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Completing the European Banking Union: Capital Cost Consequences for Credit Providers and Corporate Borrowers*

Abstract

The bank recovery and resolution directive (BRRD) regulates the bail-in hierarchy to resolve distressed banks without burdening tax payers. We exploit the staggered implementation of the BRRD across 15 European Union (EU) member states to identify banks' capital cost and capital structure responses. In a first stage, we show that average capital costs of banks increased. WACC hikes are lowest in the core countries of the European Monetary Union (EMU) compared to formerly stressed EMU and non-EMU countries. This pattern is driven by changes in the relative WACC weight of equity in response to the BRRD, which indicates enhanced financial system resilience. In a second stage, we document asymmetric transmission patterns of banks' capital cost changes on to corporates' borrowing terms. Only EMU banks located in core countries that exhibit higher WACC are those that also increase firms' borrowing cost and contract credit supply. Hence, the BRRD had unintended consequences for selected segments of the real economy.

Keywords: bail-in, banking union, funding costs, real effects

JEL classification: C41, F34, G21, H63

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1 Motivation

Pervasive bank bailouts by European Union (EU) governments during the Great Financial Crisis 2007/2008 transmitted much of the prevailing risks in the financial system to the public sector. The resulting bank-sovereign risk nexus was one of the main drivers of the subsequent European sovereign debt crisis of 2010, which endangered the sustainability of the entire European Monetary Union (EMU, see Brunnermeier et al., 2016; Farhi and Tirole, 2017). To avoid future doom loops of this kind, the EU designed the Bank Recovery and Resolution Directive (BRRD), one of the main pillars of the European Banking Union (EBU). The BRRD regulates early intervention measures to prevent banking insolvency, an orderly resolution of distressed banks, establishes a resolution fund, and specifies a bail-in rule.

A key element of this latter rule is to define a bail-in hierarchy. Equity and subordinated debt holders bear bank losses first, by which the implementation of the BRRD aims to reduce bailout expectations. The successful elimination of implicit government guarantees would imply higher risk premia, and thus funding costs, for individual banks. At the same time, explicit rules on bank resolution should reduce banks' incentives to "bet the bank", thereby reducing idiosyncratic probabilities of distress while enhancing financial system stability. Both effects would consequently reduce the average risk premium of banks that operate under BRRD regulation.

Whether banks incur higher or lower funding costs and adjusted capital cost components due to the regulation is therefore an empirical question, which we answer in a first step. In a second step, we use credit relationships in syndicated loan markets to match banks and borrowers to test for a pass-through of potential funding cost reactions of banks to the real economy. We sample the largest EU banks between 2010 and 2018 and exploit in the vein of Christensen et al. (2016) the staggered implementation of the BRRD across EU nations into national law for identification purposes. This staggered implementation of the BRRD, which eventually had to be adopted by all EU members, permits to saturate the empirical specification with many fixed effects. This approach mitigates concerns of omitted variables and confounding factors, such as regulatory changes or monetary policy.

Besides this empirical feature, the institutional setting of BRRD implementation provides an optimal setting to test for any capital cost implications of this policy to complete the EBU for both banks and firms. The BRRD has been decided at the level of the European Commission (EC) and it establishes rules for orderly resolution and restructuring of banks in distress that

banks from both EMU and non-EMU countries have to implement. Therefore, we are much less likely to face self-selection issues that plague single-country studies of regulatory effects. Whereas the EC set the common transposition deadline for the BRRD, most countries have delayed the implementation of it into national law. The staggered adoption into national law across EU member states reflects existing regulation and institutional features, whereas the state of the banking system plays a minor role for timely implementation (Koetter et al., 2019). The absence of "strategic delays" across countries further supports the exogeneity of the implementation dates vis-à-vis the outcome of interest: banks' weighted average cost of capital (WACC).

Our empirical results highlight a number of important differences in cross-country WACC responses towards the implementation of the BRRD into national law. For the sample of the largest 59 EU banks, we estimate a quarterly increase of banks' WACC up to almost 2 percentage points. This differential effect equals $\frac{2}{3}$ of the sample's standard deviation and compares to an average WACC of 413 basis points. This effect is therefore also economically significant. Importantly, the response towards the policy shock differs across three regional clusters: core EMU countries, EMU countries that experienced stress during the sovereign debt crisis (GIIPS), and non-EMU countries.[1] Whereas investors required around 1.5 percentage point higher WACC from banks residing in core EMU markets, the risk premium charged on GIIPS and non-EMU banks increased by more than 2 percentage points during the 8 quarters after the implementation of the BRRD. WACC changes are primarily driven by the fact that banks increased the relative weight of equity and reduced correspondingly their leverage. Therefore, these results suggest that the national implementations of the BRRD enhanced the resilience of banks in Europe. Especially the threat of being "likely to fail" has generated incentives for banks to increase equity positions. This dynamic contributed the most to hikes in banks' WACC.

Subsequently, we test whether these heterogeneous country-group responses in general and the increase in banks' capital cost in particular are passed-on to the real economy via lending relationships. Exploiting bank-firm links observed in the syndicated loan market and controlling for corporate credit demand in the spirit of Khwaja and Mian (2008), we find that spillovers to the real economy are most prevalent for firms borrowing from banks in core EMU countries. This pass-through works primarily via an increased equity premium of core EMU banks and unfolds asymmetric effects. Reduced funding costs of banks are generally not passed on to corporate

[1] Core EMU countries comprise Austria, Belgium, France, Germany, and the Netherlands. GIIPS countries include Greece, Italy, Portugal, and Spain. Non-EMU countries are Czech Republic, Denmark, Hungary, Poland, Romania, and Sweden.

borrowers. In contrast, those banks in core EMU countries that exhibit increasing WACC in response to the BRRD also increase the credit spreads charged to corporate borrowers. This result is robust vis-à-vis a plethora of confounding factors, such as heterogeneity in credit market competition, monetary policy stances, or long-term credit relationships. While overall statistically weaker, we also document deteriorating credit terms other than loan pricing for firms connected to core EMU banks with increasing WACC. Specifically, loan maturity increases, average loan amounts contract, and covenants are used more often. So whereas the BRRD enhanced overall the resilience of the European financial systems, it also bears important ramifications for the real economy.

We contribute to three strands of literature. First, ample evidence shows that bailout guarantees affect market discipline, monitoring incentives, and bank risk-taking (Cordella and Yeyati, 2003; Sironi, 2003; Dam and Koetter, 2012; Duchin and Sosyura, 2014; Acharya et al., 2016). The BRRD reduces such guarantees, which might increase risk premia required by investors and thus banks' funding costs. Recent studies report indeed empirical evidence for reduced bailout expectations and increased market discipline after the introduction of the BRRD (Schäfer et al., 2016; Bernard et al., 2017; Cutura, 2018; Giuliana, 2019; Lewrick et al., 2019). An exception is Pancotto et al. (2019) who based on CDS data do not find a weaker relation between bank and sovereign risk following the BRRD. We extend this literature by testing whether new bail-in rules change banks' funding costs as measured by their WACC. Whereas the literature on banks' debt structure is large (Ashcraft, 2008; Gropp and Heider, 2010; Jonghe and Öztekin, 2015; Berg and Gider, 2017), the evidence on implications of regulatory changes on banks' funding costs remains scarce. An exception are Baker and Wurgler (2015), who show that sufficiently higher capital requirements increase capital costs and Kovner and Tassel (2018) examining the effect of the Dodd-Frank Act on banks' cost of capital.[2]

The second strand of literature assesses spillovers from the financial to the real sector following changes in liquidity conditions and/ or regulation. Balduzzi et al. (2018) show for Italy that changes in banks' funding costs spillover to firm' real decisions.[3] Beck et al. (2020a) find that after the resolution of a major Portuguese bank, those firms with a relationship to banks that are more affected by the bail-in exhibit a decline in credit and tighter credit conditions. Similarly, Danisewicz et al. (2018) provide evidence for negative spillovers to the real economy

[2]Flannery and Sorescu (1996) study subordinated debt yields in a period of declining government guarantees.

[3]In the financial crisis, banks' funding constraints tightened credit supply conditions and affected the macroeconomy adversely (Chodorow-Reich, 2013; Cingano et al., 2016; Acharya et al., 2018; Berton et al., 2018).

following supervisory enforcement actions at single-market banks in the US. Related, Berger et al. (2016) report negative effects on German banks' liquidity creation after regulatory interventions. Regarding recent changes in the regulatory framework, Fiordelisi et al. (2017) find that once the Single Supervisory Mechanism (SSM) started to supervise significant banks in the EMU, these banks reduced lending activities. Hence, regulatory spillovers from banks to the real sector seem to be the rule rather than the exception and we assess whether this also applies to the BRRD.

