Macroprudential Policy Evaluation using Credit Registry Data: Argentina, 2009-2014 *

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Abstract

We aim to assess the impact of macroprudential policy measures on credit growth at the firm level, using credit registry panel data from Argentina. We examine the impact of the introduction and tightening of a capital buffer and a limit of the foreign currency position of financial institutions on credit growth of firms, controlling for macroeconomic, financial institutions and firms' variables; the model is estimated for the period 2009-2014. We find that the capital buffer is generally associated to lower credit growth, both when introduced and when tightened; limits on global foreign currency position are linked to lower credit growth when tightened; measures operate both on the extensive and the intensive margins. Macroprudential policies also have an effect on credit quality: growth of non-performing loans is reduced after their implementation. And in general, credit granted by banks with more capital and assets evidences a higher impact of the introduction of the capital buffer, while this measure also acts more acutely during econonomic activity expansions.

JEL classification codes: E58, G28, C33
Keywords: Macroprudential policy, credit registry data, panel data models

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1 Introduction

In recent years, macroprudential tools have come to the forefront of the discussion on financial stability policy. Several aspects of macroprudential policy pose challenges to both analysts and policy-makers, including the proper definition of such policy, its implementation and the relevant evaluation of its impact. As macroprudential policy (MPP), by definition, is concerned with system-wide repercussions of the behaviour of financial institutions, beyond purely individual risk-taking, impact evaluation has both macroeconomic and microeconomic dimensions. While there is a relatively established body of work for the former, the latter is actually very scant. This contrasts with impact evaluation literature in other policy areas, which has profitted substantially from the growing availability of microdata. In this paper, we aim at assessing two types of macroprudential measures taken in Argentina from 2010 onwards, using credit registry data and microeconometric models.

Emerging market economies (EMEs) have long put in place the kind of measures that only more recently have become widely known (and applied) as "macroprudential". Measures that exceed the safeguarding of individual financial institutions' risk to cover their system-wide impact, as well as their possible spillovers on the economy at large (and from the economy to the financial system) have only become widespread since the breakout of the international financial crisis, following a period of steady discussion and development (Borio, 2003); it is perhaps unsurprising that EMEs, with a track record of financial crises since at least the mid-1970s, have been pioneers of macroprudential policy. This makes EMEs a natural starting place for studies on MPP effectiveness, as there is a wider variety of measures that have been taken, and they have been in place for a longer period of time, than in advanced economies.

Argentina is no exception to the rule: the demise of the currency board regime, which pegged the Argentine peso to the US dollar in context of free capital mobility from 1991 to 2001, provided dramatic evidence on the close link between financial system and macroeconomic performance; in the same breath, it illustrates with utmost clarity the "risk taking channel" of monetary policy (Borio and Zhu, 2008), in that an implicit guarantee provided by monetary policy (perfect exchange rate stability) led to behaviour that assumed that a complete tail of the exchange rate risk distribution (foreign exchange depreciation) had virtually vanished. It was only natural that, from 2003 onwards, Argentine financial system regulation incorporated aspects such as explicit and implicit currency mismatches, and, in general, features that acknowledge the macro-financial link. This makes a study of the Argentine case worthwhile for policy design more generally in EMEs.

While EMEs' experience with macroprudential regulation make them an excellent showcase for studying the design and impact evaluation of such measures, studies have tended to survey and clasify national and regional experiences, and use macroeconometric models (see, for instance, Lim et al, 2011); or, more incipiently, models have been developed that introduce "financial frictions" into conventional representations of macroeconomic and monetary policies (see Roger and Vlcek, 2011, for a survey[1]). There is ample scope for impact evaluation that goes beyond case studies and macroeconometric or theoretical models. In this sense, a microeconometric approach that profits from available credit data at a more granular level can shed light on the actual effect of policies; this is already widely applied in other policy fields, and the fact that many central banks collect credit registry data periodically in many Latin American countries represents an excellent opportunity for policy-relevant microeconometric research.

In this paper, we use data from Argentina's *Central de Deudores*, a database of all borrowers

[1] For Latin America, substantial work has been carried out by members of the BIS CCA working group on "Incorporating financial stability consideration into central bank policy models".

from financial institutions supervised by the Central Bank of Argentina; we take a subset of the registry (law persons) to focus on credit to companies (as opposed to households, or physical persons), and how its growth at the individual financial institution-firm relationship was affected after the introduction and tightening of two different macroprudential policy instruments: a capital buffer and a limit of the foreign exchange position of financial institutions.

A fundamental empirical decision has to do with what we ultimately aim to assess: the effectiveness of macroprudential policy . Does this have to do with policy actually curbing credit growth, or with it contributing to banks' resilience in the face of shocks? We tend to think the latter is more akin to a proper definition of MPP final objective, while the former may be considered an intermediate target in some cases. Credit growth over some threshold is conventionally considered a sufficiently strong early warning indicator of financial crises; but there are reasons to think that in underdeveloped financial systems this may not always be the case. Structurally low credit-to-GDP may mean that more or less prolonged periods of credit growth are actually part of a financial development process and not necessarily an indicator of the build up of pressures in the credit market. Actually, in such countries, authorities may be pursuing financial development policies while at the same time implementing some type of MPP in order to strengthen the financial system and/or decrease risks that exceed individual financial institutions' performance. If this is the case, a regression of credit growth against an indicator of MPP and controls would not necessarily be testing the effectiveness of MPP; it would only test whether MPP limits credit growth. All things considered, macroprudential policy evaluation should be carried out over several dimensions; credit growth is only one of them. With this caveat in mind, we proceed to measure the impact of MPP on credit growth at the firm level as a first step in a comprehensive assessment.

The rest of the papers is organized as follows. Section 2 puts our work in the context of empirical assessments of macroprudential policy. Section 3 describes credit registry data in Argentina, and the subset of it we will employ; section 4 reviews the main features of the Argentine macroprudential policy framework, and the two particular measures we analyze. Section 5 looks at the interplay between MPP measures and our credit registry data sample, providing descriptive statistics as a first approximation to our analysis; and then presents the econometric model and its main results. Section 6 concludes.

2 Related literature

Recent empirical evidence about the effectiveness of macroprudential policies is still in a preliminary stage. More work is needed in order to identify which are the most suitable policies to mitigate financial system vulnerabilities. The literature about the subject can be divided into macro- and microeconometric studies. The first group includes cross-country studies that use macroeconomic data to analyze the link between macroprudential policies, credit growth and other financial indicators. Most of this work is based on the dataset presented by Lim et al (2011). These authors show that policies such as loant-to-value (LTV) and debt-to-income (DTI) limits, ceilings on credit growth, reserve requirements, and dynamic provisioning rules are associated with reductions in the procyclicality of credit and leverage. IMF (2012) explores the interaction between monetary and macroprudential policies using the same IMF survey. Focusing on capital requirements, reserve requirements, and LTV and DTI caps, the work finds that capital and reserve requirements constrain growth but that the effects differ in credit busts versus credit booms for capital requirements.

More recent papers have updated the existing databases or have created new ones in order

to test the robustness of previous results. Kuttner and Shin (2013) use a BIS dataset of macroprudential measures covering as far back as 1980 for some countries. Using three different econometric techniques, they find evidence for the economic and statistical significance of DTI and housing taxes on house price inflation. Bruno et al (2014) also use the BIS macroprudential policy and a dataset of capital flow management policies to study the effects of these policies on credit, banking flows and bond flows in twelve Asian countries. They find that monetary and macroprudential policies were used as complements in Asia from 2004 to 2013. Akinci and Olmstead-Rumsey (2015) cover 57 advanced and emerging economies from 2000 to 2013, and construct an index of domestic macroprudential policies. Their main findings suggest that macroprudential tightening is associated with lower bank credit growth, housing credit growth and house price inflation and that LTV,DTI and capital requirements measures emerges as the more effective policies. Additionally, the paper finds that macroprudential policies taken in emerging and advanced economies are different; while the former have adopted measures to monitor credit growth, the latter have used policies to control the evolution of the housing sector.

