International Banking and Cross-Border Effects of Regulation: Lessons from France*

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As part of the International Banking Research Network, the Banque de France contribution to the research project on prudential policy spillovers concentrates on the "outward" adjustment of French banks' cross-border lending. We consider both adjustment of cross-border lending to foreign ("destination-country") and French ("home-country") regulation and investigate differences between financial and non-financial counterparties. For some regulatory measures, we find that French banks increase their cross-border lending growth in response to regulatory tightening abroad—presumably because they are not subject to these regulatory changes. All in all, we do not find particularly large quantitative adjustments to changes in foreign regulatory policies. Lastly, we find that balance sheet variables are important for the adjustment of cross-border lending growth in response to French regulatory policy changes.

JEL Codes: F36, G21, G28.

1. Introduction

The recent financial turmoil in industrialized countries and the particular vulnerabilities of the banking sector have led to an increased

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discussion about how to strengthen the resilience of the financial system via banking regulation and macroprudential policy. France, which is characterized by a concentrated banking system in which the four largest banking groups are classified as global systemically important banks, is particularly concerned: regulatory changes are potentially transmitted cross-border through the international activities of large banks. In this paper,[1] we try to tackle these issues using French micro-level bank data in order to explore whether French banks adjust their external positions in response to regulatory changes in the destination country as well as to French regulation.

International banking regulation was characterized by a stable environment over 2000–06. While Basel II negotiations started in 2004, implementation in many European countries only began in 2007.[2] Thus, the time period we cover (2000–13) is marked by a first period with few regulatory changes (over 2000:Q1–2007:Q2) and a second time period marked by many regulatory changes from Basel II, Basel II.5, and Basel III in parallel to the subprime crisis and the European debt crisis.[3]

In 2000, the main regulatory tools used in France[4] were capital requirements for credit and market risks,[5] concentration limits on large exposures as well as liquidity ratios. Neither a countercyclical capital buffer nor a leverage ratio were used prior to the introduction of Basel III regulation. Capital requirements significantly changed with the implementation of Basel II in 2007–08, Basel II.5 at the end of 2011, and Basel III starting from 2014 (with a phase-in).

[1]This paper presents the Banque de France contribution to a research project undertaken within the International Banking Research Network (IBRN), which aims to analyze issues related to global banks and their international activities.

[2]See Cornford (2006) for a detailed illustration.

[3]For example, as illustrated by the IBRN Prudential Instruments Database described in Cerutti et al. (2017), one regulatory change concerning capital requirements occurred in the period 2000:Q1–2006:Q4, one in 2007:Q1–2010:Q4, and ninety-eight in 2011:Q1–2014:Q4.

[4]We abstract here from a discussion on reserve requirements in France, as these are mainly used as a monetary policy tool in the Eurosystem. Reserve requirements are, however, used as a regulatory tool in emerging market economies.

[5]These were implemented respectively in 1993 and 1996; see Thoraval (1996).

While liquidity regulation evolved in 2010, the main changes came from the introduction of Basel III, namely the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). An observation period for both ratios started in 2014:Q1 prior to the implementation of the LCR with a phase-in over 2015–19. The NSFR is planned to be implemented in 2018.

In the context of this IBRN project, we concentrate on the external adjustment to regulatory changes abroad ("outward transmission"). We do so because the French banking system is strongly dominated by French banks. The first nine French banking groups cover 85 percent of credit to the real economy in France in 2006:Q4. With regards to the remaining market share, foreign banking groups are not very highly represented. Thus, we do not expect large effects of regulatory changes "imported" to France by affiliates of foreign banks ("inward transmission").

More importantly, during the financial turmoil of 2008–09 as well as 2010–12 (periods that coincide also with the introduction of various regulatory changes abroad), French domestic bank lending was relatively stable, reflecting the fact that banks paid particular attention to their core business in France. As such, we do not expect large adjustments at home, on the one hand since there were governmental actions aimed at facilitating the resolution of credit disputes and curbing risks of a credit crunch, and on the other hand since domestic retail business proved to be quite resilient to financial market distress.[6]

We thus expect more adjustments to take place abroad, which is why we concentrate on how *foreign* lending growth was adjusted. The fact that French banks are large and very active abroad, both through cross-border lending and through the establishment of affiliates abroad, is useful in this sense, as we can include a relatively high number of countries and banks in our analysis.[7] Using locational

[6]Figure 2 traces the growth rates of domestic as well as foreign lending (cross-border as well as lending by French banks' branches abroad). As shown, the low variability of domestic lending, especially to the non-financial sector, exemplifies the importance of the domestic retail market for the overall stability of the French banking sector.

[7]Though we include a large number of banks, one should keep in mind that those belong to a smaller number of banking groups.

data (in contrast to consolidated data), however, we can only concentrate on cross-border loans from French banks and thus cannot include lending by affiliates abroad in our measure of foreign loans. This notwithstanding, the use of locational data allows better econometric identification of regulatory changes abroad, as these are not targeted at French banks. For the regulatory data, we use the IBRN Prudential Instruments Database described in Cerutti et al. (2017).

Our findings can be summarized as follows: *First*, we find that cross-border lending growth is driven by the business cycle in the respective destination countries, but less so by regulatory changes. We only find consistent and significant outward adjustment in response to changes in capital requirements, reserve requirements, and interbank exposure limits. In quantitative terms, these effects are rather small. This finding is not surprising given that the bulk of regulatory changes was implemented during the Great Recession.

Second, we find that French banks' reaction to a regulatory tightening abroad depends on the type of regulatory policy. Whereas French banks decrease their cross-border lending growth in response to a tightening in interbank exposure limits, they increase their cross-border lending growth when reserve requirements are tightened abroad. Our results show that the capacity of French banks to adjust their cross-border loans depends on their balance sheet variables—in particular, the illiquid assets ratio and the dependence on net intragroup funding. If the latter two are very high, banks might be constrained in their ability to extend cross-border loans and actually decrease lending growth in response to a regulatory tightening. All in all, we interpret our findings as indicative of regulatory leakages (for selected policy measures): while lending growth by banks resident in the destination country that is tightening regulation ("locally regulated banks") presumably decreases, French banks not subject to this foreign regulation substitute for the activities of locally regulated banks by increasing their cross-border lending growth. Since the results are driven by lending to the non-financial sector, we conclude that French banks do not use their affiliate network to substitute for a reduction in lending by "locally regulated banks," but rather lend directly to (non-financial) counterparties.

Third, the results show that banks' balance sheet characteristics are important for the cross-border transmission of domestic capital regulation. We find that a high tier 1 capital ratio and a high reliance

on net intragroup funding significantly reduce cross-border lending growth in the case of a French tightening of capital requirements. On the contrary, the availability of cheap and stable funding due to a high reliance on core deposits can facilitate the maintenance of strong cross-border lending growth in the case of such tightening. However, the economic magnitudes of these effects remain small.

2. Data and Stylized Facts for France

2.1 Bank-Level Data

Our bank-level data come from the Statistics Department of the Banque de France and the Autorité de Contrôle Prudentiel et de Résolution (ACPR), the French supervisory body for the banking sector.[8] We use locational data for our analysis, thus concentrating on the unconsolidated balance sheet of individual entities within a banking group.[9] However, as a robustness check, we include balance sheet variables from the consolidated level in the regressions to check whether these affect the results.[10] We specifically rely on data of French banks' outstanding amounts of cross-border loans for which we know the country (as well as the sector) of the counterparty. Though we also have information on French banks' branches abroad (as they are regulated by the French supervisor), a disaggregation of their assets with regards to the country of residence of the counterparty is not available. This is why we use these information only for aggregate statistics and to restrict the sample of banks in robustness checks.[11]

[8]The data are confidential. They can be accessed if the application for data access has been approved by the Banque de France. External researchers as well as Banque de France staff have to apply for data access.