Third, we speak to an ongoing debate on how to allocate regulatory power in integrated banking markets. Reallocating restructuring power such that the distance between banks and regulators increases can benefit effectiveness (Agarwal et al., 2014; Behn et al., 2016; Beck et al., 2018) and reduce regulatory arbitrage (Houston et al., 2012; Ongena et al., 2013). This holds as long as multinational banks do not adjust to supranational supervision (Calzolari et al., 2018), the regulated entities or regions are not too different from each other (Dell'Ariccia and Marquez, 2006; Beck and Wagner, 2016; Colliard, 2020), and a single resolution strategy for a multinational bank is not impeded by national interests (Bolton and Oehmke, 2018). Our results reveal that a harmonized resolution regime can have different implications for the financial and the real sector across European countries. This finding indicates that the effectiveness of supranational regulation depends crucially on initial national characteristics.

In the following section, we describe the institutional setting in more detail. Section 3 studies the effect of implementing the BRRD into national law on banks' funding costs after describing the data and event study methodology. Possible spillovers to the real sector are analyzed in Section 4. The final section concludes the paper.

2 Institutional setting and identification strategy

The European Banking Union (EBU) has been implemented as a response to the flaws in the regulatory framework, which have been revealed by the financial and sovereign debt crisis in Europe. It consists of three pillars, the Single Supervisory Mechanism (SSM), the Single Resolution Mechanism (SRM), and harmonized rules for deposit insurance. The EBU is based on the Single Rulebook, which establishes common regulatory and supervisory rules across EU banking systems.[4] The contents of the Single Rulebook form the legal basis of the three pillars of the EBU and are specified in three directives. These directives are the Capital Requirements

[4] http://www.eba.europa.eu/regulation-and-policy/single-rulebook

Directive IV (CRD IV), the BRRD, and the Deposit Guarantee Scheme Directive (DGSD).

We focus on the BRRD, which is specified in the 2014/59/EU Directive published by the EC on 15 May 2014.[5] The directive stipulates that EU member states should adopt resolution instruments by 31 December 2014 and apply them from 1 January 2015 onwards. The four resolution instruments are the sale of business, bridge institutions, asset separation, and bail-ins. The latter needs to be enforced as of January 1, 2016. Table 1 summarizes the resolution authorities for our sample countries according to the European Banking Authority (EBA). In the EMU, the Single Resolution Board (SRB) and national competent authorities (NCA) are jointly responsible for applying the contents of the BRRD and they constitute the SRM. The SRB is responsible for the resolution of banks supervised by the European Central Bank (ECB), whereas the resolution scheme is in practice executed by the NCA. All other EMU banks are under the direct responsibility of the NCA. However, the SRB can step in for all EMU banks in case the SRF is accessed or resolution standards have to be ensured.[6]

[Insert Table 1 here]

While EMU countries are obliged to comply with the three pillars of the EBU and thus also the SRM, the remaining EU countries can select into adherence. Figure 1 visualizes the relevant resolution setting. The EC sought to implement additional and centralized rules for regulation and supervision beyond the Single Rulebook in the EMU (European Commission, 2013). The reason for this extended framework in the EMU is that in a common currency union, distress in financial and sovereign debt markets impacts the transmission of monetary policy. Hence, harmonizing the level playing field and ensuring financial stability via the EBU is necessary to ensure the effective transmission of monetary policy. Consequently, in the EMU, the BRRD is complemented with the Single Resolution Mechanism Regulation (SRMR), which regulates the power of the SRB. The key distinction between EMU and non-EMU countries' resolution framework is thus the existence of a supranational resolution authority and a Single Resolution Fund (SRF) compared to national resolution funds. Importantly, we avoid in either case valid concerns of self-selection in single-country studies, which may change regulatory frameworks for unobserved idiosyncratic features (Christensen et al., 2016), because the BRRD is not specific to any particular country. Instead, the regulatory directive is the same for all countries, which all have to install a resolution authority and bail-in rule.

[5]See: `https://eur-lex.europa.eu/eli/dir/2014/59/oj`. The directive has been amended in May 2019 to harmonize requirements on loss-absorbing capital (2019/879/EU Directive).

[6]See `https://srb.europa.eu/en/content/banks-under-srbs-remit`.

[Insert Figure 1 here]

The BRRD stipulates resolution and restructuring rules that EU countries should implement, including the establishment of national resolution authorities and resolution tools (Coleman et al., 2018). It defines criteria to evaluate whether a bank is in severe distress (Article 32) and contains rules on how failing banks should be resolved. Shareholders and creditors of distressed banks have to bear losses according to the specified bail-in hierarchy (Article 34) before access to a resolution fund is granted. Specifically, the bail-in hierarchy requires that write-off occurs in the following order up and until 8% of total liabilities and own funds: common equity tier 1 capital, additional tier 1 capital, tier 2 capital, unsecured subordinated liabilities, unsecured non-subordinated and non-structured debt instruments (senior non-preferred), other unsecured non-subordinated liabilities (senior non-preferred) and other deposits above €100,000 before the SRF can be accessed.[7] We hypothesize that the transposition of this EU directive into national legislation will then induce banks' owners and creditors to adjust their required returns. Therefore, we first test for any differential cost of equity and cost of debt effects among banks before and after they operate under the BRRD. In a second step, we then test whether any such WACC responses are passed on to corporate borrowers. Thereby, we shed light on potential real implications of regulation aiming to enhance the resilience of a completed Banking Union.

The important upshot regarding our aim to identify banks' WACC responses and subsequent loan pricing adjustments is that the BRRD directive to complete the Banking Union is a policy shock that is timed and detailed by supranational authorities. Thereby, it lends itself as an ideal event to isolate causal funding cost responses of banks and subsequently corporate borrowers. The specific design and implementation of the BRRD is arguably not conditioned on the state of funding conditions in specific national banking systems, let alone funding cost of individual banks or the loan pricing terms faced by their corporate loan customers. Furthermore, we can exploit the staggered implementation dynamics of the directive across 15 EU member states, which Koetter et al. (2019) have shown to be independent of the health of individual banking systems, to isolate WACC responses and subsequent loan pricing reactions of banks. This reduces concerns about reverse causality from an aggregate perspective. Most countries violated the transposition deadline set by the EC. In May 2015, the EC asked 11 member states to

[7] With the transposition of the BRRD, resolution authorities shall determine bank-specific Minimum Requirement for Own Funds and Eligible Liabilities (MREL) together with a fulfillment deadline. Also, systemic relevant institutions should transpose a Total Loss-Absorbing Capacity Standard (TLAC) as of 2019. Both MREL and TLAC requirements should enable banks to hold a sufficient amount of bail-inable liabilities.

implement EU rules on the BRRD.[8] In October 2015, six member states were referred to the Court of Justice for not having transposed these EU rules.[9] Up to date, all member states have transposed the directive and the European Commission (2019) is verifying whether the national implementations are correct. The first resolution case taking place under the new regime was the one of the Spanish bank Banco Popular (European Commission, 2019).

Based on information provided by EUR-lex and national official sources, Table 1 also shows information on BRRD implementation dates for our sample countries. The transposition deadline (31.12.2014) and the deadline for the bail-in tool (01.01.2016) are the same across EU member states. Column (3) shows the quarter we use as a reference for the implementation of the BRRD into national law. We identify the name of the national law based on EUR-lex.[10] For the publication date of the national law, we checked official websites and the exact date, the name of the document and corresponding links are provided in columns (4)-(6).[11] In case the law is published in the last month of a quarter, the date used for the analysis is moved to the following quarter as this fits more accurately the timing of possible responses of investors. Regarding the implementation into national law, there is substantial heterogeneity across countries. Some countries, e.g. Austria and Germany, published the law early (2015Q1), while others transpose the directive into national law more than one year later. We exploit the time lag between the decision-making process on the directive and the national implementation of the BRRD to tackle concerns related to omitted variable bias. For example, regulatory changes can occur as a response to macroeconomic shocks that are not captured in the regression analysis, which would then lead to biased results. But it is unlikely that market-wide shocks are correlated with the staggered law dates across member states. Controlling for time fixed effects and country-level variables further ensures that identification stems from the variation of publication dates of national laws across EU countries.

In sum, we exploit the staggered implementation of the BRRD directive to identity WACC responses by banks to a changed policy stance with respect to bailing out distressed banks and link it to resulting loan pricing implications in the syndicated loan market.

[8] https://ec.europa.eu/commission/presscorner/detail/en/IP_15_5057
[9] https://ec.europa.eu/commission/presscorner/detail/en/IP_15_5827
[10] https://eur-lex.europa.eu/legal-content/DE/NIM/?uri=celex:32014L0060
[11] For Italy we use the date of BRRD-related national decrees. Portugal lists two laws with identical quarters.