Focusing specifically on Latin America, Tovar et al. (2012) look at the impact on credit growth of reserve requirements and other MPP tools, including limits on foreign exchange positions; they find that they actually contribute to curbing credit procyclicality in a transitory fashion. In turn, Tobal (2014) presents a survey of foreign exchange MPP tools in Latin America, requesting central banks to provide information on the goals they pursued: controlling credit growth; achieving exchange rate stability; reducing currency mismatches; reducing maturity mismatches in foreign currency positions; correcting current account imbalances. Results show that reducing currency mismatches is the main purpose, followed by achieving exchange rate stability; and that the bulk of such measures were taken as countries were moving to more flexible exchange rate regimes -including inflation targeting ones.

The second group of studies is incipient and largely charaterized by those that use micro-level evidence. This includes bank-level and credit registry data. Drehmann and Gambacorta (2011) aim to determine if the countercyclical capital buffer designed in the Basel III package could impact on bank lending, using quarterly balance sheet information of 772 individuals from the EU countries and United States, extending from 1998 to 2009. They simulate the increase in capital requirements if the countercyclical capital buffer had been operating since 1986; and.embed the additional capital in a lending equation to assess how the introduction of the buffer would have changed the supply of lending. They find that the buffer could help to reduce credit growth during booms and attenuate the contraction once it is released. Claessens et al (2014) use Bankscope's data to construct a panel of 2820 banks (1650 in 23 advanced countries and 1170 in emerging economies) over the period 2000-2010. They group macroprudential policies according to whether they are aimed at borrowers, bank's assets or liabilities, policies that encourage counter cyclical buffers and a final group of miscellaneous policies. They find that both caps on borrower's and financial institutions' assets and liabilities based measures are effective in reducing the growth in assets. Buffer-based policies seem to have little impact.

Jiménez et al (2013) attempt to answer the question of whether a low monetary policy rate impacts on the composition of the supply of credit, in particular on bank's risk taking, using monthly data from the Credit Registry of Spain between February 2002 and December 2008. They estimate a Tobit model in two stages. In a first stage the granting of the loan application is determined; later, if the application is not rejected and the loan is granted, the credit amount the bank commits to each applicant is analyzed. The findings show that a lower overnight interest rate induces banks to engage in higher risk-taking in their lending rate. Moreover, a lower overnight interest rate induces lowly capitalized banks to grant more loan applications to ex-ante risky firms than highly capitalized banks; when granted, the committed loans are larger

in volume and are more likely to be uncollateralized. There is also evidence that applications granted by lowly capitalized banks also have a higher ex-post likelihood of default.

Most of the evidence on the relationship between macroprudential policies and financial institutions' performance produced so far has been obtained using aggregate data at country level or bank-level data; and a very limited use has been made of credit registry data. Our paper is a contribution to this latter strand.

3 Credit registry data in Argentina

Financial institutions under regulation and supervision of the Central Bank of Argentina (BCRA) inform monthly outstanding credit balances of their debtors since 1996; information is compiled and published by BCRA as *Central de deudores* (*Debtors' central*). The database is available on CD-ROM for purchase by the public, and individual debtor's information can be accessed on BCRA's website using the individual tax identification number. Informing institutions include: banks (public, private –domestic, foreign and branches-), non-banking financial institutions (domestic and foreign), and credit companies (*cajas de crédito*).

Information provided by financial institutions to *Central de Deudores* comprises both debtor identification and credit characteristics. The former include whether it is physical or law person, its residency, whether it belongs to the private or public sector, its main economic activity, if it is a small or medium-sized enteprise (according to the financial institution that granted the loan), and whether it is a commercial or consumption debtor). Information on credit includes: amount in national currency (AR$); type of loan (overdraft, promisory note, pledge, mortgage, personal, credit card, others); situation as classified by the lending institution, i.e. if it is performing or non-performing, ranked from 1 (normal) to 6 (write-off); guarantees; provisions; interest rate; maturity. It should be noted, however, that not all information is available for the whole database since its inception, as informational requirements have changed over time, and not all institutions inform the complete required set continuously. Finally, institutions have to provide invididual debtor information for balances over AR$500 (around USD 36 as of the closing of this version).

A very general overview of the credit registry data shows that, as of April 2015, there were 1.8 million debtors of the financial system, 150.000 of which were law persons. In what follows, we refer to law persons as "companies", and physical persons as "individuals"; still, there is not always a one-to-one correspondence between both pair of terms, as, for example, owners of small-sized companies may borrow for their companies, but this would show up as debt of an individual and not of a business. Total debt of individuals and companies with the financial system stands at AR$800 billion (USD 57bn). Over 60% of such debt is held by companies (Figure 1).

Most debt is of small amount, and relatively concentrated in a reduced numbers of debtors (Figure 2). Almost 95% of debtors have credit for an amount that does not exceed AR$100.000 (USD 7000); and of those, some 99% hold debt of amounts of up to AR$ 50.000. At the same time, 2% of debtors hold around 60% of total debt. While both individuals and companies show concentrated distributions, this is more noticeable in the latter (Figure 3).

Differences between individuals and companies also show up in access to financial institutions. More than 60% of individual debtors have received loans from only one financial institution, and over 70% of credit has been granted to them by one or two financial institutions. It is also the case that the majority of corporate debtors (almost 70%) receive loans from one financial institutions; but the bulk of of debt granted to companies is to those that work with five or more institutions (Figure 4, a) and b)).

While corporate debtors belong to the trade (23%), manufacturing (14%) and agricultural sectors (12%), most corporate debtors corresponds to the manufacturing sector, followed by trade, on average over the whole sample. Firms are geographically concentrated in the city and the province of Buenos Aires (over 60%).

Figure 1

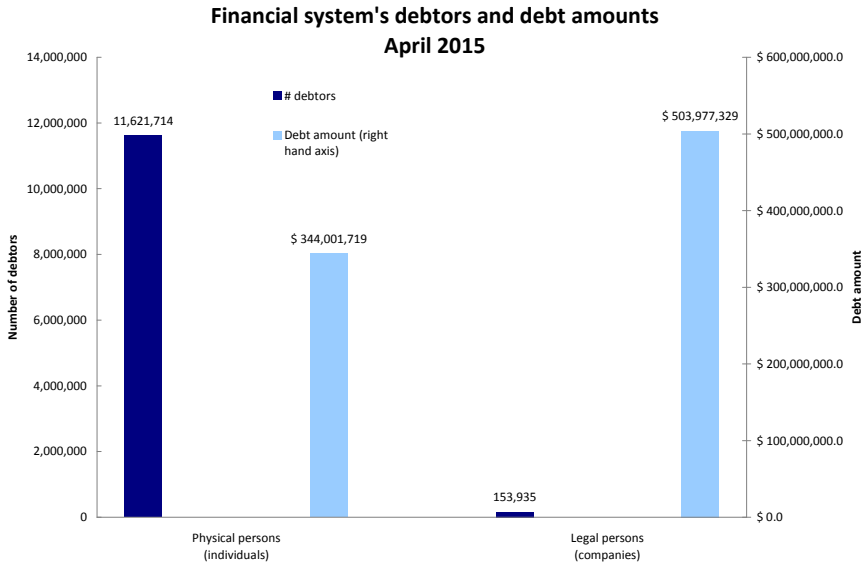
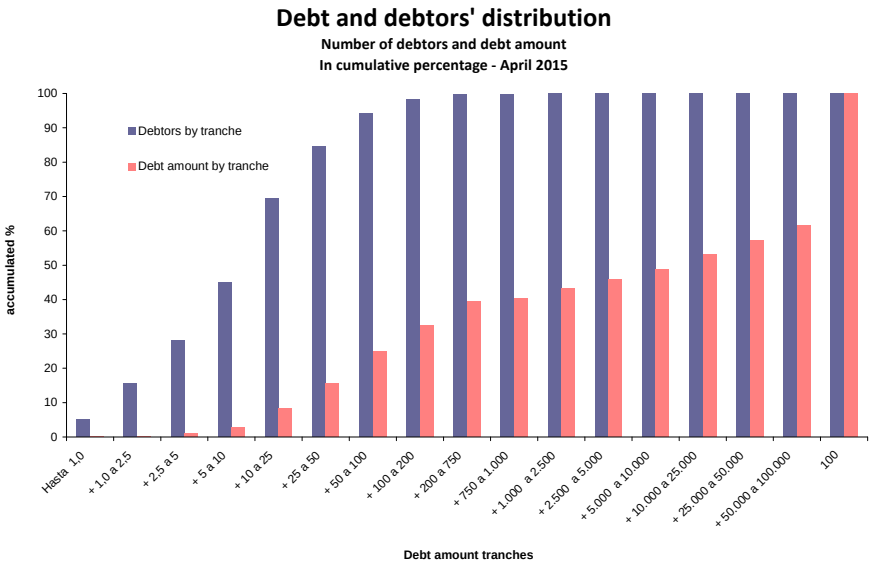