[9]We do so for several reasons: The French banking system is very concentrated, thus not allowing for a large number of banking groups to be analyzed. Further, mergers and acquisitions lead to a considerable change in the size of banks and their respective cross-border loans—a problem that is more pronounced on the consolidated level than on the locational level. In addition, consolidated balance sheet data are only available at biannual frequency.

[10]The sample size is thus reduced for these robustness checks.

[11]The underlying data in figures 1, 2 (cross-border loans), 3, 4, and 5 are based on locational data of French banks' cross-border loans which are collected by the Statistics Department of the Banque de France for the purpose of the locational

We cover the time period of 2000:Q1–2013:Q2 (with 2013:Q2 being the last available data point at the time we started implementing this project). We restrict the sample in several dimensions. First, we only consider countries reported in the IBRN Prudential Instruments Database described in Cerutti et al. (2017). This leads us to consider sixty-four countries, of which fifty-three are included in the final data set. Second, we only include French banks and exclude banks that are very small or have non-significant cross-border activities. Thus, we exclude bank observations with loans to non-banks smaller than EUR 100 million, or total assets smaller than EUR 1 billion. We also restrict the sample to banks for which foreign assets represent at least 0.5 percent of total assets all of the time. Third, we only include bank observations if a bank has a positive stock of loans in at least five countries.[12] We impose continuity by including only observations with eight consecutive quarters of non-missing observations of the left-hand-side (LHS) variable. We truncate observations if cross-border lending growth exceeds +100/–100 percent.

From an initial sample of more than 500 banks, we finally retain only 42 banks that have a stable presence over the entire sample and have significant cross-border lending activity. Though the use of locational data reduces the incidence of mergers and acquisitions (in comparison with consolidated data), our individual bank series contain a few breaks. These are most likely due to mergers and acquisitions, but are taken care of by the truncation of the LHS variable.

2.1.1 Dependent Variables

The dependent variable, $\Delta Y_{b,j,t}$, is the change in the log of loans granted by bank b to counterparties in destination country j at time t. We notably consider all cross-border loans as well as loans to the non-financial and financial sectors only to specifically investigate the importance of intragroup flows.

banking statistics of the Bank for International Settlements (BIS). The underlying data of figure 2 (domestic loans and loans by branches) and table 3 are derived from balance sheet data collected by the ACPR. The underlying data of table 2 are based on consolidated data of French banking groups' foreign loans which are collected by the Statistics Department of the Banque de France for the purpose of the consolidated banking statistics of the BIS.

[12]We do so in order to only include banks with significant international activity.

2.1.2 Balance Sheet Characteristics

We include the following balance sheet variables:

- Log of total real assets, i.e., assets deflated by the GDP deflator ($LogTotalAssets_{b,t-1}$)
- Share of tier 1 capital to total assets in % ($Tier1Ratio_{b,t-1}$)
- Share of illiquid assets over total assets in % ($IlliquidAssets\text{-}Ratio_{b,t-1}$)
- Share of a bank's foreign assets relative to total assets in % ($InternationalActivity_{b,t-1}$)
- Share of a bank's net intragroup funding, i.e., liabilities of the bank vis-à-vis its branches abroad minus the corresponding assets; this difference is scaled by total assets and reported in % ($NetIntragroupFunding_{b,t-1}$)
- Share of core deposits over total assets in % ($Deposit\text{-}Ratio_{b,t-1}$)

2.2 Data on Prudential Instruments

For the measures of regulatory changes, we rely on the IBRN Prudential Instruments Database described in Cerutti et al. (2017). Regulatory changes associated with a tightening of regulation are coded as 1 in the database, whereas a loosening of regulation is associated with –1. However, for the case of reserve requirements and the sector-specific capital buffers, the numbers can take on absolute values larger than 1 to capture the intensity of the change. We consider seven instruments for the analysis: capital requirements, sector-specific capital buffers, loan-to-value ratios, reserve requirements (both for foreign- and local-currency deposits), interbank exposure limits, and concentration ratios. An aggregate index ($PruC$) that sums the changes across all seven instruments is also included. We use the following definitions to measure the impact of regulatory changes:

- $DestP_{j,t-l}$ (where $l = 0, 1, 2$): Destination-country regulation (destination = foreign country receiving a loan) with 0, 1, and 2 lags
- $HomeP_{t-l}$ (where $l = 0, 1, 2$): Home-country regulation (home = France) with 0, 1, and 2 lags

Table 1 shows that the number of changes of prudential instruments is rather small given the large number of observations.

2.3 Stylized Facts

The French banking sector is made up of a small number of banking groups, of which most are characterized as universal banks. This concentration is illustrated in the French credit registry: 85 percent of the credit exposure to the real economy in France is carried out by nine banking groups in 2006:Q4. Four among those groups have important international activities, leading the Financial Stability Board to classify them as global systematically important banks after the 2008 crisis.[13] On the contrary, activities by foreign banking groups in the domestic French market are rather limited.

2.3.1 Foreign Lending by French Banks

Figure 1 describes the sum of outstanding cross-border loans for the banks that we retain in our sample. Compared with the overall cross-border loans by banks resident in France (depicted by the official data series in the BIS international banking statistics), our restricted sample closely follows the dynamics of the total amount, though it only represents about half of the outstanding amounts. The series show a strong upward trend, especially from 2004 to 2007, before stagnating due to the Lehman shock in 2008 and the European sovereign debt crisis.

Figure 2 depicts the growth rates of French banks' domestic and cross-border lending over the time period in question. Whereas cross-border lending growth fluctuates to a substantial amount, domestic lending growth is more stable, displaying growth rates that are smaller in absolute terms. In figure 2, we also compare these growth rates with the one of lending by foreign branches—data for which we do not have the disaggregation by destination country and which can therefore only be used for comparison purposes. Figure 2 shows that lending growth by branches abroad is also very volatile, thus confirming that foreign lending is inherently more volatile than domestic

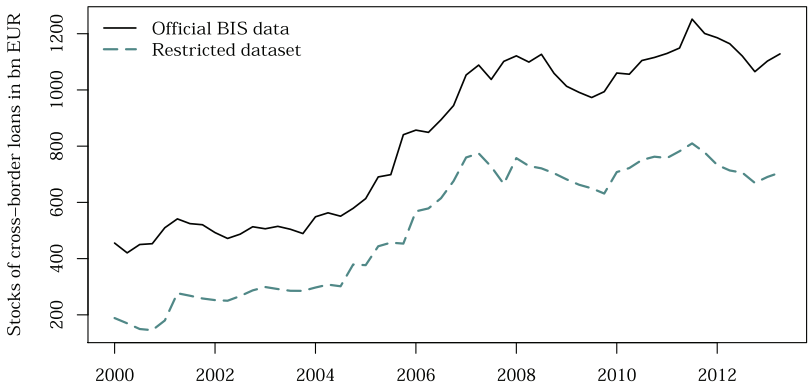
[13]Financial Stability Board (2014): "2014 Update of List of Global Systemically Important Banks (G-SIBs)." Available at http://www.fsb.org/wp-content/uploads/r_141106b.pdf.

