the developing literature on prudential regulation spillovers and particularly on the so called 'outward' transmission of the prudential policies that represents the effect of a policy activation in one country on other countries (a comprehensive collection of evidence on outward and inward spillovers can be found in Buch and Goldberg (2017))¹¹. A measure applied at the consolidated level, which was the case in the EBA's capital exercise, would particularly be susceptible to outward spillovers (Fahr and Zochowski, 2015). Such spillovers have the potential to be destabilizing if the home country of the parent of a bank group and the countries that host its affiliates are at the different phases of the cycle. This is a significant issue in the financially integrated euro area, where the market share of subsidiaries, which are in fact supervised by the host-country microprudential and macroprudential authorities and need to comply with host-country capital regulations on a standalone basis, was on average 41% (in Slovenia,

¹⁰Two domestic Slovenian banks participated in the exercise directly. They constitute special cases, where one bank was initially a surplus bank but could not keep up with the exercise due to increasing impairments and fell below the minimum requirement by the end of June 2012, and the latter received state aid and was injected capital (EBA, 2012). Therefore, I focus on the behaviour of the subsidiaries of the foreign EBA exercise groups

¹¹This paper summarizes the results of a recent initiative by the International Banking Research Network and the cooperation of the fifteen central banks and international organizations, which led to a collection of researches on the issue of international macroprudential policy spillovers.

46%) across the Member States by the end of 2016 (ECB, 2017). However, a large number of macroprudential tools can be implemented at the consolidated level, including the counter cyclical capital buffer (of which the indicators for activating the buffer are monitored mainly domestically in the home country of the group), at the home national authorities' discretion¹²(where the headquarters of the bank group is located) according to the EU regulation¹³.

The remainder of the paper is organized as follows: Section 2 provides the details about the implementation of the capital exercise and the banking environment in Slovenia in this period; Section 3 presents the methodology; Section 4 presents the results and Section 5 gives the conclusions.

2 The EBA capital exercise and Slovenian banks

The EBA announced in October 2011 that major European banking groups would need to build up capital and reach a 9% CT1 capital over their risk-weighted assets (RWA) ratio by the end of June 2012. The requirement was applied at the highest consolidation level. Banks were also required to add (temporary) capital buffers against their sovereign exposures.

Both the timing and magnitude of the required increases in the capital ratios were unexpected. Originally the CT1 requirement was set at 5% for the previous stress test by the EBA, which was conducted only months before, in July 2011. The selection of the banks was not based on bank-specific events in the months prior. The exercise covered 61 banks comprising most of those that participated in the 2011 EU-wide stress test, while a few were exempted¹⁴. The stress test and the following capital exercise banks were selected on the basis of their size, where EBA aimed to cover more than 50% of total bank assets in each country, and the banks were included after being ranked according to their market shares starting from the largest bank down.

Capital shortfalls were calculated referring to the same definition of capital in the stress test, Core Tier 1 high-quality capital instruments, and as the difference from 9% of RWAs as of September 2011. Buffers against sovereign exposures were required on top. Twenty-seven banks were identified to have an aggregate capital shortfall. In December

¹²Conventional wisdom suggests that, since financial cycles differ from country to country, policies that regard the time varying risks (i.e. the counter-cyclical policies) need to be implemented mainly by the 'host' rather than the 'home' country (Brunnermeier et al., 2009). However, in the absence of a risk-sharing mechanism, home supervisory authorities may be inclined towards reducing the risks for the home country (Goodhart and Schoenmaker, 2009). This limitation is captured by the 'financial trilemma' hypothesis (Schoenmaker, 2011), which asserts financial stability, cross-border financial integration, and standalone national supervision are mutually incompatible.

¹³In EU the European Systemic Risk Board (ESRB) provides a coordination and notification mechanism. The member states need to notify the ESRB and justify their planned actions in advance.

¹⁴The initial sample included 71 banks. Six Greek banks and four other banks (Österreichische Volksbank AG, Dexia, WestLB AG and Bankia) that had been undergoing a restructuring were later excluded.

2011, the EBA issued a recommendation to national supervisory authorities indicating shortfall banks were required to submit their plans to the EBA through their national supervisory authorities by January 2012. The vast majority of those banks could satisfy the requirement by July 2012. Only four banks failed to comply, which required interventions by their governments in terms of providing public backstops, and them to submit plans and commit to fulfilling the requirement by the end of 2012¹⁵.

Table 2.1 presents CT1 and RWAs figures for the sample with a breakdown of shortfall and non-shortfall banks, and it includes information on the Slovenian subsidiaries' parent groups. Five bank groups that were part of the exercise had subsidiaries in Slovenia. Four of these were assigned shortfalls and one was complying with the requirement¹⁶. The table shows that, in line with the EBA Recommendation, shortfall banks improved their capitalisation by adding new capital¹⁷. Nonetheless, the asset-side adjustments are not negligible and visibly larger for the shortfall banks.

Table 2.1: Changes in EBA capital exercise banks' capitalisations and exposures

	CT1 / RWA		CT1 capital			RWA		
	Sep-11	Jun-12	Sep-11	Jun-12	Growth	Sep-11	Jun-12	Growth
All exercise banks (61)	10.4	11.65	954.8	1063.3	11.37	10,147.7	9,680.2	-4.61
Shortfall banks (27)	7.82	10.13	395.7	468.5	18.38	4,920.5	4,561.2	-7.3
Non-shortfall banks (34)	12.45	12.86	559.1	594.9	6.4	5,227.2	5,199.0	-2.07
Slovenian subsidiaries' parents (5)	8.33	10.22	118.4	133.7	12.89	1,397.8	1,296.6	-7.24

Notes: First two columns present the CT1 ratios for two periods as the averages across the banks in percentages. Other columns present the CT1 and RWA figures, in million euros, for all exercise banks, shortfall banks and the Slovenian subsidiaries' parents that were in the EBA sample, together with the growth rates in percentages across two periods. The number of banks in each category is indicated in parenthesis.