Figure 2



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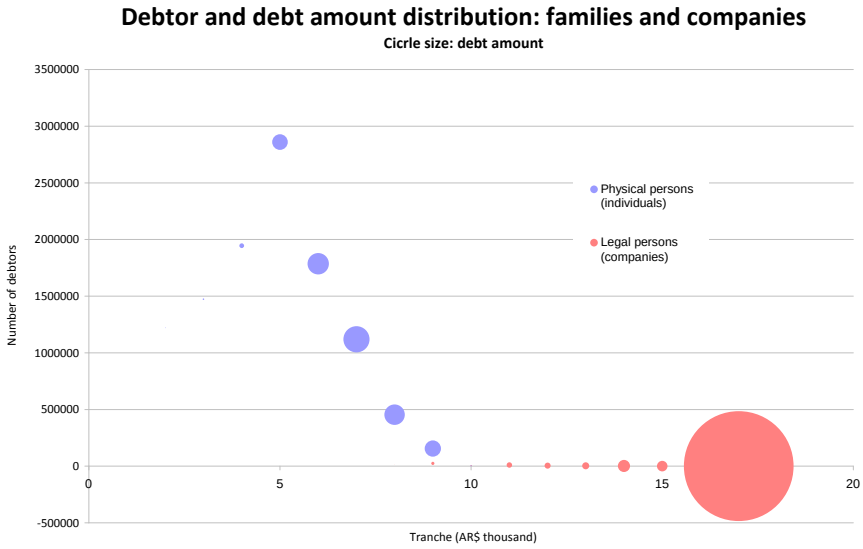


Figure 4 (a)

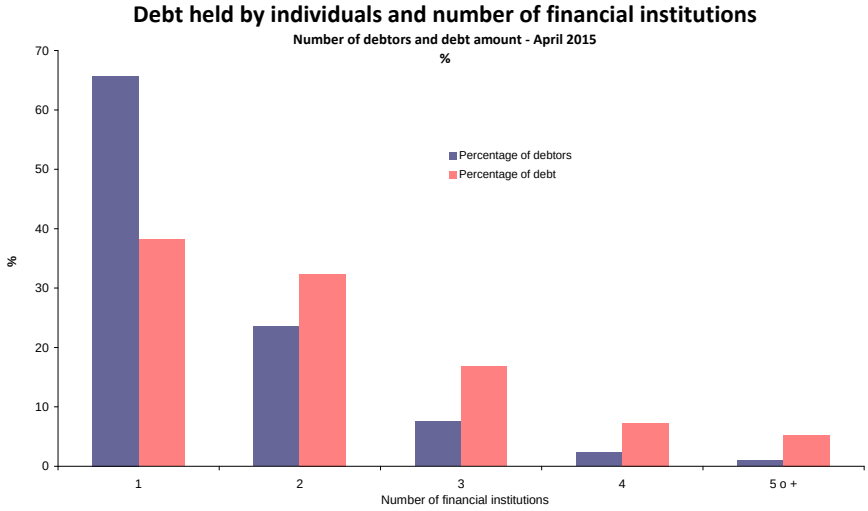
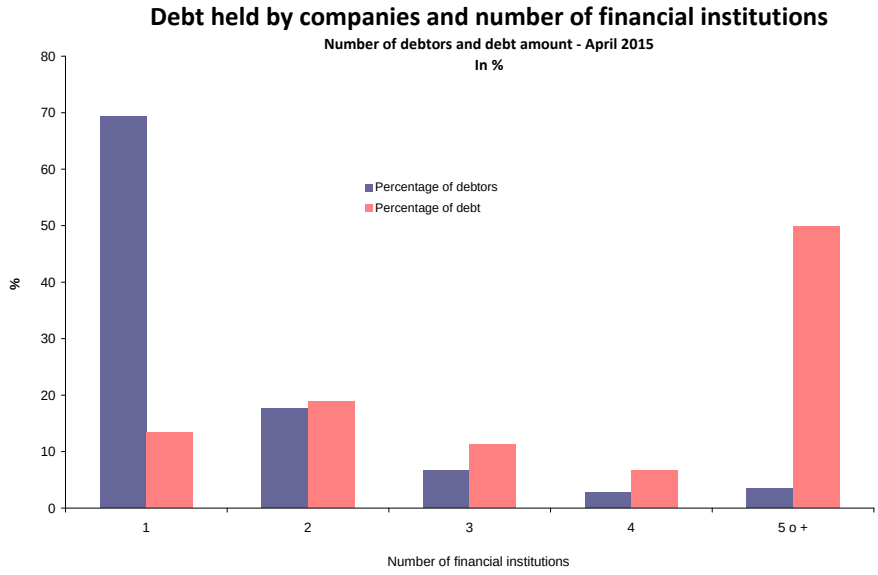


Figure 4 (b)



4 Macroprudential policy in Argentina: overview and assessment approach

In Argentina, a history of crises has made all too evident the link between financial system soundness and macroeconomic performance. Among recent episodes, the demise of the currency board, in place from 1991 to 2001, defined to a significant extent the shape taken by subsequent financial system regulation. The main features of such experience lie well beyond the scope of this paper; suffice it to say that the "convertibility" regime showed how implementing microprudential policy, even by state-of-the-art standards, may be insufficient to isolate the financial system from both negative shocks and the presence of "hidden" mismatches in a financially dollarized economy. As the peg to the US dollar was kept throughout the years, households and companies increased their debt in foreign currency, even while their revenues were mostly denominated in pesos -considering the private sector as a whole. The government also issued a growing share of debt in foreign currency. To put it simply, both private and public agents appeared to behave as if the favourable external financial conditions registered in the first half of the 1990s would last indefinitely. As a series of EMEs' crises hit the country's ability to finance itself abroad, and deteriorated its competitiveness, a recession ensued; this ultimately led to a multiple crisis, on the fiscal, foreign exchange and banking fronts.

Since 2003, direct and indirect measures limiting foreign currency exposure of financial institutions have been a hallmark of the Argentine macroprudential framework. Foreign exchange intervention can also be thought of as part of the macroprudential "toolkit" in a broader sense, as it limits the variability of a certain class of assets that weigh on financial stability; a similar reasoning applies to capital flows regulation. Macroprudential policy also includes building up a capital buffer through profit reinvestment mechanism; loan-to-value ratios for certain types of credit; valuation of public sector securities in financial institutions' balance sheets; liquidity requirements and deposit insurance. We provide an overview of the macroprudential framework in what follows (see BCRA, 2014a for a compilation of the whole regulatory framework).