Table 1. Summary Statistics on Changes in Prudential Instruments

Policy Changes in Destination Country					
Instrument	**No. of Country-Time Changes**	**No. of Country-Time Changes (Tightening)**	**No. of Country-Time Changes (Loosening)**	**No. of Bank-Country-Time Changes**	**Proportion Base-MPP Non-zero**
Prudential Index	4,110	2,618	1,492	27,414	0.150
General Capital Requirements	491	491	0	27,414	0.018
Sector-Specific Capital Buffer	608	422	186	27,414	0.022
Loan-to-Value Ratio	864	582	282	27,414	0.032
Reserve Requirements: Foreign	1,138	637	501	27,414	0.042
Reserve Requirements: Local	2,076	952	1,124	27,414	0.076
Interbank Exposure Limit	212	212	0	27,414	0.008
Concentration Ratios	276	246	30	27,414	0.010

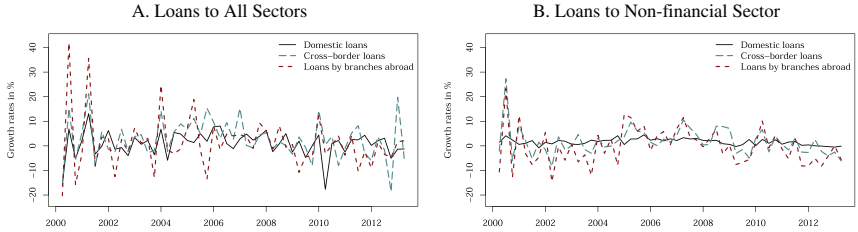
Notes: This table shows summary statistics on changes in prudential instruments for banks located in France over the period 2000:Q1–2013:Q2. Data on the instruments come from the IBRN Prudential Instruments Database described in Cerutti et al. (2017) and are on the quarterly level. The number of changes in prudential instruments is reported on several dimensions, i.e., on the country-time level and on the bank-time level. The last column of the table shows the share of prudential changes to total observations (i.e., the share of non-zero observations).

Figure 1. Sum of Cross-Border Loans



Notes: The figure depicts the sum of outstanding amounts of cross-border loans by banks resident in France over 2000:Q1–2013:Q2. The straight line represents the overall sum, whereas the dashed line represents the sum computed from the banks that are retained in the sample.

Figure 2. Growth Rates of Domestic and Foreign Loans



Notes: The figure depicts the growth rate of the sum of outstanding amounts of loans for a subsample of banks (those present over the entire sample 2000:Q1–2013:Q2). Domestic loans denote loans to French residents, whereas cross-border loans are extended to non-residents. Loans by branches abroad are extended by the branches of the same subsample of banks.

lending. Panel B of figure 2 shows that this is especially the case for lending to the non-financial sector, thus pointing to the resilience of the French domestic retail market.

Much of French banks' foreign lending is done through local lending by their affiliates abroad. Using consolidated data for six major French banking groups over the period 2006:Q4–2013:Q2, one can

Table 2. Sum of Foreign Lending of Six Major French Banking Groups (consolidated data), Mean over 2006:Q4–2013:Q2, in EUR bn

Variable	Mean	Min.	Max.
Foreign Lending	1,356.74	937.41	1,535.05
Cross-Border Lending	607.98	515.26	673.17
Lending to Financial Sector	276.54	150.94	419.16
Lending to Non-financial Sector	286.24	149.72	370.41
Lending by Affiliates Abroad	748.76	422.15	956.60
Lending to Financial Sector	121.36	34.98	201.36
Lending to Non-financial Sector	543.76	271.19	733.78

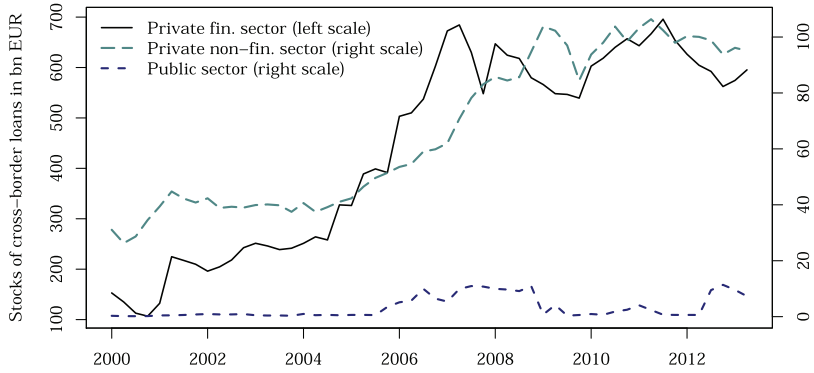
Notes: This table lists the sum of outstanding amounts of different types of loans averaged over the period 2006:Q4–2013:Q2. Data are reported at the consolidated level of six major banking groups and thus exclude intragroup flows. Foreign lending is the sum of cross-border lending as well as local lending by affiliates abroad. The financial and non-financial sector both exclude public entities.

see in table 2 that affiliates abroad mainly engage in lending to the non-financial sector.[14] At the locational level, we only have access to cross-border loans. Figure 3 splits the sum of cross-border loans into different counterparties, notably loans to the private financial (bank and non-bank) and non-financial sectors as well as the public sector. In terms of magnitudes, loans to the private financial sector (left scale of figure 3) make up the bulk of the stock of cross-border loans. Within the category of lending to the financial sector, we are specifically interested in the part stemming from lending to banks, as these represent largely intragroup flows ("internal capital markets"). Table 3 shows that cross-border interbank loans are largely composed of intragroup flows: for the year 2010,[15] the sum of outstanding amounts of intragroup loans for the banks in the sample is on average EUR 328.11 billion and makes up about 55 percent of overall cross-border loans to the bank sector. Out of these intragroup positions, only 28 percent are vis-à-vis subsidiaries, whereas

[14]Discrepancies between the numbers in tables 2 and 3 mainly stem from the fact that consolidated data do not include intragroup positions.

[15]Unfortunately, we only have access to these data for 2010, which is why table 3 is restricted to this time period.

Figure 3. Sum of Cross-Border Loans, by Counterparty



Notes: The figure depicts the sum of outstanding amounts of cross-border loans by the banks in the sample over the period 2000:Q1–2013:Q2. The counterparties denote the sectors that receive the loans.

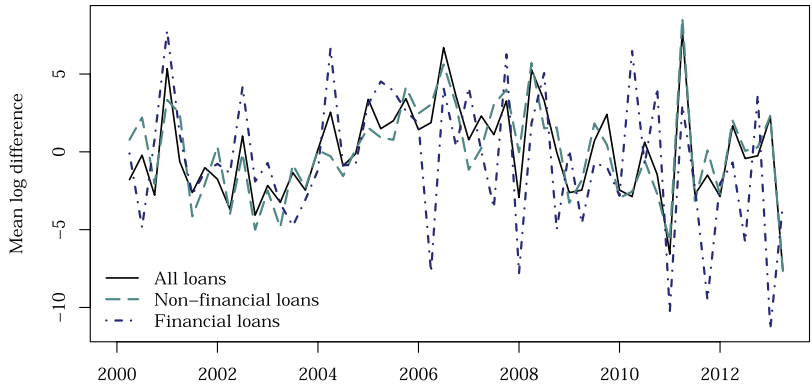
Table 3. Sum of Cross-Border Interbank Positions, Mean over 2010:Q1–2010:Q4

Variable	EUR Billions
Interbank Loans to Subsidiaries	91.17
Interbank Loans to Branches	236.94
Interbank Loans to Financial Sector Outside of Group	268.03
Interbank Borrowing from Subsidiaries	78.18
Interbank Borrowing from Branches	319.06
Interbank Borrowing from Financial Sector Outside of Group	339.83

Notes: The table lists the sum of outstanding amounts of cross-border interbank lending and borrowing averaged over the period 2010:Q1–2010:Q4. Data are reported at the locational level.

the remaining 72 percent are vis-à-vis branches. The importance of intragroup flows within the category of cross-border flows to the financial sector is important for the interpretation of the regression results. As will be explained later in more detail, intragroup flows represent one potential transmission channel, and we will test its

Figure 4. Log Difference of Cross-Border Loans (means across banks)



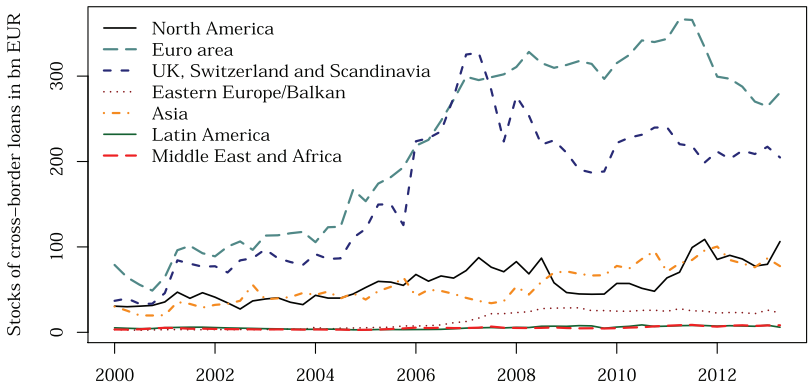
Notes: The figure depicts the mean of the dependent variables (in percentages) across the banks in the sample over the period 2000:Q1–2013:Q2.

importance by running regressions for the subsample of lending to the financial sector only.