Source: EBA capital exercise databases, publicly available.

Two domestic Slovenian banks participated in the exercise directly. While Nova Kreditna Banka Maribor d.d. (NKBM) was initially complying with the requirement by September 2011, it subsequently fell below 9% due to increasing impairments and could not fulfil the requirement by July 2012¹⁸. The Slovenian bank Nova Ljubljanska Banka d.d. (NLB) was among the 27 banks that were initially below the target. NLB could reach the target by the end of June 2012, although state support and capital injections played a critical role (EBA, 2012). The Slovenian subsidiaries' parents that were part of the exercise reached the target. Breakdowns and the respective shortfalls for the two Slovenian banks that directly participated in the exercise and for the parent groups of the Slovenian subsidiaries are presented in Table A.1.1 in Appendix.

¹⁵The Slovenian bank Nova Kreditna Banka Maribor d.d. was among the four banks. The other three were Banca Monte Dei Paschi di Siena S.p.A, Cyprus Popular Bank Public Co Ltd and Bank of Cyprus Public Co Ltd.

¹⁶This group, Banka Intesa Sanpaolo S.p.A, was marginally above 9% when its sovereign exposures were counted.

¹⁷The EBA urged the banks and national authorities to achieve the target mainly via measures that have a direct impact on capital, i.e. by retaining earnings and issuing new equity (EBA press release, Dec. 8th, 2011). According to the final report by the EBA, 72% of all recapitalisation that took place were direct capital measures (EBA, 2012).

¹⁸NKBM submitted in June a plan to meet the target by December 2012.

Table 2.2 presents the credit growth for the EBA banks, the domestic participants and the subsidiaries of participating foreign groups, and the other banks in Slovenia¹⁹ over the three quarters period from 2011 Q4 to 2012 Q2, together with their market shares, CT1 ratios and the share of NPLs on their balance sheets by the end of 2011 Q3. The evolution of these variables between 2010 Q3 and 2012 Q3 is presented in Figure A.3.1 in Appendix, which shows the reduction in credit in the sample period was part of a trend. The deterioration with the NPL ratios started before the sample period and continued after the exercise, with the exception of foreign subsidiaries of EBA banks that fared better regarding the NPLs ratios. The system-wide NPL ratio was at 11.4% by end of 2011Q3 and reached 14.3% by 2012 Q3. For the subsidiaries of EBA banks these figures were at 4.1% at 2011 Q3 and 5.5% by 2012 Q3.

Table 2.2: Slovenian banks' market shares, capital ratios, NPLs and credit growth around the EBA exercise (in %)

	Market share Sep-11	CT1 / RWA Sep-11	NPLs Sep-11	Credit growth Sep-11 - Jun-12
EBA shortfall subsidiary banks (4)	16.7	10.1	4.1	-1.3
EBA domestic banks (2)	37.9	7.8	16	-6.4
Others (15)	45.5	10.5	13.2	-7.5
All banks (21)	100	9.4	11.4	-6.1

Notes: The number of banks in each category is indicated in parenthesis.
Source: Bank of Slovenia, own calculations.

These figures (in Table 2.2 and Figure A.3.1) show that the contraction in credit over the capital exercise period for the rest of the banks (for the banks other than subsidiaries of EBA exercise groups), albeit following an earlier trend, was stronger. On the other hand, the evolution of NPLs points to two issues that deserve attention. First, increasing NPLs, for the rest of the banks, could have impacted the banks' capital positions and constrained their credit in this period. Second, the treatment banks (subsidiaries of the bank groups that were targeted by the EBA exercise) and the control group (the rest of the banks, excluding two domestic banks that were directly involved in the EBA exercise) seem to had been lending to different types of borrowers regarding their risk. This latter issue could lead the banks in the control group to face a procyclical demand, and banks in the treatment and control groups to face different levels of demand in the downturn. These issues underscore the importance of identification and disentangling the factors that affect the demand and supply from the effect of the intervention. The empirical strategy that is introduced in the next section aims to address these issues.

¹⁹In 2011-2012, 21 banks were active in Slovenia. Total bank assets accounted for 135% of GDP and bank-based finance was the dominant form of finance. In terms of ownership structure, in 2011 the banking system comprised eight banks under majority domestic ownership, three banks under 100% domestic ownership and eight banks with majority foreign ownership. The state owned the majority shares of the three largest banks. In terms of funding structure, deposits by non-banking sectors were the most important element, which accounted for 49.6% of total liabilities.

3 Data and Methodology

This section explains the empirical strategy for estimating the effect of the capital exercise on the banks' credit supply. The investigation includes a complementary analysis concerning the overall effect on real outcomes. The sample and data are also explained in the following paragraphs.

3.1 Identification: Disentangling credit supply and demand

Credit growth is determined by supply and demand side factors. Failing to control for the demand-side component of credit growth, which is unobservable, may lead to an omitted variable bias in measuring the impact of a certain factor on the banks' credit supply to the extent credit demand is correlated with the determinants of the bank's credit supply. This bias is quite likely: for instance, in an economic downturn, the demand for credit would be low, but the banks' balance sheets may also deteriorate constraining their ability to make new loans. Furthermore, shocks may impact the banks heterogeneously with respect to the demand they face when there is a matching between the banks and the firms²⁰. The availability of detailed bank-firm level loan data offers a key advantage for overcoming the identification problem.