Ruling out currency mismatches. There are three main measures in this respect. 1) Part

of the market risk capital requirement is based on foreign exchange volatility, i.e. financial institutions have to comply with more or less regulatory capital depending on the volatility of their foreign currency exposure. 2) Foreign currency lending capacity: only firms whose revenues are denominated in foreign currency (or denominated in local currency but closely linked to the evolution of the exchange rate) such as those that export their production or substitute imports can obtain financing in foreign currency. This measure has been in place since 2002/03, without substantial changes. 3) Foreign currency net global position: there is a limit on financial institutions' net position in foreign currency; the latter comprises assets and liabilities from financial intermediation, bonds in foreign currency and forwards. The limit was introduced in 2003 (30% of Tier 1 capital), suspended in 2005, and re-introduced in 2014: first as 30% of Tier 1 capital (February[2]), then lowered to 20% in September of that year[3]. We consider the latter change to be a tightening of the measure, as it sets a more stringent limit on banks' portfolio choice in terms of foreign currency.

Capital buffer and profit reinvestment. Any financial institution having profits to be distributed – after applying regulatory and supervisory filters – may allocate them through dividends as long as its regulatory capital – after dividends are paid – is at least 75% above the regulatory minimum capital requirement (a percentage that has changed since its introduction). This mechanism generates a capital buffer; its design is not necessarily countercyclical -even if it may have cyclical properties, as profits change with the cycle. Thus, this macroprudential measure can be thought of as the joint implementation of limits on dividend distribution and a capital conservation buffer. This measure was introduced in 2010, with 30% threshold of regulatory capital requirement over which profits may be distributed[4]; it was further increased to 75% in 2012[5].

Reserve (liquidity) requirements. While this measure is not explicitly countercyclical, it nonetheless has macroprudential properties. Liquidity requirements have changed over time, but not always with cyclical aims: changes in recent years tend to foster credit to SMEs and in relative underdeveloped regions, by reducing requirements to banks who grant such credits.

Loan to value / Debt to income ratios. There are loan-to-value ratios for mortgages (previously, for pledges) that affect credit to companies.There is a debt-to-income ratio on retail credit to physical persons.

Of the measures we have mentioned, we aim to assess the effects on credit growth to companies of: a) the capital buffer and profit reinvestment as introduced in the second quarter of 2010, and tightened in 2012; b) the most recent changes in foreign currency net global position (tightened in the first and third quarters of 2014); in all cases using credit registry data.

It can certainly be argued that other elements of the macroprudential policy package are equally important (or even more so) than the measures we have chosen; in particular, limits to foreign currency lending capacity, or, in the broader macroprudential sense, foreign exchange intervention and international reserves' accumulation. However, evaluating measures like foreign currency lending limits would imply: increasing sample size out of workable limits, as the measure was first implemented in 2003; and including performance of financial institutions during the financial crisis of 2001-2002 and its aftermath, which would bias results toward public and private sector behaviour in reaction to financial crises (see González Padilla et al., 2006, for an econometric analysis using credit registry data that includes that period). As for foreign exchange intervention, other papers have looked at its macroeconomic effects (Aguirre and

[2]See Comunicación "A" 5536, available on the BCRA website.
[3]See Comunicación "A" 5627, available on the BCRA website.
[4]See Comunicación "A" 5072, available on the BCRA website.
[5]See Comunicación "A" 5273, available on the BCRA website.

Grosman, 2010).

Both measures we examine, the introduction and tightening of the capital buffer and the increase to foreign currency net global position (in what follows, DBK and PGN, respectively) were introduced for reasons directly unrelated to credit growth. As we want to evaluate the impact of DBK and PGN on credit growth, the condition of exogeneity of the intervention is satisfied. While rationalising the ultimate aims of these measures exceeds the scope of this note, we mention here that DBK was initially put in place in a context of external financial turbulence (2010, with the first round of repercussions on EMEs of the Greek debt crisis); its tightening in 2012 was explicitly attributed to the aim of reinforcing institutions's solvency, in line with the discussion of new international standards such as the capital conservation buffer (BCRA, 2012). As for PGN, the suspension of limits in 2005 was decided in the face of foreign inflows, and allowed financial institutions to buy currency more aggressively; its re-introduction in 2014 occured amid pressure on the local foreign exchange market, and one of its aims was to increase supply in foreign currency, as financial institutions were long in US dollar assets, decreasing foreign exchange volatility (BCRA, 2014b). In both cases, there was a macroprudential concern behind the measures, but one cannot attribute them to a response to a boom in credit that they tried to curb; so we can rule out endogeneity in the sense that changes observed in policy are a function of changes in credit growth. We believe this a substantial strength of the empirical analysis we propose: as long as credit growth is one of the relevant and conventional metrics of macroprudential policy, finding two cases in which changes in such policy do not obey to the specific aim of preventing or curbing a "credit boom" leaves with a "quasi natural experiment" of the impact of macroprudential policy on this dimension.

However, the change in credit associated to the introduction of such measures may not necessarily be the proper metric to assess MPP effectiveness, if the latter aims at strengthening the financial system -this could specially be the case of measures limiting foreign currency exposure. While financial system busts are systematically associated to previous credit booms (Mendoza and Terrones, 2012), and this is the rationale for prudential policies that take into account a cyclical aspect like the "credit gap", one should consider that reducing credit growth during booms is an intermediate rather than a final target; and that the ultimate objective of macroprudential policy is increasing financial system resilience against shocks from the economy, while also limiting negative spillover from the system to the economy at large. It can be argued that both the intermediate and the final target are consistent in advanced economies, but the point is certainly weaker in financially underdeveloped economies. In the latter, with high potential for credit growth in the medium to long term, reducing the credit gap may work against financial development and not contribute to strenthening the financial system. This is to say that the aim of our exercise is literally to assess the impact of some macroprudential measures on credit growth at the individual bank-firm level, which is not necessarily identical to the effectiveness of macroprudential policy.

5 Empirical strategy

5.1 Data and sample

In our analysis, we use quarterly data of *Central de Deudores* from the first quarter of 2009 to the fourth quarter of 2014. We look at credit to law persons ("companies"); this keeps sample size in check, as there are around 150.000 companies each quarter, compared to over 10 million

individuals, in a sample that spans twenty-four quarters. Focusing on credit to companies also helps depict the biggest market segment and the most representative debtors in terms of weight in that market, as described in section 3. Finally, the reaction of credit to companies and to households to different measures is expected to be different, so it makes sense to analyze them separately; we take this as a first step to analyzing the impact of MPP.

Each observation in the sample is the total stock of credit held by company i and granted by financial institution j, computing the quarterly average of three monthly observations. We make certain adjustments to sample; we look at credit granted to private sector companies by financial instituions (FIs), so we leave out of the registry data set: a) credit granted from FIs to FIs; b) public sector institutions or companies as credit recipients; c) credit granted by non-financial institutions, i.e.not supervised or regulated by BCRA. This leaves us with roughly 5 million observations in our sample, each one of them a credit relationship between a firm and a company.

Our dependent variable is the change of the logarithm of real debt held by company i granted by FI j. Nominal debt is deflated using the GDP implicit price index (or GDP deflator). Using the rate of change of real debt means that we leave out of the sample all the cases in which debt is zero, where the rate of change is not defined. We are aware this introduces a potential bias in any estimate, as we omit the cases in which firms enter the market for the first time, or leave it after having been in for some time. We could address this by changing the dependent variable (for instance, the absolute change in real credit), but this would mean a change in the project's research protocol, and in that case it would be best to employ a two-step procedure (an equation to estimate the decision to enter or exit the credit market, another to estimate how much credit is granted).

Figure 5 shows the evolution in the number of firms and firm-credit relationships during the sampling period; figure 6.. shows the evolution of nominal and real credit growth in our sample, before and after each of the measures implemented. DBK1 and DBK2 denote, respectively, the introduction of the capital buffer in 2010 and its tightening in 2012; PGN1 and PGN2 denote, respetively, the reactivation of the limit on the foreign currency global position in 2014 and its tightening later that year.

