

# Eliminating the Tax Shield through Allowance for Corporate Equity: Cross-border Credit Supply Effects \*

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## Abstract

This paper studies how the elimination of the corporate tax bias on bank leverage affects banks' credit provisioning using the introduction of an allowance for corporate equity (ACE) in Belgium. We find that affected banks increased their contribution *within* cross-border syndicated loan facilities relative to other foreign banks, and that this effect was stronger for relatively safe borrowers, with borrower country heterogeneity also playing some limited role. We estimate that Belgian bank-lead loans had on average 20-50 basis points lower spreads when ACE was in effect. Finally, our results suggest a relatively large, positive credit supply effect domestically.

Keywords: Cross-border lending; Syndicated loans; Credit supply; Allowance for Corporate Equity; Bank taxation

JEL codes: G21; G28; E51; H25

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# 1 Introduction

A growing number of papers provide evidence that corporate income taxation is an important determinant of bank capital structure (Heider and Ljungqvist, 2015; De Mooij and Keen, 2016), which is driven by the tax deductibility of interest payments in most countries. Beside biasing investment behavior, the wedge that the tax shield creates between the cost of debt financing and equity financing incentivizes high leverage ratios which then contribute to financial instability (De Mooij et al., 2013). Because of its anticipated beneficial effects on financial stability, the elimination of the debt tax shield has gained renewed interest (De Mooij, 2012; Hemmelgarn and Teichmann, 2014). While there is evidence that such policies can be effective at lowering bank leverage (Schepens, 2016), there is little evidence on what other effects they have on banks.

This is where this paper contributes. We study the impact of the elimination of the debt shield on banks' cross-border lending. For identification, we exploit the introduction of an allowance for corporate equity (ACE) in Belgium in 2006. This new tax policy allowed all corporations, including banks, to deduct a notional interest on equity, thereby reducing the difference in the tax treatment of equity and debt. The new policy had two main expected impacts on banks, the combination of which makes it different from other, well studied shocks, like bank funding shocks. First, by lowering the cost of equity relative to debt, Belgian banks are expected to have increased their capitalization. Indeed, Schepens (2016) finds an increase in capital ratios of Belgian banks compared to the control group following the adoption of ACE.<sup>1</sup>

Second, the deductibility of a notional interest on equity lowered banks' total funding cost. This, *ceteris paribus*, incentivized banks to scale up their activities as a result of lower input costs. Additionally, Belgian banks' higher capital ratios may have relaxed regulatory constraints, allowing them to expand their portfolios (as in Devereux et al., 2013; and Horváth, 2013). In this paper we focus on this second impact, namely on how Belgian banks changed their credit supply under

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<sup>1</sup>See also Gambacorta et al. (2017); Bremus et al. (2018) for the liability side effects of taxation on banks.

ACE.

Using a difference-in-difference approach on syndicated loan data, and controlling for loan demand by exploiting variation *within* loan facilities, we find that on average Belgian banks increased the volume of cross-border loans relative to non-Belgian banks following the implementation of ACE. In our main tests we concentrate on cross-border lending, as opposed to total or domestic lending, because for these deals we achieve clean identification: we compare lending to the same borrower by treated and untreated foreign banks. We also confirm that these results are not driven by other confounders by carrying out various placebo tests. First, we shift the treatment and control periods by two years. Second, we test if Dutch banks' credit supply showed a similar pattern around the introduction of ACE. Both of these placebo tests support our interpretation of ACE affecting bank credit supply.

While an overall increase in credit-supply is perhaps not surprising, it is *ex ante* less clear whether this was also accompanied by increased risk taking and hence, potentially adverse policy outcomes. We do not find evidence for increased risk taking. Instead, we find that the increase in credit supply was larger for borrowers with a higher Altman's Z score, i.e. for relatively safe borrowers. This result is consistent with Belgian banks lowering their risk taking after the introduction of ACE, possibly as a result of their higher capitalization and consequently, higher skin in the game.

Next, we study how the effect of ACE on cross-border credit supply varies across different borrower countries. We find some evidence that Belgian banks increased credit supply relatively more in non-neighboring countries, as well as in countries with relatively fewer restrictions on banks' activities. The former finding is consistent with Belgian banks being more competitive vis-à-vis better informed, local lenders (Dell'Ariccia, 2001; Dell'Ariccia and Marquez, 2004; Hauswald and Marquez, 2006) in relatively distant countries after the implementation of the new tax policy. Meanwhile, the latter finding suggests that Belgian banks might have exploited regulatory arbitrage to lend more in countries where they could enjoy relatively favorable regulatory treatment (Houston et al., 2012; Ongena et al., 2013).

We also test if banking market competition in the borrower country had an impact on the portfolio allocation of Belgian banks and find no evidence for this. Additionally, the relatively large increase of credit supply to safe borrowers cannot be explained by heterogeneity in these these borrower country characteristics.

All of the above results are drawn from changes at the intensive margin of lending. Regressions of the number of loans extended in a borrower country-industry in the periods before and after the tax reform suggest that Belgian banks increased loan provisioning at the extensive margin as well. Admittedly, in these regressions identification is somewhat weaker, since we can control for loan demand only at the borrower country-time level.

Our data allows us to compare the size of the impact of ACE on cross-border lending to its impact on domestic lending. Identifying the domestic credit supply effect is made more difficult by the fact that we do not have untreated Belgian banks to serve as a control group for domestic loans. Hence, we estimate the impact of ACE on domestic loan supply by comparing the lending of Belgian banks with a group of foreign banks lending in Belgium, and to the lending of non-Belgian banks to domestic borrowers. We find that Belgian banks increased loan provisioning to Belgian borrowers even more than to foreign borrowers, when compared to non-Belgian lenders, while still controlling for loan demand at the loan level. This suggests that the increase in Belgian banks' cross-border credit supply was not at the detriment of their domestic lending.

Finally, we provide additional evidence that the increase in loan volumes experienced by borrowers of Belgian banks was not driven by an increase in demand for loans by looking at the pricing of syndicated loans before and after the tax reform. After controlling for various combinations of loan facility, borrower, borrower-lender, and lender country characteristics and fixed effects, we find that borrowers obtained loans with lower spreads after the Belgian tax reform if the loan syndicate contained at least one Belgian bank as a lead arranger. This corroborates the hypothesis that Belgian lenders' supply curve shifted outward after the introduction of ACE.

These results have important policy implications. First, they suggest that in-

centivizing higher bank capitalization through taxation can be an effective form of strengthening financial stability without negative consequences for credit supply, i.e. without inducing an overall reduction of lending, or increasing bank risk taking, as also argued by [C  lerier et al. \(2018\)](#). In addition, the increased credit supply in non-neighboring countries might enhance financial stability through better diversified banks. Some of our results, however, also suggest a need for caution. First, lending to geographically distant, less familiar borrowers might expose banks to new types of risks. Second, the engagement of banks in activities to exploit regulatory arbitrage might undermine regulatory objectives and/or financial stability in their home jurisdiction.

This paper contributes to several strands of the literature. There is a large literature studying the international transmission of bank balance sheet shocks. Several papers exploit shocks to bank capital ([Peek and Rosengren, 1997, 2000](#)) and/or liquidity ([Cerutti et al., 2014](#); [De Haas and Van Horen, 2013](#); [Cetorelli and Goldberg, 2011](#); [Liberti and Sturgess, 2018](#)). We contribute to this literature by studying the impact of a funding shock, which is different from the shocks studied previously. First, while almost all existing papers exploit negative shocks, we study a positive shock that lowered banks' funding cost. Second, we exploit a quasi-natural experiment that simultaneously lowered banks' total funding cost, as well as the cost of equity relative to debt.

An emerging literature shows that policy-induced credit supply shocks transmit internationally through global banks. These policies include monetary policy ([Cetorelli and Goldberg, 2012](#); [Morais et al., forthcoming](#); [Temesvary et al., 2018](#)) and bank regulation ([Forbes et al., 2017](#); [Houston et al., 2012](#); [Ongena et al., 2013](#)). We show that taxation can also be a source of international spillovers.

Overall, the evidence on the effects of bank taxation on bank lending is scarce. [Buch et al. \(2016\)](#) find that the German bank levy taxing liabilities had a negative impact on lending. [Devereux et al. \(2013\)](#) and [Horv  th \(2013\)](#) find that corporate income taxes and bank levies on leverage induce banks to change the composition of their balance sheets toward less and more risky assets, respectively. Closest to our paper is the contemporaneously written paper by [C  lerier et al. \(2018\)](#) who use

the German credit registry to study the cross-border credit supply effect of various tax reforms, including the introduction of ACE in Belgium. Their main finding is that taxes that increase the cost of leverage result in a shift in banks' balance sheets toward more lending, which is at least partly driven by increased credit supply. We also study how Belgian banks' overall credit supply and risk taking was affected, and, in addition, contribute in several different ways. Using a dataset that includes borrowers in several countries we are able to study the heterogeneous effect of ACE on credit supply across different borrower countries. Second, we provide an estimate of the impact of ACE on domestic credit supply, allowing us to make inferences about Belgian banks' overall credit supply, not just cross-border supply. Finally, we exploit that our data includes information on loans terms to study whether borrowers benefited from cheaper loans following the introduction of ACE, which provides further tests of whether changes in Belgian banks' lending was demand or supply driven.

Finally, we show that banks do not necessarily pass through a reduction of funding costs to borrowers. Instead, our findings suggests that the pass-through is stronger for banks acting as lead banks, as opposed to participating banks. In this way our paper is also related to the literature studying the incidence of bank taxation (c.f. [Huizinga et al., 2014](#)) and the process of syndicated lending (c.f. [Bruche et al., 2017](#)).

In the remainder of this paper, we proceed as follows. In [section 2](#), we describe the Belgian tax reform and the circumstances under which it was introduced, provide the theoretical background for the empirical analysis, and develop our hypotheses. In [section 3](#) we describe our data. In [section 4](#) we discuss the difference-in-difference method we use to estimate the effect of ACE on loan volumes, and present the results of these estimations. In [section 5](#) we present additional empirical evidence on the effect of ACE on cross-border credit supply at the extensive margin, on domestic credit supply, and on loan spreads. We conclude in [section 6](#).

## 2 Institutional background and hypotheses

### 2.1 The introduction of Allowance for Corporate Equity in Belgium

[Schepens \(2016\)](#) provides a detailed discussion of the introduction of allowance for corporate equity in Belgium. The Belgian government introduced ACE in response to the ruling of the European Commission which prohibited the favorable tax treatment of multinational firms' subsidiaries in Belgium. Such subsidiaries, also called coordination centers, were created to provide financial and accounting services to their parents companies. Belgian tax legislation between 1982 and 2003 allowed such coordination centers to calculate their taxable income based on expenses less financial and salary costs, as opposed to profits. In 2003, the European Commission ruled that this practice was discriminatory against Belgian companies. In order to retain the attractiveness of the country for multinationals, the Belgian government passed legislation on June 30, 2005, which allowed all companies subject to corporate income taxation in Belgium to deduct a notional interest from their tax liabilities. Since there was considerable uncertainty about the implementation with further adjustments made to the tax in September and October 2005, it is unlikely that Belgian banks responded to the tax reform before 2006.<sup>2</sup> Thus, we study how Belgian banks' lending behavior changed from 2006 onwards.

The specific implementation of ACE in Belgium allows firms to deduct a notional interest proportional to the book value of their equity from their taxable income. The deduction equals the calculated average 10-year Belgian government bond rate observed two years before the actual fiscal year (3.44%, 3.78% and 4.31% in the first three years of the implementation), with a maximum set at 6.5% and with the restriction that the rate cannot change by more than 1 percentage point year over year.

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<sup>2</sup>Later we verify this with formal tests.

## 2.2 Theoretical background

In this section we continue by describing the various channels through which the introduction of ACE is expected to have impacted banks' loan supply. We start with the expected overall impact on credit supply, then discuss how banks' risk taking might have been impacted, then conclude with a discussion on how various country characteristics could have influenced the strength of the credit supply impact.