Figure 4 traces the mean of the dependent variable, the difference of the log of loans. Cross-border lending growth to the nonfinancial sector closely follows the pattern of overall cross-border lending growth, whereas cross-border lending growth to the financial sector fluctuates to a larger extent. Though highly volatile, the growth rates are clearly positive in 2005–07 before slumping into negative territory from 2008 onward. While regulatory changes could be one of the factors behind these negative growth rates, the financial crisis, the turmoil in interbank and wholesale funding markets, and large changes in monetary policy have certainly also contributed to the adjustments in foreign lending.

French banks' cross-border loans are mainly directed at euro-area countries and the United Kingdom, followed by the United States and Asian countries (figure 5). With regards to the United Kingdom, this predominant position is mainly driven by flows to the financial sector, reflecting the importance of the London interbank market. The large exposure of French banks toward industrialized countries implies that there is very little time variation of the regulatory changes in the countries that French banks are mainly exposed

Figure 5. Sum of Cross-Border Loans, Different Regions



Notes: The figure depicts the sum of outstanding amounts of cross-border loans by the banks in the sample for different regions of residence of the counterparty.

to: These countries did not implement a large number of regulatory changes (in comparison with emerging market economies) and often implement regulatory changes simultaneously (due to Basel II–III or in the case of reserve requirements due to the common monetary policy in the Eurosystem). In addition, these countries have been affected the most by financial market distress during the recent financial crisis.

2.3.2 Balance Sheet Characteristics

Summary statistics in table 4 describe the balance sheet features. Real total assets continuously grew since 2002 before abating in 2008. The tier 1 capital ratio equals 6 percent on average. The illiquid assets ratio rises from a mean of around 87 percent to 93 percent in 2009 when this trend stalled, possibly due to increased liquidity holdings during the European sovereign debt crisis. The variable capturing banks' international activities fluctuates around 24 percent before decreasing steadily from 2010 onward. Once again, this might be driven by the retrenchment from foreign markets and, in particular, from periphery euro-area countries. Net intragroup funding, which was positive at the beginning of the sample, steadily declined over 2000–13 to values as low as –5 percent, suggesting that

Table 4. Summary Statistics

Variable	Mean	Median	SD
Dependent Variables:			
Δ Cross-Border Loans	0.16	−0.19	30.69
Δ Cross-Border Non-financial Loans	0.19	−0.44	27.32
Δ Cross-Border Financial Loans	−0.66	0.00	36.92
Independent Variables:			
Log Total Assets	16.97	16.79	1.76
Tier 1 Ratio	6.02	5.10	6.52
Illiquid Assets Ratio	90.14	98.81	16.70
International Activity	23.25	11.48	23.32
Net Intragroup Funding	−0.75	0.00	7.87
Deposit Ratio	32.96	30.09	26.97

Notes: This table provides summary statistics for bank balance sheet and lending data. Data are observed quarterly from 2000:Q1 to 2013:Q2. Banking data are reported at the locational level, i.e., the level of the individual bank. Only banks resident in France and of French nationality are included in the sample. The Net Intragroup Funding variable measures the difference of borrowing minus lending from branches abroad and is scaled by total assets. All are expressed in percentages.

French banks supported their affiliates abroad during the financial troubles of 2007–09 as well as during the European sovereign debt crisis. The mean core deposits ratio fluctuates around 31 percent before increasing steadily from 2010:Q3 to over 40 percent in 2013, reflecting banks' desire as well as regulatory pressure to rely on more stable sources of funding.

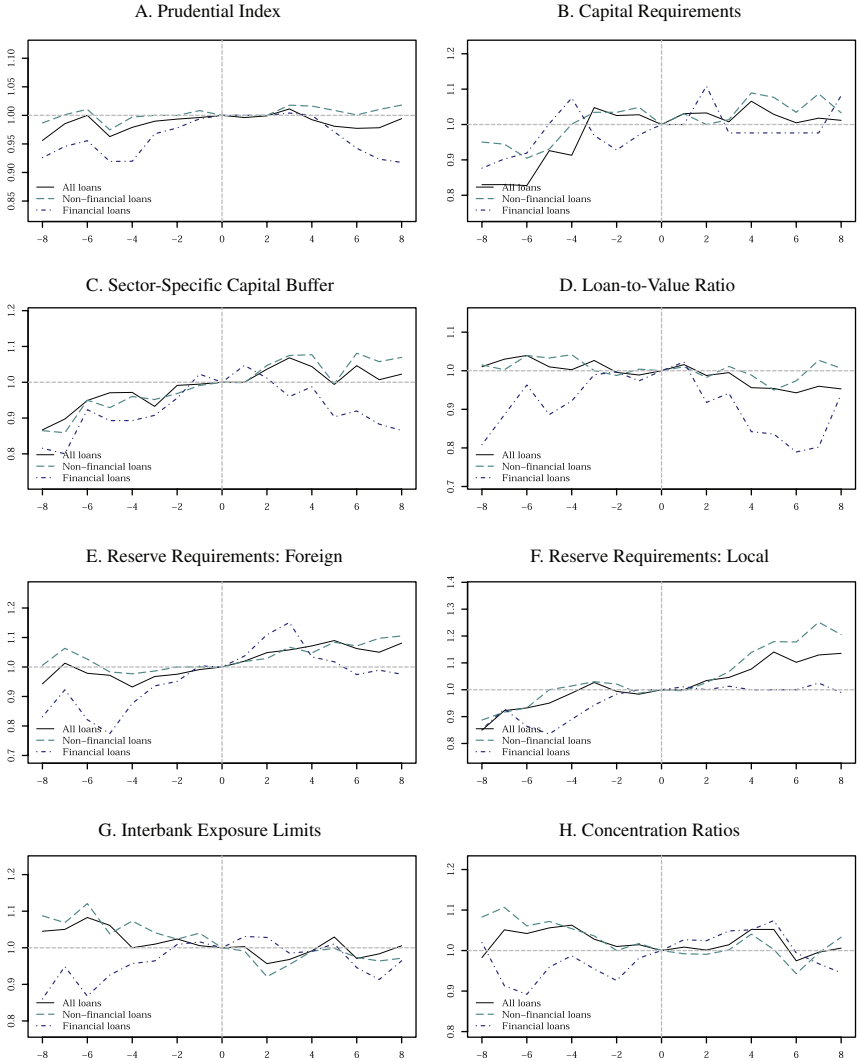
2.3.3 Prudential Instruments

We use locational data and thus only include cross-border loans (loans granted by French banks resident in France to non-residents) in our measure of foreign loans. In comparison with the other type of foreign lending, namely local lending by French banks' affiliates abroad, this has one advantage, as we can be sure that the regulatory change in a respective destination country is not directly targeted at French banks resident in France (while their affiliates abroad might be subject to regulation in the host country).

The effect of a regulatory change in a given destination country on cross-border lending growth by French banks might be driven by several channels. Let us assume a regulatory tightening that is associated with a reduction in lending. On the one hand, French banks' affiliates in the respective destination country could be subject to the regulation, thus reducing their lending and potentially requiring less funding from the head office in France. This is the case for French subsidiaries abroad, but potentially also their branches in the case where the prudential regulation is targeted at the borrowers, as could be the case for loan-to-value limits. On the other hand, the reduction in lending by domestic and foreign banks resident in the destination country implementing the regulatory change could lead to increased cross-border lending by French banks, as these are substituting for the reduction in lending by locally regulated banks. They can do so either by increasing their direct cross-border lending or by using their branches abroad that are presumably not subject to the regulatory tightening in question. We therefore test all regressions in terms of overall lending growth as well as growth of lending to the non-financial sector (direct adjustment) and financial sector (adjustment via branch network) to test these different channels of adjustment.