I adopt the identification strategy proposed by Khwaja and Mian (2008), which entails focusing on firms with multiple bank relationships (rest of the firms are dropped from the sample), and the identifying assumption is that loan demand by the same firm is constant across the banks (i.e. when the firm's loan demand changes over the time dimension, it changes proportionally across the banks that the firm is in borrowing relationships with)²¹. Such within firm comparison absorbs the effect of the firm-specific variations in demand and other firm characteristics²² on credit growth, and the observed effect can be attributed to the differences between the banks.

In my case, the differences in the loan growth across banks, estimated by employing firm-fixed effects and first-differencing the data across before and after EBA announcement dates, stand for the effect of the announcement of the EBA capital shortfalls. The following equation describes the regression that is estimated to identify the causal effect of the EBA

²⁰For example, better capitalised banks might be acting more prudent than the weakly capitalised banks and working with more resilient firms. If this is the case then we cannot be sure that we have disentangled the impact of the intervention that is related to the bank capitalisation from the other developments affecting the firms and the demand side.

²¹This implies that the loans of the banks in the sample are (perfectly) substitutable and the shocks we are interested in should not induce firms to systematically shift their borrowing from one bank to another. This assumption may not hold if banks are specialized and have lending advantages in certain sectors (Rappoport et al., 2015).

²²Banks may prefer not to advance credit to firms even when demand is present, if they evaluate the firm outlook as weak (i.e. banks may do 'credit rationing'). The fixed effects capture all potential firm-side effects on credit growth, including the firm-related risk. On the other hand, we are not able to estimate the effects of specific firm-side variables when the firm-fixed effects are included in the regression equation.

capital shortfalls:

$$\Delta L_{ij} = a_i + \beta_1 * EBA_shortfall_j * F_j + \beta_2 * EBA_shortfall_j * D_j + b_3 * X_j \quad (1)$$

ΔL_{ij} in eq. (1) stands for the growth of loans to firm i from bank j in some interval around the EBA exercise in percentage terms. Firm-fixed effects are introduced by a_i to absorb the firm-related, demand-side drivers of the loan growth. $EBA_shortfall_j$ stands for the size of the shortfall (or of the surplus if the bank had a capital ratio higher than the requirement, with different signs) by September 2011 (2011 Q3) of the domestic bank or the parent group for the Slovenian subsidiary bank j as assigned by the EBA. $F_j(D_j)$ is a dummy variable, and it stands for the foreign (domestic) ownership and is set at 1 (0) if the bank is a foreign subsidiary (or domestic). Coefficients b_1 and b_2 stand for the effects of the shortfall in the respective cases. I estimate two coefficients separately for the effect of the exercise due to two domestic Slovenian banks that participated in the exercise directly (which also constituted special cases, as explained in Section 2). Vector X_j contains appropriate bank-level controls.

The specification above describes a ‘difference-in-difference’ estimation, where the procedure controls for the differences across borrowers and identifies the supply-side drivers of the differences in loan growth between banks in the ‘treatment group’ and the ‘control group’. Subsidiaries of the bank groups targeted by the EBA exercise constitute the ‘treatment group’ and the rest of the banks, excluding domestic banks that were directly involved in the exercise, make up the ‘control group’. A key assumption regarding validity of difference-in-difference estimation is the presence of a common trend across these groups. Diverging trends are not visible in Figure A.3.1(a). Nonetheless, the estimations in the Results section are presented with robustness checks, which include regression specifications where previous loan growth for banks is controlled for and a placebo test where I move the estimation window to cover the period right before the intervention.

The identification strategy of Khwaja and Mian (2008) now constitutes a standard in the empirical banking literature. However, I incorporate a recent contribution: I follow Amiti and Weinstein (2018) and take into account the shares of the firms in the banks’ loan portfolios. This method improves on the unweighted approach to the extent the banks’ loan portfolios are not symmetric (which need not be the case)²³. Hence, regressions are estimated by weighted least squares regarding the respective shares of outstanding loans to firms in the total outstanding loans in the previous period.

²³An inefficiency arises if the loan portfolios are asymmetric (i.e. firms’ shares in the banks’ loan portfolios are uneven) that leads individual loans not to add up to explain the actual loan growth at the bank level.

3.2 Aggregate effect on firm borrowing

A reduction in the supply of credit by certain banks would affect the real economy to the extent that firms cannot substitute the credit previously offered by those banks. Therefore, the analysis is complemented by estimating the effect of the capital exercise on overall firm borrowing in terms of bank credit²⁴.

The regression equation below aims at testing whether firm borrowing was reduced depending on the firms' reliance on the Slovenian subsidiaries of the EBA exercise banks:

$$\Delta L_i = \beta_1 * Share_i + \beta_2 * X_i \quad (2)$$

In eq. (2), ΔL_i stands for the growth of loans to firm i from all banks in Slovenia in the interval around the EBA exercise in percentages. Variable $Share_i$ represents the share of the outstanding credit by subsidiaries of the EBA exercise banks for firm i in its overall borrowing as of the last period before the announcement of the capital exercise. A negative estimate of β_1 would imply the firms that were more dependent on loans from the subsidiaries of the EBA exercise banks experienced larger reductions in the amount they borrowed. X_i includes the financial ratios of the firms with the aim to control for demand- and firm-side drivers of the credit growth. It is necessary to emphasize that in this case the empirical strategy for controlling for demand is weaker compared to the difference-in-difference strategy that is employed for estimating the effect on the bank credit supply, and some caution is required in interpreting the results.

