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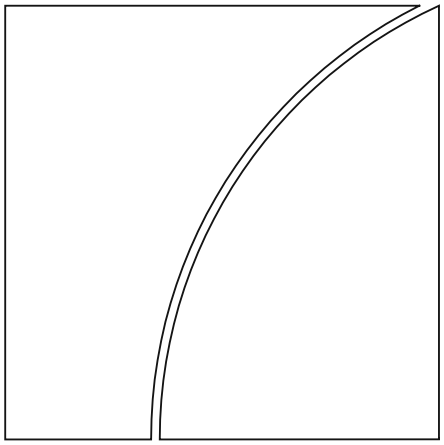

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Keywords: Unconventional monetary policy, credit conditions, spillovers

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Whatever it takes. What's the impact of a major nonconventional monetary policy intervention?*

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Abstract

We assess how a major, unconventional central bank intervention, Draghi's "whatever it takes" speech, affected lending conditions. Similar to other large interventions, it responded to adverse financial and macroeconomic developments that also influenced the supply and demand for credit. We avoid such endogeneity concerns by comparing credit granted and its conditions by individual banks to the same borrower in a third country. We show that the intervention reversed prior risk-taking – in volume, price, and risk ratings – by subsidiaries of euro area banks relative to other local and foreign banks. Our results document a new effect of interventions and are robust along many dimensions.

Keywords: Unconventional monetary policy; credit conditions; spillovers

JEL classification: E51; F34; G21

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1. Introduction

Historically, a leading reason for the emergence of many central banks has been the need to setup institutions that are able to provide extraordinary amounts of liquidity to halt a systemic crisis during periods of financial stress (Goodhart, 1988, Capie, Goodhart, and Schnadt, 1994; see Bindseil, 2018 for a recent review). These interventions involve trade-offs. By providing liquidity to certain institutions, a central bank can stem individual bank runs and prevent failures related to frictions in funding and capital markets. By ensuring the availability of ample liquidity to the overall banking system, a central bank can prevent contagion during periods of high stress and buttress the stability of the overall financial system. Furthermore, support from the central bank can provide financial authorities the time to arrange an orderly resolution of troubled banks. However, liquidity provision can also lead to unintended consequences, such as "risk-shifting", and introduce other distortions, including moral hazard, where banks take excessive risks at the expense of debt holders (Jensen and Meckling, 1976).[1] Understanding the exact impact of large scale injections of liquidity on banks, and the economy more generally, is therefore a key question. Our paper sheds light on this by studying how a large, unconventional, central bank intervention affected lending in a third country through the operations of foreign banks residing in that third country.

During the recent financial crises, most major central banks have undertaken unparalleled large-scale interventions to restore financial stability, reestablish financial intermediation, and support the transmission of monetary policy. These actions have involved a dramatic lowering of policy interest rates as well as the adoption of nonconventional monetary policy measures, such as the easing of refinancing operations.[2] The largest nonconventional interventions, notably in the United States and Europe, have often involved outright asset purchases, including the direct acquisitions of government and private sector securities. These and other interventions have been credited with containing financial stress, stabilizing the financial system, and, eventually, restarting the real economy (eg, Goodhart, 2014; Financial Crisis Inquiry Report, 2011). At the same time, a number of authors have emphasized and analyzed the distortions that can be triggered by these often massive interventions (BIS, 2014; Acharya and Steffen. 2015; Rajan, 2017; Drechsler, Drechsel, Marques-Ibanez and Schnabl, 2016). The diverse implications of these actions and the potential trade-offs involved make it crucial to understand and accurately quantify their effects. Yet, several challenges must be overcome in order to provide compelling evidence on the effects of these interventions.

The major hurdle for this type of analysis is that it is very difficult to disentangle the effects of such interventions from the factors that led to them in the first place. Extreme financial distress and a worsening macroeconomic outlook are typically among the reasons leading to major liquidity injections and other central bank interventions. However, the presence of these factors and other concurrent forces

[1] The idea is that bankers (both management and shareholders) may have incentives to undertake very risky projects because they benefit from a positive outcome if things go well, yet leave creditors to face the losses if they do not.

[2] These interventions linked to refinancing operations included, inter alia, liquidity offerings with longer maturities and larger amounts at fixed (low) interest rates as well as an augmentation of the pool of assets eligible as collateral.

make it very hard to isolate the impact of the interventions. A more practical, but equally important challenge for conducting impact assessments is the lack of granular data necessary to identify the precise channel through which the intervention affects the banking system and the economy.

To overcome the main hurdle, we study how a large, unconventional central bank intervention in Europe influenced credit conditions of various banks in a third country. Specifically, we focus on European Central Bank's president Mario Draghi's "whatever it takes" speech (WIT henceforth) and analyze its effect on lending standards of the subsidiaries of euro area banks in Mexico.[3] We hypothesize that prior to WIT, euro area banks, which suffered heavy losses on their U.S. and European operations and saw their capital depleted, would have had greater incentives to increase risk-taking compared to other institutions (Dewatripont and Tirole, 1994; Holmstrom and Tirole, 1997).[4] We then expect that by augmenting their net worth, the WIT speech restored banks' incentives to be safe, which, in turn, should be reflected in reduced risk-taking incentives afterwards.

The increase in banks' net worth induced by WIT likely worked via two related mechanisms. First, by solving a multiple equilibrium problem, WIT prevented a full-scale liquidity crisis, as it dramatically reduced the incentives of debt holders to run from euro area banks (Goldstein and Pauzner, 2005).[5] The decline in liquidity risk and uncertainty contributed to strengthen banks' capital position and help preserve their franchise value. Second, WIT also supported the euro area's banks' capital by eliciting a general increase in the prices of the assets held by banks.

Our setting allows us to properly identify the effects of WIT for three reasons. First, we focus on one of the largest central bank interventions ever undertaken, meaning the action was quantitatively sufficiently important that it could be expected to have a significant economic impact. The WIT speech was a response to a severe deterioration in financial and economic conditions in 2011 and early 2012 in the euro area. As the region sank deeper into a sovereign debt crisis and faced a deep recession, banking institutions and sovereign yields came under unprecedented financial stress, especially in peripheral euro area countries. Through WIT, the ECB implicitly promised to provide unlimited support to financial institutions, markets and countries in order to save the Euro. Besides its large scale, the unexpected nature of the announcement helps us to measure its impact, as it ensures that banks and borrowers did not adjust their actions in advance. The surprise associated with the WIT speech was reflected in financial markets dynamics, leading to large effects on the stock prices and credit spreads of banks and sovereigns. After the speech, euro area banks saw their stock prices increase and their spreads on credit default swaps (CDS) narrow (Figures 1 and 2; see also Szczerbowicz, 2015). Sovereign and corporate bond yields of many peripheral euro area countries declined drastically, settling at much lower levels (Figure 3; see also Krishnamurthy et al, 2018).

Second, Mexico's financial system provides a very good setting to disentangle the effect of a central bank intervention on lending conditions from other factors

[3] The WIT speech was delivered in London, on July 26, 2012, at the Global Investment Conference, see www.ecb.europa.eu/press/key/date/2012/html/sp120726.en.html.

[4] Due to the different return structures of equity and debt holders, shareholders' incentives towards risk-taking become stronger as bank capital declines.

[5] See Corsetti et al (2006) for the cross-border analogue, ie, international lender-of-last resort.

contemporaneously affecting borrowers. This is because at the time of the speech, Mexico's banking system and economy were relatively unaffected by the financial crisis in Europe other than via euro area banks operating in the country. Indeed, around the time of WIT, Mexico did not experience any major bout of financial instability in its banking sector, nor did its central bank need to conduct any major intervention (Bank of Mexico, 2012). Mexico's economy was also largely disconnected from the source of the shock, ie, the euro area.[6] Therefore, there are few concerns about other shocks affecting the Mexican banking system at the time besides the events in the euro area. Altogether, this setting – akin to Peek and Rosengren (1997, 2002) – is ideal because it minimizes the risk of reverse feedbacks which can contaminate the empirical results.

Concerns about any other events complicating identification are further addressed by the characteristics of Mexico's banking system. It is a banking system with an important presence of foreign banks, which hold a market share of more than 70%, and include not only European but also other foreign banks (Table 1). Specifically, the foreign banks present in Mexico have their headquarters in Europe, the United Kingdom, Canada and the United States. With these banks exposed differentially to shocks and official policy actions, including those in the euro area, we expect to identify the effects of WIT.

Finally, Mexican authorities collect detailed information on lending relationships between banks and borrowers, which allows us to cleanly measure the effects of any shock on Mexican borrowers. Specifically, we use the Mexican Central Credit Bureau which stores comprehensive data on the universe of bank loans, and we follow the methodology of Khwaja and Mian (2008). We isolate loan supply shocks by studying the differences in lending conditions to the same borrower between WIT (ie euro area) and non-WIT (ie non-euro area) affected banks to multi-bank firms, ie, those firms borrowing from more than one bank including at least of bank from the euro area and another from outside the euro area. This allows us to assess the effect of the announcement on bank lending conditions operating via banks' lending supply (in terms of prices, quantities, and risk ratings) fully controlling for changes in loan demand and borrowers' risk.

We show that following the WIT speech, euro area banks became less aggressive in their lending volumes, interest rate pricing, and risk-taking. While prior to the intervention euro area banks had been pricing their loans more aggressively than other institutions, after WIT they reverted their lending standards back in line with other banks. Our results are confirmed by a number of robustness tests, including winsorizing and changes in time windows, as well as a number of placebo tests.

Our findings show that major central bank liquidity interventions can contribute significantly to altering banks' lending conditions. The results also suggest, however, that even with strict regulation and supervision in place, covering aspects such as changes in (risk) exposures and limits on internal transfers of capital and liquidity between headquarters and subsidiaries, there can be spillovers from headquarters to subsidiaries (and presumably vice-versa). The likely reason is that a bank's risk attitude operates across the whole institution. Thus, when its franchise value is under pressure, say due to worsening circumstances in its home market, the bank aims to preserve its

[6] Business cycles were not synchronized, as the Mexican economy was growing by almost 4 percent in 2012 while the euro area's economy contracted by about 1 percent, measured on year-on-year change basis.

overall profitability by engaging more in risk-taking globally. As this risk-taking might be difficult to detect in real-time, our results suggest the need to pre-emptively adapt cross-border regulation, supervision and resolution of global banks to make these measures well integrated, so as to assure not only that risks do not go undetected, but also that incentives remain well-aligned.