As a first—preliminary and unconditional—look at the data, we track the evolution of foreign loans around a regulatory tightening in figure 6. Loans are normalized to 1 on the date of the regulatory tightening, and the graphs show the median evolution of loans around the tightening. The graphs show that prior to a regulatory tightening, stocks fluctuate around their normalized value of 1 and pick up afterward for the case of capital requirements, sector-specific capital buffers, and reserve requirements (both for local and foreign currency). An opposite trend can be seen with regards to the loan-to-value ratio, interbank exposure limits, and concentration ratios: a decrease in lending can be observed following the implementation of a regulatory tightening. In the following analysis, we will show that this preliminary assessment holds—in terms of statistical significance—for reserve requirements in local and foreign currency as well as interbank exposure limits.

Figure 6. Median Time-Series Behavior around Regulatory Changes (tightening)



Notes: The figure depicts the median of the time-series behavior around a regulatory tightening event which happens at 0. Before taking the median, the series have been normalized to 1 at the time of the regulatory tightening.

3. Empirical Method and Regression Results

3.1 Baseline Analysis of Outward Transmission of Prudential Policies

The analysis explores the effect of regulatory changes on banks' lending growth, following the approach described in Buch and Goldberg (2017).

Specification 1. *Outward transmission of destination-country policy (see table 5).*

$$\Delta Y_{b,j,t} = \alpha_0 + (\alpha_1 DestP_{j,t} + \alpha_2 DestP_{j,t-1} + \alpha_3 DestP_{j,t-2}) + \alpha_4 X_{b,t-1} + \alpha_5 Z_{j,t} + f_b + f_j + f_t + \varepsilon_{b,j,t},$$

where *DestP* denotes the prudential policy of the destination country where the loan goes to. The regressions include bank, country, and time fixed effects. In this first specification, we test the effect of contemporaneous and lagged regulatory changes on cross-border lending growth, controlling both for bank balance sheet characteristics $X_{b,t-1}$ and destination-country demand factors $Z_{j,t}$ (financial and business cycle). Table 5 describes these results. One first notes the highly significant and positive coefficient of the financial and business cycle indicators, thus suggesting that demand factors played a significant role in the adjustment process. With regards to the balance sheet variables, the regression results in table 5 show that a low tier 1 capital ratio and a high dependence on net intragroup funding are associated with higher cross-border lending growth. The latter suggests that banks relying to a large extent on affiliate funding are the ones increasing lending growth the most via cross-border activities. This could on the one hand be related to large banks' affiliates obtaining cheap wholesale funding abroad which is then invested cross-border by the head office in France (i.e., the "global banking glut" story; see Shin 2012). On the other hand, those banks that supported their foreign affiliates to a large extent were thus constrained in their ability to increase cross-border lending growth.

Our variable of interest is the regulatory change in the destination country. At the bottom of table 5, we summarize the effect of destination-country regulation by summing the coefficients α_1, α_2, and α_3 and evaluating their joint significance with an F-test. In

Table 5. Outward Transmission of Destination-Country Policy

	Prudential IndexC (1)	Capital Requirements (2)	Sector-Specific Capital Buffer (3)	LTV Ratio (4)	Reserve Requirements: Foreign (5)	Reserve Requirements: Local (6)	Interbank Exposure Limits (7)	Concentration Ratios (8)
Destination-Country Regulation $DestP_t$	0.006	0.007	0.010	0.011	0.006	0.009*	−0.015	0.021
	(0.005)	(0.016)	(0.015)	(0.012)	(0.005)	(0.005)	(0.024)	(0.017)
Destination-Country Regulation $DestP_{t-1}$	0.002	−0.034**	−0.006	0.009	0.010	−0.003	−0.031*	0.022
	(0.005)	(0.013)	(0.008)	(0.016)	(0.007)	(0.004)	(0.016)	(0.014)
Destination-Country Regulation $DestP_{t-2}$	−0.001	−0.020	0.008	−0.027*	0.008*	0.011**	−0.025	−0.002
	(0.005)	(0.019)	(0.010)	(0.014)	(0.004)	(0.005)	(0.019)	(0.020)
Log Total $Assets_{t-1}$	−0.009	−0.009	−0.009	−0.009	−0.009	−0.010	−0.010	−0.009
	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)
Tier 1 $Ratio_{t-1}$	−0.002**	−0.002**	−0.002**	−0.002**	−0.002**	−0.002**	−0.002**	−0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Illiquid Assets $Ratio_{t-1}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
International $Activity_{t-1}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Net Intragroup $Funding_{t-1}$	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Core Deposits $Ratio_{t-1}$	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BIS Financial Cycle (Destination Country)	0.046***	0.047***	0.046***	0.047***	0.046***	0.046***	0.046***	0.048***
	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
BIS Business Cycle (Destination Country)	0.552***	0.561***	0.557***	0.558***	0.553***	0.566***	0.557***	0.557***
	(0.112)	(0.113)	(0.113)	(0.111)	(0.114)	(0.114)	(0.112)	(0.113)
Observations	27,414	27,414	27,414	27,414	27,414	27,414	27,414	27,414
R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Adjusted R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
No. of Destination Countries	53	53	53	53	53	53	53	53
No. of Banks	42	42	42	42	42	42	42	42
Sum of $\alpha_1 + \alpha_2 + \alpha_3$	0.007	−0.047	0.012	−0.007	0.023***	0.017**	−0.071***	0.041
p(F-test)	[0.348]	[0.144]	[0.560]	[0.682]	[0.003]	[0.030]	[0.010]	[0.232]

Notes: This table reports the effects of changes in destination-country regulation and bank characteristics on log changes in cross-border loans by destination country. Data are collected at the locational level. The data are quarterly from 2000:Q1 to 2013:Q2. DestP refers to the changes in regulation in the destination country of the loan. For more details on the variables, see table 9 in the appendix. Each column gives the result for the regulatory measure specified in the column headline. All specifications include bank, country, and time fixed effects. Standard errors (in parentheses) are clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

response to a tightening of interbank exposure limits (column 7), French banks' cross-border lending growth slows down or contracts. On the contrary, a tightening of reserve requirements (columns 5 and 6) in the destination country leads to an increase of cross-border lending growth by French banks. As already alluded to above, these differences in reaction can be attributed to the ability of French banks to substitute for the presumed contraction in lending by the banks resident in the destination country that are subject to the regulatory tightening: Whereas tightened reserve requirements affect the banks regulated in the destination country, French banks are able to maintain cross-border lending growth, as they are not concerned by this destination-country policy. In the case of interbank exposure limits, however, French banks' counterparties are directly affected and, as a consequence, French banks are affected as well, thus explaining the negative effect on cross-border lending growth.

In terms of economic magnitudes, these effects are relatively small. A regulatory tightening of reserve requirements has a positive cumulative effect (sum of α_1, α_2, and α_3) on cross-border lending growth, increasing it by 2.3 percent. Given the extremely large standard deviation of the dependent variable (30.69 percent), this effect can be categorized as quantitatively small. The cumulative reduction due to interbank exposure limits is also rather small, amounting to –7.1 percent.

In the following specification, we want to investigate the role of balance sheet variables in characterizing banks' ability to maintain or expand cross-border lending growth in response to a regulatory tightening in the destination country. We therefore include interaction effects between regulatory changes and the aforementioned balance sheet characteristics.