Figure 5

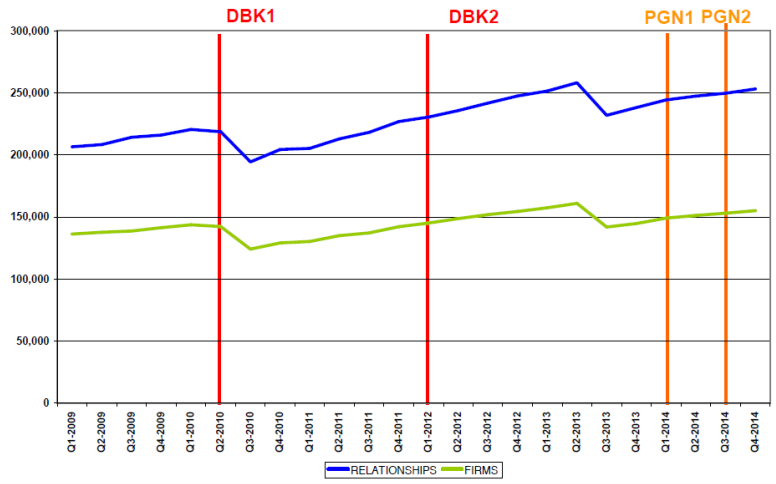
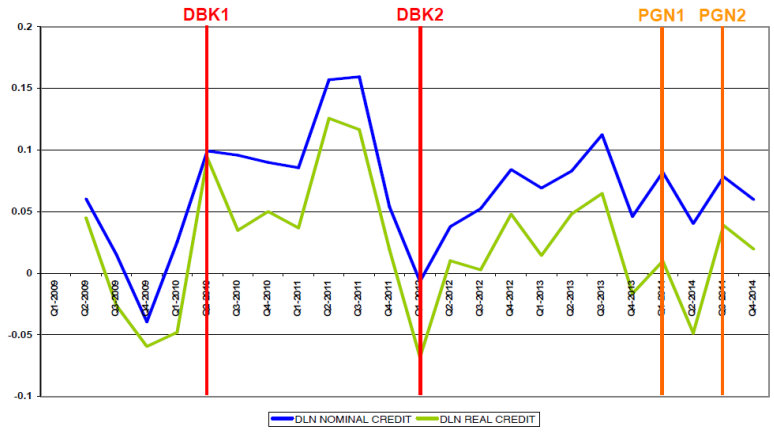


Figure 6



5.2 Econometric model and results

Our baseline model is defined in the following equation, estimated by fixed effects:

$$\begin{aligned}\Delta Log\_credit_{ijt} &= \beta_0 + \beta_1 MPP\_tool_t + \beta_2 macro\_controls_t + \beta_3 FI\_controls_j + \\ &\beta_4 firm\_controls_i + \beta_5 quarter_t + \varepsilon_{jit}\end{aligned}$$

The dependent variable is the change of the logarithm of real debt of company i granted by financial institution j, as explained previously. The independent variables comprise macroprudential tools, macroeconomic, financial institutions and firms' controls. Macroprudential tools are introduced as dummy variables for:

a) capital buffer (II-2010, I-2012) ;

b) foreign currency net global position (I-2014, III-2014).

We look at the impact of measures(dummy only in quarter of implementation) and, alternatively, at: one lag (dummy in lagged quarter of implementation), impact and one lag (using one dummy); and the whole period when the measure was in place (one dummy for all quarters satisfying that condition).

Macroeconomic controls include:

- quarterly change in real GDP (not seasonally adjusted);
- change in money market rate (BADLAR, AR$, private sector);
- change in nominal exchange rate (AR$/USD)
- the balance of the foreign exchangemarket, defined as total operations of the financial system (including the Central Bank) with the non-financial private and public sectors, and the rest of the world[6].

Financial institutions' variables comprise:

-log of net total assets;

-liquidity ratio (liquid assets as % of total deposits);

-capital to assets ratio (equity to total assets);

-deposits to liabilities ratio;

[6] We consider this variable to be a better indicator of external conditions for the financial system than the current account or capital account of the balance of payments, as it shows directly whether the financial system as a whole is a net buyer or seller in the foreign exchange market.

-dummies for type of FI: public bank, private bank (domestic/foreign owned), non-banking FI[7].

And we chose the following control variables at the firm level:

-type of credit that the firm has taken;

-log of number of FIs that the firm is working with in each quarter;

There are also firm data on economic sector, geographic location and type of legal person, but as these features do not change over time, they do not show up in the fixed effect estimation. Finally, there are quarterly dummies to capture seasonal effects. When running the regressions, we dropped outlying values of real credit growth in the top 1% percentile. Table 1 summarizes descriptive statistics of the dependent variable and the main control variables. Further description and sources of each variable are provided in the Annex.

Table 1: Baseline model

Descriptive stadistics

Variables	**Min**	**Max**	**Mean**	**Std. Dev.**
DLN_MONTO_R	-14.35	3.692949	-0.0576472	0.8950039
DLN_GDP	-0.09215	0.1270809	0.0132184	0.0632814
$DBADLAR\_pri$	-4.4819	6.44	0.2933992	2.356354
$\Delta exchange\_rate$	-0.01569	1.5503	0.2266692	0.3190883
$\Delta forex\_market\_balance$	-5037.02	5850.86	80.94156	3158.053
$Bank\_capital\_ratio$	2.9932	970.44	9.501752	24.31614
$Bank\_liquidity$	4.5	15199.7	26.62254	87184.25
$Ln(total\_assets)$	1.682275	12.7447	10.61474	1.176209
$Deposits\_to\_total\_liabilities\_ratio$	0.013339	98.13567	82.66676	4.940417

Table 2 shows the main results for the baseline model: both macroprudential measures have significant effects in all specifications. When we look at the impact in the same quarter the measure was introduced (model 1), the capital buffer initial implementation was negative for credit growth, while its tightening was positive; the reintroduction of limits on foreign currency positions had a positive effect, but its tightening was negative. However, it is advisable to look at longer periods: including the contemporaneus impact and one lag[8] (model 2), the average impact over two quarters (model 3), or the whole time the measure was in place (model 4), we find lower credit growth for all the measures considered here. Finally, if we include not only lags for the regressors but also lags for the controls (model 5), there is a negative average effect of the capital buffer on credit growth over two quarters when it was introduced and when it was tightened; and a positive effect of foreign currency limits when reintroduced, but a negative one when tightened.

Besides statistical signicance, estimated coefficients show economic significance. The introduction of the capital buffer reduces firms' credit growth by 1% to 3% quarterly (on average over two quarters), and by 2% quarterly during the whole period of implementation; there is higher impact of the tightening of this measure, that ranges from -7% to -11% quarterly. Limits to the global currency position also yield effects lower than -10% quarterly; but, as discussed in the previous paragraph, under two specifications their introduction shows a positive sign.

[7] This variables do not appear in the fixed effect specification, but are included in alternative ones we employed, such as random effects.

[8] With quarterly data, it is advisable to look at up to four lags; this, however, is feasible within our sample for the capital buffer but not for the global currency position limit. We leave for future work to run a model of the fomer measure with up to four lags.

Estimated signs on control variables also merit a mention. GDP growth is not significant for the impact estimation and for the whole period the policies were in place; but its lagged value is positive and significant; the contemporary and lagged values are positive and significant in the equation with impact and lag dummies of the policy variables (not reported here). Money market interest rates are associated to lower credit growth in eq..; when both contemporaneous and lagged effects are allowed for, the impact is negative but the lag is positive, while the sum of both coefficients is still negative. In general, exchange rate depreciation (i.e. the local currency depreciating with respect to the US dollar) weighs negatively on credit growth, while a higher balance of the foreign exchange market is usually (but not in every specification) associated to higher credit growth. The latter two effects are consistent with anecdotal evidence of the disruptive impact on financial stability of foreign exchange depreciations and foreign exchange market turbulence. As for financial institutions' controls, banks with more capital and liquidity, and with a higher share of deposits to total assets, generally show higher credit growth granted to firms; their size as measured by total assets, however, appears to be negatively linked to credit growth. Finally, firms control show that those companies working with a larger quantity of financial institutions also hold credit at higher rates; and that the type of credit they hold is related to its growth.