3 BRRD implementation effects on banks' capital costs

3.1 Method

The main purpose of the BRRD is to reduce bailout expectations by specifying clear rules for bank resolution and restructuring. As a result, shareholders and selected creditors of EU banks are excluded from the "safety net", which deposit insurance schemes, national resolution funds, and the SRF represent. This fundamental change in bank resolution alters banks' risk premia and thus their funding costs.

However, the direction of such implementation effects of the BRRD for banks' funding costs is not obvious a priori. The elimination of bailout guarantees simply implies the loss of a tax-payer funded insurance to bank owners. This loss can induce investors to exert more monitoring effort, which would further increase required risk premia (Cutura, 2018; Giuliana, 2019; Lewrick et al., 2019). Alternatively, radically reduced bailout guarantees dampen individual risk-shifting incentives of bank owners. Reduced idiosyncratic risk-taking would then, in turn, also lower the funding cost of the average bank. In addition, the new architecture of the EBU increases financial stability for the entire system, which could further reduce relative risk-premia required by investors for the entire sector. Yet recent research indicates that resolution schemes may be effective to handle idiosyncratic bank failures, but the effects on financial stability in case of a system-wide shock are less clear. For example, Beck et al. (2020b) find that in countries with more comprehensive resolution schemes, systemic risk increases after a negative shock to the system.[12] Additionally, market participants' expectations can be different across banks, e.g., if they assume that large banks will be treated differently than less systemically important banks.

To test whether and what kind of effects staggered BRRD implementation has on banks' capital costs, we conduct an event study regression following the approach by Charles et al. (2018) for EU stock listed banks between 2010 and 2018:

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}, \tag{1}$$

where the dependent variable ($WACC_{bct}$) corresponds to the weighted average costs of capital (or one of its sub-components) regarding bank b in country c at time t.

The main explanatory variable of interest is $BRRD(0/1)_{c,law}$, which takes a value of one

[12] Similarly, Avgouleas and Goodhart (2015) and Keister (2015) discuss potential negative effects of resolution and bail-in on financial stability.

for the quarter when the law implementing the directive has been published in country c and zero otherwise. To trace out time trends around the BRRD transposition, we define a set of j indicator variables for each quarter relative to the quarter in which the transposition takes place. The quarter before the transposition of the BRRD is normalized to zero. For each bank in the sample, we include eight observations pre-BRRD implementation and up to nine observations starting from the country-specific implementation quarter onwards.

If the national implementation of the BRRD indeed results in higher bail-in probabilities for individual banks, WACCs should be higher and we expect β to be positive and significant around the implementation of the directive. Alternatively, the establishment of clear rules for resolution and restructuring as well as a resolution fund, may increase expectations about the stability of the financial system, implying a negative sign of β in the post-BRRD period. Depending on bank and country characteristics as well as the place of the investor in the bail-in hierarchy, effects might differ between costs of equity and costs of debt. Therefore, we specify the respective WACC-components as alternative dependent variables. Likewise, banks will likely adjust their capital structure in response to changes in capital cost components. For that reason we also specify the weights pertaining to equity and debt in the calculation of WACC as dependent variables, respectively.

Bank fixed effects α_b gauge bank-invariant characteristics, which should also control for bank traits that do not change radically over this fairly short time span, such as bank size. For scrutiny, we also conduct weighted regressions to account for bank size. Common time trends are controlled for by quarter fixed effects γ_t. Standard errors are clustered at the bank level.

3.2 Data on funding cost

All empirical analyzes rely on three bank-level data sources: Bloomberg, Worldscope, and DealScan. Table 2 provides an overview of variable definitions and sources. To test whether listed banks in the EU face higher funding costs after the publication of the national law implementing the BRRD, we use weighted average cost of capital (WACC, in %) (Baker and Wurgler, 2015). We further use information on the sub-components, that is, weighted average costs of equity and debt, respectively, and the equity and debt funding shares when calculating the WACC. The data has been retrieved from Bloomberg at the quarterly frequency.

[Insert Table 2 here]

We restrict the sample to commercial banks according to Worldscope and omit financial institutions which cannot be related to traditional financial intermediaries. We drop banks that only report missing WACC data or that exhibit no WACC variation in the eight quarters before and after the respective national implementation of the BRRD. This culling yields a sample of 97 banks covering the period from 2010 to 2018. We then match bank identities to the DealScan database to test in Section 4 for the potential transmission of any capital cost effects among banks on to corporate borrowing cost. This matching further reduces the sample to 59 banks. To correct for outliers, we winsorize the WACC data at the 1st and 99th percentile.

We merge the observations obtained from Bloomberg to quarterly financial accounting data provided by Worldscope via banks' ticker number and country to construct a set of bank-level control variables used in the second step of the analysis in Section 4. We use information on total assets to conduct weighted regressions of equation (1).

Table 3 lists the 59 banks included in the final sample indicating the country of origin, a large bank indicator equal to one if average assets are above the sample median, and the regional cluster (see footnote 1). The geographical distribution of banks is fairly balanced across EMU and non-EMU countries, although large banks are mostly located in EMU countries. Summary statistics across the WACC variables are shown for each bank and by region in Table 4. The mean of WACC is around 4.1. Banks in the core EMU countries exhibit much lower mean values compared to banks from elsewhere. The mean cost of equity are lower in both non-EMU and core EMU countries. Average cost of debt are lowest for banks in core EMU countries.

[Insert Tables 3-4 here]

3.3 Headline WACC results

Figure 2 shows how the implementation of the BRRD into national law affects the pattern of banks' funding costs. We plot the coefficient estimates together with their 95% confidence bands for the full sample of banks in the upper, left panel. We extend the estimation by adding interaction terms between the BRRD indicator variables and subsample dummies to trace out heterogeneous responses across country groups. Marginal effects of BRRD on capital costs conditional on a bank being located in a subsample are shown in the other three panels of Figure 2.[13]

[13]Corresponding regression tables are provided in the supplementary appendix (Table OA1). Table OA2 shows results when we specify a single indicator variable equal to one once the national law implementing the BRRD is published ($BRRD_{ct}$), and equal to zero before that date.

[Insert Figure 2 here]

Consider first results for the full sample in the upper left panel. Importantly, most of the coefficients in the eight quarters prior to implementation do not indicate a statistically significant difference in WACC at the 5% level.[14] This result bodes well for the validity of our approach to identify capital cost responses based on staggered transposition patterns of the BRRD into national law across EU countries. In all eight subsequent quarters, we estimate a statistically significant and positive WACC response to BRRD transposition. The magnitude of this effect increases continuously, until it levels off in the last two quarters on the order of 1.8% percentage points. The effect is thus also economically sizable. This result indicates that the average listed EU bank had to cope with substantially increased refinancing cost.

The differentiation between the three regional clusters highlights some crucial qualifications of this first result though. The upper right panel illustrates that banks residing in the countries that were arguably hit the hardest by the sovereign debt crisis—which considerably co-motivated the launch of EBU—did not exhibit statistically significant WACC responses pre-implementation but a stronger increase compared to the full sample following the introduction of the BRRD.

The lower left panel of Figure 2 shows that banks residing in core EMU countries exhibit a continuous and significant increase in their refinancing cost starting four quarters after the BRRD has been implemented and without exhibiting any significant pre-implementation trends. Given that these countries are mostly early adopters of the new regime and the complexity of the underlying regulatory documents (see Table 1), market participants might have only responded with some delay. The increase is lower than for GIIPS countries and indicates that financial markets considered banks in core EMU countries to benefit more from clear and transparent rules on how to deal with distressed banks.

The lower right panel shows, in turn, that banks located outside the already more stringently supervised perimeter of the EMU—and thus the SSM for large banks—exhibited significantly increasing WACC's. This increase takes place immediately after BRRD implementation. Investors and junior creditors of banks in these non-EMU countries apparently re-considered the required risk premia given the reduction of government guarantees.

Overall, our findings thus strongly suggest an economically important, yet regionally quite heterogeneous effect of this directive towards the completion of the EBU in terms of banks'

[14] Table OA1 shows that none of the pre-BRRD coefficients in column (1) is significantly different from zero at the 1% level.

funding costs. Banks in the core of the EMU exhibit a delayed increase in funding costs due to BRRD transposition, probably reflecting the uncertainty of the new framework upon implementation. EU banks located in GIIPS and non-EMU countries exhibit, in turn, quicker WACC responses of larger magnitudes.