3.3 Data

I use the credit register data available at the Bank of Slovenia, which provides a detailed breakdown of loans at the bank-firm level²⁵. The sample covers observations at two periods: one quarter before EBA capital shortfalls were announced, 2011 Q3, and the deadline for complying with the requirement, 2012 Q2.

The sample is restricted to firms that were indebted to at least two banks, regarding the empirical strategy that was introduced in the previous section. Thus, the sample covers 9,820 firms that were in the same period indebted to at least one bank, and that accounts for 20.3% of the all firms (firms with missing values are excluded). However, the loan amount covered in the analysis is about 85% of all loans, which suggests the sample is representative. The explanation for the large difference between the number of the firms

²⁴It would be ideal to estimate the effect on firm investment. However, this is not possible regarding the availability of reliable data on investment. This may be of a less concern considering the central role of banks in finance in Slovenia, i.e. market finance was less an alternative, and internal resources for finance could also be limited in an economy that was already in a downturn.

²⁵Household loans, only available being cumulated across risk buckets, are not included in the sample. The loans to firms cover the majority of the total loan volume to the private non-financial sector. Loans to households represented 29.3% of all loans by the end of 2011.

and the loan amount covered is that larger firms often work with multiple banks and hold bigger loans. The sample is restricted to performing firms and loans. Finally, the sample covers the observations that fall within the range from the 5th to 95th percentiles of the distribution regarding the dependent variable, loan growth, to eliminate the effect of the outliers. Table 3.1 presents the summary statistics for the dependent variable and the main bank level control variables that are included in each regression.

Table 3.1: Summary statistics

Variable	Unit	Mean	Std. Dev	Min	Max	Obs.
Loan growth	%	-7.77	0.28	-66.47	100	10240
Log total assets	Log (EUR bln)	15.04	0.91	10.27	16.42	10240
Capital adequacy ratio	%	11.97	0.97	10	14.69	10240
Non-performing loans	%	9.59	3.86	0.12	14.74	10240

Notes: Loan growth is the growth in the outstanding loans to each firm by the banks in the sample from the end of 2011 Q3 to end of 2012 Q2. Total assets, capital adequacy ratio and non-performing loans are bank-level variables at their values as reported in 2011 Q3.

Source: Bank of Slovenia, own calculations.

4 Results

The descriptive analysis in Section 2 showed that the overall credit contracted in the period following the introduction of the capital exercise, while a prior deleveraging trend in Slovenia was also present. The credit provided by the subsidiaries of the groups that participated in the capital exercise did not decrease more than that provided by the rest of the banks in Slovenia within the exercise period. However, as discussed above, one cannot determine the bank-side drivers of the change in the loan volumes or the impact of the implementation of the capital exercise from these descriptive figures without controlling for the changes in the demand the banks face for their credit. This section presents the results from employing the identification strategy introduced in the previous section, which addresses the issue of the unobservable demand. The analysis is complemented with a discussion on the overall effects of the exercise on firm borrowing.

The estimates from difference-in-difference regressions are given in Table 4.1. Regarding my research question, I am primarily interested in the effect of the new requirements on the provision of credit in Slovenia through the subsidiaries of the exercise banks. This effect is represented by the coefficient of EBA shortfall x Foreign. Dependent variable in all specifications is firm i loan growth from bank j in percentage terms between 2011 Q3 - 2012 Q2. Each regression includes the control variables: Capital adequacy ratio, Share of NPLs and Total assets. Models (3) to (5) include additional controls for robustness checks.

According to specifications (1) and (2), a 1 p.p. shortfall at the group level led to a credit contraction of 2.2 p.p. (over three quarters on average for four subsidiaries, annualized: 2.9 p.p.) for the subsidiaries in Slovenia by June 2012. While the coefficient representing the effect of the higher requirements on the domestic exercise banks is not negative, it is hard to comment on these estimates regarding the specific conditions of these banks, as discussed previously, and they are included in the models as control variables. The sign of the share of NPLs has the expected sign, but the estimates for the other two control variables are not consistent through the specifications in terms of their significance and signs.

Table 4.1: The effect of EBA shortfalls on bank lending

	(1)	(2)	(3)	(4)	(5)
	ΔL	ΔL	ΔL	ΔL	ΔL
EBA shortfall x Foreign	-0.022***	-0.022***	-0.034***	-0.024***	-0.020***
EBA shortfall x (1-Foreign)		-0.003	0.001	0.000	0.004
ΔL_{-1}			0.034***	0.026***	0.024***
Foreign (dummy)				-0.022**	-0.017*
Capital adequacy ratio	0.002	0.002	-0.002	-0.003*	-0.002
Share of NPLs	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***
Total assets	-0.003	0.001	0.013**	0.006	0.000
Constant	0.004	-0.042	-0.166	-0.045	0.031
Firm FE	YES	YES	YES	YES	YES
Number of observations	10,240	10,240	10,240	10,240	10,240