We then restrict the sample to firms that held debt in all quarters during the estimation period (table 3): they represent the relatively more important ones in terms of size and share in the credit market. In this case, the average effect over two quarters is negative for all the measures analyzed, and the same applies to the average effect during the whole time they were in place. When we also include lag of the control variables, we find that capital buffers weigh negatively on credit growth on average over two quarters, as does the tightening of the foreign currency position; but the opposit applies to the introduction of such limits. Estimated coefficients are generally lower in this subsample, which we interpret as a difference between intensive and extensive margins: the latter would be somewhat lower than the former, implying a higher impact on credit growth through the granting of credit to less companies than to less credit to the same firms.

As the ultimate aim of macroprudential policy should be to strengthen the resilience of the financial system, we want to incorporate an indicator of solvency risk: the model is estimated for growth of non-performing loans, as classified by financial institutions (table 4). For the complete sample, capital buffer implementation and its tightening decreased non-performing credit growth at the firm level on impact (same quarter of implementation), just as the re-introduction of a ceiling on the foreign currency position did; but there is a small positive impact of the tightening of such ceiling. The average effect over two quarters is negative for all measures, and the same applies to the effect during the whole time they were in place; this is robust to introducing lags in the control variables. Thus, we can say that both type of measures actually contributed to decreasing *ex post* riskier loans in banks' portfolios. There are two additional takeaways here: the introduction of the capital buffer shows a higher estimated impact on NPLs than on total credit, in any of the models employed; and the re-introduction of the global net currency position shows a negative on NPL growth effect over two quarters when controls are lagged, whereas for total credit such estimated impact was positive.

We also look at the impact of macroprudential policies on growth of non-performing loans of firms that are present during the whole sampling period (table 5): the introduction and tightening of the capital buffer decreases NPL growth both on average during the first two quarters after implementation, and during the whole period the measure was in place; the re-introduction of a limit on the global foreign currency position works in the same direction. The tightening of such position, however, carries a negative sign on NPL growth for the first two quarters of implementation, but not for the whole time the measure was in place. When control variables

are lagged, all measures show a negative impact in the first two quarters of implementation. Here, once again we find that the introduction of the capital buffer entails a higher impact for NPLs than for total credit, in all models employed; and that the re-introduction of the global net foreign currency position goes from a positive to negative effect on growth when we look at NPL instead of total credit, and lags for controls.

We enrich model specification by allowing for interaction terms between policy and control variables (table 6). For expositional ease, we will focus on policy dummies active during the whole period of each measure's implementation. The interaction between the capital buffer's introduction and financial institutions' controls shows that banks with higher capital and higher total assets felt a marginally higher impact of the measure; while the opposit applies to banks with a higher share of deposits to total liabilities; there is no significant interaction with liquidity. The tightening of the buffer offers comparable readings in terms of size, except that banks with more assets can actually offset part of the measure's impact. As for the re-introduction of the global foreign currency position limit, there is no association of its impact with capital or liquidity, but bigger institutions in terms of assets evidence a higher impact of the measure, while those with a higher share of deposits in their liability structure show a lower effect. The tightening of this limit involves a bigger effect on credit growth for bigger banks in terms of capital and assets, but a lower one for those with a higher deposit-to-liabilities ratio; there is, once again, no discernible association with liquidity. Generally, at least one measure of bank size interacts negatively with the measure, denoting a more important impact of macroprudential policy on bigger banks, while there is no association with institutions' liquidity.

In the sample with firms that are always present in the credit market in 2009-2014, we find the same estimated signs for interactions of financial institutions' controls with macroprudential dummies as in the whole sample; we also find that banks that are more liquid see relatively more credit growth when policy is implemented.

Macroprudential policy variables are also interacted with macroeconomic controls: as expected, estimated significant signs of the interaction between all measures analyzied and money market interest rates are negative; however, interaction of GDP growth with the capital buffer is not significant (neither for introduction nor for tightening), whereas it is positive with the limit on global foreign currency position. It should be noted that when the average impact over two quarters is measured, the interaction between GDP growth and the introduction of the capital buffer is negative, suggesting that this measure contributes additionally to curbing credit growth during upswings of economic activity; this can be seen as reinforcing its macroprudential nature.

We also run the models using a random effects specification (not reported here but available on request from the authors), as this allows for both variations between and within individual firm credit relationships; and performed the Hausman test between random and fixed effect models. The null hypothesis of equality of estimated coefficients was rejected: based on the consistency of fixed effects estimation, this suggest the lack of exogeneity of regressors with respect to the unobservable random component in the random effects model. The result thus leads us to favour the fixed effects specification.

Table 2: Baseline model.

All firms, total credit

	1	2	3	4	5
Dependent variable: DLN_MONTO_R	Impact effect	Impact effect and lags	Impact effect and lags as an only dummy	Effect during complete period of implementation	Impact effect and lags as an only dumy (with lag controls)
DBK1_I	-0.01303***	0.05470***			
	-0.003034	-0.003726			
DBK2_I	0.03192***	-0.1367***			
	-0.00304	-0.003892			
PGN1_I	0.2797***	0.4486***			
	-0.00695	-0.01115			
PGN2_I	-0.04653***	-0.1930***			
	-0.00257	-0.00338			
DBK1_I_L1		-0.05075***			
		-0.002925			
DBK2_I_L1		-0.2088***			
		-0.004337			
PGN1_I_L1		-0.1110***			
		-0.003287			
PGN2_I_L1		-0.1873***			
		-0.002881			
DBK1_C1			-0.01139***		-0.03411***
			-0.001958		(0.002485)
DBK2_C1			-0.07137***		-0.09682***
			-0.00279		(0.005417)
PGN1_C1			-0.1606***		0.1307***
			-0.003058		(0.008358)
PGN2_C1			-0.1155***		-0.1297***
			-0.002187		(0.002783)
DBK1_E				-0.02249***	
				-0.00175	
DBK2_E				-0.1124***	
				-0.002163	
PGN1_E				-0.1683***	
				-0.002903	
PGN2_E				-0.1116***	
				-0.002014	
DLN_GDP_R	0.02756	-2.3830***	-0.3084***	-0.007041	-0.1426
	-0.03927	-0.06995	-0.04281	-0.0342	(0.08914)
DBADLAR_PRI	0.01150***	-0.006835***	0.001329***	-8.612e-04**	-0.007347***
	-0.0003065	-0.0004046	-0.0003508	-0.0003393	(5.411e-04)
Δ exchange rate	-0.2505***	-0.3928***	0.02431***	0.07443***	-0.09843***
	-0.005058	-0.007927	-0.002768	-0.003009	(0.005029)
Δ foreign_XR_balance	-5.111e-06***	3.060e-06***	5.369e-06***	2.962e-06***	6.901e-06***
	-2.21E-07	-0.00000029	-2.71E-07	-2.29E-07	(3.014e-07)
DLN_GDP_R_L1					0.2813***
					(0.05551)
DBADLAR_PRI_L1					0.001233***
					(4.173e-04)
Δ exchange rate_L1					-0.2229***
					(0.007105)
Δ foreign_XR_balance_L1					-5.956e-07*
					(3.548e-07)

(continued)

Table 2 (continued): Baseline model.