The remainder of this paper is organized as follows. Section 2 reviews related literature on major central bank interventions, including an analysis on the WIT speech. Section 3 describes the institutional setting in Mexico and the dataset employed, while Section 4 provides the empirical model we use. Section 5 presents the main empirical findings and our robustness tests. Section 6 considers some general implications and concludes.

2. Literature

The analytical literature on major central bank interventions has a long history, starting with Thornton (1802). These and other very early contributions already justify why in times of stress, central banks' provision of liquidity to solvent banks, freely and against good collateral at a penalty rate, can help avert bank runs and prevent contagion. More recent theoretical work rigorously shows that banks' inherently unstable nature can give creditors the incentive to run, even on solvent banks: therefore, a liquidity crisis can quickly become a solvency crisis (Diamond and Dybvig, 1983).[7] The literature also stresses that inaction on the side of the central bank can lead to contagion, potentially endangering systemic stability (Allen and Gale, 2000, and Freixas et al, 2000). By providing liquidity, a central bank can prevent bank runs from happening, so that the better equilibrium prevails and stability is restored.

A key concern about major central bank liquidity operations has been moral hazard (Bagehot, 1873). The idea is that the provision of liquidity and capital support – as with any type of insurance – modifies the incentives for banks to take preventive actions going forward, thereby increasing the probability of them experiencing stress in the future. Recent work departs from Bagehot's prescriptions and the classical moral hazard literature, by emphasizing that limiting the intervention to lending at a penalty rate to solvent institutions might not be welfare improving.[8] These models, which incorporate both liquidity and solvency shocks, conclude that in cases of severe financial stress the central bank should offer loans at lower rates than the market (Rochet and Vives, 2004). It follows that Bagehot's classical principles would have failed in the context of a systemic event, like the 2007–2009 crisis. Instead, under these conditions, lending generously to all banks against risky assets (in practice banks' illiquid portfolios) at favorable rates is argued to be preferable (Freixas, 2009).

There is a paucity of empirical studies on the effects of central bank interventions on financial institutions' behavior, and even fewer on their impact on borrowers. Some

[7] See further Rochet and Vives (2004) and Diamond and Rajan (2011). Goodhart and Illing (2002) and Freixas et al, (2004) are two useful literature reviews that help justify central bank interventions such as liquidity support as well as other support mechanisms such as deposit insurance, and the associated distortions.

[8] In this respect Martin (2006) argues that the liquidity provision to all banks does not lead to moral hazard if the central bank is not limited by major informational disadvantages with respect to commercial banks.

of the reasons are straightforward. First, one needs a major systemic crisis combined with a large central bank intervention to potentially observe a meaningful impact. Second, the empirical analysis requires access to very detailed data on the interventions by the central bank complemented with granular information on banks' and matched borrowers' conditions. Such data, however, are not available for many countries and when they do exist, they tend to be highly confidential.[9]

As such, most studies use aggregate data, making conclusions largely qualitative.[10] Some recent exceptions, where more detailed confidential data from national credit registers are used, show that central bank liquidity injections – such as the extension of liquidity operations – are effective in restoring bank credit supply in the thick of the crisis, particularly for financially constrained banks (Carpinelli and Crosignani, 2017; Andrade, Cahn, Fraisse and Mésonnier, 2018; Alves, Bonfim and Soares, 2016). Other recent work focuses on the unintended consequences of these large liquidity operations either in the United States (Acharya, Fleming, Hrung and Sarkar, 2017) or the euro area (Drechsler et al, 2016) and finds that weaker banks (ie, those with greater leverage) are more likely to borrow more aggressively and in larger amounts from the central bank's liquidity facilities, suggesting that large central bank interventions can induce risk-shifting.

Some studies specifically analyze the WIT's announcement through its impact on financial asset prices. They find a positive outcome (or "bright side") resulting from the intervention, as they show that WIT led to a significant and long-lasting decline in sovereign bond yields, particularly in the euro area periphery (Krishnamurthy et al, 2018). WIT also triggered strong improvements in banks' stock market prices and declines in their CDS spreads (Fiordelisi and Ricci, 2016). Closely related to our work is Acharya, Eisert, Eufinger and Hirsch (2017) who try to quantify the impact of the intervention on banks' lending conditions using data (more limited in coverage) from the euro area syndicated loan market. They find that WIT contributed to lending to insolvent (or zombie) firms at the expense of solvent borrowers, thereby contending that the unintended effects (or "darker side") of the intervention won out.

At the same time, these papers show the challenges mentioned earlier in terms of analyzing the impact of events such as WIT. First, interventions typically happen amid extreme financial stress with many confounding factors occurring simultaneously, including, inter alia, political uncertainty, financial instability, as well as shifts in economic expectations and activity. Thus, any analysis in the same economic region where the intervention takes place has a hard time isolating the effect of the event from these other factors occurring contemporaneously. Another limitation is the lack of data availability. For instance, the commonly used way to account for credit supply (Khwaja and Mian, 2008) is very demanding, as it requires observations on credit (conditions) for the same borrower with at least two banks before and after the intervention. Using public data from the syndicated loan market, often an alternative, restricts the analysis of shifts in loan supply and demand to a small sample, as there are typically only a very limited number of cases where two

[9] In the United States, for instance, no agency routinely collects matched banks and borrowers' conditions.

[10] See Domanski, Moessner, and Nelson (2014) for a review.

different loan syndicates lend to the same borrower in the months before and after an event like WIT.[11]

Besides aiming to overcome these endogeneity and data problems, our study contributes to the literature on cross-border banking spillovers (Ongena and Goldberg, 2015). Starting with the seminal papers by Peek and Rosengren (1997, 2000), this literature suggests that distress at the parent (home) country (bank) affects financing conditions and the real economy abroad (host country) via lending standards by foreign subsidiaries. Plenty of evidence, including from recent crises, also shows that global banks transmit liquidity and monetary policy shocks internationally (Cetorelli and Goldberg, 2011, 2012; Buch, Koch, Koetter, 2016; Morais et al, 2016, and Buch et al, 2018). At the same time, domestic banks exhibit more stable lending patterns than foreign banks (Claessens and van Horen, 2014; De Haas, van Lelyveld, 2014).[12]

Altogether, this literature suggests that shocks, including central bank interventions, tend to have a significant impact abroad through global banks. In contrast to our analysis, these papers tend to focus on either the cross-border activities of banks or on the intra-bank (or inter-banking systems) transfers of liquidity or capital in response to shocks. In contrast, in our analysis, spillovers occur because of changes in the riskiness of opportunities at home versus abroad, but without any direct financial transactions between the affected banks and their international operations, including their subsidiaries. As such, we analyze a new channel of spillovers related to relative shifts in franchise values and capitalization at home versus abroad.

3. Institutional Setting and Data

In this section we explain why Mexico is a good "laboratory" for testing the effects of a large central bank intervention around the period of the WIT announcement. We do this by reviewing some key institutional features of the Mexican banking system that are relevant for our setting, and by detailing the data used in our analysis.

3.1 Institutional Framework: Mexico

The Mexican banking sector is quite concentrated and has an important presence of European banks coexisting with other foreign institutions and domestic banks. As shown in Table 1, during the 2011 – 2013 period, the seven largest banks represented almost 80 percent of the assets of the Mexican banking system. Of these banks, five were foreign and two domestic. Among the foreign banks, two were from Spain, one

[11] The following example illustrates the limitation of using syndicated loan data. Take a large corporation that can be expected to regularly receive funding via the syndicated loan market. To identify demand and supply conditions using Khwaja and Mian (2008) would require the corporation to get funding from two different syndicates *before* (yet sufficiently close) and another two syndicates (ideally the same two from before) *after* (yet sufficiently close) an event. This is an extremely low probability event. For instance, only one Italian company (Telecom Italia) was granted two syndicated loans in the six months before and after WIT. And only three Italian firms and six German firms took out at least one syndicated loan in the six months before and one syndicated loan in the six months after WIT.

[12] See Popov and Udell (2012). Schnabl (2012) shows that the 1998 Russian default reduced bank lending to a third country, Peru, due to reduced lending to Peruvian firms by international banks.

from Canada, one from the United Kingdom, and one from the United States. The subsidiaries of these global banks held more than 70 percent of the total assets of the Mexican banking sector. This wide distribution in terms of geographical areas of the ultimate bank ownership, allows us to isolate the impact of a foreign shock – the WIT announcement – on the Mexican banking system.

The importance of foreign banks varies across market segments. Figure 4 shows the share of credit in four categories (non-financial corporations, mortgage, consumer, and government loans) both for the largest ("G7") and all other banks ("non-G7"), with the categories further split by domestic and foreign ownership. The figure shows that large and small banks lend in similar proportions to the corporate sector. In contrast, banks differ significantly in their relative shares of mortgage and consumer lending, with foreign banks much more focused on these types of lending. In order to reduce any biases related to lending specialization connected to the shock, and to ensure comparability across banks, we restrict our analysis to the lending to nonfinancial corporations.

The Mexican banking system was well-capitalized during our period of analysis. Table 2 shows that in June 2012 – just before the WIT event – the capitalization ratio of the banking sector was around 16 percent, mostly in the form of high-quality capital, substantially above the then prevailing regulatory requirement of 8 percent. The table also shows that among the largest banks in the system, both euro area subsidiaries and non-euro area institutions were well-capitalized. During that period, Mexican banks already satisfied the liquidity requirements of Basel III, with little dispersion among banks of similar size, as depicted in Figure 5.[13] In short, domestic banks and subsidiaries of foreign banks were all well-capitalized and had satisfactory liquidity buffers at the time of WIT.