### 2.2.1 Overall impact on credit supply and risk taking

It is well known that in a Modigliani-Miller world<sup>3</sup> banks' capital structure is irrelevant for the value of the bank. This is no longer true in the presence of frictions. In the optimal capital structure literature banks trade off the agency and bankruptcy costs of debt with the benefits of debt financing (see for example [Orgler and Taggart, 1983](#)). As ACE reduces the relative cost advantage of debt financing, the optimal capital structure literature suggests that banks respond by increasing their capital ratios, consistent with the findings of [Schepens \(2016\)](#). Additionally, the particular implementation of ACE in Belgium lowered banks' funding costs by lowering their tax liabilities. Both of these effects are expected to induce banks to increase the total supply of credit.

A simultaneous increase in lending and a reduction in bank leverage is a welcome combination from a policy perspective, especially if the new loans are not directed to excessively risky borrowers. However, whether ACE induces banks to increase their risk taking is ambiguous from a theoretical perspective.

The introduction of the ACE affects bank capitalization, which in turn influences banks' risk taking. A higher level of bank capital incentivizes less risk taking through a skin in the game effect (see for example [Holmström and Tirole, 1997](#)) and mitigates asset substitution ([Jensen and Meckling, 1976](#)). These considerations suggest that especially relatively safe borrowers should experience an increase in credit supply.

Alternatively, the relatively lower cost of equity capital might have enabled Belgian borrowers to invest in assets that require more regulatory capital ([Dev-](#)

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<sup>3</sup>([Modigliani and Miller, 1958](#))



ereux et al., 2013; Horváth, 2013). Similarly, banks might lend to riskier industries because a higher level of capitalization *ceteris paribus* reduces their expected bankruptcy costs. In order to balance expected marginal bankruptcy costs with expected returns on their investments, banks may adjust by increasing the riskiness of their portfolios (see for instance Koehn and Santomero, 1980; Kim and Santomero, 1988; Allen et al., 2015).

In addition, there is some empirical evidence suggesting that banks tighten the supply of credit to risky borrowers (e.g. small firms with little tangible assets) following a negative funding shock (De Jonghe et al., 2016; Ongena et al., 2015; Liberti and Sturgess, 2018). Thus, Belgian banks might have increased credit supply to riskier borrowers relatively more because regulatory or market imposed constraints are less binding, or on account of their reduced funding costs.

### 2.2.2 The role of borrower country heterogeneity

The literature suggests that borrower country heterogeneity has a potential role in the impact of ACE on banks' cross-border lending activity. First, physical distance between lenders and borrowers has been shown to affect the terms of and access to loans either because of transportation and monitoring costs<sup>4</sup> (Degryse and Ongena, 2005), or because of asymmetric information (Agarwal and Hauswald, 2010). These studies are consistent with theoretical work suggesting that lenders enjoy market power over local borrowers (Dell'Araccia, 2001; Hauswald and Marquez, 2006). As Belgian banks become more competitive due to their lower funding costs we would expect them to expand lending relatively more in markets where they do not enjoy an informational advantage, i.e. geographically or culturally more distant markets.

Next, differences in the regulatory environment might have also affected Belgian banks' decisions about where to allocate additional credit after the introduction of ACE. Indeed, there is evidence that international bank capital flows from countries with strict regulation to countries with laxer standards (Houston et al., 2012), and banks maintain lower lending standards abroad when domestic regulation is tighter (Ongena et al., 2013). Thus, we would expect that Belgian banks increased their

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<sup>4</sup>Among others, these may include the cost of lending to culturally more distant borrowers (Giannetti and Yafeh, 2012; Fisman et al., 2017).

lending in countries with lax regulatory standards relatively more.

Finally, the strength of borrower market competition may also affect Belgian banks' decision to differentially expand lending across various markets. Since lower funding costs and a higher level of capitalization suggest an outward shift in credit supply, banks may disproportionately increase lending where they expect higher margins. Alternatively, in the presence of entry barriers in uncompetitive markets, lower funding costs may enable Belgian banks to compete in markets where they were previously not competitive. Thus, the impact of bank competition on Belgian banks' portfolio allocation following the introduction of ACE is *ex ante* ambiguous.

### 3 Data

To measure bank lending we obtain syndicated loan data from the Loan Pricing Corporation's DealScan database. This database contains information on individual lenders and borrowers at the loan level, including the size of the loan and each bank's contribution in the loan.<sup>5</sup> Since we focus on how the introduction of ACE affected banks' cross-border credit allocation we drop all domestic loans in the main sample. Next, we only include loans provided to borrowers in Europe. Limiting the sample to European countries makes it more likely that banks in our sample faced similar demand conditions.

We further narrow the sample by only including loans made between 2004 and 2007, which ensures that we have a symmetric observation period around the treatment. Since ACE was implemented at the end of 2005 we define the treatment period as the years 2006 and 2007, while the control period is defined as the years 2004 and 2005. We limit the treatment period to run up to 2007 in order to avoid the impact of the global financial crisis starting in 2008. Finally, we drop sole-lender loans, since our identification relies on observing the same borrower in the same time period borrowing from multiple lenders, as well as observations where a lender's loan contribution is not available in DealScan. After these adjustments our sample contains 7,035 loan observations issued by 571 banks in 52 countries,

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<sup>5</sup>Syndicated loans are typically provided by several lenders. For a description of the syndication process and the market see for example [Sufi \(2007\)](#).

including 5 Belgian banks.

If Belgian banks increased loan supply we would expect a simultaneous increase in loan volumes and a reduction in loan spreads. Hence, our two main dependent variables are *Volume*, which is the natural logarithm of the size of the loan in US dollars; and *Spread* (all-in-spread drawn), which is the loan spread in basis points. The average contribution of lenders in our sample is 81.8 million US dollars, while the average spread is 235 basis points (as shown in [Table 1](#)). Additionally, we also test the impact of ACE on credit supply at the extensive margin. In these regressions the dependent variable is *Number*, which is the natural logarithm of the number of loans a bank made to all firms in a given industry in a given country over the periods 2004-05 and 2006-07. [Table 1](#) reports that the sample mean of loans provided by banks in our sample to a country-industry is close to 7 in a two-year period.

The key independent variables are interaction terms of a treatment dummy, *Belgian*, which indicates that a lender is headquartered in Belgium; and *Post*, indicating loans made in 2006 or 2007. In an extension in which we study domestic lending and include domestic loans in the sample, we interact with a dummy variable, *Domestic*, indicating that the lender is headquartered in the same country as the borrower. In these regressions domestic loans represent 43% of the sample. In some specifications we include further interactions with measures of borrower risk and other borrower market characteristics.

Our borrower risk measure is Altman's *Z Score*, defined as the weighted sum of five financial ratios, measured in 2005.<sup>6</sup> Higher values of *Z Score* indicate safer firms with a sample mean of 1.5. Balance sheet data for borrowers is taken from [Worldscope](#).<sup>7</sup>

Among borrower market characteristics, *Distance* is the geographic distance between the capital of the country in which the lender bank is headquartered and the capital of country of the borrower's residence, measured in log-kilometers. [Table 1](#) shows that the mean distance between lenders and borrowers is about 2,700 km.

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<sup>6</sup>Altman's Z score is calculated as  $1.2 (\text{Working Capital}/\text{Total Assets}) + 1.4 (\text{Retained Earnings}/\text{Total Assets}) + 3.3 (\text{Earnings Before Interest and Taxes}/\text{Total Assets}) + 0.6 (\text{Market Value of Equity}/\text{Book Value of Liabilities}) + 0.999 (\text{Net Sales}/\text{Total Assets})$ .

<sup>7</sup>We thank [Ferreira and Matos \(2012\)](#) for sharing their data link between Dealscan and Worldscope.

We also consider an alternative measure of distance, *Contiguous*, a dummy variable indicating that the countries of the borrower and lender share a common border. In our sample about 90% of the loan agreements are between companies from neighboring countries.

The second set of borrower characteristics capture competition in borrower country banking sectors. *HHI* is the Herfindahl-Hirschman index of banking market concentration on the syndicated loan market in the borrower country measured in 2005. The sample mean of *HHI* is 0.022. Next, *Lerner index* is the markup of the median bank in the borrower's country in 2005, with higher values indicating lower competition and a sample mean of 0.27. *HHI* is calculated using Dealscan data, while *Lerner index* is taken from the World Bank's Global Financial Development Report.

The final set of borrower characteristics capture the regulatory environment in the borrower country. *Official supervisory power* is an index that measures the extent to which supervisory authorities in the borrower's country have the authority to take specific actions to prevent and correct banking problems. This variable ranges between 5.385 and 14, with higher values reflecting more supervisory power. Next, *Capital stringency* measures whether the capital requirement in the borrower's country reflects certain risk elements and deducts certain market value losses from capital before minimum capital adequacy is determined, and ranges between 1 and 6 with higher values reflecting more stringent rules. Finally, *Activity restrictions* is an index of restrictions on various activities (securities, insurance and real estate) banks in the borrower's country are allowed to engage in. Higher values of this variable reflect more restrictions, ranging between 4 and 9. Data on bank regulation is obtained from the third wave of the World Bank's Bank Regulation and Supervision Survey, which was released in 2007 and measures the quality of regulation in 2006 (Barth et al., 2013).

We control for the macroeconomic environment and level of economic development in lender countries by including *GDP per capita*, the *GDP growth* rate and consumer price index (*CPI*) of these countries in the year when the loan was extended. These data are taken from the World Bank's World Development Indicators

database.

We also include the dummy variable *Relationship*, which is one if the borrower had borrowed from the lender in the preceding five years. About 30.7% of the loans in our sample were taken from lenders with which borrowers had prior relationships.

In facility-level regressions the main dependent variable is *Spread*, which is the all-in spread drawn in basis points. The average loan in our sample has a spread of 235 basis points. In these regressions we include the unweighted means of lender country characteristics (*GDP per capita*, *GDP growth*, *CPI*) and *Relationship*, as well as various borrower and facility characteristics. *Borrower size* is the natural logarithm of the total assets of the borrower with sample mean 13.8. *Borrower leverage* is total liabilities over total assets, *Borrower ROA* is net income over total assets, while *Borrower tangible assets* is the amortized book value of properties, plants and equipments over total assets. All of these borrower level variables, are taken for the year prior to the loan to mitigate any bias resulting from the loan's impact on these variables. The average borrower in our sample has a leverage of 0.307, ROA of 7.5% and a tangible assets ratio of 32.5%.

*Collateral* is a dummy variable which equals one if Dealscan reports the loan as secured and zero otherwise. *Revolver* is also a dummy taking the value of one if the reported loan type is either "Revolver/Line < 1 Yr.," "Revolver/Line >= 1 Yr.," "364-Day Facility," "Revolver/Term Loan," or "Limited Line." The *Covenant* dummy equals one if the loan has a net worth or financial covenant, and zero otherwise. *Maturity* is the maturity of the loan in months with sample mean 82.9 (about 6.9 years). *Senior* is a dummy variable indicating that the loan is a senior loan, while the *Purpose* dummy indicates that the primary purpose of the loan is for corporate purposes.