All firms, total credit

Bank _capital_ratio_L1	-0.001017***	0.002978***	-0.003455***	0.002298***	-2.710e-04
	-0.0003837	-0.0003879	-0.000372	-0.00038	(4.798e-04)
Bank_Liquidity_L1	4.41E-07	3.435e-06***	4.36E-07	4.175e-06***	2.385e-06***
	-1.406E-06	-1.106E-06	-1.091E-06	-0.000001123	(7.713e-07)
Ln(total_assets)_L1	-0.3015***	-0.06230***	-0.2866***	-0.04928***	-0.05468***
	-0.005937	-0.006822	-0.005482	-0.006995	(0.01180)
Deposits_to_totliabilities_L1	4.359e-04**	0.001112***	0.0000851	0.001867***	0.003320***
	-0.0001808	-0.0001819	-0.0001805	-0.0001882	(2.574e-04)
Bank _capital_ratio_L2					0.004582***
					(4.917e-04)
Bank_Liquidity_L2					5.495e-08
					(7.542e-07)
Ln(total_assets)_L2					-0.02784**
					(0.01167)
Deposits_to_totliabilities_L2					-0.001999***
					(2.506e-04)
LNNBCRASUP	0.01057***	0.01158***	0.009993***	0.01352***	0.01561***
	-0.002041	-0.002041	-0.002042	-0.002042	(0.002102)
grlin2	0.09255***	0.09028***	0.08917***	0.08942***	0.09177***
	-0.002588	-0.002605	-0.002593	-0.002605	(0.002681)
grlin3	-0.1020***	-0.09658***	-0.09115***	-0.1006***	-0.08663***
	-0.01317	-0.01312	-0.01313	-0.01314	(0.01336)
grlin4	0.08747***	0.09442***	0.08911***	0.09502***	0.09143***
	-0.00244	-0.002446	-0.002446	-0.002448	(0.002516)
grlin6	0.1893***	0.1908***	0.1920***	0.1902***	0.1902***
	-0.003151	-0.003157	-0.003158	-0.003156	(0.003213)
grlin7	0.2356***	0.2291***	0.2155***	0.2288***	0.2336***
	-0.007737	-0.007787	-0.007799	-0.007767	(0.007874)
Constant	3.1069***	0.3123***	2.9716***	0.2986***	0.6423***
	-0.06173	-0.07408	-0.05618	-0.07511	(0.08207)
Debtor-Bank FE	Yes	Yes	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes	Yes	Yes
Observations	4,455,316	4,455,316	4,455,316	4,455,316	4,277,178
R-squared	0.007	0.008	0.007	0.008	0.008
Number of RELA_id	457,671	457,671	457,671	457,671	448,785

Robust standard errors in parentheses

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

Table 3: Baseline model, modified sample

Firms with debt in all periods, total credit

	1	2	3	4	5
Dependent variable: DLN_MONTO_R	Impact effect	Impact effect and lags	Impact effect and lags as an only dummy	Effect during complete period of implementation	Impact effect and lags as an only dumy (with lag controls)
DBK1_I	0.01298***	0.06243***			
	(0.003580)	(0.004350)			
DBK2_I	0.006153*	-0.1266***			
	(0.003480)	(0.004476)			
PGN1_I	0.2689***	0.3851***			
	(0.008166)	(0.01285)			
PGN2_I	-0.03279***	-0.1428***			
	(0.003109)	(0.003956)			
DBK1_I_L1		-0.05129***			
		(0.003376)			
DBK2_I_L1		-0.1738***			
		(0.005064)			
PGN1_I_L1		-0.09659***			
		(0.003906)			
PGN2_I_L1		-0.1368***			
		(0.003412)			
DBK1_C1			-0.006445***		-0.03113***
			(0.002299)		(0.002919)
DBK2_C1			-0.05770***		-0.08845***
			(0.003282)		(0.006379)
PGN1_C1			-0.1406***		0.1116***
			(0.003646)		(0.009695)
PGN2_C1			-0.07515***		-0.08992***
			(0.002607)		(0.003279)
DBK1_E				-0.01255***	
				(0.002024)	
DBK2_E				-0.08826***	
				(0.002466)	
PGN1_E				-0.1478***	
				(0.003458)	
PGN2_E				-0.07112***	
				(0.002400)	
Debtor-Bank FE	Yes	Yes	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes	Yes	Yes
Observations	2,583,803	2,583,803	2,583,803	2,583,803	2,480,759
R-squared	0.007	0.008	0.007	0.008	0.008
Number of RELA_id	182,690	182,690	182,690	182,690	180,470

Robust standard errors in parentheses

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

Note: all models include macroeconomic, financial institutions and firm controls (not shown here, available on request)

Table 4: Credit quality model

All firms, non-performing loans only

	1	2	3	4	5
Dependent variable: DLN_MONTO_R	Impact effect	Impact effect and lags	Impact effect and lags as an only dummy	Effect during complete period of implementation	Impact effect and lags as an only dummy (with lag controls)
DBK1_I	-0.01121***	0.04885***			
	(0.002557)	(0.002860)			
DBK2_I	-0.03296***	-0.1416***			
	(0.002725)	(0.003309)			
PGN1_I	-0.05997***	0.1334***			
	(0.007662)	(0.009608)			
PGN2_I	0.02694***	-0.06745***			
	(0.002391)	(0.002903)			
DBK1_I_L1		-0.08022***			
		(0.002370)			
DBK2_I_L1		-0.1666***			
		(0.004409)			
PGN1_I_L1		-0.03621***			
		(0.003369)			
PGN2_I_L1		-0.08824***			
		(0.002609)			
DBK1_C1			-0.03061***		-0.04962***
			(0.001571)		(0.002003)
DBK2_C1			-0.1029***		-0.02541***
			(0.002945)		(0.004955)
PGN1_C1			-0.06857***		-0.09147***
			(0.003307)		(0.007289)
PGN2_C1			-0.04369***		-0.03862***
			(0.002087)		(0.002509)
DBK1_E				-0.04872***	
				(0.001431)	
DBK2_E				-0.07933***	
				(0.001795)	
PGN1_E				-0.03757***	
				(0.003270)	
PGN2_E				-0.008149***	
				(0.001920)	
Debtor-Bank FE	Yes	Yes	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes	Yes	Yes
Observations	671,859	671,859	671,859	671,859	640,723
R-squared	0.016	0.020	0.019	0.019	0.018
Number of RELA_id	84,125	84,125	84,125	84,125	81,289

Robust standard errors in parentheses

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

Note: all models include macroeconomic, financial institutions and firm controls (not shown here, available on request)

Table 5: Credit quality model, modified sample

Firms with debt in all periods, non-performing loans only

	1	2	3	4	5
Dependent variable: DLN_MONTO_R	Impact effect	Impact effect and lags	Impact effect and lags as an only dummy	Effect during complete period of implementation	Impact effect and lags as an only dumy (with lag controls)
DBK1_I	0.01075***	0.03451***			
	(0.002631)	(0.002836)			
DBK2_I	-0.01920***	-0.09934***			
	(0.002568)	(0.003056)			
PGN1_I	0.06528***	0.1113***			
	(0.006762)	(0.009042)			
PGN2_I	0.02246***	-0.03952***			
	(0.002315)	(0.002675)			
DBK1_I_L1		-0.06341***			
		(0.002445)			
DBK2_I_L1		-0.1165***			
		(0.004618)			
PGN1_I_L1		-0.07222***			
		(0.002978)			
PGN2_I_L1		-0.04676***			
		(0.002490)			
DBK1_C1			-0.02483***		-0.03549***
			(0.001655)		(0.002021)
DBK2_C1			-0.06207***		-0.01749***
			(0.002926)		(0.004772)
PGN1_C1			-0.09892***		-0.06677***
			(0.002863)		(0.007085)
PGN2_C1			-0.01190***		-0.01523***
			(0.001969)		(0.002340)
DBK1_E				-0.03380***	
				(0.001477)	
DBK2_E				-0.05214***	
				(0.001695)	
PGN1_E				-0.07889***	
				(0.002767)	
PGN2_E				0.009585***	
				(0.001873)	
Debtor-Bank FE	Yes	Yes	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes	Yes	Yes
Observations	412,438	412,438	412,438	412,438	395,744
R-squared	0.013	0.018	0.016	0.017	32,070
Number of RELA_id	32,690	32,690	32,690	32,690	0.016