In general, and especially during our period of study, the operations of the euro area banks both at home and in Mexico were closely supervised. This meant that there was very limited scope for intra-bank transfers of liquidity and capital. As such, spillovers between the euro area banks and their subsidiaries could have arisen because headquarters altered relative incentives for risk taking due to shifts in perceived growth opportunities at home versus abroad, but not because of headquarters moving financial resources between home and abroad. Indeed data from the Bank of International Settlements show little change in the claims of banks operating in Mexico with their Spanish counterparts around the WIT speech.

3.2 Data

We combine several datasets to conduct our analysis. Our main dataset consists of loan-level information on the credit granted by banks operating in Mexico to Mexican corporate borrowers from July 2009 to December 2013. This database is managed by the Banking Supervisor in Mexico (Comisión Nacional Bancaria y de Valores or CNBV) and is available at a monthly frequency. It covers the majority of Mexican bank loans, as the cut-off for reporting is very low, at 5,000 Mexican pesos (about 373 US dollars at the time). We rely on the so-called form R04-C that all banks operating in Mexico are legally required to report to the CNBV, and which contains detailed information

[13] Notice that in 2012, the rules to measure the Basel liquidity coverage ratio were yet to be established with certainty, and that the rules changed in 2013.

on all bank loans granted in Mexico.[14] This loan level information is matched with another database containing the financial statements of all banks. For comparability purposes, we restrict our sample to commercial banks and drop other financial institutions, such as development banks or those institutions belonging to other parts of the financial system. We also focus on the largest banks to ensure a similar pool of borrowers with significant overlap across banks both geographically and across sectors.

Table 4 shows the distribution of all loans across the various types of credit for each of the largest banks operating in Mexico. The table also shows that the majority of loans (about 55%) are so-called "single disposition." It also shows that interest rates are largely similar across loan types, except for syndicated loans, which are much larger and often denominated in US dollars. We therefore focus on "single disposition" loans, but we corroborate our results by also including other types of loans and the totality of Mexican banks. We always drop syndicated loans from our sample, since they do not depend solely on the characteristics of a single bank, and we do not include revolving and multiple non-revolving loans, as they both allow the borrower to have access to multiple loans on pre-arranged conditions.

We include both "straight" as well as "contingent" loans (such as bridge loans). We distinguish between new and previously granted loans. Unlike most national credit registries, the Mexican data covers extensive information on lending rates, including, inter alia, the reference rate, the spread over the reference rate, and the frequency of repricing. In terms of credit quality, we know whether the loan is non-performing, and if this is the case, the number of days overdue, and its so-called "qualification," ie, an internal risk rating provided by the supervisor.

The database covers loans to companies as well as to physical persons with entrepreneurial activities. We focus our analysis on loans to non-financial companies. The database includes firm-specific information such as borrower's location (state and municipality), main sector of activity, as well as firm's age, size (number of employees) and gross income in previous year.[15]

Finally, we obtain monthly data from Markit and Haver on credit default swap (CDS) spreads and equity prices for banks operating in Mexico during the period of analysis, where in the case of foreign banks the data reflect the assessment of the consolidated operations of the banks and not only of their subsidiaries in Mexico. The list of all the variables used in the study and the corresponding data sources are detailed in Table 3.

4. Empirical Methodology

In order to isolate the effects of WIT, we proceed in a number of steps. First, we document its impact on the stock prices of banks, in particular of foreign banks operating in Mexico. Figure 1 shows the evolution of stock prices in the years

[14] They include financial institutions with multiple purposes, financial institutions with single purpose, multiple service banks, and development banks.

[15] Note that the database, being nearly universal, covers mainly smaller firms, implying that the majority of firms do not have access to other, international financing sources nor are likely to export to or import from the euro area. Nevertheless our regression technique controls for these and other possible sources of bias due to omitted factors.

surrounding the WIT speech (with shading for the June–August period around the speech) of the two largest euro area banks operating in Mexico (BBVA and Santander) and compares them to that of HSBC – another European bank operating in Mexico but with headquarters in the United Kingdom, ie, outside the euro area. The figure starkly illustrates how the stock prices of these three banks evolved similarly during 2011, also in line with the broad US index (S&P 500). In the first half of 2012 – ie, the months just before the WIT – however, stock price developments saw a large divergence between euro area and other foreign banks. Euro area banks suffered a further decline in prices of around 30 percent, while HSBC experienced a sustained improvement. After WIT, the downward trend of euro area banks reversed, and their prices came back in sync with those of their peers. In short, the announcement by Draghi in July of 2012 proved to be a turning point for European bank stock prices.

Bank CDS spreads, shown in Figure 2, also highlight that the shocks varied across institutions, with euro area banks being hit harder before Draghi's announcement and benefitting more after it. Figure 3 suggests that the shocks came in large part via changes in sovereign risks, with yields of the peripheral euro area countries increasing markedly and reaching historical heights before the July 2012 announcement, as shown for Spain. Following WIT (marked again together with the previous and following month by the shaded area), Spanish bond yields declined substantially. In contrast, Mexican and US sovereign yields exhibited a declining trend through most of the period.

We next assess the effect of the central bank intervention on lending conditions by banks operating in Mexico. We first study changes in the overall growth rates of bank credit and interest rates. Simple comparisons of aggregate lending by all euro area and all other banks operating in Mexico and t-tests already suggest that WIT led to statistically significant differences in lending conditions between euro area and non-euro banks comparing before and after the event.[16] Specifically, we find that the difference in the average monthly growth rate of credit to all Mexican firms between euro area and non-euro area banks decreased significantly, and that the average interest rate charged was some 20 basis points higher for euro area banks relative to non-euro area banks after the event compared to before.

In order to assess causality, our main estimating technique is the difference-in-difference (diff-in-diff) methodology procedure of Khwaja and Mian (2008).[17] Following this setup, we only include borrowers with lending relationships with several banks, including at least one euro area and one non-euro area bank. This allows us to capture loan supply shocks by fully accounting for any shift in demand conditions or change in borrower's risk. In other words, to be included in our main sample, a firm would need to borrow from at least one bank affected by WIT and from another bank not affected by the shock. We initially apply this methodology using a panel structure, so, in its most demanding form, the specification is as follows:

$$\Delta Log\ loan_{ijt} = \beta_0 + \beta_1 treatedbank_j * treatmentperiod_t + \beta_2 bank_j + \beta_3 location_k + \beta_4\ firm_i * period_t + \varepsilon_{ijt} \quad \text{(1.a)},$$

[16] Not reported, but available upon request, also for different periods.

[17] This identification approach has been subsequently used by others in domestic studies (Jimenez, Ongena, Peydro and Saurina, 2012 and Albertazzi and Bottero, 2013), and cross-border banking analyses (Cetorelli and Goldberg, 2011; Schnabl, 2012). See also Jakovljević, Degryse and Ongena, (2015) for a review of empirical banking research on the impact of regulatory changes and events.

where $\Delta loan_{ijt}$ is the log difference in general credit (single disposition loans) to non-financial firm i by bank j at time t; $treatedbank_j$ is a dummy variable that equals 1 if the bank is "treated" by WIT (1 for all euro area banks, and 0 for all other banks); $treatment\ period_t$ a dummy variable that equals 1 in the months immediately after the WIT announcement (August to November 2012); $bank_j$ is a bank fixed effect (to account for bank-specific characteristics); $location_k$ is the geographical location of the firm (to account for local economic conditions); $firm_i$ is the firm fixed effect (accounting for borrower characteristics); and $period_t$ is a monthly time dummy (to account for macroeconomic and regulatory factors). Crucially, the $firm_i{*}period_t$ dummy variable controls for firm demand and risk in a given month. We are primarily interested in the coefficient β_1, which captures the (differential) effect of WIT on the affected banks, with the null-hypothesis that as the WIT speech increased the franchise value of the euro banks home operations, it reduced the incentives of these banks to engage in risk taking in their Mexican subsidiaries.

We also run similar regressions for the level of interest rates charged, $interest_{ijt}$. For both sets of regressions, we start with a limited set of fixed effects that we then expand progressively to the full set of fixed effects. This means that in the presentation of our regressions, we proceed to specification (1.a) above by progressively adding fixed effects to the equation below: [18]

$$\Delta Log\ loan_{ijt} = \beta_0 + \beta_1 treatedbank_j * treatmentperiod_t + \beta_2 firm_i + \beta_3 period_t + \beta_4 bank_j + \beta_5 location_k + \varepsilon_{ijt}. \quad (1.b)$$

These regressions are run over different windows of time before and after the WIT event to analyze how the behavior of affected banks changes over time. The main period of study extends from March to November 2012. Since Mario Draghi's speech was made on July 26th, the month of July itself is excluded from the sample. The base period is thus March to June 2012, while the treatment period runs from August to November 2012, so it incorporates four months following the event, a period during which banks had sufficient time to change their lending conditions. In our robustness tests, however, we use several alternative periods.

While we focus on changes in lending (conditions) to multi-bank firms, we also consider changes in credit conditions on bank loans to *all* firms. Therefore, this estimation includes firms with multiple and single banking lending relationships.[19] The estimation is similar to (1.a) except that we cannot use *firm*period* fixed effects to control for changes in demand at the firm level. Yet, we can use firm fixed effects to control for firm-specific characteristics. In this specification, we also include *location*period* and *industry* dummy variables to control for local economic and industry-specific conditions. We thus use the following specification for these regressions:

[18] Note that we cannot use certain combinations of fixed effects simultaneously. For instance we cannot include firm or time fixed effects in the equation including firm*period fixed effects, as the former would be subsumed by the latter, ie, we would have perfect collinearity. Also, we cannot use location and firm fixed effects in the same regression, as there is a single location for each firm. Similarly, we cannot include firm fixed effects and firm*period fixed effects in the same regression.