Specification 2. *Outward transmission of destination-country policy: the role of balance sheet characteristics (see table 6).*

$$\begin{aligned}\Delta Y_{b,j,t} = \alpha_0 &+ (\alpha_1 DestP_{j,t} + \alpha_2 DestP_{j,t-1} + \alpha_3 DestP_{j,t-2}) \\ &+ \alpha_4 X_{b,t-1} + \alpha_5 Z_{j,t} + (\beta_1 DestP_{j,t} X_{b,t-1} \\ &+ \beta_2 DestP_{j,t-1} X_{b,t-1} + \beta_3 DestP_{j,t-2} X_{b,t-1}) \\ &+ f_b + f_j + f_t + \varepsilon_{b,j,t}\end{aligned}$$

The interaction terms show how banks with different balance sheet characteristics adjust their lending growth in response to regulatory changes. Thus, as in specification 1, we measure the impact of regulatory changes abroad on cross-border lending growth by French banks, but differentiate between the impact when balance sheet characteristics are zero and the one provoked via balance sheet characteristics.

Table 6 reports the results for this regression. Throughout all regressions, the cycle variables are positively and significantly associated with higher foreign lending growth as in table 5. With regards to the regulatory variables, we concentrate on the sum of α_1, α_2, and α_3 (F-statistic at the bottom of table 6), which measures the effect of regulatory changes if all balance sheet variables were equal to zero, as well as the sum of β_1, β_2, and β_3 presented in the bottom half of table 6. With respect to reserve requirements (columns 5 and 6), table 6 shows that there is no statistically significant differential impact of a tightening in reserve requirements when differentiating between its direct impact (sum of α_1, α_2, and α_3) and its impact via balance sheet variables (sum of β_1, β_2, and β_3).

However, the overall negative impact of regulatory tightening of capital requirements (column 2) and interbank exposure limits (column 7) can be decomposed into a positive direct effect (sum of α_1, α_2, and α_3) and a negative effect (sum of β_1, β_2, and β_3). The latter is brought about by large bank size and a high illiquid assets ratio in the case of capital requirements and a high illiquid assets ratio and a high dependence on net intragroup funding in the case of interbank exposure limits. Banks with a high illiquid assets ratio might therefore not be able to mobilize the funds necessary to increase cross-border lending growth. Overall, the findings suggest that, on average, balance sheet constraints can limit French banks' ability to substitute for the presumed contraction of lending by the banks subject to regulatory tightening. In terms of economic magnitudes, we note that the cumulative direct effect of regulatory tightening (assuming balance sheet variables are zero) is not only positive for capital requirements and interbank exposure limits but also one order of magnitude larger (in absolute terms).

Our results are robust to the following modifications of the baseline specifications. We include parent-bank controls (in this case, the sample runs only from 2000:Q4 to 2013:Q2). We also restrict the

Table 6. Outward Transmission of Destination-Country Policy: The Role of Balance Sheet Characteristics

	Prudential IndexC (1)	Capital Requirements (2)	Sector-Specific Capital Buffer (3)	LTV Ratio (4)	Reserve Requirements: Foreign (5)	Reserve Requirements: Local (6)	Interbank Exposure Limits (7)	Concentration Ratios (8)
Destination-Country Regulation DestP_{t}	0.049	0.648^{***}	0.124	0.178	0.073	−0.076	0.115	0.140
	(0.083)	(0.231)	(0.149)	(0.255)	(0.057)	(0.103)	(0.234)	(0.173)
Destination-Country Regulation DestP_{t-1}	0.002	0.234	−0.036	−0.197	−0.011	−0.033	0.174	−0.094
	(0.062)	(0.206)	(0.140)	(0.214)	(0.086)	(0.065)	(0.249)	(0.332)
Destination-Country Regulation DestP_{t-2}	−0.011	0.060	−0.005	−0.112	−0.019	0.067	0.330	−0.269
	(0.076)	(0.282)	(0.202)	(0.261)	(0.063)	(0.089)	(0.213)	(0.272)
Log Total Assets_{t-1}	−0.010	−0.011	−0.009	−0.009	−0.009	−0.010	−0.010	−0.010
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)	(0.013)
Tier 1 Ratio_{t-1}	-0.002^{**}	-0.002^{**}	-0.002^{**}	-0.002^{**}	-0.002^{**}	-0.002^{**}	-0.002^{**}	-0.002^{**}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Illiquid $\text{Assets Ratio}_{t-1}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
International Activity_{t-1}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Net Intragroup Funding_{t-1}	0.002^{***}	0.002^{***}	0.002^{***}	0.002^{***}	0.002^{***}	0.002^{***}	0.002^{***}	0.002^{***}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Core Deposits Ratio_{t-1}	−0.001	-0.001^{*}	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BIS Financial Cycle (Destination Country)	0.047^{***}	0.048^{***}	0.046^{***}	0.046^{***}	0.046^{***}	0.046^{***}	0.046^{***}	0.048^{***}
	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)
BIS Business Cycle (Destination Country)	0.553^{***}	0.561^{***}	0.558^{***}	0.555^{***}	0.550^{***}	0.566^{***}	0.557^{***}	0.563^{***}
	(0.113)	(0.113)	(0.113)	(0.111)	(0.114)	(0.114)	(0.112)	(0.112)

(*continued*)

Table 6. (Continued)

	Prudential IndexC (1)	Capital Requirements (2)	Sector-Specific Capital Buffer (3)	LTV Ratio (4)	Reserve Requirements: Foreign (5)	Reserve Requirements: Local (6)	Interbank Exposure Limits (7)	Concentration Ratios (8)
Log Total Assets*DestP	−0.002	−0.035*	−0.006	0.001	−0.002	0.002	0.005	0.017
	[0.638]	[0.063]	[0.487]	[0.892]	[0.588]	[0.670]	[0.761]	[0.389]
Tier 1 Ratio*DestP	0.000	−0.014	0.004	0.002	0.002	0.000	0.010	0.000
	[0.817]	[0.442]	[0.205]	[0.703]	[0.304]	[0.855]	[0.192]	[0.947]
Illiquid Assets Ratio*DestP	0.000	−0.004*	0.000	0.002	0.000	0.000	−0.009***	0.000
	[0.957]	[0.087]	[0.993]	[0.422]	[0.922]	[0.788]	[0.000]	[0.905]
International Activity*DestP	0.000	0.002	0.000	0.000	0.000	0.000	−0.003**	−0.001
	[0.658]	[0.381]	[0.963]	[0.716]	[0.854]	[0.617]	[0.033]	[0.576]
Net Intragroup Funding*DestP	0.001	0.004	0.000	0.001	−0.001	0.002	−0.011***	0.004
	[0.362]	[0.402]	[0.975]	[0.681]	[0.765]	[0.190]	[0.000]	[0.463]
Core Deposits Ratio*DestP	0.000	0.002	0.000	−0.001	0.000	0.000	0.001	−0.001
	[0.932]	[0.381]	[0.843]	[0.254]	[0.731]	[0.977]	[0.198]	[0.619]
Observations	27,414	27,414	27,414	27,414	27,414	27,414	27,414	27,414
R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Adjusted R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
No. of Destination Countries	53	53	53	53	53	53	53	53
No. of Banks	42	42	42	42	42	42	42	42
Sum of $\alpha_1 + \alpha_2 + \alpha_3$	0.040	0.942**	0.083	−0.131	0.044	−0.041	0.618*	−0.223
p(F-test)	[0.697]	[0.035]	[0.706]	[0.544]	[0.584]	[0.730]	[0.063]	[0.625]

Notes: This table reports the effects of changes in destination-country regulation and bank characteristics on log changes in cross-border loans by destination country. Data are collected at the locational level. The data are quarterly from 2000:Q1 to 2013:Q2. DestP refers to the changes in regulation in the destination country of the loan. For DestP and its interaction effects, the reported coefficient is the sum of the contemporaneous term and two lags, with the corresponding p-values for significance in squared brackets. For more details on the variables, see table 9 in the appendix. Each column gives the result for the regulatory measure specified in the column headline. All specifications include bank, country, and time fixed effects. Standard errors (in parentheses) are clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

bank sample to only comprise banks which have a very large presence abroad and are present in the sample with at least 1,000 observations. Another robustness check that we perform is the restriction of the country sample to include only those destination countries that actually changed one of the instruments over the time period in question. The use of exchange-rate-adjusted stocks for the calculation of cross-border loan growth rates[16] does not alter the results.