# 4 Empirical evidence on the effect of ACE on loan volumes

## 4.1 Econometric methodology

We identify the effect of ACE on banks' cross-border credit supply and risk taking using a difference-in-difference methodology. For this purpose we estimate the following model:

$$\begin{aligned} Volume_{i,j,k,l,t} = & \beta_1 Belgian_i * Post_t + \beta_2 Belgian_i * Post_t * Z\ score_l \\ & + \beta_3 Belgian_i * Z\ score_l + \beta_4 C_{j,t} \\ & + \beta_5 Relationship_{i,l,t} + \gamma_i + \delta_k + \epsilon_{i,j,k,l,t}, \end{aligned} \tag{1}$$

where the dependent variable,  $Volume_{i,j,k,l,t}$ , is the log of the USD amount of the contribution of lender  $i$ , headquartered in lender country  $j$ , in loan  $k$ , to borrower  $l$ , in year  $t$ . The main variables of interest are  $Belgian_i * Post_t$  indicating lending by Belgian banks in the post-treatment period, and its interaction with  $Z\ score_l$ , which is Altman's Z score for borrower  $l$  measured in 2005, i.e. before the treatment to mitigate endogeneity concerns.<sup>8</sup>

The vector  $C_{j,t}$  consists of control variables that capture the business cycle (GDP growth and CPI) in and economic development (GDP per capita) of lender country  $j$  in year  $t$ . Following a similar strategy as in [Khwaja and Mian \(2005\)](#), we control for loan demand by exploiting multiple lender-borrower relationships. We do this by including loan (facility) fixed effects ( $\delta_k$ ). We also include bank fixed effects ( $\gamma_i$ ), which control for time-invariant bank characteristics, such as a bank's overall activity on the syndicated loan market. In some specifications we even include bank-year fixed effects, controlling for unobserved, time-varying lender characteristics. Finally, we also include the *Relationship* variable, which controls for a prior lending relationship between lender  $i$  and borrower  $l$ . Past relationship mitigates information asymmetries and allows lenders to contribute larger amount in the loan. We estimate [equation \(1\)](#) with OLS and cluster standard errors at the

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<sup>8</sup>We cannot estimate the coefficients of *Belgian*, *Post*, *Z score* and *Post \* Z score* as they are subsumed by the included fixed effects.

bank level.

To reduce the likelihood that our results are driven by unobserved bank heterogeneity we also estimate [equation \(1\)](#) on a matched sample. We create this sample using propensity score matching based on the following bank and lender country characteristics. We approximate bank size by a bank’s total volume of cross-border syndicate lending over 2004 and 2005.<sup>9</sup> We also match on the growth rate of a bank’s total cross-border syndicated lending from 2004 to 2005, as well as the average total assets and Altman’s Z Score of its borrowers in 2004 and 2005. The final matching variables are GDP growth and inflation in 2005 in the country where the lender is headquartered. We match the nearest five non-Belgian banks with four Belgian banks in our sample with replacement.<sup>10</sup>

## 4.2 Parallel Trends

The validity of our difference-in-differences set-up relies on the common trend assumption, which means that the cross-border lending behaviour of the treated and the control groups should have followed a parallel trend in the absence of the treatment (see e.g. [Angrist and Krueger, 1991](#)). To verify that our treatment and control groups are comparable prior to treatment, we look at the characteristics of loans provided by Belgian banks and non-Belgian banks in 2004 and 2005. Panels A and B of [Table 2](#) show means of the size, spread, and maturity of loans in Belgian and non-Belgian banks’ portfolios in the full and matched samples, respectively, as well as the ratio of loans that are secured, the ratio of loans that have covenants, and the total size of a bank’s cross-border syndicated loan portfolio. The t-statistics testing the equality of means indicate that there are no statistically significant differences between treated and control banks’ syndicated loan portfolios.

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<sup>9</sup>We replace missing loan contribution in Dealscan following the approach of [Ivashina \(2009\)](#). We regress loan contributions on a dummy variable for a lead role and use the predicted values when the loan contribution data is missing. We identify whether the lender is a lead arranger using the variable “lead arranger credit” from Dealscan.

<sup>10</sup>We cannot match one Belgian bank because balance sheet data for this bank’s borrowers is not available.

### 4.3 The impact of ACE on cross-border syndicated loan supply and risk taking

Table 3 shows the result of estimating equation (1). We start by estimating the model using the full sample. Regression 1 shows that the overall impact of the introduction of ACE on Belgian banks' cross-border lending activity was positive and significant as evidenced by the coefficient of *Belgian \* Post*. The estimated coefficient implies that Belgian banks increased their loan supply by about 13.3% following the tax reform. While this is a large increase in absolute terms, it amounts to about a tenth of the standard deviation of the log loan volume variable (see Table 1). We also find that lenders retain on average a 16.2% higher share of the loan if they had a prior relationship with the borrower, which is consistent with the idea that this helps overcome information asymmetries among lenders (Sufi, 2007).

Next, we are interested in whether the increased credit supply was directed towards riskier borrowers. To that end we first reestimate regression 1 on the sample of borrowers for which balance sheet data is available, and find a somewhat larger estimate for the credit supply effect (0.164, regression 2) than for the full sample. Next, in regression 3 we include the interactions of *Z score* with *Belgian \* Post* and *Belgian*. The triple interaction obtains a positive and significant coefficient, while the coefficient of *Belgian \* Z score* is insignificant.

In regression 4 we include an even more restrictive set of fixed effects: beside facility fixed effects we include bank-year fixed effects, controlling for all observable and unobservable, time-varying bank characteristics. In these regressions *Belgian \* Post* and lender country variables are spanned by fixed effects. The richness of our data, however, allows us to estimate the coefficient of the triple interaction, which is positive and significant in regression 4.

In columns 5 to 8 we present the results of re-estimating regressions 1 to 4 on the matched sample. In all three regressions, in which we can estimate *Belgian \* Post*, this interaction term obtains positive coefficients, which are statistically significant in regressions 6 and 7. In regression 7 *Belgian \* Post \* Z score* continues to have a positive and significant coefficient, while in regression 8 it is also positive, but



insignificant.

Overall, [Table 3](#) provides persuasive evidence that Belgian banks increased their overall supply of cross-border syndicated loans following the adoption of ACE and that they did so relatively more to safer borrowers.

#### 4.4 Placebo tests

In [Table 4](#) we present the results of various placebo tests. First, we change the treatment period to 2004-05, the two year-period prior to the implementation of ACE, and the control years to 2002-03. We then re-estimate regressions 1, 3, 5, and 7 of [Table 3](#) (with the appropriately updated Post dummy and using observations from 2002 to 2005) and present the results as regressions 1 to 4 in [Table 4](#), respectively. All of the interaction terms obtain insignificant coefficients, indicating that Belgian banks did not anticipate the tax change, and their lending followed a parallel path to that of non-Belgian banks prior to the tax reform.

Next, we provide further evidence that the effects that we capture are specific to Belgian banks, and we are not picking up shocks that affected banks in the region. We perform the following placebo test: we assume that the treatment took place in the Netherlands, instead of Belgium. The Netherlands is an ideal choice for carrying out such an exercise because of its geographic proximity to Belgium, and because they are similar in size (with population sizes of around 16 million in the Netherlands and 10.5 million in Belgium), level of economic development (Dutch GDP per capita was 49,720 in 2010 US dollars, while the Belgian figure stood at 43,782 in 2005, based on data from WDI) and number of banks in the sample (18 Dutch banks and 5 Belgian ones).

Columns 5 and 6 in [Table 4](#) present the results of re-estimating the baseline regressions 1 and 3 of [Table 3](#), with the Belgian dummy replaced by *Dutch*. We find that none of the interaction terms are statistically significant, indicating that the loan supply effects we identified in previous tables were not driven by other, regional factors.

## 4.5 Heterogeneous cross-border credit supply effects

In order to test the heterogeneous effect of the implementation of ACE, we further extend the econometric model by including borrower country characteristics and their interactions with *Belgian \* Post*. The estimated model is now

$$\begin{aligned}
 \log(y_{i,j,k,l,t}) = & \beta_1 \text{Belgian}_i * \text{Post}_t + \beta_2 \text{Belgian}_i * \text{Post}_t * Z \text{ score}_l \\
 & + \beta_3 \text{Belgian}_i * \text{Post}_t * X_{j,l} + \beta_4 \text{Belgian}_i * X_{j,l} \\
 & + \beta_5 \text{Post}_t * X_{j,l} + \beta_6 X_{j,l} \\
 & + \beta_7 \text{Belgian}_i * Z \text{ score}_l + \beta_8 C_{j,t} \\
 & + \beta_9 \text{Relationship}_{i,l,t} + \gamma_i + \delta_{j,k,t} + \epsilon_{i,j,k,t}.
 \end{aligned} \tag{2}$$

This equation is the same as [equation \(1\)](#) but now includes interactions with  $X_{j,l}$ , which is either a measure of geographic distance between the country of borrower  $l$  and lender country  $j$ ; or a measure of competition or regulation in the borrower's country in 2005, the year before ACE was introduced.

We present the results of estimating [equation \(2\)](#) on the full sample including one borrower country characteristic at a time in [Table 5](#). We first note that regardless of the included borrower country characteristic the triple interaction term between *Belgian*, *Post* and *Z score* has a positive and significant coefficient, whereas *Belgian \* Z score* has a positive and significant coefficient when we control for borrower country *Activity restrictions*. These results confirm that Belgian banks increased their supply of syndicated loans following the tax reform and especially so toward safer borrowers; and this source of heterogeneity was unrelated to other borrower country characteristics.

Proceeding to country-level characteristics, we find no significant interactions with *Distance* in regression 1. In regression 2 we include *Contiguous* and find that its interaction with *Belgian* and *Post* is negative and significant, while *Belgian \* Contiguous* is positive and insignificant. These estimation results imply an insignificant change in Belgian banks' credit supply in neighboring countries. Overall, regression 2 provides some evidence that Belgian banks increased their supply of cross-border loans to borrowers situated in more distant, i.e. non-neighbouring countries. This is consistent with lower funding costs and/or more relaxed regu-

latory or funding constraints allowing Belgian banks to compete more with local banks that have an informational advantage. Alternatively, it may be that Belgian banks increased credit supply disproportionately to distant borrowers to benefit from increased geographic diversification.

Next, in regressions 3 and 4 we include measures that capture the structure of a borrower country’s syndicated loan market (*HHI*), and the overall banking marketplace (*Lerner index*), respectively. Neither of the interactions of either variable enters the regressions with significant coefficients. Thus, we find no evidence that Belgian banks increased cross-border loan supply especially in more or less competitive markets.

Finally, it is also possible that Belgian banks’ portfolio rebalancing decisions were affected by regulatory arbitrage, in the form of lending more in countries with more or less stringent regulatory standards. We explore this possibility in regressions 5 to 7 of [Table 5](#), in which we include interactions of borrower country regulatory variables with our focus variables. In regressions 5 and 6 the interaction terms with *Official Supervisory Power* and *Capital Stringency* obtain insignificant coefficients. In regression 7 we include *Activity restrictions* and find that its interaction with *Belgian \* Post* has a negative and significant coefficient, while its interaction with *Belgian* is insignificant. Thus, Belgian banks increased their credit supply especially in countries with fewer regulatory restrictions on bank activities, consistent with a negative form of regulatory arbitrage, or “race to the bottom.”<sup>11</sup>

## 5 Additional evidence on the effect of ACE on credit supply

All of our previous tests are designed to measure the impact of ACE on cross-border credit supply at the intensive margin. We view these as our main tests, because this is where we have strongest identification (being able to directly control for

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<sup>11</sup>We also estimated the regressions of [Table 5](#) on the matched sample. The results of these regressions, presented in [Table A2](#), are robust to this change. All of the results discussed above continue to hold, except for the interaction of *Activity restrictions* with *Belgian \* Post*, which obtains an insignificant coefficient when estimated on the matched sample.

demand at the loan level). However, there are several additional questions that are interesting and worth studying, but where the inclusion of facility fixed effects is not possible, or identification suffers from other limitations. In the rest of the paper we address these questions while still controlling for loan demand and other confounders as well as possible.

## 5.1 The effect of ACE at the extensive margin

The first of these questions is whether ACE had an impact on bank credit supply at the extensive margin. On the one hand, a positive answer to this question would provide additional support for our previous evidence. Additionally, this is an interesting question on its own merit because increased credit supply at the extensive margin may mean that the benefits of easier credit are dispersed more broadly in the receiving economy.

In regression 1 of [Table 6](#) we present our baseline diff-in-diff regression with the log number of loans provided by a lender in a borrower country-industry as dependent variable. The regression includes borrower country-industry-time fixed effects to control for loan demand as comprehensively as the data allows, and borrower country-industry-bank fixed effects to control for time-invariant (and persistent) bank characteristics, such as a bank's inclination to lend in a particular industry in a particular country. The results suggest that Belgian banks provided about 8.5% more loans following the introduction of ACE relative to other banks lending to the same industries.