[19] Often data restrictions do not allow for adding borrower*time fixed affects and the literature resorts to pooling of firms to account for common shocks (see for instance Degryse, Laeven and Ongena, 2009; Popov and Udell, 2012; Degryse, Laeven and Ongena, 2009; De Haas and Van Horen, 2013).

$$Log\ loan_{ijt} = \beta_0 + \beta_1 treatedbank_j * treatmentperiod_t + \beta_2 firm_i + \beta_3 bank_j + \beta_4 location_k * period_t + \varepsilon_{ijt}. \quad (2)$$

While specification (2) is less able to disentangle supply effects from demand shocks and is therefore less rigorous than specification (1), it helps assessing the effects of WIT also on credit to *new* firms, therefore capturing the *extensive* margin of credit.[20] Finally, in order to further capture the impact of WIT on risk-taking, we build on (1.a) and (2) and run an additional specification in which we use borrowers' credit risk as the left-hand side variable of study, instead of loan amounts or lending rates, keeping the rest of the identification unchanged.

5. Empirical Results and Robustness

5.1 Main Regression Results

The main results on the effect of WIT on bank lending are presented in Table 5, where the classification variable "Euro" applies to euro area banks, and the treatment effect dummy variable "Post" refers to the period following the WIT speech. Column (1) shows the specification without any fixed effects. Column (2) adds location-specific fixed effects to account for local economic conditions which might impact loan demand. Column (3) has fixed effects accounting for firm-specific characteristics (dropping the location fixed effects). Column (4) includes both firm and location fixed effects; and in column (5) adds firm*treatment fixed effects. Finally, column (6) shows the results with firm*period fixed effects, our most stringent base estimation.

The results show that, compared to other institutions, euro area banks decreased their lending following the WIT speech, as suggested by the consistently negative and highly statistically significant euro area*post variable. In terms of economic magnitude, the reduction is very large, between 0.79 and 0.63 percentage points *per month*, a very considerable slowdown in growth rates. To put this amount in perspective, this represents about half of the average growth rate in credit for *all* banks in the period before the event (January to May 2012). Our findings remain robust to the inclusion of various sets of fixed effects accounting for demand and other shocks affecting firms differently. Thus, these findings provide strong evidence that the WIT speech substantially reduced the incentives of euro area banks to engage in more aggressive lending.

We next conduct a similar set of regressions, but considering now the level of the interest rate charged by banks. Table 6 reports these findings, which are again consistent across specifications. We document that euro area banks adjusted upwards their lending rates following WIT, as the coefficient of the euro area*post dummy interaction variable is positive and highly statistically significant in all six columns. As for lending volumes, the economic impact of this change in euro area banks' behavior is considerable, as the rates go up by between 20 and 29 basis points.

[20] In addition to testing explicitly treatment vs. non-treatment on the basis of a single coefficient, we also ran these regressions in a panel, ie, on the month by month growth rates, which provides us with results in the form of dummy variables for each bank*period. The coefficients for these various dummy variable thus indicate whether any bank deviated significantly in their month-to-month behavior from the other banks at any points in time over the period. These methods deliver very similar results in that they show a break in behavior around the same points in time that we use to center the diff-in-diff tests (not reported).

The results imply that, compared to other banks, euro-area banks tightened their lending standards to the same borrowers after WIT.

The analysis so far was limited to multi-bank firms only. This allows us to control well for changes in demand and other firms' characteristics, but a drawback of this specification is that we leave out large amounts of lending, including loans to firms who receive credit from one bank only. This choice could affect our results. For instance, a bank may change lending conditions to firms that borrow exclusively from that bank, and not to firms that also borrow from other banks (multi-bank firms). This can be due to private information linked to relationship-based lending, which tends to be more prevalent for single-bank firms (Degryse and Ongena, 2005).[21] In short, banks could respond differently to policy interventions in their lending to single-bank firms compared to their lending to multi-bank firms.

Therefore, we conduct a similar set of regressions, but now including all firms, ie, the specification (2) that considers loans to both multi and single-bank firms. Note that compared to specification (1.a) we need to drop the specification used in column 6 of Tables 5 and 6, as we cannot include firm*period fixed effects, and rather use location fixed effects to account for local economic conditions.

The results for all firms are reported in Table 7 for lending volumes and in Table 8 for interest rates. As with the sample of multi-bank firms, we report results for the differences between euro area and other banks. This analysis also finds that the monthly loan growth of euro area banks is lower relative to other banks after the policy intervention, in this case by about 0.8 percentage point, with results consistent across all five specifications. While weaker, the effects on the extensive margin are very comparable to the ones for multi-bank firms. Note that we show the window with the most conservative results, as all other windows consistently show stronger and more significant coefficients. As such, we can be confident that the effects we find reflect the overall adjustments by banks to the shocks, instead of adjustments in specific lending strategies. In terms of interest rates, Table 8 illustrates that the effects for all loans are also broadly in line with previous results, as euro area banks adjusted their lending rates relatively upwards after the policy event, between 13 and 26 basis points, depending on the specification. Thus, these results show that there is also a significant adjustment in the interest rate for single-bank firms.

We also consider borrowers' credit risk, where we investigate if changes in lending standards were linked to banks actively altering the risk profile of their borrowers. We adopt a similar approach as in previous specifications – (1.a) for multibank and (2) for all borrowers – but now use a credit score as our dependent variable (in which a higher credit score indicates lower risk). This score uses the supervisory agency's estimate of a firm's credit risk, which is derived from a logit model, with the score assigned to each borrower at each point in time.[22]

To proxy a firm's default, two measures are used: short-term default, defined as either nonpayment or partial payment of the minimum amount required by the bank during the last 3 months; and long-term default, defined as a default registered during the last consecutive 12 months. To estimate the likelihood of such defaults,

[21] See also Degryse, Cerqueiro, and Ongena (2011) and Jakovljević, Degryse and Ongena, (2015). For instance, as switching costs are higher for single-bank firms and hold-up costs can arise, one could expect banks to find it easier to (temporarily) adjust the interest rate for such borrowers.

[22] An important consideration here is that none of these measures are constructed by the banks themselves.

the credit score includes a measure of credit exposure – the past amount of unpaid loans as a share of total loans, the usage of credit lines, the total amount of the credit line used by the firm in the current period, and regional and bank fixed effects. Using only firms that have sufficient data available, the credit risk score is then estimated using logit regressions for each month on a rolling basis, controlling for heteroscedasticity of errors. The behavior of these out-of-sample credit scores are then analyzed.

We undertake the usual diff-in-diff regressions using this variable. As measures of firm credit risk tend to change gradually over time, we extend the periods of comparison: from January to June 2012 (before) and from August 2012 to January 2013 (after).[23] Beyond that adjustment, the regression specification remains the same and explains whether there were statistically significant changes in the estimated credit risk scores before versus after the WIT speech.

The regression results are presented in Table 9 for multibank firms and in Table 10 for all firms. They show that there was an improvement in the credit riskiness of firms lent to by euro area banks compared to other banks following the WIT intervention, with the effect present in both sets of regressions, ie, for multibank firms as well as the full sample of firms. This suggests that following WIT, euro area banks chose to lend to a safer credit portfolio relative to other banks, so WIT seems to have improved their incentives to maintain a prudent risk exposure.

We also ran all the regressions (settings (1.a) and (2)) in panel formats that include bank*period fixed effects and drop the treatment variable (WIT).[24] As before, we did this exercise for our two main dependent variables: loan growth and interest rates. These sets of regressions capture the dynamics of bank lending, by analyzing whether at any time a bank's lending conditions deviated significantly from other banks. That is, in this setting we do not test explicitly for the effect of WIT by comparing treated (euro area) and non-treated (non-euro area) banks on the basis of a single coefficient (WIT), but we run a panel that includes dummy variables for each bank at each point in time.

Consistent with previous findings, this method (not reported) also shows that euro area banks became more prudent after the WIT. They suggest that, in the run-up to the WIT, as financial distress in the euro area was reaching its peak, euro area banks loosened their lending standards compared to other institutions. The deterioration was stronger for the bank that saw its stock market capitalization decline more, reinforcing the idea that large declines in banks' capital positions are linked to higher risk taking by banks and that, by contributing to augment banks' capital positions, WIT reversed the increase in risk taking by providing banks better incentive to tighten their lending conditions.

Interestingly, our results suggest that an increase in bank stocks of euro area parent banks meant lower lending abroad. This finding apparently contrasts those obtained by Peek and Rosengren (1997) for Japanese bank subsidiaries in the United States in the early 1990s. However, the two findings likely reflect the widely different responses by the Bank of Japan and the ECB when confronted with a severe bank

[23] Results are robust to different periods of comparison.

[24] While for confidentiality reasons, we cannot provide results for individual banks, all aggregate results (ie group*time fixed effects) are available upon request.

crisis. While the ECB swiftly provided large amounts liquidity to the banking sector following the default of Lehman Brothers in 2008 (as reflected by the sharp expansion of its balance sheet over time), the Bank of Japan kept its balance sheet fairly constant until late into the Asian crisis.[25]

5.2 Robustness

We next conduct a number of robustness tests, including alternative groupings of treated and non-treated banks, different time windows, and additional econometric exercises. We use our most stringent specification, ie, (1.a) with firm*time fixed effects.

Alternative groupings. To assess the effects of the ECB intervention, so far we have focused on the differences between the euro area (treated) and all other banks (control), with the latter group amalgamating both domestic Mexican banks and non-euro area foreign banks. Yet, it can be argued that the right control group should be domestic banks (ie, Mexican banks) and should not include the non-euro area foreign banks, as the latter are typically global institutions that might (indirectly) also be affected by WIT.

Therefore, we replicate our baseline regression – specification (1.a) – now using two new control groups, one including Mexican banks only, and another limited to non-euro area foreign banks. Apart from the new groupings of treated and control groups, the estimation is the same as our estimations with firm*period fixed effects including only multibank firms (columns 4 and 6 of Tables 5 and 6). We again analyze the impact of WIT on both loan growth rates and interest rates.