We also include all prudential instruments simultaneously (excluding the aggregate *PruC* measure) for the case of specification 1. Only the sums of $\alpha_1 + \alpha_2 + \alpha_3$ for foreign-currency reserve requirements and interbank exposure limits are statistically significant and show the same sign as in table 5. Since specification 2 concentrates on the importance of balance sheet variables for the adjustment to policy changes in destination countries (lower panel of table 6), we also run this specification including country-time fixed effects as well as a saturated model including country-time, bank-time, and bank-country fixed effects. Whereas most of the significant results carry over to the setup with country-time fixed effects, only the respective interactions of interbank exposure limits with the illiquid assets ratio and net intragroup funding remain significant in the case of the highly saturated model.

3.2 Exploration of Loan Growth to the Non-financial and Financial Sectors

In this section, we explore the channels of the adjustments demonstrated in table 5. In particular, we want to test whether results differ when considering different counterparties: lending to the non-financial sector will automatically exclude intragroup flows, whereas lending to the financial sector is presumably driven to a large extent by intragroup flows, notably to branches: as described in section 2.3, much of interbank lending is done with regards to branches and less so to subsidiaries abroad (see table 3).

[16]We follow the BIS methodology and calculate stocks in original currency by using average-of-period exchange rates and then calculate exchange-rate-adjusted flows using end-of-period exchange rates. These flows are then used to construct exchange-rate-adjusted stocks.

The results for specification 1 are displayed in table 7, panel A (non-financial sector) and panel B (financial sector).[17] The aggregate results in table 5 seem to be driven mainly by lending to the non-financial sector: the sum of α_1, α_2, and α_3 is statistically significant and positive for both types of reserve requirements as well as negative for interbank exposure limits. However, we also note the significant and positive cumulative effect of foreign-currency reserve requirements for lending to the financial sector. In this case, the economic magnitudes are even double the size of the one for lending to the non-financial sector (0.36 versus 0.18).

We thus do not find convincing evidence that French banks increase their lending growth to branches abroad because these are not regulated by the supervisory authority in the host country (the destination country). Instead of these branches substituting for the decrease in lending growth by the locally regulated banks, French banks rather lend directly cross-border (to the non-financial sector), thus potentially substituting for a presumed reduction in lending by locally regulated banks. Interestingly, we also note the high significance of the financial cycle in the destination country for lending growth to the financial sector, whereas it is the business cycle that shows a high significance for lending growth to the non-financial sector.

3.3 Exploration of External Adjustment in Response to French Regulation

As pointed out in the introduction, the main regulatory instruments used during the time period in question were capital requirements and concentration limits on large exposures. These regulatory changes motivate the choice of instruments for the analysis of outward transmission of French regulation. We also include reserve requirements for local-currency deposits, but keep in mind that this is primarily a monetary policy tool in the euro area.

In particular, we estimate the following specification to measure the adjustment of external lending growth to regulatory changes in France:

[17] We note that the number of observations drops considerably when restricting cross-border loans to financial counterparties.

Table 7. Outward Transmission of Destination-Country Policy: By Counterparty Sector

	Prudential IndexC (1)	Capital Requirements (2)	Sector-Specific Capital Buffer (3)	LTV Ratio (4)	Reserve Requirements: Foreign (5)	Reserve Requirements: Local (6)	Interbank Exposure Limits (7)	Concentration Ratios (8)
A. Non-financial Counterparties								
Destination-Country Regulation DestP_t	0.007	−0.010	0.003	0.014	0.002	0.009	−0.021	0.015
	(0.005)	(0.016)	(0.010)	(0.010)	(0.005)	(0.006)	(0.030)	(0.022)
Destination-Country Regulation DestP_{t-1}	0.003	−0.022	−0.010	0.007	0.008	0.001	−0.020	−0.019
	(0.005)	(0.015)	(0.009)	(0.014)	(0.007)	(0.005)	(0.013)	(0.017)
Destination-Country Regulation DestP_{t-2}	0.001	−0.011	−0.001	−0.023*	0.008	0.013***	−0.036	0.000
	(0.006)	(0.020)	(0.006)	(0.013)	(0.005)	(0.005)	(0.025)	(0.021)
Observations	27,174	27,174	27,174	27,174	27,174	27,174	27,174	27,174
R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Adjusted R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
No. of Destination Countries	53	53	53	53	53	53	53	53
No. of Banks	40	40	40	40	40	40	40	40
Sum of $\alpha_1 + \alpha_2 + \alpha_3$	0.011	−0.043	−0.007	−0.002	0.018**	0.024***	−0.077**	−0.004
p(F-test)	[0.136]	[0.226]	[0.633]	[0.908]	[0.035]	[0.007]	[0.014]	[0.925]

(*continued*)

Table 7. (Continued)

	Prudential IndexC (1)	Capital Requirements (2)	Sector-Specific Capital Buffer (3)	LTV Ratio (4)	Reserve Requirements: Foreign (5)	Reserve Requirements: Local (6)	Interbank Exposure Limits (7)	Concentration Ratios (8)
B. Financial Counterparties								
Destination-Country Regulation $DestP_t$	0.006	0.018	0.013	0.002	0.024**	0.027***	0.002	−0.003
	(0.008)	(0.027)	(0.023)	(0.018)	(0.011)	(0.008)	(0.032)	(0.027)
Destination-Country Regulation $DestP_{t-1}$	0.000	0.013	0.002	0.019	0.006	−0.014	−0.022	−0.004
	(0.009)	(0.028)	(0.016)	(0.016)	(0.008)	(0.013)	(0.034)	(0.030)
Destination-Country Regulation $DestP_{t-2}$	−0.007	−0.010	−0.011	−0.003	0.006	−0.009	−0.013	0.023
	(0.010)	(0.026)	(0.021)	(0.026)	(0.009)	(0.012)	(0.034)	(0.037)
Observations	11,988	11,988	11,988	11,988	11,988	11,988	11,988	11,988
R^2	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Adjusted R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
No. of Destination Countries	53	53	53	53	53	53	53	53
No. of Banks	40	40	40	40	40	40	40	40
Sum of $\alpha_1 + \alpha_2 + \alpha_3$	−0.001	0.020	0.004	0.018	0.036*	0.005	−0.034	0.016
P(F-test)	[0.971]	[0.700]	[0.919]	[0.597]	[0.084]	[0.830]	[0.519]	[0.754]

Notes: This table reports the effects of changes in destination-country regulation and firm characteristics on log changes in cross-border loans by destination country. The regression model corresponds to specification 1, but the coefficients on bank characteristics and the business and financial cycle are not reported. Data are collected at the locational level. The data are quarterly from 2000:Q1 to 2013:Q4. DestP refers to the changes in regulation in the destination country of the loan. For more details on the variables, see table 9 in the appendix. Each column gives the result for the regulatory measure specified in the column headline. All specifications include bank, country, and time fixed effects. Standard errors (in parentheses) are clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Specification 3. *Outward transmission of French policy (see table 8).*

$$\begin{aligned}\Delta Y_{b,j,t} = \alpha_0 &+ (\alpha_1 DestP_{j,t} + \alpha_2 DestP_{j,t-1} + \alpha_3 DestP_{j,t-2}) \\ &+ \alpha_4 X_{b,t-1} + \alpha_5 Z_{j,t} + (\beta_1 HomeP_t X_{b,t-1} \\ &+ \beta_2 HomeP_{t-1} X_{b,t-1} + \beta_3 HomeP_{t-2} X_{b,t-1}) \\ &+ f_j + f_b + f_t + \varepsilon_{b,j,t},\end{aligned}$$

where all variables are defined as above and $HomeP_t$ denotes changes in French regulation.