These results hold up to a battery of scrutiny tests, which are shown in the supplementary appendix. First, the discussed main patterns remain significant at a confidence level of 99%. For core EMU countries, we estimate an increase in WACC, yet significance is reduced (Figure OA1). Second, we estimate weighted regressions to account for different effects of bank size on funding costs, which also confirm all four patterns per regional cluster (Figure OA2). Third, we conduct a placebo test to check whether we are only estimating some structural factor that varies across countries in the same way as BRRD. In Figure OA4, we show results when using placebo event dates. To avoid overlaps with the baseline event sample, we move the BRRD date for each country three years into the past, which yields no relevant, longer-lasting, and upward-moving pattern compared to the true dates.

Further tests include the following. First, we collect the publication date of the first legal document listed in EUR-lex that relates to the BRRD and appears after the publication of the directive in May 2014. For many countries, this date coincides with the publication date of the law. For the remaining countries, the average difference is less than four quarters compared to the publication date of the law. Using this first available date for the event analysis (Figure OA4), results remain quantitatively the same. Second, we specify the natural logarithm of the dependent variable (Figure OA5). Third, in unreported tests, we re-estimate the regression leaving out each country once, which does not alter results either.

3.4 Responses of separate WACC components

Having established a significant overall, regionally heterogeneous WACC response to BRRD transposition, we test next whether banks' funding cost components—equity or debt—respond differently. To that end, we specify first the cost of equity in Figure 3 and compare it to the cost of debt in Figure 4.

[Insert Figure 3 here]

In general, there is little evidence for significant reactions in banks' cost of equity. The vast majority of significant cost of equity responses to the national implementation of the BRRD are

observable for banks residing in non-EMU countries. The order of magnitude corresponds with the total WACC response reported earlier. Hence, we find some evidence that the introduction of an EU-wide harmonized, potentially more credible resolution and restructuring regime seemingly reduced bailout expectations, thereby increasing the required risk-premium among equity investors. One important upshot is that, in fact, cost of equity among banks in the GIIPS economies was significantly lower during the run-up to national implementations of the directive compared to the date of the BRRD implementation, while showing an upward trend until BRRD implementation. In contrast, for the core EMU countries, we cannot reject the hypothesis that virtually all cost of equity responses were in fact zero.

[Insert Figure 4 here]

Figure 4 for banks' cost of debt patterns further illustrates that responses by creditors towards national BRRD transpositions were mostly insignificant from a statistical perspective. Interestingly, the increased risk for banks' debt holders to be called for a bail-in did not entice them to require larger coupon payments to reflect this additional risk. Thus, the main effect of BRRD transpositions appears to have worked its way on WACC via the cost of equity, and hence the implications that the regulation had for the resilience of the entire system.

Another margin of investors' adjustments towards a changed risk map due to the implementation of the BRRD is the relative importance of equity and debt. Besides the BRRD, especially the CRD IV had important implications for large banks to hold more core equity. This fact would only interact with our estimation results in case the CRD IV directive has the same implementation dates as the BRRD, which does not hold true. To gauge this "quantity" effect in addition to the "price" effects considered before, we contrast in Figures 5 and 6 the relative weights of equity and debt, respectively, in the calculation of WACC.

[Insert Figure 5 here]

For the full sample, Figure 5 vividly underpins the surge of equity weights in the calculation of total capital cost, clearly reflecting the significant increase in capital levels. For banks from core EMU countries, where most large banks reside, we again see only delayed responses. However, for both GIIPS countries and non-EMU countries, we estimate faster and substantial increases in equity weights on the order of up to 10 percentage points among GIIPS. Beyond capital regulation, the establishment of the SRM and national bail-in rules might have added market

discipline for these banks that let them increase their equity levels. One reason for additional disciplining effects that enhanced resilience in terms of equity in these markets is that the SRB or national competent authorities would intervene in case that banks are likely to fail. Potentially, the threat of having to surrender the resolution and restructuring of banks to a (supra)national authority might have sufficed to spark increasing capital weights by these banks.

[Insert Figure 6 here]

Figure 6 exhibits a contraction in debt shares among banks from core EMU, GIIPS and non-EMU countries that is commensurate with the hike of equity shares.

The totality of results suggests that the transposition of the BRRD into national law has quite heterogeneous effects across EU member states. In core countries of the EMU, the implementation of clear rules for resolution and restructuring of banks increases banks' WACC post-implementation of the BRRD into national law but to a lower extent compared to other country groups. Results for GIIPS countries and non-EMU countries reveal that WACC significantly increases compared to the pre-BRRD period. The immediate and strong response in non-EMU countries may reflect that investors mainly respond to the increased probability of a bail-in by requiring higher risk premia. In contrast, in EMU countries, not only the BRRD entered into force but it is strengthened by the establishment of the SRM as a supranational agency. Hence, this additional layer of macro-prudential policy might contribute to the financial stability argument. The weaker increase in WACC in core EMU compared to GIIPS countries might be due to a stronger capital buffer core EMU banks had already before BRRD implementation. Hence, a softer increase in capital is needed to reduce the probability to be "likely to fail", which in turn results in a more modest increase in the cost of equity.

Differential refinancing cost patterns of banks are likely to affect borrowing costs in the real sector heterogeneously as well, depending on how banks pass burden and benefits on to customers. Therefore, we turn next to an assessment of such potential transmission patterns.

4 The transmission of funding cost changes to the real sector

4.1 Method

The previous section has shown that following the publication of the national law implementing the BRRD, the average bank faced increased funding costs. Even among the banks in core

EMU countries, for which we document a weaker WACC response, some selected banks may also experience substantial funding cost hikes. As an unintended side-effect of the new regulatory scheme, banks suffering from particularly large WACC hikes might pass higher funding costs on to customers. We test for such a transmission using bank-firm lending relationship information from syndicated loan data provided by DealScan. In the syndicated loan market, a group of banks originates a loan to a firm f. The "lead arranger" sets up the loan deal with the borrower, provides a significant share of the financing, and recruits other "participant" lenders to provide the remainder of the funds. To test if the BRRD-induced change in banks' funding costs leads to a change in the cost of firm credit, we follow Khwaja and Mian (2008) and study how syndicated loan spreads change from the pre- to the post-shock period holding loan demand by the firm constant. We achieve this by sampling only firms that borrow from at least two different banks both before and after the BRRD implementation, such that we can estimate with-in variation in differential loan pricing conditional on changes in banks' respective WACC changes:

$$\Delta Spread_{bf} = \beta_0 + \beta_1 \Delta WACC_b + \eta_f + \gamma_c + \beta_2 Bank_{bt-1} + \beta_3 Loan_{bft-1} + \epsilon_{bf}, \qquad (2)$$

where $\Delta Spread_{bf}$ is the first log difference in all-in-drawn spreads that bank b charges from firm f between the pre- and post-shock period. $Spread_{bf}$ is measured as the number of basis points over LIBOR including fees that a firm is charged for a loan tranche. We collapse quarterly loan data for a given bank-firm pair into a pre- and post-BRRD period based on a sample between 2010 and 2018. Due to the lack of having proper panel data in DealScan, we choose the firm's last loan that it obtained from a bank pre-BRRD and compare it to the first loan post-BRRD. $\Delta WACC_b$ is the first log difference of the weighted average cost of capital (WACC) of bank b between the pre- and post-shock period relating to the considered bank-firm relationship. The shock is defined based on the $BRRD(0/1)_{ct}$ dummy, which is equal to one for the quarter when the national law implementing the BRRD directive is published in country c, and zero otherwise. As we only keep firms that borrow from at least two different banks, we can specify η_f to gauge firm fixed effects and that controls for loan demand as well as firm characteristics. Intuitively, our setting tests whether the same firm borrowing from at least two different banks before and after the implementation of the BRRD experiences a larger change in loan spreads from the bank more affected by the BRRD. Furthermore, we include fixed effects γ_c for the country in which the

bank is located to account for country-specific developments that might affect pricing behavior. $Bank_{bt-1}$ includes pre-shock-determined bank controls like a bank's equity ratio, profitability or the log of total assets. We add loan controls of the pre-shock loan ($Loan_{bft-1}$) following Chodorow-Reich (2013). The error term is denoted by ϵ_{bf}. Standard errors are clustered at the bank level to account for serial correlation across loans provided by the same bank. Based on effect heterogeneity across country groups in our event analysis, we also estimate interaction models to see whether the pass-through of regulatory costs differs for banks located in GIIPS countries, non-EMU countries, and core EMU countries.

4.2 Data on bank-firm relationships and corporate borrowing cost

We extract information on bank-firm lending relationships from DealScan. We use the linking file provided by Ferreira and Matos (2012) who assign DealScan lender IDs to Worldscope Permanent IDs to match banks appearing as lenders in DealScan to banks in our matched Bloomberg/ Worldscope dataset.[15] For those of the 97 banks in the Bloomberg/ Worldscope dataset that we could not match, we conduct a manual search such that we are able to match a final amount of 59 lending institutions to DealScan.