We summarize these tests in Table 11, where we report only the treatment*period coefficients, showing different combinations of the treated (columns) and control groups of banks (rows). Panel A reports the results for loan amounts and Panel B for interest rates. The different control groups confirm our main results, in that following WIT, euro area banks lent significantly less and at considerably higher lending rates to the same borrower than domestic Mexican banks, as shown by the statistically significant coefficients of around -0.7 and 0.2, respectively. While the signs and magnitude of these results are consistent with our previous findings when including all non-euro banks as a control, the effect of WIT is not significant for the control group including only non-Mexican foreign banks (last column of panels A and B), presumably because foreign banks operating in Mexico operate globally and might have been affected by WIT, although indirectly and to a far lesser extent than euro area banks.

When splitting among the sample of euro area banks (in rows 2 and 3 using all non-euro banks as controls), we find that the coefficients on lending (Panel A) remain consistently negative and strongly statistically significant for both euro area banks at about 0.8 percentage points, with the WIT leading to a somewhat stronger restriction in the loan supply of euro bank 2. We do not find large differences across euro area banks regarding the impact of WIT on lending rates (Panel B). The panel shows that WIT resulted in higher lending rates by both euro area banks compared to Mexican

[25] An additional difference is that Japanese banks mostly operated abroad through branches, whereas we study local lending by subsidiaries. This means the capital constraints at home affected Japanese banks' activities abroad more directly, and that their international operations were under the close purview of the Japanese authorities, which likely asked their banks to focus on their home market. In contrast, the model of subsidiaries still allowed euro area banks to use their subsidiaries to engage in risk taking globally.

banks. Reassuringly, this increase in lending rates is not significant when the set of other (ie, non-euro area) foreign banks is used as the control group. Note that since these regressions consider lending to the same firm, the effects are not due to differences in the (pool of) firms' risk.

We further compare key characteristics of these euro area banks at the time. Both of them were heavily exposed to extreme funding stress due to the euro area crisis, so we review the relative amount of liquidity support that each of these banks received from the European Central Bank (ECB). As the crisis intensified after the default of Lehman Brothers in 2008 and banks' funding markets became more strained in the euro area, particularly for banks in the periphery, the ECB provided banks unlimited liquidity against good collateral.[26] Evidence suggests that weakly capitalized banks took out more liquidity and provided riskier collateral than better capitalized banks (Drechsler et al, 2016). Analysis of confidential data on all liquidity operations granted by the ECB to the largest euro area banks shows that both euro area banks operating in Mexico were among the top 25 percent of banks requesting liquidity (as a percentage of total assets).[27] Hence, the data support the idea that these banks had relatively high liquidity demands prior to WIT due to strains in funding markets.

Aggregate data on liquidity granted by the ECB shows that following WIT there was a massive reduction in liquidity requested by euro area banks, further supporting the view that WIT dramatically alleviated liquidity constraints in funding markets, in line with the prediction of Goldstein and Pauzner (2005). A more detailed analysis focusing on both euro area banks operating in Mexico shows that the bank that reduced its lending more sharply as a result of WIT (euro bank 2) had greater liquidity needs prior to WIT compared to euro bank 1, as revealed by the respective liquidity requests to the central bank.

Other large euro area banks. As illustrated in Figure 6, stock market data for other large European banks point to a similar pattern to that of the two euro area banks in our sample, showing a large decline in the months prior to the WIT speech followed by a sharp rebound afterwards. This suggests that the incentives applying to the banks in our sample were common to other large euro area institutions.

Using the same setup, we also ran a similar set of regressions but now including lending to all firms, ie, without restricting our sample to those firms borrowing from more than one bank. The results – not shown – are qualitatively similar to those for the multi-bank firms. Following WIT there is a relative decline in loan growth by euro area banks who also tightened their interest rates more than other institutions. The results also show a similar pattern to that of multi bank borrowers, in that the tightening following WIT was more pronounced for the euro bank that experienced a larger improvement in capitalization following the WIT.

Windows of study. Another set of robustness tests alters the window of time used to assess the policy event. It may take longer or shorter for the WIT to influence bank behavior than the window of time we used in our previous specifications. Since we have no strong priors other than informal conversations with supervisors and some previous literature on monetary policy (de Bondt, 2005) as to what is the correct time span is to capture the lag over which banks adjust their lending standards to such

[26] See Eser et al (2012) for an overview.

[27] We used consolidated figures for the largest 123 euro area banks from January to June 2012.

shocks, we apply a number of different start and end dates. Tables 12 and 13 report the results comparing euro area banks with all other banks. In Table 12 the specification includes location and firm fixed effects for all firms and multi-bank firms. Table 13 uses again our most stringent regression for multi-bank firms using firm*period fixed effects. The tables only report the coefficients for the treatment*period dummies. In terms of loan growth, results are only marginally affected by the time window. If anything, effects become stronger as the window of time expands. Comparisons are similar for the sample of all firms (Panel B) and when using the specification with firm*period fixed effects (Table 13).

In terms of interest rates, it also appears that shifts in the time window do not change our main conclusion supporting that euro area banks adjusted their interest rate upward after the event. Again, these regression results hold when using other combinations of treatment and control groups, when using all firms, and when using the most rigorous specification in Table 13. As such, our findings consistently suggest that there was a major shift in lending behavior around the time of the WIT speech.

The Tables also show that trimming observations at the 2 and 98 percentiles or at the 5 and 95 percentiles does not change the main results for loan growth rates or interest rates. The size of the coefficients becomes slightly smaller when winsorizing is performed at the 5 and 95th percentile, but the statistical significance largely remains.

6. Conclusions

We analyze how a major unconventional central bank intervention, Draghi's WIT speech, impacts lending conditions. To avoid endogeneity problems – where local demand shocks and macroeconomic risks are hard to insulate from the effects of the intervention – we conduct our analysis using data for Mexico and assess how banks from the euro area, which are directly affected by WIT, changed their lending conditions in Mexico, a financial system with diverse banking ownership. Our detailed data from a third country allow us to control for shifts in borrowers' demand and riskiness. Comparing local lending conditions to the same borrower with banks largely sheltered from the WIT shock, we show that the intervention significantly reduced incentives for risk shifting among euro area banks.

Our findings show that major central bank liquidity interventions can contribute significantly to altering banks' lending conditions. Our results complement those analyzing international spillovers, such as Peek and Rosengren (1997) for the case of Japan, and many others since. They suggest that, even with strict regulation and supervision covering aspects such as changes in (risk) exposures and limits on internal transfers of capital and liquidity between headquarters and subsidiaries, there can be spillovers from headquarters to subsidiaries (and vice-versa). The likely reason is that a bank's risk attitude operates across the whole institution, so that when the franchise value is under pressure the bank aims to preserve its overall profitability by engaging more in risk-taking globally. As this risk-taking might be difficult to detect in real-time, our results suggest the need to pre-emptively adapt cross-border regulation, supervision and resolution of global banks to make them well integrated, so as to assure not only that risks do not go undetected, but also that incentives remain well-aligned.

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Mexican Banking System

Table 1

Commercial Banks	2011		2012		2013	
	Number	(%) Assets	Number	(%) Assets	Number	(%) Assets
I. Subsidiaries of foreign financial institutions	**15**	**72.5**	**15**	**70.7**	**14**	**70.4**
a. United States	5	20.8	5	20.3	5	20.0
b. Euro	2	33.8	2	33.4	2	33.5
c. Others	8	17.9	8	16.9	7	16.9
II. National banks	**27**	**27.5**	**28**	**29.3**	**32**	**29.6**
Total	**42**	**100**	**43**	**100**	**46**	**100**

Source: Comisión Nacional Bancaria y de Valores.

Capital, Asset and Capital Adequacy Ratio (2012)

Million pesos

Table 2

	Non-euro	Euro	Total
Capital	294,210	247,934	542,145
Risk Weighted Assets	1,888,050	1,599,571	3,487,621
Capital Adequacy Ratio (%)	**15.58**	**15.5**	**15.54**

Source: Comisión Nacional Bancaria y de Valores.

Data Description

Table 3

Variable	Variable Definition	Source
Outstanding amount	Outstanding balance (in Mexican pesos) of the commercial credit at the end of the period, including receivable accrued interest, capitalized or refinanced interest, commissions or any other concept.	Comisión Nacional Bancaria y de Valores (CNBV). R04C database.
Interest rate	Weighted average of the interest rates used to calculate the interest payment of the period, using outstanding amounts as weights.	Comisión Nacional Bancaria y de Valores (CNBV). R04C database.
Type of credit	Credits are grouped into four categories according to their main characteristics: 1. Revolving. Credits granted for given amount, for an indefinite or a fixed term, over which the borrower can make one or more dispositions whose sum does not exceed the original amount contracted. 2. Single disposition. Credits granted with only one disposition. 3. Non-revolving. Credits granted for a given amount and for a fixed term. 4. Syndicated. Credits granted by a group of banks, with the objective of diversifying the risk when the amount of the credit approved is very large.	Comisión Nacional Bancaria y de Valores (CNBV). R04C database.
Spanish	Dummy variable that takes the value 1 if the loan was granted by a Spanish bank.	Created by the authors with R04C database.
Post "Whatever it takes"	Dummy variable that takes the value 1 for the period July–October 2012, ie the period post "Whatever it takes"	Created by the authors with R04C database.
Bank	Dummy variable that includes a category for each of the 9 banks included in our sample.	Comisión Nacional Bancaria y de Valores (CNBV). R04C database.
Firm	Dummy variable that includes a different category for each firm.	Comisión Nacional Bancaria y de Valores (CNBV). R04C database.
Location	Includes a different category for each state in Mexico, as well as a category for "Other country".	Adapted by authors from R04C database.

Notes: This table describes the variables used in the empirical analyses, ie differences-in differences and panel regressions. We use all firms in the database, but exclude loans with errors in their maturity dates (eg 75 loans that are coded to expire in December 2049). We winsorized growth rates of outstanding amounts at the 2nd and 98th percentiles. We winsorized interest rates at the 0.1% and 70% levels.