In regressions 2 and 3 we present placebo tests in the spirit of [Table 4](#): first we change the treatment and control periods to 2004-05 and 2002-03, respectively; then we replace *Belgian \* Post* by *Dutch \* Post*. Both placebo tests verify the validity of our tests as we do not find significant coefficients for the interaction terms.

## 5.2 The effect of ACE on domestic credit supply

The second question we address is whether domestic borrowers experienced an expansion in lending as well. This question is of particular interest to policy makers

when considering the implementation of ACE and its impact on the domestic economy.

Table 7 presents evidence on the domestic credit supply effect of ACE. In these regressions we also include the previously dropped domestic loans in the sample. In regression 1 of Table 7 we re-estimate regression 1 of Table 3 on this extended sample and obtain a significant coefficient close to our baseline estimate, confirming our earlier results. Next, in regression 2 we include a full set of interaction terms of *Belgian* and *Post* with a dummy variable indicating that the lender is headquartered in the borrower's country. *Belgian \* Post* continues to obtain a positive and significant coefficient. The triple interaction *Belgian \* Post \* Domestic* also obtains a positive and significant coefficient, suggesting that while the overall loan provisioning of Belgian banks increased, this was especially pronounced on their domestic market.

One potential concern with regressions including domestic loans is that Belgian borrowers' demand might have also been impacted by the introduction of ACE. Since we include facility fixed effects in these regressions, any story about Belgian borrowers' demand driving our results would have to explain why a larger share of this additional demand is extended by Belgian banks in the post-treatment period than in the pre-treatment period. One such story might be that perhaps borrowers' total borrowing on the syndicated loan market is correlated with the share of loans that relationship lenders retain, and borrowers are more likely to have past relationships with domestic lenders than with foreign lenders. We address this concern by including further interactions between *Belgian*, *Post* and the *Relationship* variable in regression 3. The triple interaction between these variables is insignificant, while *Belgian \* Post \* Domestic* continues to enter the regression with a positive and significant coefficient.

In regressions 4 to 6 we re-estimate regressions 1 to 3 on the loans provided by the sample of matched banks, and find qualitatively similar results to the previous findings, although now we do not estimate *Belgian \* Post* with sufficient statistical precision in these regressions. Importantly, *Belgian \* Post \* Domestic* obtains positive and significant coefficients in both regressions 5 and 6.

Overall, [Table 7](#) suggests that ACE had a positive impact on domestic credit supply. In particular, they also suggest that the increased cross-border supply effect that we identified in the earlier sections is not driven by portfolio rebalancing, in which case we would have expected a decline in lending to Belgian borrowers by Belgian lenders.

### 5.3 The effect of ACE on loan spreads

We provide further tests of the credit supply effect of ACE by studying loan pricing. Similar to the loan volume regressions, we estimate difference-in-difference regressions that include various sets of fixed effects and control variables, but this time taking loan spread as the dependent variable, and the facility as the level of observation. The most restrictive specification we estimate is the following:

$$\begin{aligned}
 Spread_{k,l,t} = & \beta_1 * Belgian(lead)_k * Post_t + \beta_2 * C(avrg)_{k,t} \\
 & + \beta_3 * Borrower\ characteristics_{l,t-1} + \beta_4 * Loan\ terms_k \quad (3) \\
 & + Relationship(avrg)_{k,t} + \lambda_k + \epsilon_{i,j,k,l,t},
 \end{aligned}$$

where the dependent variable,  $Spread_{k,l,t}$  is the spread of loan  $k$ , to borrower  $l$  in year  $t$ . The main variable of interest is  $Belgian(lead)_k * Post_t$  indicating that at least one of the lead arrangers of the loan is a Belgian bank in the post-treatment period. We also estimate analogous regressions where we replace  $Belgian(lead)_k$  by  $Belgian(participant)_k$ , indicating loans that include at least one Belgian bank as a participant, but no Belgian banks as lead arrangers.

We include a host of variables to control for loan characteristics ( $Loan\ terms_k$ ) as well as time varying borrower characteristics ( $Borrower\ characteristics_{l,t-1}$ ). Unobserved time-invariant borrower heterogeneity is captured by borrower fixed effects ( $\lambda_l$ ). The regressions also include the unweighted averages of lender country GDP per capita, GDP growth, and CPI (captured by the vector  $C(avrg)$ ), as well as the fraction of lenders with which the borrower has a prior lending relationship ( $Relationship(avrg)$ ). We estimate the above equation with OLS and calculate Huber-White standard errors that are robust to heteroscedasticity.

[Table 8](#) shows the results of estimating various specifications similar to [equa-](#)

tion (3). To be consistent with the cross-border loan volume regressions in the previous sections we drop all loans in which all lead banks are headquartered in the same country as the borrower.<sup>12</sup> In regression 1 we include borrower and year fixed effects, facility and lender country macro controls, the relationship variable and Belgian dummy. The variable of interest, *Belgian (lead) \* Post* obtains a negative coefficient, significant at 5%. This implies a 19.7 basis points lower loan spread for borrowers that obtained loans from syndications that included at least one Belgian lead bank. The other variables obtain coefficients that are intuitive and in line with findings in other papers.

Next, in regression 2 we add borrower country-year fixed effects to further control for country-level shocks to loan demand and borrower risk. The estimated coefficient for *Belgian (lead) \* Post* is negative but no longer significant. In regression 3 we replace borrower fixed effects with time-varying borrower characteristics, while still including borrower country-year fixed effects. The estimated impact of ACE is now -36.8 basis points, which is significant at the 10% level. In these latter regressions the coefficients of other variables are close to their counterparts in regression 1.

In regressions 4-6 we re-estimate regressions 1-3 on the matched sample. In all three regressions *Belgian (lead) \* Post* obtains negative coefficients that range between -22.9 and -53 basis points, and are all significant at the 5% level.

A potential weakness of the spread regressions is that we cannot include facility fixed effects, unlike in the loan volume regressions, because all lenders in the facility receive the same interest. As a result, we cannot rule out that the lower spreads we observe are driven by changes in borrower demand or risk. Nonetheless, it is unlikely that this is the case. We take several steps to alleviate this concern. Firstly, we control for observable time-varying borrower characteristics, as well as facility characteristics that might be correlated with borrower risk, such as whether the loan is collateralized. We also control for all unobservable, constant firm characteristics, leaving only unobserved, time-varying shocks to borrowers that could potentially explain the lower spreads we observe.

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<sup>12</sup>The results are qualitatively similar when we keep all loans. These are available upon request.

We exploit a characteristic of the syndicated lending market to test whether such unobserved shocks to borrowers can explain the results in [Table 8](#). In particular, we exploit that in the syndicated loan origination process, lead banks negotiate loan terms and participating banks decide about how much they wish to contribute in the loan taking these terms as given. Thus, we expect that the spreads of loans in which Belgian banks act as lead banks are reduced relative to loans with Belgian banks as participants only.

We implement this test by estimating analogous regressions to those in [Table 8](#), but with *Belgian (lead)* replaced by *Belgian (participant)*, a dummy variable which equals one if the facility includes at least one Belgian bank as a participant, and no Belgian banks as lead banks. We present the results of these regressions in [Table 9](#). When we use the full sample (regressions 1-3) we do not find statistically significant evidence of borrowers obtaining loans at either a lower or higher rate from Belgian lenders acting as participants. In fact, when we estimate the regressions on the matched sample we find significant, positive coefficients for *Belgian (participant)* \* *Post* in regressions 4 and 5.

These results suggest that the lower spreads we observe for loans originated by syndicates that include at least one Belgian bank is not driven by unobserved borrower heterogeneity, unless this heterogeneity was also correlated with Belgian banks' decisions about acting as lead banks or as participants. In addition, the higher loan volumes combined with lower loan spreads provide compelling evidence that borrowers of Belgian banks experienced an increase in credit supply following the introduction of ACE.

## 6 Conclusion

We study the impact of a Belgian tax reform that introduced the deductibility of notional interest on equity (ACE) in 2006 on Belgian banks' cross-border lending behaviour. In a difference-in-differences set-up, we compare Belgian and non-Belgian banks' lending to the same foreign firms before and after the tax reform. We find evidence that following the tax reform, Belgians banks contribute more *within* a



loan facility relative to other foreign banks following the introduction of ACE. We find no evidence of increased risk taking; on the contrary, the increase in credit supply was larger for safer borrowers as measured by Altman's Z score. Various placebo tests confirm that the effect we identify is driven by the new tax policy.

We also develop several hypotheses about the heterogeneous impact of ACE on banks' cross-border supply. In particular, theory suggests potential roles for geographic distance between borrowers and lenders as well as regulation and bank competition in the borrower country. We find that Belgian banks' loan provisioning expanded relatively more in non-neighboring countries, consistent with theories suggesting that lenders have an informational advantage at providing loans to local borrowers. In addition, we also find some evidence that Belgian banks increased lending in markets characterised by fewer restrictions on banking activities, consistent with regulatory arbitrage.

In additional tests we show that Belgian banks increased credit supply at the extensive margin as well, by providing a larger number of loans compared to other foreign banks lending to firms in the same borrower country in the same industry. When comparing the cross-border and domestic credit supply effects of ACE we estimate a larger expansion of lending by Belgian banks at home.

Finally, we show that borrowers obtained loans from Belgian bank-lead syndicates with 20-50 basis points lower spreads, further corroborating the finding that Belgian banks increased their supply of cross-border credit. Interestingly, this is not true for loans that included Belgian banks only as participants, but not as lead banks. This suggests that Belgian banks were able and/or willing to pass on the reduction in funding costs to borrowers as lead banks, but not as participants.

The main implication of our results is that ACE can be a useful policy tool to simultaneously boost bank capitalization and bank lending, without increasing bank risk taking. Many other policies that are designed to increase financial stability through bank capital suffer from weaknesses. For example, higher minimum capital requirements have the ability to hurt bank lending, and create incentives for banks to avoid them through financial innovation. Similarly, taxing bank leverage may induce banks to increase capital ratios, but doing so reduces bank net worth, and

thus incentivizes risk taking. While in this paper we focus on cross-border lending, our results using both foreign and domestic borrowers suggest that our conclusions hold for domestic lending as well.

A key feature of ACE for banks is that it simultaneously reduces the relative cost of bank equity and total cost of bank funding. This suggests that adopting alternative policies that have similar impacts on bank funding costs would have a comparable impact on bank lending to what we find: for example, a levy on bank liabilities combined with a reduction in corporate income taxes might produce similar effects.

Our results also suggest that ACE is not without potentially negative consequences for bank stability, especially for large, internationally active banks. In particular, the finding that Belgian banks increased credit supply relatively more in geographically distant countries suggests a need for regulatory attention, to the extent that more distant borrowers pose new types of risks to lenders. Similarly, that Belgian banks increased loan supply relatively more in countries with fewer activity restrictions raises financial stability concerns, especially if this indicates that Belgian banks increased their overall activity in these countries and thus circumvented domestic restrictions.