Note: Table reports the estimation results for the loan-level difference-in-difference models as described by equation (1). The dependent variable in all the equations is firm i loan growth in bank j in percentage terms in the period 2011 Q3 - 2012 Q2. EBA Shortfall is the amount of the EBA shortfall (surplus) in 2011 Q3 and positive (negative) values stand for being below (above) the target. At specification (5) +1 is added to the shortfall variable. Capital adequacy ratio, Share of NPLs and Total assets are taken from 2011 Q3. ΔL_{-1} is bank specific credit growth in 2011 Q3 over the previous quarter. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Models (3) to (5) provide the robustness checks. ΔL_{-1} is bank-specific credit growth in 2011 Q3 over the previous quarter. This variable aims to take into account the trend in credit supply by the banks: If shortfall banks were also those that were already contracting their credit before the implementation of the exercise, and they were contracting the credit more, then the identified effect could be wrongly attributed to the exercise. In fact, there is a correlation between prior lending growth and the lending growth by a bank to its customers in 2011 Q3 - 2012 Q2. The ‘Foreign’ variable is a dummy that is set at 1 for any subsidiary in Slovenia. Its coefficient suggests foreign banks contracted compared to domestic banks (or domestic banks expanded relatively). Although these variables turned out to have significant explanatory power, the coefficients regarding the effect of the exercise remain significant, with comparable sizes as before. Finally, the banks might have aimed to keep a safe margin above the minimum requirement. In specification (5) the shortfall/surplus is calculated as if the requirement was 1% higher ²⁶. A placebo test is provided in Appendix A.4 that covers the preceding period of three quarters between 2010 Q4 - 2011 Q3 in place of 2011 Q3 - 2012 Q2, with the aim to provide a further robustness check as to whether the results were indeed driven by the EBA exercise.

²⁶This increases the number of banks treatment group from four to five, where the group of Banka Intesa Sanpaolo was above the requirement by only 0.2%.

In the preceding analysis the difference-in-difference set-up allowed for identifying the causal effects and not only the correlations: Within firm estimation enables isolating the supply-side drivers of credit growth, where the demand is absorbed by the firm-fixed effects, with the assumption the loan demand of a firm is constant across the banks for the firms with multiple bank relations. Estimated coefficients on capital shortfalls stand for the relative contraction of the credit by the EBA shortfall banks, depending on the level of their shortfall, compared to banks that were not involved in the exercise. The findings indicate that the causal effect of the EBA exercise on lending by subsidiaries of the EBA banks was contractionary, and I estimate that 1 p.p. higher capital requirements at the consolidated level led the subsidiaries to contract their credit by 2.7 p.p. and 4.6 p.p. in annualized terms (2 p.p. to 3.4 p.p., over nine months).

These estimated effects on credit supply are larger than the one documented in Mesonnier and Monks (2015), which estimated that a 1 p.p. CT1 capital shortfall in EBA’s capital exercise led to a 1.2 p.p. (annualized) decrease in the targeted banks’ credit supply. The authors note that their result is at the lower end of available estimates in the literature. However, Gropp et al. (2019) find larger effects from the EBA’s capital exercise on syndicated loans, where they estimate that the exercise banks with shortfalls reduced their supply of syndicated loans by 17 p.p. relative to unconstrained banks. While Gropp et al. (2019) too employ an identification à la Khwaja and Mian (2008) to control for demand, they take advantage of a larger sample and use a matching methodology to make sure the treatment and control samples are comparable²⁷. On the other hand, Sivec and Volk (2017), using information from the ‘supervisory review and evaluation process’ (SREP) in Slovenia and letters of notification on capital shortfalls to the banks, find that a bank with a capital shortfall decreased its credit supply by 3.1 p.p. more than a bank with a capital surplus, on average in the three quarters following the assignment of the shortfall in the period 2009-2015. Taking into account the shortfall banks in the Slovenian SREP were on average 3.3 p.p. below the requirement in this period (Sivec and Volk, 2017) and the parents of the Slovenian subsidiaries were in a shortfall of 1.2 p.p. on average (Table A.1.1), the estimated effect in Sivec and Volk (2017) can be considered to be smaller than my estimates²⁸.

Complementary analysis of the aggregate effect

While the effect of the intervention on the provision of credit by the subsidiaries of the bank groups that took part in the EBA’s capital exercise is found to be negative, the overall effect on firm outcomes could be unimportant depending on the firms’ ability to switch the source of bank credit. Table 4.2 presents the results from estimating the regression given in equation (2) that aims to test the overall effect on credit growth.

²⁷The difference-in-difference methodology estimates the effects in relative terms, between the banks in the treatment and control groups. Arguably, the capital requirements might have a non-linear effect on bank lending where banks engage in forms of relationship lending, and accordingly there may be limits to how much the banks could contract their credit over the other banks in a country that was already experiencing a credit crunch. One also needs to take note of the specific nature of syndicated loans, in which banks partner with other financial institutions to originate large loans and the presence of already binding regulations may be among the potential motivations for the banks to issue syndicated loans.

²⁸The banks similarly had three quarters to comply with the requirements, at the regular SREPs and the 2011 EBA capital exercise. However, the differences in sample periods might have had a role in the differences in the estimates, where my results are based on a single event in which the banks might have had limited options besides contracting their credit.

The coefficient for Share is estimated to be negative. The estimate is significant at 10% significance level at the specification that includes firms' credit ratings²⁹. The estimated coefficient in this specification suggests a firm that was only borrowing from subsidiaries of the EBA exercise banks would on average experience 1.3% reduction in credit over the exercise period (three quarters), compared to the firms that borrowed entirely from the other banks³⁰.

Table 4.2: Overall effect on firm borrowing

	(1)	(2)
	ΔL	ΔL
Share (of EBA subs.)	-0.0084	-0.0127*
Quick ratio	0.0011*	0.0011*
Debt-to-asset ratio	0.0013	0.0021
Asset turnover ratio	0.0156***	0.0149***
Return on assets	0.0211	0.0199
Rating		-0.0117***
Constant	-0.1156***	-0.095***
Number of observations	12,573	12,566

Notes: Table reports the effect of capital shortfall on aggregate firm borrowing. Variable Share is the share of loans borrowed from banks with a capital shortfall for a firm in its total loans. Significance: * $p < 0:10$, ** $p < 0:05$, *** $p < 0:01$.