Robust standard errors in parentheses

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

Note: all models include macroeconomic, financial institutions and firm controls (not shown here, available on request)

Table 6: Interactions

All firms, total credit

	1	2	3
Dependent variable: DLNMONTO_R	Bank-characteristics	Money market	GDP
DBK1_E	-0.07864***	-0.024518***	-0.0253115***
	(0.01965)	0.0020614	0.0025401
DBK2_E	-0.2667***	-0.0889689***	-0.0881894***
	(0.02118)	0.0024945	0.0027198
PGN1_E	-0.2521***	0.25105***	0.0734587***
	(0.01587)	0.0188127	0.0087497
PGN2_E	-0.3123***	-0.137031***	-0.1339053***
	(0.01757)	0.0028728	0.0022938
Bank capital ratio y DBK1_E	-0.002085***		
	(3.907e-04)		
Bank liquidity y DBK1_E	1.100e-04		
	(7.036e-05)		
Ln(total_assets) y DBK1_E	-0.004061***		
	(0.001442)		
Deposits to total liabilities y DBK1_E	0.001426***		
	(1.391e-04)		
Bank capital ratio y DBK2_E	-0.003396***		
	(4.267e-04)		
Bank liquidity y DBK2_E	9.975e-05		
	(6.915e-05)		
Ln(total_assets) y DBK2_E	0.008700***		
	(0.001533)		
Deposits to total liabilities y DBK2_E	0.001142***		
	(1.507e-04)		
Bank capital ratio y PGN1_E	-5.577e-04		
	(3.603e-04)		
Bank liquidity y PGN1_E	-4.718e-07		
	(9.470e-07)		
Ln(total_assets) y PGN1_E	-0.006509***		
	(0.001410)		
Deposits to total liabilities y PGN1_E	0.001980***		
	(1.009e-04)		
Bank capital ratio y PGN2_E	-0.002041***		
	(4.042e-04)		
Bank liquidity y PGN2_E	-1.747e-06		
	(1.081e-06)		
Ln(total_assets) y PGN2_E	-0.006868***		
	(0.001508)		
Deposits to total liabilities y PGN2_E	0.003571***		
	(1.244e-04)		

Table 6 (continued): Interactions

All firms, total credit

BADLAR_RyDBK1_E		-0.0006724	
		0.0020684	
BADLAR_RyDBK2_E		-0.0007624	
		0.000402	
BADLAR_RyPGN1_E		-0.072645***	
		0.0034036	
BADLAR_RyPGN2_E		0.0000913	
		0.0009457	
DLN_GDP_RyDBK1_E			-0.0036098
			0.0284665
DLN_GDP_RyDBK2_E			-0.0204814
			0.0346488
DLN_GDP_RyPGN1_E			2.122999***
			0.0729656
DLN_GDP_RyPGN2_E			-0.0150068
			0.0313218
Constant	0.6175***	-0.7359942***	-0.7181559***
	(0.08151)	(0.0849735)	(0.0845325)
Debtor-Bank FE	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes
Observations	4,455,316	4,280,908	4,280,908
R-squared	0.008	0.0017	0.0017
Number of RELA_id	457,671	448,940	448,940

Robust standard errors in parentheses

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

6 Concluding remarks

Using credit registry data from the Central Bank of Argentina's *Central de Deudores*, we assess the impact on individual firms' credit growth of two types of macroprudential policies: a capital buffer based on limits to profit distribution, and a limit to the global foreign currency position of financial institutions; we use quarterly data from 2009 to 2014, and estimate fixed effects models. In both cases, we examine the introduction and tightening of each measure; and include macroeconomic, financial institutions and firms' control variables. We propose different specifications, to capture for each measure its impact: initially, after one quarter, on average over two quarters and during the whole period it was in place. As all four instances of the measures' implementation were directly unrelated to credit growth, the exercise can be taken as quasi natural experiment to gauge the influence of macroprudential policy on what is conventionally considered its intermediate aim -curbing credit expansion.

Our main results show that:

- all measures have a significant effect on credit growth at the firm-bank level;
- there are differences between the initial impact and effects over time;
- the capital buffer is generally associated to lower credit growth, both when introduced and when tightened;
- limits on global foreign currency position are linked to lower credit growth when tightened;

- macroprudential measures operate both on the extensive and the intensive margins: when the sample is adjusted to consider only firms that were always present in the credit market, all measures tend to reduce credit growth, and there is preliminary evidence to suggest that measures operate more through the granting of credit to less companies than to less credit to the same firms;

- macroprudential policies also have an effect on credit quality: growth of non-performing loans is reduced after the implementation of such measures; in particular, the capital buffer reduces NPL expansion more than total credit.

- interactions between macroprudential measures, macroeconomic conditions and financial institutions variables matter: in general, banks with higher capital and more assets evidence a higher impact of the introduction of the capital buffer, while this measure also acts more acutely during econonomic activity expansions.

We take our results as a first approximation toward a comprehensive assessment of macroprudential measures' impact. Ultimately, this type of policies should be aimed at increasing financial system's resilience against shocks, and also limiting negative spillovers from the system to the economy at large; this requires an evaluation on several fronts, and looking at credit growth is only one of them, which may be relevant insofar as credit booms typically precede crisis. But in economies financially underdeveloped, there may be a tradeoff between the financial development objective and macroprudential measures. Therefore, we leave for future work the incorporation of financial institutions and firms' risk measures. The results presented here suggest that a granular level, macroprudential measures actually operate in the conventionally expected direction of taming credit booms, but more work is required to fully understand their effects.

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Annex. Description of variables and data sources

Table A.1

Variable	Description	Source
DLN_MONTO_R	Change of log of real debt held by company "i" granted by FI "j" in each quarter (average of monthly data), deflated by GDP implicit price index	Central de Deudores (CD), BCRA; INDEC (deflator)
DLN_GDP	Change of the log of GDP, quarter-over-quarter (q-o-q), not seasonally adjusted	INDEC
$DBADLAR\_pri$	Change of Buenos Aires Deposits of Large Amount Rate (BADLAR), private sector, in Argentine pesos (q-o-q)	BCRA
$\Delta exchange\_rate$	Change of nominal exchange rate AR$/USD, official rate Number of FI that serve firms in the quarter (q-o-q)	BCRA
$\Delta forex\_market\_balance$	Change of total operations of the financial system (including the Central Bank) with the non-financial private and public sectors, and the rest of the world, in USD million (q-o-q)	BCRA
$Bank\_capital\_ratio$	Total equity to total assets ratio (quaterly average of monthly data)	Financial institutions balance sheets, BCRA
$Bank\_liquidity$	Ratio of: compulsory BCRA liquidity regulation item, plus holdings of BCRA bills and notes linked to repos, plus "Otras disponibilidades"; to total deposits (quarterly average of monthly data)	Financial institutions balance sheets, BCRA
$Ln(total\_assets)$	Log of total assets, net of double accounting associated to repo and forward operations (quarterly average of monthly data)	Financial institutions balance sheets, BCRA
$Deposits\_to\_total\_liabilities$	Total deposits to total liabilities ratio (quaterly average of monthly data)	Financial institutions balance sheets, BCRA
$ln\_NBCRASUP$	Number of FI that serve firm i in each quarter (quarterly average of monthly data)	CD, BCRA
$grlin2$	dummy variable for collateralized financing line (in all grlin cases, note that the omitted dummy is overdrafts and promisory notes financing lines)	CD, BCRA
$grlin3$	dummy variable for personal financing line	CD, BCRA
$grlin4$	dummy variable for credit card financing line	CD, BCRA
$grlin6$	dummy variable for other financing lines	CD, BCRA
$grlin7$	dummy variable for export financing line	CD, BCRA