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Table 1: Descriptive statistics

See [Table A1](#) for variable definitions.

|                          | N     | Mean     | Std. Dev. | Min     | Max       |
|--------------------------|-------|----------|-----------|---------|-----------|
| Volume (millions of USD) | 7035  | 81.766   | 233.786   | 0.019   | 7825.859  |
| Volume                   | 7035  | 17.159   | 1.544     | 12.686  | 20.643    |
| Number                   | 4014  | 7.072    | 9.058     | 1.000   | 132.000   |
| ln(1+Number)             | 4014  | 1.712    | 0.794     | 0.693   | 3.466     |
| Spread                   | 6797  | 235.046  | 150.837   | 15.000  | 700.000   |
| Belgian                  | 7035  | 0.050    | 0.219     | 0.000   | 1.000     |
| Belgian (lead)           | 6797  | 0.078    | 0.269     | 0.000   | 1.000     |
| Belgian (participant)    | 6797  | 0.117    | 0.321     | 0.000   | 1.000     |
| Domestic                 | 13175 | 0.429    | 0.495     | 0.000   | 1.000     |
| Post                     | 7035  | 0.336    | 0.472     | 0.000   | 1.000     |
| Z score                  | 2264  | 1.500    | 2.409     | -18.621 | 5.462     |
| Distance (km)            | 7035  | 2686.292 | 3191.299  | 164.031 | 16059.380 |
| Distance (log km)        | 7035  | 7.261    | 1.112     | 5.106   | 9.684     |
| Contiguous               | 7035  | 0.898    | 0.303     | 0.000   | 1.000     |
| HHI                      | 7029  | 0.022    | 0.007     | 0.014   | 0.062     |
| Lerner Index             | 7035  | 0.227    | 0.062     | 0.089   | 0.293     |
| Off. Supervisory Power   | 7035  | 8.556    | 2.011     | 5.385   | 14.000    |
| Capital Stringency       | 7035  | 4.314    | 1.660     | 1.000   | 6.000     |
| Activity Restrictions    | 7035  | 5.094    | 1.207     | 4.000   | 9.000     |
| Relationship             | 7035  | 0.307    | 0.461     | 0.000   | 1.000     |
| CPI                      | 7035  | 91.321   | 4.761     | 55.075  | 101.573   |
| GDP per capita           | 7035  | 10.485   | 0.526     | 7.236   | 11.213    |
| GDP growth               | 7035  | 1.961    | 1.064     | -5.189  | 7.925     |
| Loan size                | 6797  | 18.405   | 1.509     | 14.926  | 22.333    |
| Collateral               | 6797  | 0.534    | 0.499     | 0.000   | 1.000     |



|                          |      |        |        |        |         |
|--------------------------|------|--------|--------|--------|---------|
| Revolver                 | 6797 | 0.259  | 0.438  | 0.000  | 1.000   |
| Convenant                | 6797 | 0.026  | 0.161  | 0.000  | 1.000   |
| Maturity                 | 6797 | 82.892 | 31.416 | 6.000  | 222.000 |
| Senior                   | 6797 | 0.924  | 0.265  | 0.000  | 1.000   |
| Purpose                  | 6797 | 0.054  | 0.227  | 0.000  | 1.000   |
| Borrower size            | 860  | 13.806 | 1.969  | 8.557  | 18.891  |
| Borrower leverage        | 860  | 0.307  | 0.214  | 0.000  | 1.077   |
| Borrower ROA             | 860  | 0.075  | 0.148  | -0.741 | 0.520   |
| Borrower tangible assets | 860  | 0.325  | 0.238  | 0.001  | 0.940   |

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Table 2: Loan characteristics between treated and control groups

In Panel A columns 1 and 2 show sample means of various characteristics of syndicated loans extended in 2004 and 2005 by Belgian and non-Belgian banks in the full sample, respectively. Column 3 shows the difference between the sample means in columns 1 and 2. Column 4 shows the t-statistics of tests of the equality of values in columns 1 and 2. Panel B shows analogous statistics for the matched sample. Total volume is the sum of the value of all cross-border syndicated loans extended by a bank (in millions of USD). Loan size is the average value of a bank's contribution in a deal (in millions of USD). Loan spread is the average spread (all-in-drawn-spread) of a bank's syndicated loans in basis points. Maturity is the average maturity of a bank's syndicated loans in months. Secured loans is the ratio of secured loans relative to all loans. Covenants is the ratio of loans with financial covenants relative to all loans.

| Panel A: Full sample |          | Mean        |            |             |
|----------------------|----------|-------------|------------|-------------|
| Loan characteristics | Belgian  | non-Belgian | Difference | t-Statistic |
|                      | (1)      | (2)         | (3)        | (4)         |
| Total volume         | 6849.859 | 2511.485    | -4338.374  | -1.1564     |
| Loan size            | 763.596  | 920.606     | 157.010    | 0.254       |
| Loan spread          | 176.711  | 172.070     | -4.641     | -0.070      |
| Maturity             | 73.771   | 75.681      | 1.909      | 0.117       |
| Secured loans        | 0.117    | 0.170       | 0.053      | 0.453       |
| Covenants            | 0.026    | 0.088       | .062       | 0.584       |

| Panel B: Matched sample |          | Mean        |            |             |
|-------------------------|----------|-------------|------------|-------------|
| Loan characteristics    | Belgian  | non-Belgian | Difference | t-Statistic |
|                         | (1)      | (2)         | (3)        | (4)         |
| Total volume            | 6849.859 | 5964.185    | -885.675   | -0.143      |
| Loan size               | 763.596  | 1056.808    | 293.213    | 0.698       |
| Loan spread             | 176.711  | 143.660     | -33.051    | -0.961      |
| Maturity                | 73.771   | 79.830      | 6.058      | 0.366       |
| Secured loans           | 0.117    | 0.118       | 0.001      | 0.028       |
| Covenants               | 0.026    | 0.017       | -0.009     | -0.741      |

Table 3: The overall effect of ACE on cross-border syndicated loan supply

The dependent variable in all regressions is Volume, the natural logarithm of the US dollar amount of the contribution of a lender in a loan facility. Belgian is a dummy variable indicating that the lender is headquartered in Belgium. Post is a dummy variable indicating the years 2006 and 2007. Z score is Altman's Z score for the borrower firm, measured in 2005. Higher values of Z score are associated with a lower probability of default. Relationship is a dummy variable indicating that the borrower had taken a syndicated loan in the preceding five years in which the lender participated. CPI is the consumer price index in a lender country. GDP per capita is the natural logarithm of the gross domestic product per capita in a lender country. GDP growth is the annual growth rates of the gross domestic product in a lender country. Regressions 1 and 2 are estimated on the full sample. Regressions 3 and 4 are estimated on a sample matching each Belgian bank with the five most similar non-Belgian banks using propensity score matching. The sample includes the years 2004 through 2007. t-statistics using standard errors clustered at the bank level are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

|                          | Full sample        |                      |                      |                    | Matched sample     |                    |                    |                 |
|--------------------------|--------------------|----------------------|----------------------|--------------------|--------------------|--------------------|--------------------|-----------------|
|                          | (1)                | (2)                  | (3)                  | (4)                | (5)                | (6)                | (7)                | (8)             |
| Belgian * Post           | 0.133***<br>(3.09) | 0.164*<br>(1.69)     | -0.009<br>(-0.11)    |                    | 0.077<br>(0.99)    | 0.563***<br>(4.29) | 0.329*<br>(1.77)   |                 |
| Belgian * Post * Z score |                    |                      | 0.182***<br>(3.01)   | 0.264***<br>(2.93) |                    |                    | 0.221**<br>(2.15)  | 0.358<br>(1.25) |
| Belgian * Z score        |                    |                      | 0.026<br>(1.55)      | 0.026<br>(1.37)    |                    |                    | 0.026<br>(0.43)    | 0.031<br>(0.57) |
| Relationship             | 0.162***<br>(5.97) | 0.110***<br>(3.36)   | 0.106***<br>(3.23)   | 0.112***<br>(3.18) | 0.120<br>(1.38)    | 0.049<br>(0.61)    | 0.033<br>(0.49)    | 0.017<br>(0.27) |
| CPI                      | 0.014<br>(1.18)    | 0.038<br>(1.49)      | 0.039<br>(1.53)      |                    | 0.059<br>(0.43)    | 0.221***<br>(3.09) | 0.285***<br>(5.36) |                 |
| GDP per capita           | 0.023<br>(0.08)    | -1.235***<br>(-3.30) | -1.247***<br>(-3.28) |                    | -3.501<br>(-0.84)  | 4.552<br>(1.30)    | 2.463<br>(0.83)    |                 |
| GDP growth               | 0.018<br>(1.21)    | 0.004<br>(0.21)      | 0.004<br>(0.19)      |                    | -0.112*<br>(-1.88) | -0.063<br>(-0.97)  | -0.053<br>(-0.77)  |                 |
| Observations             | 7035               | 2264                 | 2264                 | 2185               | 783                | 289                | 289                | 282             |
| adj. $R^2$               | 0.920              | 0.918                | 0.918                | 0.914              | 0.928              | 0.961              | 0.962              | 0.955           |
| Bank FE                  | Yes                | Yes                  | Yes                  | -                  | Yes                | Yes                | Yes                | -               |
| Bank * Year FE           | No                 | No                   | No                   | Yes                | No                 | No                 | No                 | Yes             |
| Facility FE              | Yes                | Yes                  | Yes                  | Yes                | Yes                | Yes                | Yes                | Yes             |

Table 4: Placebo tests

The dependent variable in all regressions is Volume, the natural logarithm of the US dollar amount of the contribution of a lender in a loan facility. Belgian is a dummy variable indicating that the lender is headquartered in Belgium. Dutch is a dummy variable indicating that the lender is headquartered in the Netherlands. Post is a dummy variable indicating the years 2004 and 2005 in regressions 1 to 4 and the years 2006 and 2007 in regressions 5 and 6. Z score is Altman's Z score for the borrower firm, measured in 2005. Higher values of Z score are associated with a lower probability of default. Relationship is a dummy variable indicating that the borrower had taken a syndicated loan in the preceding five years in which the lender participated. CPI is the consumer price index in a lender country. GDP per capita is the natural logarithm of the gross domestic product per capita in a lender country. GDP growth is the annual growth rates of the gross domestic product in a lender country. Regressions 1, 2, 5 and 6 are estimated on the full sample. Regressions 3 and 4 are estimated on a sample matching each Belgian bank with the five most similar non-Belgian banks using propensity score matching. In regression 1 to 4 the sample includes the years 2002 through 2005, while in regressions 5 and 6 it includes the years 2004 through 2007. t-statistics using standard errors clustered at the bank level are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

|                          | Placebo treatment years = 2004-2005 |                    |                     |                   | Placebo treatment:<br>Dutch banks |                   |
|--------------------------|-------------------------------------|--------------------|---------------------|-------------------|-----------------------------------|-------------------|
|                          | Full sample                         |                    | Matched sample      |                   | Full sample                       |                   |
|                          | (1)                                 | (2)                | (3)                 | (4)               | (5)                               | (6)               |
| Belgian * Post           | 0.016<br>(0.35)                     | 0.039<br>(0.39)    | 0.148<br>(0.80)     | -0.019<br>(-0.08) |                                   |                   |
| Belgian * Post * Z score |                                     | 0.016<br>(0.34)    |                     | 0.062<br>(0.87)   |                                   |                   |
| Belgian * Z score        |                                     | 0.014<br>(0.26)    |                     | -0.027<br>(-0.28) |                                   |                   |
| Dutch * Post             |                                     |                    |                     |                   | -0.069<br>(-1.11)                 | -0.083<br>(-0.65) |
| Dutch * Post * Z score   |                                     |                    |                     |                   |                                   | -0.002<br>(-0.06) |
| Dutch * Z score          |                                     |                    |                     |                   |                                   | -0.011<br>(-0.54) |
| Relationship             | 0.138***<br>(5.77)                  | 0.134***<br>(3.91) | 0.117<br>(1.66)     | 0.003<br>(0.04)   | 0.177***<br>-5.98                 | 0.136***<br>-4.04 |
| CPI                      | 0.002<br>(0.45)                     | -0.009<br>(-1.07)  | 0.008<br>(0.14)     | 0.048<br>(0.45)   | -0.009<br>(-0.83)                 | 0.009<br>-0.41    |
| GDP per capita           | 0.607***<br>(2.97)                  | 0.791**<br>(2.58)  | -2.004<br>(-1.40)   | -2.582<br>(-1.17) | 0.341<br>-0.91                    | -0.646<br>(-1.35) |
| GDP growth               | -0.018<br>(-1.31)                   | -0.008<br>(-0.40)  | -0.104**<br>(-2.11) | -0.054<br>(-1.09) | 0.014<br>-0.89                    | -0.008<br>(-0.32) |
| Observations             | 9173                                | 3879               | 1047                | 486               | 6446                              | 2083              |
| adj. $R^2$               | 0.928                               | 0.907              | 0.944               | 0.950             | 0.908                             | 0.891             |
| Bank FE                  | Yes                                 | Yes                | Yes                 | Yes               | Yes                               | Yes               |
| Facility FE              | Yes                                 | Yes                | Yes                 | Yes               | Yes                               | Yes               |