5 Conclusion

The European Banking Authority's capital exercise in 2011/2012, introduced with the aim of improving the capital ratios of major banking groups in Europe, provided a unique policy experiment for studying the effects of capital-based regulation. I focused on the international dimension of the exercise in order to explore the cross-border impact of the intervention, which was implemented at the consolidated level and aimed higher capitalisation by setting a ratio target. I found the introduction of the higher capital requirements led the Slovenian subsidiaries of exercise bank groups to tighten their credit, while there was an ensuing credit crunch in Slovenia.

My results are in line with the earlier findings in the literature, and point to the importance of incorporating the macroprudential perspective in policy decisions. The results moreover provide empirical evidence that outward regulatory spillovers can be significant with adverse cross-border effects.

²⁹Credit ratings are banks' subjective assessments of their non-financial corporate clients' creditworthiness, where the banks grade their clients in a five-grade rating scale. While the coefficient for Share is negative at both specifications, it is significant only when the credit rating of the firm is controlled for. One can argue that this result points to the importance of adequately controlling for the factors on the demand side, including the firm characteristics that are unobservable and cannot be represented by certain ratios.

³⁰This result is comparable to the aggregate effect of capital shortfalls on aggregate firm borrowing documented in Sivec and Volk (2017). They estimate a firm that borrows only from banks with a shortfall is expected to have on average 3 p.p. lower loan growth than a firm that borrows from surplus banks, where SREP shortfalls were on average larger.

These findings are relevant for the European Union context, which is a financially integrated union with limited risk-sharing mechanisms that might lead home supervisors of the internationally active bank groups to prioritize reducing risks at home. In particular, implementation of prudential regulations at the consolidated level has the potential to be destabilizing when the home country of the parent of a bank group and the countries that host the affiliates of the group are at different phases of the cycle. My results, overall, highlight the importance of cooperation in the implementation of prudential policies in this context.

In this paper I focused on the impact of EBA's capital exercise in Slovenia, taking advantage of the firm-loan level credit register data available at the Bank of Slovenia. Exploiting the multinational dimension of the EBA's capital exercise can potentially provide further insights on the national prudential authorities' preferences and on bank groups' internal decision-making processes in allocating resources across their substructures when responding to regulations.

References

- Admati, A. R., P. M. DeMarzo, M. F. Hellwig, and P. Pfleiderer (2013). Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Socially Expensive. Discussion paper series of the max planck institute for research on collective goods, Max Planck Institute for Research on Collective Goods.
- Admati, A. R., P. M. Demarzo, M. F. Hellwig, and P. Pfleiderer (2018). The Leverage Ratchet Effect. *Journal of Finance* 73(1), 145 – 198.
- Amiti, M. and D. E. Weinstein (2018). How Much Do Idiosyncratic Bank Shocks Affect Investment? Evidence from Matched Bank-Firm Loan Data. *Journal of Political Economy* 126(2), 525–587.
- Borio, C. E. V. (2003). Towards a macroprudential framework for financial supervision and regulation? BIS Working Papers 128, Bank for International Settlements.
- Brunnermeier, M. K., C. A. Goodhart, C. P. Avinash, and H. S. Shin (2009). The fundamental principles of financial regulation. Geneva Reports on the World Economy 11, Centre for Economic Policy Research (CEPR), London, UK.
- Buch, C. M. and L. Goldberg (2017). Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network. *International Journal of Central Banking* 13(2), 505–558.
- Cohen, B. and M. Scatigna (2016). Banks and capital requirements: Channels of adjustment. *Journal of Banking & Finance* 69(S1), S56–S69.
- EBA (2011). Recommendation on the creation and supervisory oversight of temporary capital buffers to restore market confidence. Technical Report EBA REC 2011 1, European Banking Authority. December, 2011.
- EBA (2012). Final report on the implementation of capital plans following the EBA’s 2011 Recommendation on the creation of temporary capital buffers to restore market confidence. Technical Report BS 2012 188, European Banking Authority. October, 2012.
- ECB (2017). Report on financial structures. Technical report, European Central Bank. October, 2017.
- Fahr, S. and D. Zochowski (2015). A Framework for Analysing and Assessing Cross-Border Spillovers from Macroprudential Policies. *Financial Stability Review* 1, 1.
- Goodhart, C. and D. Schoenmaker (2009). Fiscal Burden Sharing in Cross-Border Banking Crises. *International Journal of Central Banking* 5(1), 141–165.
- Gropp, R., T. Mosk, S. Ongena, and C. Wix (2019). Banks Response to Higher Capital Requirements: Evidence from a Quasi-Natural Experiment. *Review of Financial Studies* 32(1), 266–299.

- Khwaja, A. and A. Mian (2008). Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. *American Economic Review* 98(4), 1413–42.
- Mesonnier, J.-S. and A. Monks (2015). Did the EBA Capital Exercise Cause a Credit Crunch in the Euro Area? *International Journal of Central Banking* 11(3), 75–117.
- Modigliani, F. and M. H. Miller (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review* 48(3), 261–297.
- Myers, S. C. and N. S. Majluf (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13(2), 187–221.
- Rappoport, V., P. Schnabl, and D. Paravisini (2015). Comparative Advantage and Specialization in Bank Lending. 2015 Meeting Papers 499, Society for Economic Dynamics.
- Schoenmaker, D. (2011). The financial trilemma. *Economics Letters* 111(1), 57–59.
- Sivec, V. and M. Volk (2017). Bank Response to Policy Related Changes in Capital Requirements. Mpra paper, University Library of Munich, Germany.