This sample contains both headquarter banks and affiliates for which WACC data is reported. In case DealScan provides information on loan facilities granted by an affiliate of a headquarter for which we have WACC data, we treat the affiliate's loan as if it would have been provided by the parent bank (see also Acharya et al., 2018). This approach assumes that the headquarter transmits changes in funding costs to its affiliates, which then determines their lending decisions.[16] On the borrowing side, we only keep non-financial firms and exclude borrowers that are listed as financial firms in DealScan.[17]

Loans in DealScan are typically granted by a syndicate of banks, in which one or more banks act as lead arranger(s). If a loan syndicate is composed of several banks, we treat the same loan/facility multiple times as in Ferreira and Matos (2012) or Adelino and Ferreira (2016). Similarly, we treat facilities in each deal as a different loan as pricing might differ. This dataset then includes 26,298 observations based on 15,307 loans that can be linked to 57 banks for the

[15] They merge each Borrower-Parent item in DealScan with Datastream information using the firm's country and ticker. If that information is missing, they performed a manual match by firm name. Although they concentrated their matching procedure only on DealScan borrowers, we exploit the fact that banks can also act as borrowers in the syndicated loan market.

[16] We drop affiliates that can be linked to a headquarter bank in our sample but are located in another country than the headquarter as in such a case it is not obvious whether to consider the regulatory shock in the home or the host country. We lose around 8% of observations due to this data cleaning.

[17] We drop all borrowers with a SIC code ranging in the 6000s, which reduces the number of banks to 57.

period from 2010Q1 to 2018Q4. In robustness tests, we exclude lenders that are not a lead arranger as defined in Bharath et al. (2011) and Chakraborty et al. (2020).[18]

We cull this sample as follows. First, we disregard loan types that only appear infrequently or which serve a very specialized purpose, e.g. to finance takeovers, and for which the pricing might be fundamentally different (Berg et al., 2016).[19] Second, we identify all firms that borrow from the same bank at least once before and after the implementation date of the BRRD, which is one of the necessary preconditions to hold unobservable firm-specific credit demand constant as in Khwaja and Mian (2008). This approach results in 1,457 bank-firm relationships between 32 banks and 957 firms. Table 5 lists the banks included in this sample. Column (4) lists the number of firms to which each bank lends before and after the implementation date. Columns (5) and (6) show the mean and the standard deviation of $\Delta Spread$ charged by each bank, and columns (7) and (8) the respective values of $\Delta WACC$. On average, changes in mean spreads are negative for banks from all for regional subgroups. Coefficients of variation, i.e. mean changes relative to standard deviations, however also indicate that credit spreads of selected bank-firm relationships occasionally rise. This holds especially for the largest banks in the sample, which assume more often the role of lead arrangers and are therefore linked to the largest number of firms in the sample. Consequently, these banks' average $\Delta WACC$ responses to the national phasing-in of the BRRD will dominate the cost-of-capital effects that we estimate below. For the banks in core EMU and GIIPS countries with the highest number of matches, we see positive mean values of WACC growth rates.

[Insert Table 5 here]

Table 6 aggregates these moments for the subgroups of banks located in core EMU, GIIPS, and non-EMU countries. The feature that average corporate funding costs have decreased after the implementation of the BRRD is confirmed for most firms in this sample. Importantly, the fairly high coefficients of variation are also confirmed. Therefore, we test below if banks' cost of capital responses to the national transposition of the BRRD are passed on to their corporate

[18] We define the following ranking hierarchy: 1) lender is denoted as "Admin Agent", 2) lender is denoted as "Lead bank", 3) lender is denoted as "Lead arranger", 4) lender is denoted as "Mandated lead arranger", 5) lender is denoted as "Mandated arranger", 6) lender is denoted as either "Arranger" or "Agent" and has a "yes" for the lead arranger credit, 7) lender is denoted as either "Arranger" or "Agent" and has a "no" for the lead arranger credit, 8) lender has a "yes" for the lead arranger credit but has a role other than those previously listed ("Participant" and "Secondary investor" are also excluded), 9) lender has a "no" for the lead arranger credit but has a role other than those previously listed ("Participant" and "Secondary investor" are also excluded), and 10) lender is denoted as a "Participant" or "Secondary investor".

[19] We keep loans of the following types: Bridge Loans, Revolver/Line, Term Loans and 364-Day Facility, CAPEX Facility, Delay Draw Term Loan.

borrowers, which is unclear a priori.

[Insert Table 6 here]

We also collect bank-level data, construct a measure for the strength of the bank-firm relationship from DealScan, and add host-country macroeconomic data. At the bank-level, we use Worldscope data to control for bank size (logarithm of total assets in USD), profitability (operating income to total assets ratio in %), and capitalization (common equity to total assets ratio in %). We omit observations with missing or negative values of total assets as well as negative and implausible values for the equity ratio. All control variables obtained from Worldscope are winsorized at the 1st and 99th percentile. As is standard in the literature, we augment the model with loan controls obtained from DealScan, such as loan size, maturity, and the existence of a covenant. For the country-level data, we collect information from the ECB on lending margins of monetary financial institutions (MFIs). Summary statistics for the main explanatory variable of interest, $\Delta WACC$, and further controls are provided in Table 7.

[Insert Table 7 here]

4.3 Real effects of changing refinancing cost of banks

Table 8 shows the results from estimating equation (2). We explain the change in spread paid by firm f to bank b by the change in banks' funding costs around the national implementation of the BRRD, whereas both variables are expressed as growth rates. Again, we also look at the effects due to changes in cost of equity and cost of debt separately. Panel A shows results where the explanatory variable is banks' change in WACC.

[Insert Table 8 here]

Column (1) indicates that changes in banks' cost of capital in and of itself have no impact on the growth rate of credit spreads charged to corporations once we account for unobserved firm traits by means of fixed effects. Against the backdrop of diverging WACC responses to national BRRD implementations reported above, column (2) scrutinizes the absence of any significant spread response by specifying the interactions between the WACC growth rate and indicators of banks being located either in core EMU or in non-EMU countries relative to being located in GIIPS markets, the omitted reference region. Firms borrowing from banks residing in non-EMU countries exhibit no differential response to increases in $\Delta WACC$ of their banks induced

by BRRD implementation. But firms borrowing from EMU banks do. The coefficient of the interaction term is positive and statistically significant, thereby revealing that firms linked to banks in core EMU countries are differently affected compared to firms linked to GIIPS banks. Also, the total marginal effect of the change in WACC is statistically significant and positive for core EMU countries (Table 9). Thus, banks in core EMU countries pass changes in their cost of capital on to their corporate borrowers in syndicated loan markets.

[Insert Table 9 here]

In columns (3) and (4), we add pre-transposition bank traits as well as loan controls. Importantly, these factors do not confound the effect of banks' WACC changes on spreads. When specifying $\Delta WACC$ joint with control variables, the significant and positive differential effect for core EMU countries remains intact. The total marginal effects associated with the most saturated model per region in Table 9 are shown in column (4'). Only for core EMU banks, we estimate a significant transmission effect of changes in banks' WACC to corporate borrower spreads. Besides statistical significance, this pass-through is also economically substantial. We estimate that a 1 percentage point increase in the growth rate of banks' funding costs translates into an increase of $\Delta Spread$ by 0.0023 (0.23*0.01). This corresponds to around 4.6% of the average growth rate of firms' credit spreads, which is -0.05.[20]

Before turning to a more detailed view at the components of WACC responses, the cost of bank equity and debt, we consider first the importance of holding constant firms' credit demand. Recall that our approach to do so hinges on firms that we observe borrowing (1) in the syndicated loan market both before and after BRRD transposition and (2) from at least two banks. While data-hungry, this approach has the great advantage of identifying any changes in the loan spread while holding constant corporate credit demand and other unobservable shocks at the level of the firm. To assess whether and to what extent the data intensity jeopardizes the external validity of our findings, we specify in columns (5) through (9) the model in changes without firm fixed effects. Holding the sample constant in column (6) of Table 8, but excluding fixed effects underpins the importance of our approach to hold constant unobservable corporate credit demand to avoid estimation of spurious spread responses to changes in WACC. At the same time, when we sample also firms that borrow from just one bank pre- and post-BRRD, Table 8 and

[20] Assuming that $\Delta WACC$ does not increase by 1 percentage point but by the average growth rate of banks in core EMU countries (0.08), we obtain an increase in $\Delta Spread$ by 0.23*0.08 that corresponds to more than 36% of the average growth rate of the dependent variable for the sample of firms linked to banks in core EMU. This effect is economically large.