Table 5: The impact of ACE on cross-border credit supply and borrower country heterogeneity

The dependent variable in all regressions is Volume, the natural logarithm of the US dollar amount of the contribution of a lender in a loan facility. Belgian is a dummy variable indicating that the lender is headquartered in Belgium. Post is a dummy variable indicating the years 2006 and 2007. Z score is Altman's Z score for the borrower firm, measured in 2005. Higher values of Z score are associated with a lower probability of default. Distance is the geographic distance between the capital cities of the countries where the borrower and lender firms are headquartered, measured in log kilometers. Contiguous is a dummy variable equal to 1 if the countries where the borrower and lender firms are headquartered share a common border. HHI is the Herfindahl-Hirschman index of banking market concentration, measured as the sum of the squares of the market shares of all banks in a borrower country's syndicated loan market in 2005. Lerner Index is the markup of the median bank in the borrower's country in 2005, with higher values indicating lower competition. Official Supervisory Power is an index that measures the extent to which the supervisory authorities in the borrower's country have the authority to take specific actions to prevent and correct banking problems as of 2006, higher values indicating more supervisory power. Capital Stringency is an index that measures whether the regulatory capital requirements in the borrower's country reflect certain risk elements and deduct certain market value losses from capital before minimum capital adequacy is determined as of 2006, higher values indicating more stringent capital requirements. Activity Restrictions is an index of restrictions on various activities (securities, insurance and real estate) banks in the borrower's country are allowed to engage in as of 2006, higher values reflecting more restrictions. Relationship is a dummy variable indicating that the borrower had taken a syndicated loan in the preceding five years in which the lender participated. CPI is the consumer price index in a lender country. GDP per capita is the natural logarithm of the gross domestic product per capita in a lender country. GDP growth is the annual growth rates of the gross domestic product in a lender country. All regressions are estimated on the full sample. The sample includes the years 2004 through 2007. t-statistics using standard errors clustered at the bank level are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

|                           | (1)                | (2)                | (3)                | (4)                | (5)                | (6)                | (7)                |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Belgian * Post            | 0.992<br>(1.55)    | 0.158<br>(1.00)    | 0.332<br>(1.29)    | 0.273<br>(0.54)    | 0.509<br>(1.52)    | -0.064<br>(-0.40)  | 0.843**<br>(2.15)  |
| Belgian * Post * Z score  | 0.168***<br>(3.78) | 0.184***<br>(4.04) | 0.178***<br>(3.17) | 0.186***<br>(2.94) | 0.181***<br>(3.84) | 0.185***<br>(3.01) | 0.169***<br>(3.09) |
| Belgian * Z score         | 0.027<br>(1.24)    | 0.021<br>(1.02)    | 0.025<br>(1.49)    | 0.019<br>(1.17)    | 0.024<br>(1.18)    | 0.023<br>(1.43)    | 0.025<br>(1.45)    |
| Belgian * Post * Distance | -0.160<br>(-1.56)  |                    |                    |                    |                    |                    |                    |
| Belgian * Distance        | 0.060<br>(0.49)    |                    |                    |                    |                    |                    |                    |
| Post * Distance           | 0.028<br>(0.69)    |                    |                    |                    |                    |                    |                    |
| Distance                  | -0.138***          |                    |                    |                    |                    |                    |                    |

|                                      |          |          |          |          |          |          |          |          |
|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
|                                      | (-3.06)  |          |          |          |          |          |          |          |
| Belgian * Post * Contiguous          |          | -0.351*  |          |          |          |          |          |          |
|                                      |          | (-1.95)  |          |          |          |          |          |          |
| Belgian * Contiguous                 |          | 0.124    |          |          |          |          |          |          |
|                                      |          | (0.74)   |          |          |          |          |          |          |
| Post * Contiguous                    |          | -0.088   |          |          |          |          |          |          |
|                                      |          | (-0.55)  |          |          |          |          |          |          |
| Neighbor                             |          | -0.004   |          |          |          |          |          |          |
|                                      |          | (-0.07)  |          |          |          |          |          |          |
| Belgian * Post * HHI                 |          |          |          | -16.664  |          |          |          |          |
|                                      |          |          |          | (-1.65)  |          |          |          |          |
| Belgian * HHI                        |          |          |          | -1.196   |          |          |          |          |
|                                      |          |          |          | (-0.17)  |          |          |          |          |
| Belgian * Post * Lerner              |          |          |          |          |          | -1.081   |          |          |
|                                      |          |          |          |          |          | (-0.53)  |          |          |
| Belgian * Lerner                     |          |          |          |          |          |          |          |          |
|                                      |          |          |          |          |          |          |          |          |
| Belgian * Post *                     |          |          |          |          |          |          |          |          |
| Official Supervisory Power           |          |          |          |          |          | -0.071   |          |          |
|                                      |          |          |          |          |          | (-1.63)  |          |          |
| Belgian * Official Supervisory Power |          |          |          |          |          |          |          |          |
|                                      |          |          |          |          |          |          |          |          |
|                                      |          |          |          |          |          |          |          |          |
| Belgian * Post *                     |          |          |          |          |          |          |          |          |
| Capital Stringency                   |          |          |          |          |          |          | 0.013    |          |
|                                      |          |          |          |          |          |          | (0.39)   |          |
| Belgian * Capital Stringency         |          |          |          |          |          |          |          |          |
|                                      |          |          |          |          |          |          |          |          |
|                                      |          |          |          |          |          |          |          |          |
| Belgian * Post *                     |          |          |          |          |          |          |          |          |
| Activity Restrictions                |          |          |          |          |          |          |          | -0.162** |
|                                      |          |          |          |          |          |          |          | (-2.17)  |
| Belgian * Activity Restrictions      |          |          |          |          |          |          |          |          |
|                                      |          |          |          |          |          |          |          |          |
|                                      |          |          |          |          |          |          |          |          |
| Relationship                         | 0.091*** | 0.104*** | 0.106*** | 0.106*** | 0.105*** | 0.107*** | 0.105*** |          |
|                                      | (2.87)   | (3.14)   | (3.21)   | (3.22)   | (3.19)   | (3.26)   | (3.19)   |          |

|                |                    |                      |                      |                      |                      |                      |                      |
|----------------|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| CPI            | 0.037<br>(1.40)    | 0.039<br>(1.54)      | 0.039<br>(1.53)      | 0.039<br>(1.54)      | 0.040<br>(1.54)      | 0.039<br>(1.54)      | 0.039<br>(1.53)      |
| GDP per capita | -0.849*<br>(-1.73) | -1.214***<br>(-3.07) | -1.232***<br>(-3.28) | -1.249***<br>(-3.27) | -1.249***<br>(-3.24) | -1.245***<br>(-3.27) | -1.214***<br>(-3.23) |
| GDP growth     | 0.013<br>(0.58)    | -0.001<br>(-0.05)    | 0.005<br>(0.23)      | 0.004<br>(0.21)      | 0.004<br>(0.17)      | 0.004<br>(0.18)      | 0.005<br>(0.22)      |
| Observations   | 2264               | 2264                 | 2264                 | 2264                 | 2264                 | 2264                 | 2264                 |
| adj. $R^2$     | 0.919              | 0.918                | 0.918                | 0.918                | 0.918                | 0.918                | 0.918                |
| Bank FE        | Yes                | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Facility FE    | Yes                | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |

Table 6: The effect of ACE on cross-border credit supply at the extensive margin

The dependent variable in all regressions is Number, the natural logarithm of one plus the total number of syndicated loans provided by a bank in an industry in a borrower country during the pre- and post-treatment periods (2004-2005 and 2006-2007 in regressions 1 and 3 and 2002-2003 and 2004-2005 in regression 2, respectively). Belgian is a dummy variable indicating that the lender is headquartered in Belgium. Post is a dummy variable indicating the years 2006 and 2007 in regressions 1 and 3 and the years 2004 and 2005 in regression 2. CPI is the consumer price index in a lender country. GDP per capita is the natural logarithm of the gross domestic product per capita in a lender country. GDP growth is the annual growth rates of the gross domestic product in a lender country. All regressions are estimated on the full sample. In regressions 1 and 3 the sample includes the years 2004 through 2007, while in regression 2 it includes the years 2002 through 2005. t-statistics using standard errors clustered at the bank level are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

|                                       | Baseline          | Placebo<br>treatment<br>years =<br>2004-2005 | Placebo<br>treatment:<br>Dutch banks |
|---------------------------------------|-------------------|--|--------------------------------------|
|                                       | (1)               | (2)  | (3)                                  |
| Belgian * Post                        | 0.096**<br>(2.38) | -0.111<br>(-0.41)                            |                                      |
| Dutch * Post                          |                   |  | -0.119<br>(-1.22)                    |
| CPI                                   | 0.008<br>(0.37)   | -0.024<br>(-1.08)                            | -0.009<br>(-0.36)                    |
| GDP per capita                        | 0.477<br>(1.03)   | -0.343<br>(-0.60)                            | 0.973*<br>(1.90)                     |
| GDP growth                            | -0.022<br>(-1.04) | -0.017<br>(-0.28)                            | -0.025<br>(-1.11)                    |
| Observations                          | 4014              | 4026   | 3722                                 |
| adj. $R^2$                            | 0.560             | 0.519  | 0.567                                |
| Borrower country * Industry * Time FE | Yes               | Yes  | Yes                                  |
| Borrower country * Industry * Bank FE | Yes               | Yes  | Yes                                  |



Table 7: ACE and domestic credit supply

The dependent variable in all regressions is Volume, the natural logarithm of the US dollar amount of the contribution of a lender in a loan facility. Belgian is a dummy variable indicating that the lender is headquartered in Belgium. Post is a dummy variable indicating the years 2006 and 2007. Domestic is a dummy variable indicating that the lender is headquartered in the borrower's country. Relationship is a dummy variable indicating that the borrower had taken a syndicated loan in the preceding five years in which the lender participated. CPI is the consumer price index in a lender country. GDP per capita is the natural logarithm of the gross domestic product per capita in a lender country. GDP growth is the annual growth rates of the gross domestic product in a lender country. Regressions 1 to 3 are estimated on the full sample. Regressions 4 to 6 are estimated on a sample matching each Belgian bank with the five most similar non-Belgian banks using propensity score matching. The sample includes the years 2004 through 2007. t-statistics using standard errors clustered at the bank level are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

|                               | Full sample        |                    |                    | Matched sample  |                    |                    |
|-------------------------------|--------------------|--------------------|--------------------|-----------------|--------------------|--------------------|
|                               | (1)                | (2)                | (3)                | (4)             | (5)                | (6)                |
| Belgian * Post                | 0.164***<br>(5.37) | 0.120***<br>(3.15) | 0.151***<br>(3.38) | 0.096<br>(1.35) | 0.041<br>(0.52)    | 0.114<br>(0.94)    |
| Belgian * Post * Domestic     |                    | 0.258**<br>(2.11)  | 0.258**<br>(2.14)  |                 | 0.962***<br>(2.85) | 0.978**<br>(2.32)  |
| Belgian * Domestic            |                    | -0.138<br>(-0.85)  | -0.131<br>(-0.82)  |                 | -0.485<br>(-1.71)  | -0.439<br>(-1.59)  |
| Post * Domestic               |                    | -0.019<br>(-0.48)  | -0.023<br>(-0.59)  |                 | -0.133<br>(-0.77)  | -0.133<br>(-0.79)  |
| Domestic                      |                    | 0.261***<br>(8.19) | 0.262***<br>(8.35) |                 | 0.392***<br>(4.19) | 0.401***<br>(4.24) |
| Belgian * Post * Relationship |                    |                    | -0.169<br>(-1.23)  |                 |                    | -0.289<br>(-1.04)  |
| Belgian * Relationship        |                    |                    | 0.184**<br>(2.40)  |                 |                    | 0.190<br>(1.56)    |
| Post * Relationship           |                    |                    | 0.041<br>(0.66)    |                 |                    | -0.011<br>(-0.06)  |