A Appendix

A.1 Domestic EBA banks and the Slovenian subsidiaries of bank groups that participated in the exercise

Table A.1.1: EBA capital exercise banks' capitalisations and exposures

	CT1/RWA			CT1 capital			RWA		
	Sep-11	Jun-12	Shortfall	Sep-11	Jun-12	Growth	Sep-11	Jun-12	Growth
	Domestic EBA banks								
NLB	6.78	9.81	-2.22	0.977	1.248	27.75	14.405	12.718	-11.71
NKBM	9.39	7.44	1.19	0.47	0.349	-25.74	5.003	4.688	-6.3
	Foreign EBA bank groups with subsidiaries in Slovenia								
Erste Group Bank	8.4	9.87	-0.6	10.321	10.783	4.48	122.933	109.294	-11.1
Raiffeisen Zentralbank Österreich	7.04	10.03	-1.96	7.617	8.898	16.82	108.263	88.666	-18.1
Société Générale	8.42	9.89	-0.58	30.974	33.867	9.34	367.831	342.507	-6.88
Intesa Sanpaolo S.p.A	10.03	10.95	0.2	32.826	33.762	2.85	327.377	308.353	-5.81
Unicredit S.p.A	7.78	10.36	-1.96	36.682	46.377	26.43	471.364	447.734	-5.01

Note: The first two columns present the CT1 ratios for two periods as the averages across the banks in percentages. The third column provides the shortfalls over RWA in percentages. The shortfall is calculated as the difference to the 9% CT1 requirement plus the sovereign buffer (shortfall = $0.09 \times \text{RWA} - \text{CT1 capital} + \text{Sovereign buffer}$) and once again I take the ratio over the RWA. In this table (+) stands for a surplus in the table and (-) is a shortfall. Other columns present the CT1 and RWA figures in millions of euros. Source: EBA capital exercise databases, publicly available.

Table A.1.2: Capital exercise banks' subsidiaries in Slovenia (2011 - 2012)

Bank	Parent
Banka Sparkasse	Erste Group Bank AG (Austria)
KBS Banka	Raiffeisen Zentralbank Österreich (Austria)
SKB Banka	Subsidiary of Société Générale (France)
Unicredit Banka Slovenija	Unicredit S.p.A. (Italy)
Banka Intesa Sanpaolo	Intesa Sanpaolo S.p.A. (Italy)

A.2 List of the banks with the stated EBA shortfalls

Table A.2.1 below presents the list of banks in Slovenia and the associated capital shortfalls according to the 2011 EBA exercise. Two domestic banks directly participated in the EBA exercise, NKBM and NLB (while NKBM is currently a foreign subsidiary, it was a domestic bank earlier at the time of the EBA exercise). Only NLB was assigned a capital shortfall. No foreign subsidiary in Slovenia took part in the EBA exercise directly, and the associated shortfalls in the table stand for the shortfalls assigned to the parents of their groups.