Table 9 confirm the significant responses in core EMU countries, albeit at substantially reduced level of statistical significance. In addition, both interaction terms as well as total marginal effects for non-EMU countries are positive and statistically significant. Given the drastically reduced share of explained variation when neglecting fixed effects in OLS regressions, we will rely on the most saturated specification in column (4) for the remainder of the analysis.

Section 3 already revealed that banks' WACC responses did not only differ across regions, but also across its components, equity and debt. Accordingly, panels B and C of Table 8 and Table 9 depict the results when we differentiate these two responses by banks to the BRRD implementation.[21] Focusing on the total marginal effects shown in Table 9, three insights are noteworthy. First, the preferred fixed effect specifications confirm significant roll-over effects for both WACC components in columns (2') to (4') for core EMU countries. Hence, much of the transmission of capital cost consequences for banks due to the BRRD are passed on to the real economy in those core EMU countries that adopted early. Second, the magnitude of total marginal equity cost effects is twice as high as that of debt. Third, columns (5) to (9) in Table 8 and columns (7') to (9') in Table 9 corroborate the importance to saturate the model with a tight structure of fixed effects to control for unobservable firm factors so as to avoid spurious relationships, like the responses estimated for firms in non-EMU countries. Thus, in the following extensions, we control for credit demand by always including firm fixed effects.

4.4 Further results and scrutiny

This subsection extends and scrutinizes the baseline results into several directions. To conserve space, we focus throughout on total marginal effects corresponding to the specification in column 4 of Table 8. Associated coefficient estimates are provided in the online appendix.

4.4.1 Asymmetric WACC transmission

First, we investigate possible asymmetries in the roll-over of positive and negative changes in banks' funding costs, respectively. So far, the evidence entails that banks located in core EMU countries tend to increase corporate borrowing costs in case they are exposed to an increase in funding cost around the BRRD implementation. The event analysis has revealed that funding costs in core EMU countries show, however, a weaker increase compared to banks located in different regions. Hence, we would expect that firms linked to banks in core EMU countries are

[21] We do not consider weight of equity and weight of debt as from a roll-over perspective, this is less plausible than when looking at costs.

exposed to a lower extent to funding costs roll-overs. Yet Table 5 has shown that when looking at the statistics based on matched bank-firm relationships, the pattern of WACC can be different compared to the event analysis due to i) a longer pre- and post-period in which the loan is observed and ii) the mean of WACC being inflated by those banks with many firm relationships. To get a more granular picture on what is driving the result in core EMU countries, we decompose the change in funding costs into its positive and its negative components and specify them as separate variables in the following regression model:

$$\Delta Spread_{bf} = \beta_0 + \beta_1|\Delta WACC_b^+| + \beta_2|\Delta WACC_b^-| + \eta_f + \gamma_c + \beta_3 Bank_{bt-1} + \beta_4 Loan_{bft-1} + \epsilon_{bf}. \tag{3}$$

Here, the absolute values of all positive and negative WACC changes are separate regressors. A negative coefficient on $|\Delta WACC_b^-|$ implies, for example, that a more negative change in banks' funding costs results in lower credit spread growth for firms. All other variables are defined as in equation (2).

Table 10 shows the corresponding marginal effects of either $|\Delta WACC_b^+|$ in Panel A or $|\Delta WACC_b^-|$ in Panel B on corporate funding costs. Coefficient estimates are shown in Table OA3 in the online appendix. We obtain highly significant marginal effects for banks in core EMU countries in case they face an increase in funding costs. For this country group, coefficient estimates go into the same direction for the growth in WACC and its sub-components. Hence, core EMU banks would roll-over a positive change in funding costs. In Panel B, the signs of the marginal effects for banks in core EMU countries are negative such that a decline in funding costs would result in lower credit spread growth. However, these marginal effects are not statistically significant.

[Insert Table 10 here]

These results highlight an important asymmetry in the transmission of funding cost shocks of banks due to the completion of the Banking Union. Especially those banks that face increased funding costs in the period from the pre- to the post-BRRD loan, are likely to roll-over funding costs to their corporate borrowers in terms of spreads charged on customers.[22] Thus, increased

[22]Note that the sample of banks in the real effects analysis is smaller compared to the event analysis due to the restriction on bank-firm links in the syndicated loan market. The event analysis still shows the same dynamics for the smaller sample compared to the full sample but with reduced significance, probably due to reduced sample

resilience of banking systems in Europe due to the transposition of the BRRD, especially among early-adopting core-EMU countries, appears to be funded in part by higher borrowing cost of selected corporate borrowers that are tied to banks that face higher WACC in a regulatory regime with fewer implicit bailout guarantees.

4.4.2 Policy rates and lending margins

The second issue we tackle concerns the feature that, during our estimation period, policy rates in all EU countries gravitated towards the zero lower bound. This general development may undermine our approach to exploit the staggered introduction of the BRRD across countries in case country-specific heterogeneity in interest rate developments coincides with BRRD dates. Even for EMU countries, which are subject to identical nominal policy rates set by the ECB, country-specific heterogeneity may prevail in terms of interest rate spreads charged by banks (Buchholz et al., 2020; Heider et al., 2019). National differences in lending margins may reflect varying degrees of loan market competition and other idiosyncratic frictions that affect monetary policy transmission. Such frictions can cause differential reactions of banks to the introduction of the BRRD as well. Therefore, we test more explicitly whether our results are indeed driven by the BRRD implementation into national law or whether they interact with the interest rate environment.

To that end, we assess the role of lending margins for banks' pricing decisions by interacting the growth in funding costs with the pre-shock lending margin. The lending margin captures the average difference per country between loan rates and deposit rates that banks face in percentage points. Marginal effects in Table 11 are computed as before and we differentiate growth in total $WACC$ as well as its two components. Associated coefficient estimates are provided in Table OA4 in the online appendix. Panel A shows marginal effects conditional on low lending margins, defined as the 25th percentile. Panel B presents results conditional on the 75th percentile of the lending margin distribution.

[Insert Table 11 here]

Total marginal effects in column (1) confirm that an increase in the growth rate of banks' funding costs has a positive and significant effect on credit spread growth for firms borrowing from core EMU banks whereas it remains insignificant for banks in non-EMU and GIIPS economies. The

size. Further discrepancies may arise as in the event analysis, we take a rather short-run perspective while pre- and post-BRRD loans can span over a longer horizon. We conduct robustness by limiting the time period around the pre- and post-BRRD loan.

point estimate of the magnitude of this effect is somewhat lower in case the bank is located in a country with a higher pre-shock lending margin (0.23 versus 0.20 basis points). Hence, banks in the core EMU appear to have some interest rate setting discretion despite the low interest rate environment to roll-over increased funding costs irrespective of the level of prevailing lending margins. A comparison of columns (2) and (3) across both panels highlights again that increases in equity premiums required by investors in banks are passed on significantly to banks' customers across the entire distribution of lending margins. Thus, the result that especially those banks in core EMU countries that were confronted with higher WACC growth due to more expensive equity cost after the transposition of the BRRD rolled these additional cost over to their clients is confirmed. Regarding the cost of debt, in contrast, this happens only in countries in which fairly low lending margins were already prevailing before the policy shock. Apparently, banks absorbed some of the increase in their funding cost due to BRRD if their pre-policy margins permitted them to do so. In contrast, banks operating already in environments with thin markups passed a considerable fraction of their own funding cost hikes over to corporate borrowers.

One challenge to the above analysis of margins between average deposit and loan rates is that we combine possible frictions that may interact with the launch of the BRRD that are rooted in the monetary policy stance and other frictions that drive differences in loan market competition across jurisdictions. Therefore, we focus next on EMU banks only for which central bank rates are identical across countries, thus muting at least one of the two channels.

We calculate the pre-shock difference in the country-specific lending rate that banks charge on new loans and the ECB's main refinancing rate, all measured in percentage points.[23] Larger values thus indicate a larger spread between the rate at which banks can borrow from the ECB and the loan rate they charge, thereby indicating more room available to banks to absorb possibly additional funding cost at the expense of reducing their profit margins.

[Insert Table 12 here]

Total marginal effect results are depicted in Table 12 whereas associated coefficient estimates can be found in Tables OA5 in the online appendix. Consider first the corporate loan spread implications of $\Delta WACC$ shown in column (1). We confirm the statistically significant and positive marginal effect in core EMU countries, which exhibited thin markups that banks were able to charge above policy rates before the BRRD shock. Thus, banks operating in early BRRD

[23] Lending rates on new business are from the ECB's bank lending survey and only available for EMU countries. Monthly differences are averaged per quarter.

adopter countries that also faced tough loan market competition in terms of low markups to earn in credit markets passed their own funding cost shocks on to their clients. The benefits of a more stable banking system in a more complete Banking Union thus imposed cost on the real economy. In contrast, core EMU banks operating under less competitive conditions that permitted for higher margins in loan markets relative to policy rates apparently absorbed these funding cost hikes due to the BRRD. Consequently, in banking markets characterized by less competition, corporate borrowers benefited from more stable banks while not having to face an increase in their cost of debt. As before, these effects are significant across the entire margin distribution for changes in banks' cost of equity, whereas they are only statistically discernible from zero for the cost of debt in countries with narrow pre-shock margins.