Summary statistics for outstanding amount and interest rate by type of credit

Table 4

		Outstanding Amount (MXN)					Interest Rate (%)			
Bank	Obs	Mean	Std. Dev.	Min	Max	Total outstanding amount	Mean	Std. Dev.	Min	Max
Revolving	3,059,387	4,123,995	40,100,435	5,000	5,469,988,160	12,616,897,847,744	13.0	3.5	0.1	58.0
Single disposition	4,004,575	5,313,190	58,122,336	5,000	15,042,893,667	21,277,067,518,602	14.0	4.3	0.1	70.0
Non-revolving	756,287	9,244,394	76,937,639	5,000	5,815,343,664	6,991,414,710,675	14.0	5.9	0.1	48.0
Syndicated	2,374	485,023,909	588,717,177	934,129	3,375,122,312	9,638,755,699,566	7.2	1.4	1.0	12.0

Notes: This table shows the total credit during the period July 2009–December 2014. We winsorized the outstanding amount by setting it equal to $5,000 MXN if it was lower than this value. We winsorized interest rates at levels 0.1% and 70%.

Diff-in-diff regressions: monthly growth rates of loans of multibank firms

Table 5

Monthly loan growth rates	(1)	(2)	(3)	(4)	(5)	(6)
Euro (1 if euro bank)	-1.244	-1.220	-1.905	-1.898	-1.853	-1.848
	(2.103)	(2.115)	(1.420)	(1.415)	(1.419)	(1.767)
Post (1 if Aug–Nov 2012)	0.639	0.635	-0.966	-0.967		
	(0.417)	(0.417)	(0.352)**	(0.352)**		
Euro*Post	**-0.793**	**-0.793**	**-0.634**	**-0.634**	**-0.767**	**-0.778**
	(0.418)*	(0.417)*	(0.392)[a]	(0.390)[a]	(0.203)***	(0.221)***
Location fixed effects	No	Yes	No	Yes	No	No
Firm fixed effects	No	No	Yes	Yes	No	No
Post*firm fixed effects	No	No	No	No	Yes	No
Firm*period fixed effects	No	No	No	No	No	Yes
Adjusted R^2	0.001	0.001	0.025	0.025	0.028	0.015
N	349,697	349,697	349,697	349,697	349,697	349,697

Notes: [a] p<0.15, * p<0.10; ** p<0.05; *** p<0.01. Standard errors in parentheses. The period of analysis goes from March to November 2012. We exclude July 2012. We winsorized growth rates at the 2nd and 98th percentiles. Clustered standard errors at bank level.

Diff-in-diff regressions: interest rates of multibank firms

Table 6

Interest rates	(1)	(2)	(3)	(4)	(5)	(6)
Euro (1 if Euro bank)	-1.983	-2.100	-1.748	-1.751	-1.762	-1.761
	(1.087)	(1.071)*	(0.592)**	(0.591)**	(0.597)**	(0.734)**
Post (1 if Aug–Nov 2012)	-0.210	-0.210	-0.154	-0.154		
	(0.090)**	(0.090)**	(0.060)**	(0.060)**		
Euro*Post	**0.285**	**0.286**	**0.196**	**0.197**	**0.224**	**0.224**
	(0.094)**	(0.094)**	(0.062)**	(0.062)**	(0.046)***	(0.057)***
Location fixed effects	No	Yes	No	Yes	No	No
Firm fixed effects	No	No	Yes	Yes	No	No
Post*firm fixed effects	No	No	No	No	Yes	No
Firm*period fixed effects	No	No	No	No	No	Yes
Adjusted R^2	0.057	0.080	0.676	0.677	0.664	0.493
N	349,697	349,697	349,697	349,697	349,697	349,697

Notes: * p<0.1; ** p<0.05; *** p<0.01. Standard errors in parentheses. We restrict data to the period from March to November 2012. We exclude July 2012. We use the same number of observations as the loan growth rate regressions. We winsorized interest rates at levels 0.1% and 70%. Clustered standard errors at bank level.

Diff-in-diff regressions: monthly growth rates of loans of all firms

Table 7

Monthly loan growth rates	(1)	(2)	(3)	(4)	(5)
Euro (1 if Euro bank)	-2.010	-1.875	-2.062	-2.056	-2.032
	(2.280)	(2.279)	(1.317)	(1.311)	(1.528)
Post (1 if Aug–Nov 2012)	0.558	0.554	-1.045	-1.046	
	(0.457)	(0.458)	(0.371)**	(0.371)**	
Euro*Post	**-0.812**	**-0.829**	**-0.572**	**-0.571**	**-0.608**
	(0.466) [a]	(0.479) [a]	(0.647)	(0.646)	(0.246)**
Location fixed effects	No	Yes	No	Yes	No
Firm fixed effects	No	No	Yes	Yes	No
Post*firm fixed effects	No	No	No	No	Yes
Adjusted R^2	0.001	0.002	0.037	0.037	0.040
N	835,391	835,391	835,391	835,391	835,391

Notes: [a] p<0.15, * p<0.10; ** p<0.05; *** p<0.01. Standard errors in parentheses. The period of analysis goes from March to November 2012. We exclude July 2012. We winsorized growth rates at the 2nd and 98th percentiles. Clustered standard errors at the bank level.

Diff-in-diff regressions: interest rates of all firms

Table 8

Interest rates	(1)	(2)	(3)	(4)	(5)
Euro (1 if Euro bank)	-1.845	-2.108	-1.721	-1.724	-1.761
	(1.070)	(1.026)*	(0.602)**	(0.601)**	(0.628)**
Post (1 if Aug–Nov 2012)	-0.154	-0.158	-0.121	-0.121	
	(0.073)*	(0.075)*	(0.054)*	(0.054)*	
Euro*Post	**0.234**	**0.255**	**0.132**	**0.133**	**0.221**
	(0.080)**	(0.075)***	(0.057)*	(0.057)**	(0.044)***
Location fixed effects	No	Yes	No	Yes	No
Firm fixed effects	No	No	Yes	Yes	No
Post*firm fixed effects	No	No	No	No	Yes
Adjusted R^2	0.053	0.085	0.828	0.829	0.823
N	835,391	835,391	835,391	835,391	835,391

Notes: * p<0.1; ** p<0.05; *** p<0.01. Standard errors in parentheses. The period of analysis goes from March to November 2012. We exclude July 2012. We winsorized interest rates at levels 0.1% and 70%. Clustered standard errors at the bank level.

Diff-in-diff regressions for credit risk scores growth of multibank firms

Table 9

Monthly loan growth rates	(1)	(2)	(3)	(4)	(5)	(6)
Euro (1 if euro bank)	-0.065	-0.057	0.067	0.072	-0.025	-0.024
	-0.11	-0.113	-0.079	-0.079	-0.057	-0.06
Post (1 if Aug–Dec 2012)	-0.117	-0.11	-0.186	-0.174		
	-0.155	-0.156	-0.2	-0.196		
Euro*Post	**0.625**	**0.639**	**0.554**	**0.544**	**0.724**	**0.725**
	(0.304)*	(0.299)*	(0.255)*	(0.253)*	(0.288)**	(0.368)*
Location fixed effects	No	Yes	No	Yes	No	No
Firm fixed effects	No	No	Yes	Yes	No	No
Post*firm fixed effects	No	No	No	No	Yes	No
Firm*period fixed effects	No	No	No	No	No	Yes
Adjusted R^2	0.001	0.001	0.29	0.30	0.31	0.51
N	4,549	4,549	4,549	4,549	4,549	4,549

Notes: * p<0.10; ** p<0.05; *** p<0.01. Standard errors in parentheses. Period of analysis is: from January 2012 to January 2013. Post period spans from August 2012 to January 2013. We exclude July 2012. We winsorized growth rates at the 2nd and 98th percentiles. Clustered standard errors at the bank level.

Diff-in-diff regressions for credit risk scores growth of all firms

Table 10

Interest rates	(1)	(2)	(3)	(4)	(5)	(6)
Euro (1 if Euro bank)	-1.983	-2.100	-1.748	-1.751	-1.762	-1.761
	(1.087)	(1.071)*	(0.592)**	(0.591)**	(0.597)**	(0.734)**
Post (1 if Aug–Dec 2012)	-0.210	-0.210	-0.154	-0.154		
	(0.090)**	(0.090)**	(0.060)**	(0.060)**		
Euro*Post	**0.285**	**0.286**	**0.196**	**0.197**	**0.224**	**0.224**
	(0.094)**	(0.094)**	(0.062)**	(0.062)**	(0.046)***	(0.057)***
Location fixed effects	No	Yes	No	Yes	No	No
Firm fixed effects	No	No	Yes	Yes	No	No
Post*firm fixed effects	No	No	No	No	Yes	No
Firm*period fixed effects	No	No	No	No	No	Yes
Adjusted R^2	0.057	0.080	0.676	0.677	0.664	0.493
N	349,697	349,697	349,697	349,697	349,697	349,697

Notes: * p<0.10; ** p<0.05; *** p<0.01. Standard errors in parentheses. The period of analysis is: from January 2012 to January 2013. Post period spans from August 2012 to January 2013. We exclude July 2012. We winsorized growth rates at the 2nd and 98th percentiles. Clustered standard errors at the bank level.

Robustness checks: changing treatment and control groups. Coefficient for multibank firms

Table 11

Panel A: Loan Amounts			
Treatment (row) / Control (column)	**Non-Euro**	**Mexican**	**Non-Mexican (foreign)**
Euro	-0.778***	-0.725*	-0.736
Euro bank 1	-0.759**		
Euro bank 2	-0.855**		
Panel B: Interest Rates			
Treatment (row) / Control (column)	**Non-Euro**	**Mexican**	**Non-Mexican (foreign)**
Euro	0.224***	0.182***	0.289
Euro bank 1	0.242***		
Euro bank 2	0.199***		

Notes: * p<0.10; ** p<0.05; *** p<0.01. Clustered standard errors at the bank level.