|                |                    |                    |                    |                   |                   |                   |
|----------------|--------------------|--------------------|--------------------|-------------------|-------------------|-------------------|
| Relationship   | 0.195***<br>(7.84) | 0.169***<br>(7.53) | 0.156***<br>(5.88) | 0.218**<br>(2.71) | 0.181**<br>(2.26) | 0.163*<br>(1.86)  |
| CPI            | -0.001<br>(-0.06)  | 0.002<br>(0.18)    | 0.002<br>(0.20)    | -0.123<br>(-1.05) | -0.120<br>(-1.29) | -0.117<br>(-1.29) |
| GDP per capita | 0.374<br>(1.60)    | 0.352<br>(1.50)    | 0.349<br>(1.48)    | 3.364<br>(0.58)   | 4.479<br>(0.90)   | 4.344<br>(0.86)   |
| GDP growth     | 0.014<br>(1.17)    | 0.008<br>(0.69)    | 0.009<br>(0.72)    | -0.018<br>(-0.30) | -0.030<br>(-0.55) | -0.024<br>(-0.42) |
| Observations   | 13175              | 13175              | 13175              | 1349              | 1349              | 1349              |
| adj. $R^2$     | 0.908              | 0.911              | 0.911              | 0.912             | 0.916             | 0.916             |
| Bank FE        | Yes                | Yes                | Yes                | Yes               | Yes               | Yes               |
| Facility FE    | Yes                | Yes                | Yes                | Yes               | Yes               | Yes               |

Table 8: The effect of ACE on the spread of syndicated loans with Belgian lead banks

The dependent variable in all regressions is Spread, which is the all-in spread drawn in basis points. Belgian (lead) is a dummy variable indicating that at least one of the lead banks is headquartered in Belgium. Post is a dummy variable indicating the years 2006 and 2007. Relationship (avrg) is the fraction of lenders that participated in any syndicated loans taken by the borrower in the preceding five years. CPI (avrg) is the unweighted average of the consumer price indices in the lender countries. GDP per capita (avrg) is the unweighted average of the natural logarithm of the gross domestic product per capita in the lender countries. GDP growth (avrg) is the unweighted average of the annual growth rates of the gross domestic product in the lender countries. Borrower size is the natural logarithm of the total assets of the borrower. Borrower leverage is the borrower's total liabilities over total assets ratio. Borrower ROA is the borrower's net income over total assets ratio. Borrower tangible assets is tangible assets over total assets. Collateral is a dummy variable which equals one if DealScan reports the loan as secured and zero otherwise. Revolver is a dummy variable which equals one if the reported loan type is either "Revolver/Line < 1 Yr.", "Revolver/Line >= 1 Yr.", "364-Day Facility", "Revolver/Term Loan", or "Limited Line". Covenant is a dummy variable indicating that the loan has a net worth or financial covenant. Maturity is the maturity of the loan in months. Senior is a dummy variable indicating that the loan is a senior loan. Purpose is a dummy variable indicating that the loan is primarily for corporate purposes. Regressions 1 to 3 are estimated on the full sample. Regressions 4 to 6 are estimated on a sample matching each Belgian bank with the five most similar non-Belgian banks using propensity score matching. The sample includes the years 2004 through 2007. The sample includes the years 2004 through 2007. t-statistics using Huber-White heteroskedasticity-robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

|                       | Full sample            |                        |                        | Matched sample         |                        |                        |
|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|                       | (1)                    | (2)                    | (3)                    | (4)                    | (5)                    | (6)                    |
| Belgian (lead) * Post | -19.660**<br>(-2.24)   | -15.320<br>(-1.59)     | -36.801*<br>(-1.74)    | -22.915**<br>(-2.35)   | -27.036**<br>(-2.45)   | -53.016**<br>(-2.57)   |
| Belgian (lead)        | -3.783<br>(-0.41)      | -8.531<br>(-0.84)      | 17.973<br>(1.64)       | 5.688<br>(0.56)        | 3.695<br>(0.33)        | 29.403***<br>(2.91)    |
| Relationship          | -18.495***<br>(-3.01)  | -14.847**<br>(-2.40)   | 6.332<br>(0.43)        | -17.019**<br>(-2.39)   | -13.222*<br>(-1.79)    | -3.353<br>(-0.24)      |
| Loan size             | -7.606***<br>(-5.17)   | -7.493***<br>(-5.07)   | -29.524***<br>(-10.73) | -7.404***<br>(-4.57)   | -7.594***<br>(-4.70)   | -33.220***<br>(-10.53) |
| Collateral            | -4.645<br>(-0.99)      | -3.709<br>(-0.75)      | 46.660***<br>(4.47)    | -9.957<br>(-1.60)      | -9.954<br>(-1.52)      | 20.890**<br>(2.02)     |
| Revolver              | -37.063***<br>(-19.16) | -36.708***<br>(-18.96) | -67.240***<br>(-10.18) | -34.141***<br>(-16.25) | -34.129***<br>(-16.26) | -55.939***<br>(-8.94)  |
| Covenant dummy        | -0.460                 | -4.537                 | 12.189                 | 8.255                  | -1.241                 | 30.620                 |

|                            |                         |                         |                         |                         |                         |                        |
|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|
|                            | (-0.03)                 | (-0.29)                 | (0.75)                  | (0.62)                  | (-0.09)                 | (1.27)                 |
| Maturity                   | 1.001***<br>(14.45)     | 0.995***<br>(14.53)     | 0.907***<br>(4.91)      | 0.905***<br>(12.44)     | 0.903***<br>(12.31)     | 0.832***<br>(4.57)     |
| Senior                     | -345.123***<br>(-56.65) | -345.723***<br>(-56.75) | -329.210***<br>(-11.01) | -347.510***<br>(-41.67) | -346.927***<br>(-41.36) | -337.887***<br>(-8.94) |
| Purpose                    | -1.946<br>(-0.30)       | -3.219<br>(-0.48)       | -12.712<br>(-1.14)      | -9.459<br>(-1.57)       | -9.564<br>(-1.47)       | -20.005**<br>(-2.17)   |
| CPI                        | -2.834*<br>(-1.84)      | -2.763*<br>(-1.74)      | -1.643<br>(-0.49)       | -3.359<br>(-1.58)       | -4.481*<br>(-1.93)      | -2.166<br>(-0.65)      |
| GDP per capita             | 50.095***<br>(3.43)     | 58.063***<br>(3.75)     | 103.694***<br>(3.16)    | 49.115**<br>(2.16)      | 48.040**<br>(2.03)      | 111.298***<br>(3.86)   |
| GDP growth                 | -2.728<br>(-0.73)       | -5.385<br>(-1.22)       | 5.444<br>(0.44)         | -3.774<br>(-0.58)       | -7.097<br>(-0.95)       | 12.382<br>(1.03)       |
| Firm size                  |                         |                         | 0.796<br>(0.43)         |                         |                         | 0.421<br>(0.28)        |
| Firm leverage              |                         |                         | 47.977**<br>(2.32)      |                         |                         | 72.296***<br>(3.56)    |
| Firm ROA                   |                         |                         | 16.725<br>(0.75)        |                         |                         | -31.587<br>(-1.43)     |
| Firm tangibility           |                         |                         | -26.025**<br>(-1.96)    |                         |                         | 0.579<br>(0.05)        |
| <i>N</i>                   | 5053                    | 5044                    | 743                     | 3094                    | 3084                    | 552                    |
| adj. <i>R</i> <sup>2</sup> | 0.843                   | 0.845                   | 0.690                   | 0.867                   | 0.868                   | 0.735                  |
| Year FE                    | Yes                     | Yes                     | Yes                     | Yes                     | Yes                     | Yes                    |
| Borrower FE                | Yes                     | Yes                     | No                      | Yes                     | Yes                     | No                     |
| Borrower Country * Year FE | No                      | Yes                     | Yes                     | No                      | Yes                     | Yes                    |

Table 9: The effect of ACE on the spread of syndicated loans with Belgian participating banks

The dependent variable in all regressions is Spread, which is the all-in spread drawn in basis points. Belgian (participant) is a dummy variable indicating that none of the lead banks are headquartered in Belgium and at least one of the lenders is headquartered in Belgium. Post is a dummy variable indicating the years 2006 and 2007. Relationship (avrg) is the fraction of lenders that participated in any syndicated loans taken by the borrower in the preceding five years. CPI (avrg) is the unweighted average of the consumer price indices in the lender countries. GDP per capita (avrg) is the unweighted average of the natural logarithm of the gross domestic product per capita in the lender countries. GDP growth (avrg) is the unweighted average of the annual growth rates of the gross domestic product in the lender countries. Borrower size is the natural logarithm of the total assets of the borrower Borrower leverage is the borrower's total liabilities over total assets ratio. Borrower ROA is the borrower's net income over total assets ratio. Borrower tangible assets is tangible assets over total assets. Collateral is a dummy variable which equals one if DealScan reports the loan as secured and zero otherwise Revolver is a dummy variable which equals one if the reported loan type is either "Revolver/Line < 1 Yr.", "Revolver/Line >= 1 Yr.", "364-Day Facility", "Revolver/Term Loan", or "Limited Line". Covenant is a dummy variable indicating that the loan has a net worth or financial covenant. Maturity is the maturity of the loan in months. Senior is a dummy variable indicating that the loan is a senior loan. Purpose is a dummy variable indicating that the loan is primarily for corporate purposes. Regressions 1 to 3 are estimated on the full sample. Regressions 4 to 6 are estimated on a sample matching each Belgian bank with the five most similar non-Belgian banks using propensity score matching. The sample includes the years 2004 through 2007. The sample includes the years 2004 through 2007. t-statistics using using Huber-White heteroskedasticity-robust standard errors are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

|                              | Full sample            |                        |                        | Matched sample         |                        |                        |
|------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|                              | (1)                    | (2)                    | (3)                    | (4)                    | (5)                    | (6)                    |
| Belgian (participant) * Post | 5.985<br>(0.67)        | 1.372<br>(0.14)        | 25.851<br>(1.60)       | 18.502**<br>(1.97)     | 17.354*<br>(1.78)      | 19.026<br>(1.14)       |
| Belgian (participant)        | -9.132<br>(-1.39)      | -7.331<br>(-1.08)      | 12.986<br>(1.20)       | -8.690<br>(-1.34)      | -6.809<br>(-1.04)      | 22.130**<br>(2.20)     |
| Relationship                 | -18.877***<br>(-3.07)  | -15.017**<br>(-2.41)   | 10.269<br>(0.69)       | -15.144**<br>(-2.14)   | -10.936<br>(-1.48)     | 6.905<br>(0.49)        |
| Loan size                    | -7.656***<br>(-5.18)   | -7.568***<br>(-5.11)   | -29.312***<br>(-11.27) | -7.345***<br>(-4.52)   | -7.474***<br>(-4.61)   | -32.577***<br>(-10.68) |
| Collateral                   | -4.767<br>(-1.00)      | -3.522<br>(-0.71)      | 51.039***<br>(4.87)    | -9.677<br>(-1.58)      | -8.498<br>(-1.32)      | 26.767***<br>(2.62)    |
| Revolver                     | -37.211***<br>(-19.17) | -36.895***<br>(-18.97) | -65.372***<br>(-10.00) | -34.081***<br>(-16.20) | -34.008***<br>(-16.17) | -52.500***<br>(-8.44)  |
| Covenant dummy               | -1.145                 | -4.352                 | 14.906                 | 4.365                  | -5.450                 | 32.679                 |