Table A.2.1: Slovenian banks and the EBA exercise 2011 - 2012

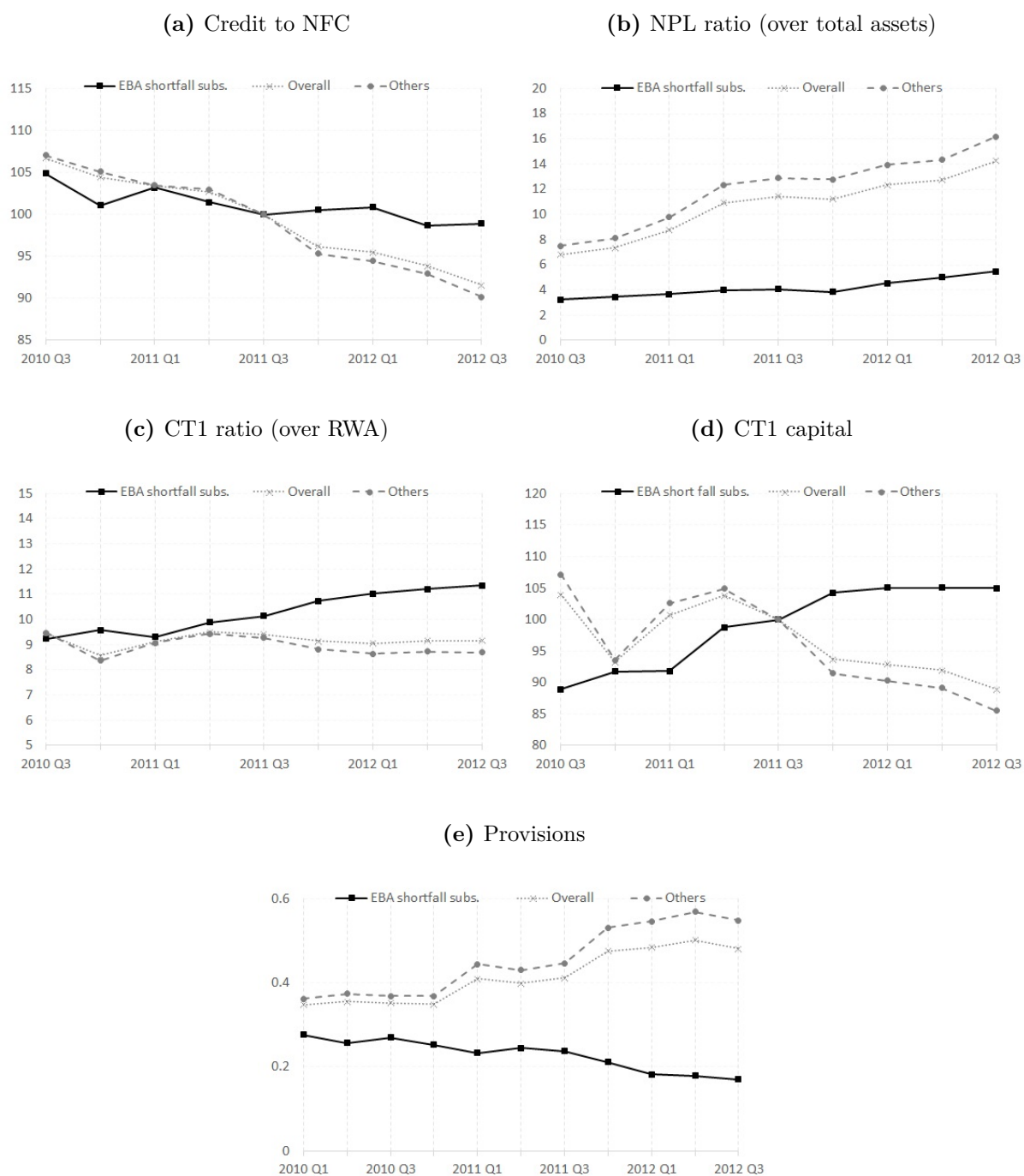
	Ownership	EBA included	EBA Shortfall (%)
Nova Kreditna Banka Maribor (NKBM)	D	1	1.19
Nova Ljubljanska Banka (NLB)	D	1	-2.22
Banka Sparkasse	F	1	-0.6
KBS Banka	F	1	-1.96
SKB Banka	F	1	-0.58
UniCredit Banka Slovenija	F	1	-1.69
Banka Intesa Sanpaolo	F	1	0.2
Abanka VIPA	D	0	0
Banka Celje	D	0	0
Delavska Hranilnica	D	0	0
Deželna Banka Slovenije	D	0	0
Factor Banka	D	0	0
Gorenjska Banka	D	0	0
Hranilnica Lon	D	0	0
Hranilnica Posojilnica Vipava	D	0	0
KD Banka	D	0	0
Probanka	D	0	0
SID-Slovenska Izvozna in Razvojna Banka	D	0	0
ADDIKO Bank	F	0	0
BAWAG banka	F	0	0
Sberbank Banka	F	0	0

Note: D stands for the domestic banks and F indicates the subsidiaries of foreign groups. In this table a negative shortfall value stands for the gap and the bank needs to improve its capital ratio, and positive is a surplus (bank capital is higher than the 9% requirement) at group level (not individual banks, in the case of the banks with non-zero values that are indicated with F). Delavska Hranilnica, Hranilnica Lon and Hranilnica Posojilnica Vipava are savings banks.

Source: Shortfall figures are taken from publicly available EBA capital exercise database.

A.3 Evolution of credit, capitalisation, NPLs and provisions

Figure A.3.1: Balance sheet items relevant for the banks' credit supply constraints



Note: The graphs present the weighted averages (weighted by the banks' total assets) for CT1 and NPL ratios (in %). Credit to NFC, CT1 capital and Provisions are total outstanding volumes indexed at 100 at 2011 Q3. Banks are grouped as subsidiaries of EBA shortfall groups in Slovenia (four banks) and the rest of the banks in Slovenia (17 banks).

A.4 Placebo test over the period that precedes the EBA capital exercise

The placebo test repeats the estimations whose results were presented in Table A.4.1, while the period is 2010 Q4 - 2011 Q3 instead of 2011 Q3 - 2012 Q2. The results are provided in Table A.3. The placebo test shows that in the three quarters period that preceded the capital exercise the subsidiaries of the exercise banks, as opposed to the earlier results for the period 2011 Q3 - 2012 Q2, did not contract their credit compared to the rest of the banks.

Table A.4.1: The effect of EBA shortfalls on bank lending

	(1)	(2)	(3)	(4)	(5)
	ΔL	ΔL	ΔL	ΔL	ΔL
EBA shortfall x Foreign	0.008	0.007	0.003	0.009	0.008
EBA shortfall x (1-Foreign)		-0.006**	0.000	-0.001	0.000
ΔL_{-1}			0.003***	0.002***	0.003***
Foreign (dummy)				-0.021**	-0.023**
Capital adequacy ratio	-0.002	-0.002	-0.003	-0.003	-0.003
Share of NPL	0.003**	0.003*	0.006***	0.005***	0.005***
Total assets	0.011***	0.016***	0.020***	0.013***	0.013**
Constant	-0.245	-0.318	-0.329	-0.214	-0.205
Firm FE	YES	YES	YES	YES	YES
Number of observations	10,240	10,366	10,366	10,366	10,366

Note: Table reports the estimation results for the loan-level difference-in-difference models as described by equation (1). The dependent variable in all the equations is firm i loan growth in bank j in percentage terms in the period 2010 Q4 - 2011 Q3. EBA Shortfall is the amount of the EBA shortfall (surplus) in 2011 Q3 and positive (negative) values stand for being below (above) the target. Based on specification (5), +1 is added to the shortfall variable. Capital adequacy ratio, Share of NPLs and Total assets are taken from 2011 Q3. ΔL_{-1} is bank specific credit growth in 2011 Q3 over the previous quarter. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.