Economic Robustness Checks. Changing study period and winsorizing. Specification 4 (location & firm fixed effects)

Table 12

Study period	Loans (monthly growth rates)		Interest rates		
	Winsorizing P2-P98	Winsorizing P5-P95	Winsorizing 0.1-70%	Winsorizing P2-P98	Winsorizing P5-P95
Panel A: Multibank firms					
February–December 2012	-1.415**	-0.808**	0.223**	0.205**	0.163***
January 2012–January 2013	-1.272*	-0.639**	0.275**	0.248**	0.197***
February–November 2012	-1.171**	-0.662**	0.208**	0.193**	0.153***
March- December 2012	-0.866**	-0.601*	0.212**	0.196***	0.159***
Panel B: All firms					
February–December 2012	-1.338**	-0.745*	0.157**	0.146**	0.113**
January 2012–Jan 2013	-1.067**	-0.546 [a]	0.203**	0.183**	0.143***
February–November 2012	-1.060**	-0.574 [a]	0.143*	0.134*	0.103**
March–December 2012	-0.841*	-0.580 [a]	0.147**	0.138**	0.109**

Notes: [a]<0.15, * p<0.1; ** p<0.05; *** p<0.01.This table summarizes the following robustness checks for specification 4 that includes location and firm fixed effects: i) modifying the study period, and ii) winsorizing loans' growth rates and interest rates at 5th–95th percentiles and 2nd–98th percentiles. Our base specification for loans includes winsorizing at percentiles 2nd and 98th. Our base specification for interest rates includes winsorizing at interest rate levels 0.1% and 70%, and clustering at the bank level. This table includes the Spanish*Post estimated coefficient of specification 4, which includes location and firm fixed effects. The base study period is March–November 2012. We exclude July 2012.

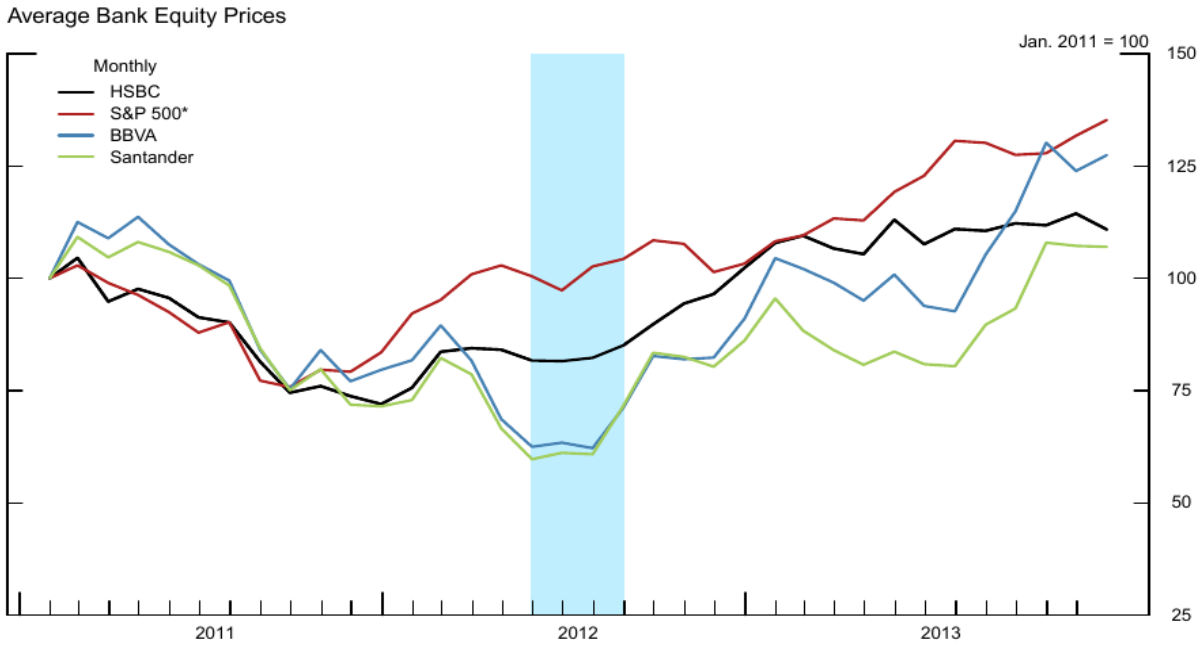
Economic Robustness Checks. Changing study period and winsorizing. Multibank firms Specification 6 (firm*period fixed effects)

Table 13

Study period	Loans (monthly growth rates)		Interest rates		
	Winsorizing P2-P98	Winsorizing P5-P95	Winsorizing 0.1-70%	Winsorizing P2-P98	Winsorizing P5-P95
February–December 2012	-1.534**	-0.826**	0.253***	0.232***	0.188***
January 2012–January 2013	-1.425**	-0.675*	0.310***	0.278***	0.225***
February–November 2012	-1.312**	-0.688**	0.239***	0.220***	0.178***
March–December 2012	-1.000***	-0.625*	0.239***	0.219***	0.180***

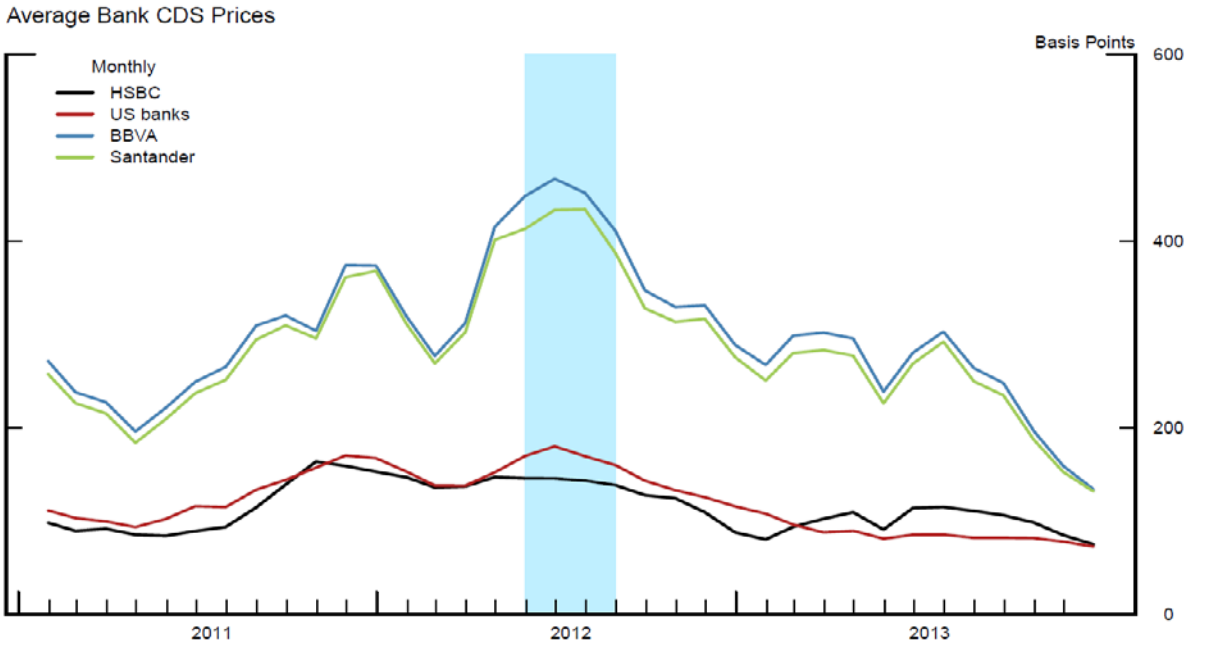
Notes: * p<0.1; ** p<0.05; *** p<0.01.This table summarizes the following robustness checks: i) modifying the study period, ii) winsorizing loans' growth rates and interest rates at 5th–95th percentiles, and iii) 2nd–98th percentiles. Our base specification for loans includes winsorizing at percentiles 2nd and 98th, and clustering at the bank level. Our base specification for interest rates includes winsorizing at interest rate levels 0.1% and 70%, and clustering at the bank level. This table includes the Spanish*Post estimated coefficient of specification 6, which includes fixed effects for the interaction between firm and period. Multibank firms. The base study period is March–November 2012.

Figure 1: Bank equity prices



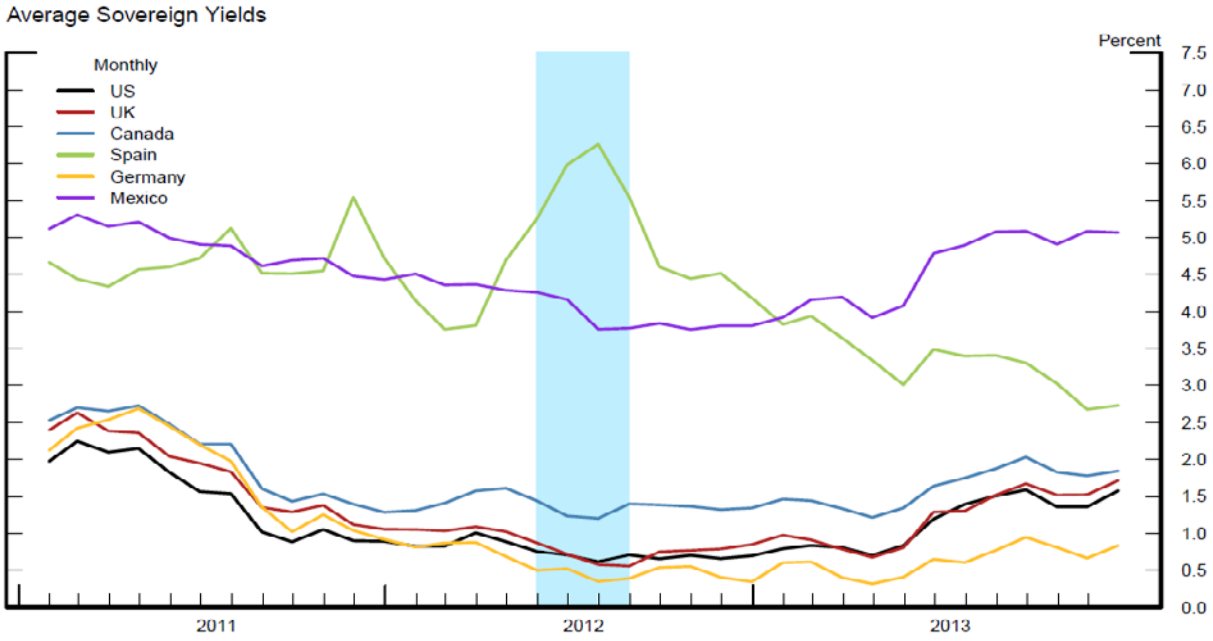
*S&P 500 is the bank sub-index.