In addition to these slightly qualified results for core EMU countries compared to the analysis based on lending margins in Table 11, we also obtain important new results for formerly stressed GIIPS countries using lending spreads relative to a common ECB policy rate. Once we focus only on EMU countries, we find marginal effects for growth in both total as well as all WACC components that are statistically significant and positive. Thus, banks in these systems—which presumably face even more challenges to the viability of their business compared to core EMU banks—passed all their funding cost hikes on to their corporate clients. In comparison to baseline specifications including non-EMU countries, this result therefore indicates indirectly that common monetary policy in the EMU accommodated especially in the EMU periphery further hikes to the debt funding cost of non-financial firms. Once we hold this mitigating effect constant though, the within EMU comparison reveals that GIIPS banks that were still digesting the fallout from the sovereign debt crisis on their balance sheets and which struggled with overall poor profitability transmitted the additional cost due to the abolition of (implicit) bailout guarantees directly to their corporate borrowers as well. This effect is camouflaged when also considering non-EMU banks in the full sample. For the remainder of the paper, we continue to consider the full sample as we are mostly interested in broad transmission patterns of completing the European Banking Union by means of the BRRD introduction on corporate lending conditions in the entire EU.

4.4.3 Intensity of bank-firm relationships

Third, we aim to shed light on one specific and well documented friction in loan markets that might interact with banks' funding cost hikes: relationship intensity. We hypothesize that banks'

roll-over of increased funding costs is likely to depend on the importance of the relationship they maintain with a firm. To test for differential effects along this dimension, we add a triple interaction with an indicator of bank-firm relationship strengths. The variable is defined such that it takes a higher value in case the firm is more important in the loan portfolio of the bank in the syndicated loan market. Controlling for this possible interaction effect confirms the general gist of previous results.

[Insert Table 13 here]

Table 13 confirms that only banks in core EMU countries exhibit for the full sample a significantly positive marginal transmission effect. Coefficient estimates are provided in Table OA6 in the online appendix. Contrary to the results obtained for the lending margin in Table 11, this effect is also statistically detectable across the entire distribution of relationship intensity indicators as well as for both $\Delta WACC$ components. As before, no statistically significant effects emerge in turn when also sampling GIIPS and non-EMU countries at the same time.

Overall, these results therefore do bear little indication that it is the relative importance of a borrower in a bank's entire syndicated loan portfolio that matters for the existence and magnitude of shock transmission regarding BRRD induced funding hikes.

4.4.4 Non-pricing lending responses

Up and until here, the results strongly suggest that banks did experience funding cost changes due to the transposition of the BRRD, but that only WACC hikes experienced by banks in core EMU countries were passed on to corporate borrowers, especially in banking systems that already allowed in pre-shock times only for very narrow margins.

An alternative to increasing interest rates on syndicated loans is for banks to adjust other loan contract terms. Instead of adjusting corporate spreads, banks may shorten maturities, impose covenants, or ration credit volumes. To test for such changes in overall credit conditions, we accordingly specify alternative dependent variables in Table 14. The corresponding coefficient estimates per country group are provided in Table OA7 in the online appendix.

[Insert Table 14 here]

Consider first changes in maturity before and after national BRRD transpositions shown in columns (1) to (3). As for loan pricing, only corporate borrowers taking out loans from core EMU banks exhibit a statistically significant response in this loan contract dimension. While

only significant at the 10%-level, we find a higher likelihood that banks originate loans with longer maturities after the policy shock with identical customers compared to loan contracts prior to the shock. Likewise, columns (4) to (6) indicate clearly that banks in core EMU markets also rationed credit volume, primarily driven by hikes in debt funding cost as shown in column (5). Finally, core EMU banks also imposed more often covenants after the BRRD implementation, especially in response to hikes in their own cost of equity.

Overall, we thus observe a significant tightening of credit standards by core EMU banks also in non-pricing loan terms. Mimicking the baseline results, we do neither find similar effects in non-EMU nor GIIPS countries. Together, these results therefore indicate that the completion of the Banking Union had especially adverse ramifications for the real economy for borrowers from those core EMU banks that experienced against the short-run trend an increase in their funding cost.

4.4.5 Robustness

We scrutinize our results when narrowing down the estimation window around the regulatory shock. The inclusion of firm fixed effects is possible when a firm borrows from different banks in both the pre- and the post-period. Note that the pre-BRRD period is quite long. Therefore, loans observed in the pre-period might be relatively far away from one another. To test the importance of this choice for our main results, we reduce this window to two years before and after the law on the BRRD was implemented in the respective country. Furthermore, to trace out time-invariant and structural factors that drive demand differently across industries and countries, we include industry fixed effects as well as fixed effects for the country in which the firm is located. Marginal effects are reported in Table 15 with the corresponding coefficient estimates in Table OA8. Whereas coefficient signs remain robust, we partially lose significance on the marginal effect of a change in WACC on $\Delta Spread$, probably because of a declined sample size when restricting the sample period in columns (1), (3), and (5).

[Insert Table 15 here]

Next, we check whether the timing of the BRRD implementation into national law matters for our main result. For example, countries that implemented rather late might bias our results downwards due to anticipation effects taking place pre-BRRD. We approach this issue by, first, including an indicator variable for the calendar time in which the BRRD was imposed in a

country, whereas marginal effects are depicted in columns (1), (3), and (5) of Table 16 (and coefficient estimates can be found in Table OA9). Second, we exclude banks located in "late implementers", that is countries implementing only in 2016, and results can be found in columns (2), (4) and (6). Overall, these additional tests leave our main result unaffected.

[Insert Table 16 here]

Finally, we address the issue of syndicate composition and banks' roles in the syndicate. Specifically, we exclude banks ranked in the last two categories of the hierarchy described in footnote 18 (columns (1), (3) and (5)) and those banks assigned to the last category (columns (2), (4) and (6)). Total marginal effects are depicted in Table 17 and associated coefficient estimates are shown in Table OA10. Marginal effects exhibit robust signs and significance, in particular for the cost of equity. Lowering the number of observations by taking out more lenders, however, results in a loss of significance for cost of debt in core EMU countries.

[Insert Table 17 here]

5 Conclusions

We test if and to what extent the staggered transposition of the bank recovery and resolution directive (BRRD) affected the funding costs of banks in the European Union (EU). Subsequently, we analyze whether EU banks passed-on any such changes in their weighted average cost of capital (WACC) in syndicated loan markets to corporate borrowers.

The first part of our analysis hinges on the staggered implementation of the BRRD into national law across EU countries, which we exploit to identify WACC responses of banks in core EMU countries, GIIPS countries, and non-EMU countries. Event study results indicate a significant and economically substantial hike in European banks' capital costs. This hike is driven by WACC increases after BRRD implementations in GIIPS and non-EMU countries. Costs of capital in core EMU countries showed a more modest and delayed response. Importantly, the increase in WACC can be explained by banks shifting from debt to equity financing. We thus conclude that the establishment of clear rules for the resolution and restructuring of distressed banks paired with more stringent supranational supervision and resolution authorities credibly enhanced the stability and resilience of financial systems in the EMU. At the same time, the apparently credible commitment of non-EMU financial authorities to also adhere to BRRD rules

seems to have implied a reduction in bailout expectations in these countries, which is reflected in somewhat higher risk premia.

In a second step, we assess the extent to which changes in banks' WACC around the implementation of the BRRD into national law are transmitted to the real economy. Our results indicate that, conditional on controlling for corporate credit demand, spreads of firms connected to banks in core EMU countries respond significantly to changes in banks' funding cost. In fact, banks in core EMU countries appear to pass on changes in their WACC asymmetrically. Whereas funding cost reductions are not passed on to borrowers, those core EMU banks that faced higher funding costs due to the BRRD implementation also charged higher loan rates in syndicated loan markets. These effects are amplified in banking markets characterized by already thin pre-policy shock lending margins, either vis-à-vis deposit rates in the EU or common policy rates in the EMU. Besides the transmission of banks' funding cost hikes in terms of loan pricing, we also document a general tightening of credit standards in non-pricing terms, namely the lengthening of maturities, the reduction of loan volumes, and the increased use of covenants.

Overall, our results suggest that the completion of the Banking Union is associated with an enhanced resilience of European financial systems. At the same time, this gain entailed for early BRRD-adopters some unintended adverse effects for selected segments of the real economy in terms of worsened credit terms in general and higher corporate borrowing cost in particular.