|                            |                         |                         |                         |                         |                         |                        |
|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|
|                            | (-0.08)                 | (-0.28)                 | (0.89)                  | (0.33)                  | (-0.37)                 | (1.27)                 |
| Maturity                   | 1.001***<br>(14.42)     | 0.996***<br>(14.51)     | 0.920***<br>(5.03)      | 0.906***<br>(12.42)     | 0.904***<br>(12.28)     | 0.870***<br>(4.79)     |
| Senior                     | -345.224***<br>(-56.23) | -345.864***<br>(-56.46) | -329.564***<br>(-10.93) | -347.903***<br>(-41.57) | -347.589***<br>(-41.33) | -337.159***<br>(-8.70) |
| Purpose                    | -2.345<br>(-0.36)       | -3.221<br>(-0.48)       | -15.280<br>(-1.37)      | -9.782<br>(-1.63)       | -10.100<br>(-1.55)      | -23.652**<br>(-2.56)   |
| CPI                        | -2.871*<br>(-1.86)      | -2.882*<br>(-1.82)      | -1.914<br>(-0.58)       | -3.278<br>(-1.57)       | -4.490*<br>(-1.96)      | -2.630<br>(-0.78)      |
| GDP per capita             | 49.907***<br>(3.41)     | 58.171***<br>(3.74)     | 100.401***<br>(3.06)    | 47.654**<br>(2.09)      | 48.417**<br>(2.02)      | 105.822***<br>(3.68)   |
| GDP growth                 | -1.970<br>(-0.52)       | -4.515<br>(-1.01)       | 6.304<br>(0.51)         | -4.727<br>(-0.72)       | -8.602<br>(-1.13)       | 11.543<br>(0.95)       |
| Firm size                  |                         |                         | 0.871<br>(0.47)         |                         |                         | 0.598<br>(0.39)        |
| Firm leverage              |                         |                         | 51.646**<br>(2.40)      |                         |                         | 81.961***<br>(3.86)    |
| Firm ROA                   |                         |                         | 19.021<br>(0.86)        |                         |                         | -19.872<br>(-0.93)     |
| Firm tangibility           |                         |                         | -27.847**<br>(-2.12)    |                         |                         | -5.449<br>(-0.46)      |
| <i>N</i>                   | 5053                    | 5044                    | 743                     | 3094                    | 3084                    | 552                    |
| adj. <i>R</i> <sup>2</sup> | 0.843                   | 0.845                   | 0.690                   | 0.867                   | 0.867                   | 0.734                  |
| Year FE                    | Yes                     | Yes                     | Yes                     | Yes                     | Yes                     | Yes                    |
| Borrower FE                | Yes                     | Yes                     | No                      | Yes                     | Yes                     | No                     |
| Borrower Country * Year FE | No                      | Yes                     | Yes                     | No                      | Yes                     | Yes                    |

# Appendix

Table A1: Data description and sources

| Variable              | Description  | Data Source  |
|-----------------------|--|--|
| Volume                | The natural logarithm of the US dollar amount of the contribution of a lender in a loan facility.  | DealScan   |
| Number                | The natural logarithm of 1 plus the number of loans a bank made to all firms in a given industry in a given country over the periods 2004-05 and 2006-07.  | DealScan   |
| Spread                | The all-in spread drawn in basis points.   | DealScan   |
| Belgian               | Dummy variable indicating that the lender is headquartered in Belgium.   | DealScan   |
| Belgian (lead)        | Dummy variable indicating that at least one of the lead banks is headquartered in Belgium.   | DealScan   |
| Belgian (participant) | Dummy variable indicating that none of the lead banks are headquartered in Belgium and at least one of the lenders is headquartered in Belgium.  | DealScan   |
| Domestic              | Dummy variable indicating that the lender is headquartered in the borrower's country.  | DealScan   |
| Post                  | Dummy variable indicating the years 2006 and 2007.   | Authors' calculations.   |
| Z score               | Altman's Z score for the borrower firm calculated as 1.2 (Working Capital/Total Assets) + 1.4 (Retained Earnings/Total Assets)+3.3 (Earnings Before Interest and Taxes/Total Assets)+0.6 (Market Value of Equity/Book Value of Liabilities) + 0.999 (Net Sales/Total Assets), measured in 2005. Higher values of Z score are associated with a lower probability of default. | WorldScope   |
| Distance              | Geographic distance between the capital cities of the countries where the borrower and lender firms are headquartered, measured in log kilometers.   | <a href="http://techslides.com/list-of-countries-and-capitals">http://techslides.com/list-of-countries-and-capitals</a><br>(downloaded on June 27, 2016) |
| Contiguous            | Dummy variable equal to 1 if the countries where the borrower and lender firms are headquartered share a common border.  | <a href="http://data.okfn.org/data/ppKrauss/country-geotime">http://data.okfn.org/data/ppKrauss/country-geotime</a><br>(downloaded on October 17, 2016)  |
| HHI                   | The Herfindahl-Hirschman index of banking market concentration, measured as the sum of the squares of the market shares of all banks in a borrower country's syndicated loan market in 2005.   | DealScan   |
| Lerner Index          | The markup of the median bank in the borrower's country in 2005, with higher values indicating lower competition.  | Global Financial Development Report  |

Table A1: Data description and sources (continued)

| Variable                   | Description  | Data Source                  |
|----------------------------|--|------------------------------|
| Official Supervisory Power | An index that measures the extent to which the supervisory authorities in the borrower's country have the authority to take specific actions to prevent and correct banking problems as of 2006, higher values indicating more supervisory power.  | Barth et al. (2013)          |
| Capital Stringency         | An index that measures whether the regulatory capital requirements in the borrower's country reflect certain risk elements and deduct certain market value losses from capital before minimum capital adequacy is determined as of 2006, higher values indicating more stringent capital requirements. | Barth et al. (2013)          |
| Activity Restrictions      | An index of restrictions on various activities (securities, insurance and real estate) banks in the borrower's country are allowed to engage in as of 2006, higher values reflecting more restrictions.  | Barth et al. (2013)          |
| Relationship               | Dummy variable indicating that the borrower had taken a syndicated loan in the preceding five years in which the lender participated.  | DealScan                     |
| CPI                        | The consumer price index in a lender country in the year of the origination date of the loan.  | World Development Indicators |
| GDP per capita             | The natural logarithm of the gross domestic product per capita in a lender country in the year of the origination date of the loan.  | World Development Indicators |
| GDP growth                 | The annual growth rates of the gross domestic product in a lender country in the year of the origination date of the loan.   | World Development Indicators |
| Borrower size              | The natural logarithm of the total assets of the borrower at the end of the year prior to the loan.  | WorldScope                   |
| Borrower leverage          | The borrower's total liabilities over total assets ratio at the end of the year prior to the loan.   | WorldScope                   |
| Borrower ROA               | The borrower's net income over total assets ratio for the year prior to the loan.  | WorldScope                   |
| Borrower tangible assets   | The borrower's tangible assets over total assets ratio at the end of the year prior to the loan.   | WorldScope                   |
| Collateral                 | Dummy variable which equals one if DealScan reports the loan as secured and zero otherwise.  | DealScan                     |
| Revolver                   | Dummy variable which equals one if the reported loan type is either "Revolver/Line < 1 Yr.", "Revolver/Line >= 1 Yr.", "364-Day Facility", "Revolver/Term Loan", or "Limited Line".  | DealScan                     |
| Covenant                   | Dummy variable indicating that the loan has a net worth or financial covenant.   | DealScan                     |
| Maturity Senior            | The maturity of the loan is months.  | DealScan                     |
| Purpose                    | Dummy variable indicating that the loan is primarily for corporate purposes.   | DealScan                     |



Table A2: The impact of ACE on loan supply and borrower country heterogeneity using the matched sample

The dependent variable in all regressions is Volume, the natural logarithm of the US dollar amount of the contribution of a lender in a loan facility. Belgian is a dummy variable indicating that the lender is headquartered in Belgium. Post is a dummy variable indicating the years 2006 and 2007. Z score is Altman's Z score for the borrower firm. Higher values of Z score are associated with a lower probability of default. Distance is the geographic distance between the capital cities of the countries where the borrower and lender firms are headquartered, measured in log kilometers. Contiguous is a dummy variable equal to 1 if the countries where the borrower and lender firms are headquartered share a common border. HHI is the Herfindahl-Hirschman index of banking market concentration, measured as the sum of the squares of the market shares of all banks in a borrower country's syndicated loan market in 2005. Lerner Index is the markup of the median bank in the borrower's country in 2005, with higher values indicating lower competition. Official Supervisory Power is an index that measures the extent to which the supervisory authorities in the borrower's country have the authority to take specific actions to prevent and correct banking problems as of 2006, higher values indicating more supervisory power. Capital Stringency is an index that measures whether the regulatory capital requirements in the borrower's country reflect certain risk elements and deduct certain market value losses from capital before minimum capital adequacy is determined as of 2006, higher values indicating more stringent capital requirements. Activity Restrictions is an index of restrictions on various activities (securities, insurance and real estate) banks in the borrower's country are allowed to engage in as of 2006, higher values reflecting more restrictions. Relationship is a dummy variable indicating that the borrower had taken a syndicated loan in the preceding five years in which the lender participated. CPI is the consumer price index in a lender country. GDP per capita is the natural logarithm of the gross domestic product per capita in a lender country. GDP growth is the annual growth rates of the gross domestic product in a lender country. All regressions are estimated on a sample matching each Belgian bank with the five most similar non-Belgian banks using propensity score matching. The sample includes the years 2004 through 2007. t-statistics using standard errors clustered at the bank level are shown in parentheses. \*, \*\*, and \*\*\* denote significance at 10%, 5%, and 1%.

49

|                           | (1)               | (2)               | (3)              | (4)               | (5)               | (6)               | (7)              |
|---------------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|
| Belgian * Post            | 1.141<br>(1.34)   | 1.196**<br>(2.45) | 0.939<br>(1.00)  | 0.600<br>(0.87)   | 0.846*<br>(1.87)  | 1.014**<br>(2.45) | 0.785<br>(0.46)  |
| Belgian * Post * Z score  | 0.186**<br>(2.26) | 0.211**<br>(2.46) | 0.202*<br>(1.78) | 0.216**<br>(2.32) | 0.205**<br>(2.47) | 0.184**<br>(2.16) | 0.219*<br>(2.01) |
| Belgian * Z score         | 0.018<br>(0.28)   | 0.026<br>(0.45)   | 0.043<br>(0.69)  | 0.019<br>(0.29)   | 0.021<br>(0.37)   | 0.028<br>(0.46)   | 0.026<br>(0.43)  |
| Belgian * Post * Distance | -0.149<br>(-1.16) |                   |                  |                   |                   |                   |                  |
| Belgian * Distance        | -0.060            |                   |                  |                   |                   |                   |                  |

|  |          |          |          |
|--|----------|----------|----------|
|  | (-0.83)  |          |          |
| Post * Distance                                | -0.058   |          |          |
|  | (-0.22)  |          |          |
| Distance                                       | -0.159   |          |          |
|  | (-0.88)  |          |          |
| Belgian * Post * Contiguous                    | -1.144** |          |          |
|  | (-2.26)  |          |          |
| Belgian * Contiguous                           | 0.409    |          |          |
|  | (1.69)   |          |          |
| Post * Contiguous                              | 0.498    |          |          |
|  | (1.13)   |          |          |
| Contiguous                                     | -0.322   |          |          |
|  | (-1.67)  |          |          |
| Belgian * Post * HHI                           |          | -28.225  |          |
|  |          | (-0.69)  |          |
| Belgian * HHI                                  |          | 21.178   |          |
|  |          | (1.04)   |          |
| Belgian * Post * Lerner                        |          | -0.711   |          |
|  |          | (-0.25)  |          |
| Belgian * Lerner                               |          | -2.351** |          |
|  |          | (-2.46)  |          |
| Belgian * Post *<br>Official Supervisory Power |          |          | -0.073   |
|  |          |          | (-1.40)  |
| Belgian * Official Supervisory Power           |          |          | -0.053** |
|  |          |          | (-2.57)  |