Figure 2: Bank CDS



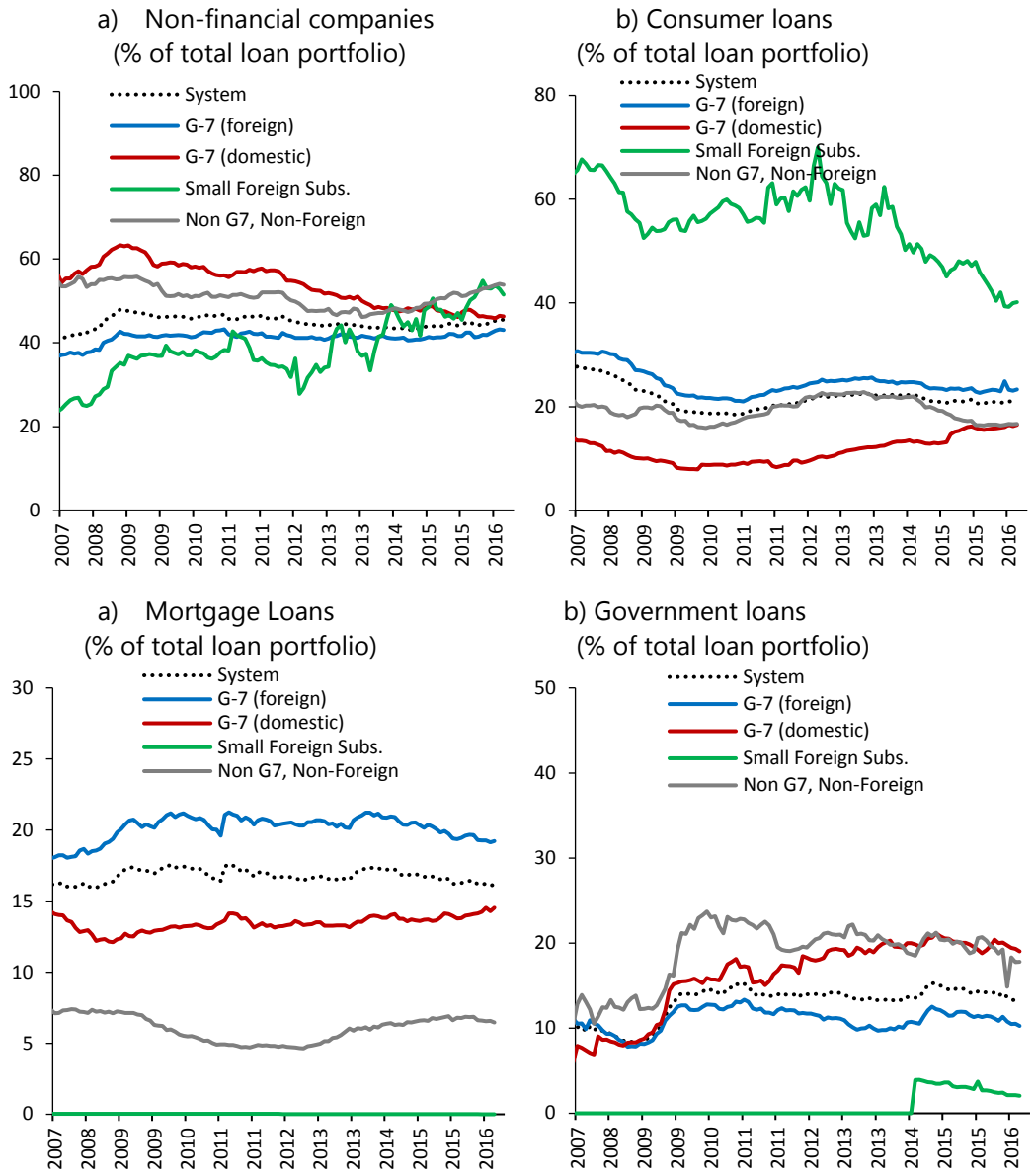
Source: Markit; JPMorgan

Figure 3: Sovereign yields



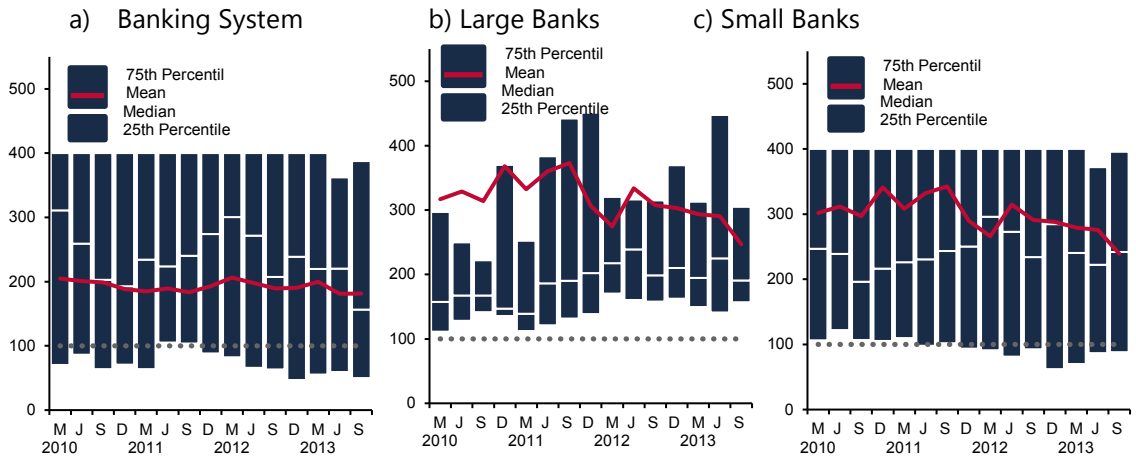
Note: Data are monthly average yields on 5−Year Sovereign Bonds.

Figure 4: Loan Portfolio



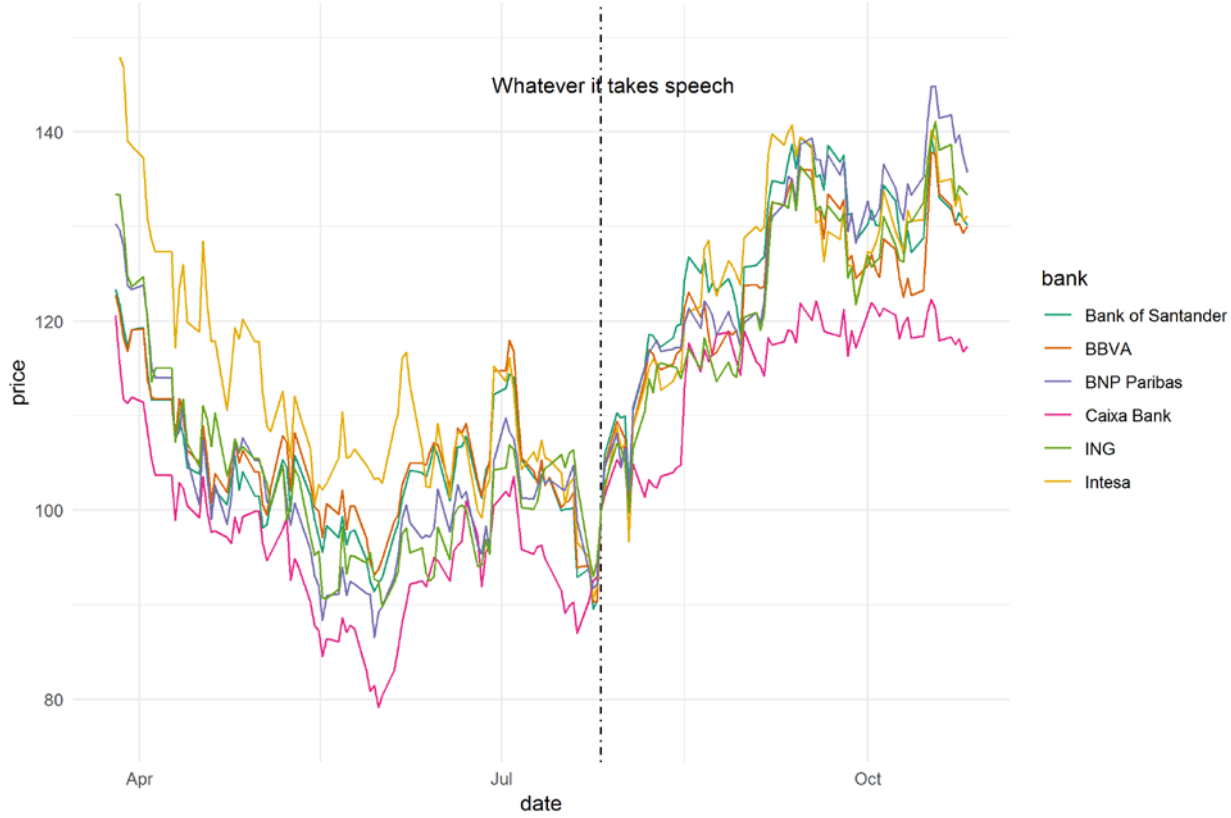
Source: Comisión Nacional Bancaria y de Valores
Note: G-7 refers to the seven largest banks, split by domestic and foreign banks. The remaining banks are small foreign subsidiaries or smaller domestic banks.

Figure 5: Banks' Liquidity



Source: Bank of Mexico.

Figure 6: Stock prices of large euro area banks



Note: Market prices have been indexed at 100 at the date of the WIT speech.

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