Table 8 shows the impact of French regulatory changes on the growth of cross-border credit by French banks. As time fixed effects are set in the regressions, we measure only the differential impact of regulatory changes through banks' balance sheet characteristics. With regards to the aggregate prudential index (column 1), French banks with a high tier 1 ratio are the ones that are more constrained in their ability to maintain cross-border lending growth. Most likely, this effect is driven by the variation in French regulation on capital requirements (column 2).

Overall, we find that the adjustment of cross-border lending growth to French regulation due to balance sheet characteristics is economically small: In the case of a regulatory tightening, a bank with a one-standard-deviation higher capital ratio decreases its growth of cross-border loans by 0.34 percent (= 0.052 × 6.52 percent). The same goes for the effect on intragroup borrowing: a bank that is characterized by a one-standard-deviation higher reliance on intragroup funding (7.87 percent) will decrease cross-border lending growth by 0.07 percent. A high core deposits ratio is associated with a better ability to extend loans abroad in response to a tightening of capital requirements in France, but once again economic magnitudes are small: a one-standard-deviation higher dependence on core deposit funding (26.97 percent) increases lending growth by 0.22 percent.

We note that the economic magnitudes for the significant variables in column 2 of table 8 are nevertheless higher than in the case of destination-country capital requirements (column 2 of table 6). This can be related to the fact that French capital regulation specifically targets French banks' balance sheets and these constraints thus have

Table 8. Outward Transmission of French Policy

	Prudential IndexC (1)	Capital Require-ments (2)	Reserve Require-ments: Local (3)	Concen-tration Ratios (4)
Destination-Country Regulation	0.006	0.007	0.009*	0.021
DestP_t	(0.005)	(0.016)	(0.005)	(0.017)
Destination-Country Regulation	0.002	−0.034**	−0.003	0.022
DestP_{t-1}	(0.005)	(0.013)	(0.004)	(0.015)
Destination-Country Regulation	−0.001	−0.021	0.011**	−0.001
DestP_{t-2}	(0.005)	(0.018)	(0.005)	(0.020)
Log Total Assets_{t-1}	−0.007	0.009	−0.011	−0.009
	(0.013)	(0.013)	(0.012)	(0.012)
Tier 1 Ratio_{t-1}	−0.002**	−0.002**	−0.002**	−0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Illiquid Assets Ratio_{t-1}	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
International Activity_{t-1}	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Net Intragroup Funding_{t-1}	0.003***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Core Deposits Ratio_{t-1}	−0.001	−0.001	−0.001*	−0.001
	(0.000)	(0.000)	(0.000)	(0.000)
BIS Financial Cycle	0.046***	0.047***	0.046***	0.047***
(Destination Country)	(0.016)	(0.016)	(0.017)	(0.016)
BIS Business Cycle	0.552***	0.562***	0.566***	0.555***
(Destination Country)	(0.112)	(0.112)	(0.114)	(0.112)
Log Total Assets*HomeP	0.004	−0.013	0.022	0.004
	[0.597]	[0.457]	[0.201]	[0.612]
Tier 1 Ratio*HomeP	−0.006*	−0.052**	0.014	−0.004
	[0.055]	[0.013]	[0.353]	[0.239]
Illiquid Assets Ratio*HomeP	0.000	−0.004	0.003	0.000
	[0.982]	[0.128]	[0.210]	[0.858]
International Activity*HomeP	−0.001	−0.002	0.000	−0.001
	[0.119]	[0.442]	[0.871]	[0.176]
Net Intragroup Funding*HomeP	−0.001	−0.009*	0.001	0.001
	[0.699]	[0.069]	[0.841]	[0.770]
Core Deposits Ratio*HomeP	0.001	0.008***	−0.003*	0.000
	[0.297]	[0.000]	[0.084]	[0.655]
Observations	27,414	27,414	27,414	27,414
R^2	0.02	0.02	0.02	0.02
Adjusted R^2	0.02	0.02	0.02	0.02
No. of Destination Countries	53	53	53	53
No. of Banks	42	42	42	42
Sum of $\alpha_1 + \alpha_2 + \alpha_3$	0.007	−0.048	0.017**	0.042
p(F-test)	[0.337]	[0.127]	[0.028]	[0.0233]

Notes: This table reports the effects of changes in destination-country regulation and bank characteristics on log changes in cross-border loans by destination country. Data are collected at the locational level. The data are quarterly from 2000:Q1 to 2013:Q2. DestP refers to the changes in regulation in the destination country of the loan. For HomeP (French regulation) and its interaction effects, the reported coefficient is the sum of the contemporaneous term and two lags, with the corresponding p-values for significance in squared brackets. For more details on the variables, see table 9 in the appendix. Each column gives the result for the regulatory measure specified in the column headline. All specifications include bank, country, and time fixed effects. Standard errors (in parentheses) are clustered at the country level. ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent level, respectively.

a larger impact on the outward adjustment of foreign lending growth than in the case of destination-country policy which is not directed at French banks.

4. Concluding Remarks

In this paper, we investigate the outward adjustment of French cross-border lending growth to changes in regulatory policies in destination countries as well as in reaction to French domestic policy changes.

We first note that we cannot rule out that the scarcity of regulatory changes, both in France and in countries to which French banks are exposed, might drive some of the results. This problem is further exacerbated by the fact that most regulatory changes were implemented during times of financial turmoil.

This caveat notwithstanding, we find that French banks sometimes expand their cross-border loans in response to a regulatory tightening abroad, thus suggesting that international banking might be contributing to regulatory leakages. This is especially the case for the tightening of reserve requirements. For the case of capital requirements and interbank exposure limits, banks are only able to increase cross-border lending growth if their balance sheet characteristics allow them to do so. Differentiating between lending to the financial and non-financial sector shows that the overall results are driven by lending to the latter. Combining these results with the stylized facts on French banks' cross-border lending, we thus do not find evidence that French banks use their branch network abroad to substitute for the presumed contraction in lending by locally regulated banks; they rather do so directly using their cross-border operations.

The findings also imply that balance sheet characteristics such as the tier 1 capital ratio, dependence on intragroup funding, or the core deposits ratio matter for the transmission of French domestic regulation to foreign lending growth. This is coherent given the fact that French domestic regulation specifically targets changes in the balance sheet structure of French banks, whereas French banks that are not subject to foreign regulation can adjust their cross-border lending growth independently of their balance sheet constraints.

Appendix

Table 9. Construction of Balance Sheet Variables

Variable	Description
Log Total Assets	Log(Total Assets, Deflated by GDP Deflator)
Tier 1 Capital Ratio	Capital without Subordinated Debt/Total Assets
Illiquid Assets Ratio	Total Assets – (Cash + Central Bank Accounts + Assets from Repo Transactions + Other Liquid Financial Securities)/Total Assets
International Activity	Assets vis-à-vis Non-residents/Total Assets
Net Intragroup Funding	(Borrowing from Branches Abroad – Lending to Branches Abroad)/Total Assets
Core Deposits Ratio	Deposits (without Term Deposits, nor Special Savings Accounts like "Livret A"/Total Assets

References

Buch, C. M., and L. Goldberg. 2017. "Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network." *International Journal of Central Banking* 13 (S1).

Cerutti, E., R. Correa, E. Fiorentino, and E. Segalla. 2017. "Changes in Prudential Policy Instruments—A New Cross-Country Database. *International Journal of Central Banking* 13 (S1).

Cornford, A. 2006. "The Global Implementation of Basel II: Prospects and Outstanding Problems." UNCTAD Blue Series Paper No. 34.

Shin, H. S. 2012. "Global Banking Glut and Loan Risk Premium." *IMF Economic Review* 60 (2): 155–92.

Thoraval, P.-Y. 1996. "La surveillance prudentielle des risques de marché supporté par les établissements de crédit." *Revue d'économie financière* 37 (2): 22–37.