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7 Abbreviations

BRRD	Bank Recovery and Resolution Directive
CRD IV	Capital Regulation Directive IV
DGSD	Deposit Guarantee Scheme Directive
EBA	European Banking Authority
EBU	European Banking Union
EC	European Commission
ECB	European Central Bank
EMU	European Monetary Union
ESM	European Stability Mechanism
EU	European Union
GIIPS	Greece, Italy, Ireland, Portugal, Spain
NCA	National Competent Authority
MFI	Monetary Financial Institution
SRM	Single Resolution Mechanism
SRB	Single Resolution Board
SRF	Single Resolution Fund
SRMR	Single Resolution Mechanism Regulation
SSM	Single Supervisory Mechanism
WACC	Weighted Average Cost of Capital

8 Tables and figures

Table 1: Resolution authority and BRRD dates by country

(1) Country	(2) Resolution authority	(3) BRRD Law published	(4) Dates Exact date	(5) Name of law (in national language)	(6) Source
Austria	Financial Market Authority	q1:15	29.12.2014	Bundesgesetz über die Sanierung und Abwicklung von Banken	Link
Belgium	National Bank of Belgium	q3:16	06.07.2016	JUNI 2016. – Wet tot omzetting van diverse bepalingen van (...)	Link
Czech Republic	Czech National Bank	q1:16	28.12.2015	Zákon č. 374/2015 Sb., o ozdravných postupech a řešení krize na finančním trhu	Link
Denmark	Danish Financial Supervisory Authority	q2:15	02.04.2015	Lov nr. 333 af 31. marts 2015 om restrukturering og afvikling af visse finansielle virksomheder	Link
France	Prudential Supervisory and Resolution Authority	q3:15	21.08.2015	Ordonnance no. 2015-1024 du 20 août 2015 (...)	Link
Germany	Federal Financial Supervisory Authority	q1:15	18.12.2014	Gesetz zur Sanierung und Abwicklung von Kreditinstituten	Link
Greece	Bank of Greece, Hellenic Capital Market Commission	q3:15	23.07.2015	$Επειγοντα\ μετρα\ εφαρμογης\ του\ ν$ 4334/2015 (A' 80)	Link
Hungary	Central Bank of Hungary	q3:14	18.07.2014	2014. évi XXXVII. törvény a pénzügyi közvetítőrendszer egyes (...)	Link
Italy	Bank of Italy	q4:15	16.11.2015	DECRETO LEGISLATIVO 16 novembre 2015, n. 180 & n. 181	Link
Netherlands	Dutch Central Bank	q4:15	25.11.2015	Implementatiewet Europees kader voor herstel en afwikkeling van banken en beleggingsondernemingen 431/2015	Link
Poland	Bank Guarantee Fund	q3:16	08.07.2016	Ustawa z dnia 10 czerwca 2016 r. o Bankowym Funduszu Gwarancyjnym, systemie gwarantowania depozytów oraz przymusowej restrukturyzacji	Link
Portugal	Bank of Portugal	q2:15	26.03.2015	Lei n.º 23-A/2015 de 26 de março	Link
Romania	National Bank of Romania, Financial Supervisory Authority	q1:16	11.12.2015	Legii nr. 312/2015 privind redresarea și rezoluția instituțiilor de credit și a firmelor de investiții (...)	Link
Spain	Bank of Spain, Spanish Executive Resolution Authority, National Securities Market Commission	q3:15	19.06.2015	Ley 11/2015 de recuperación y resolución de entidades de crédito y empresas de servicios de inversión	Link
Sweden	Swedish National Debt Office	q1:16	29.12.2015	Lag (2015:1016) om resolution	Link

Notes: This table shows information on resolution authority and dates by country. Information on resolution authorities in column (2) is obtained from the European Banking Authority (`https://eba.europa.eu/about-us/organisation/resolution-committee/resolution-authorities`). Columns (3)-(4) show different dates related to the BRRD implementation process. The transposition deadline of the BRRD directive set by the European Commission has been in December 2014. The bail-in tool should be implemented by EU member states at the latest until 01.01.2016. Column (3) shows the quarter at which the main law on the BRRD implementation has been published by a country. In case the law is published in the last month of a quarter, the date used for the regression analysis is moved to the following quarter and it is indicated in the table accordingly. The exact publication date is shown in column (4). The publication date can be some days later than the date of the law. The name of the law in the national language is shown in column (5). The main source on the national law is EUR-Lex (`https://eur-lex.europa.eu/legal-content/DE/NIM/?uri=celex:32014L0060`) as well as national official websites (see also link to websites in column (6)).

Table 2: Variable sources and definitions

Variable	Definition	Source
BRRD dates (country level)		
$BRRD(0/1)_{c,law}$	Dummy variable being one in the quarter when the law implementing the BRRD was published in country c	EUR-Lex/national sources
$BRRD(0/1)_{c,law+j}$	Dummy variable being one j quarters after the law implementing the BRRD was published in country c	EUR-Lex/national sources
$BRRD(0/1)_{c,law-j}$	Dummy variable being one j quarters before the law implementing the BRRD was published in country c	EUR-Lex/national sources
Variables in event analysis (bank level)		
WACC	$\frac{E}{D+E}K_E + \frac{D}{D+E}K_D(1-t_c)$, where E=market value of equity; D=bank's debt; K_E=cost of equity (CAPM); K_D=cost of debt; t_c=corporate tax rate.	Bloomberg
Cost of Equity	Derived from CAPM model: $CAPM = r_f + \beta(r_m - r_f)$ (in %), where r_f=10-year treasury yield; r_m=expected market return based on the dividend discount model	Bloomberg
Cost of Debt	$[\frac{SD}{TD} * (TN * AF)] + [\frac{LD}{TD} * (TB * AF)] * [1 - TR]$, where SD=Short term debt; LD=Long term debt; TD=Total debt; AF=Debt adjustment factor; TN=Avg. rate of treasury notes; TB=Treasury bond rate; TR=Tax rate	Bloomberg
Weight of Equity	Share of equity in total capital costs ($\frac{E}{D+E}$)	Bloomberg
Weight of Debt	Share of debt in total capital costs ($\frac{D}{D+E}$)	Bloomberg
Dependent variables in real effects analysis (bank-firm level)		
ΔSpread	Spread is the all-in spread drawn: Describes the amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with any annual (or facility) fee paid to the bank group. ΔSpread is calculated as $ln(Spread)_{post-BRRD} - ln(Spread)_{pre-BRRD}$, i.e. the log difference between the spreads of the first loan after and the last one before BRRD implementation for each bank-firm relationship. If more than one loan is observed in the same quarter, the average spread is calculated.	DealScan (own calculation)
ΔMaturity	Dummy variable being one if the post-BRRD loan's maturity is higher than the pre-BRRD loan's maturity. If more than one loan is observed in the same quarter, the average maturity is calculated.	DealScan (own calculation)
Δ Loan Amount	The log difference between the loan amount of the first loan after and the last one before BRRD implementation for each bank-firm relationship. If more than one loan is observed in the same quarter, the average amount is calculated.	DealScan (own calculation)
ΔCovenant	Dummy variable being one if the post-BRRD loan has a more stringent covenant compared to the pre-BRRD loan, i.e. if $Covenant_{post-BRRD} - Covenant_{pre-BRRD} > 0$, where the dummy for covenant in each loan is one if any of the 15 distinct classes of financial covenants are present. If more than one loan is observed in the same quarter, the average of the covenant dummies is calculated.	DealScan (own calculation)

Variable	Definition	Source
Explanatory variables in real effects analysis (bank level)		
ΔWACC	Using WACC defined as above: $\Delta WACC = ln(WACC)_{post-BRRD} - ln(WACC)_{pre-BRRD}$, i.e. the log difference between a bank's WACC in the quarter of the first loan after BRRD implementation and its WACC in the quarter of the last loan before BRRD implementation for each bank-firm relationship.	Bloomberg (own calculation)
ΔCost of Equity	Using Cost of Equity defined as above: $\Delta Cost\ of\ Equity = ln(Cost\ of\ Equity)_{post-BRRD} - ln(Cost\ of\ Equity)_{pre-BRRD}$, i.e. the log difference between the cost of equity of the bank in the quarters of the first loan after and the last one before BRRD implementation for each bank-firm relationship.	Bloomberg (own calculation)
ΔCost of Debt	Using Cost of Debt defined as above: $\Delta Cost\ of\ Debt = ln(Cost\ of\ Debt)_{post-BRRD} - ln(Cost\ of\ Debt)_{pre-BRRD}$, i.e. the log difference between a bank's cost of debt in the quarters of the first loan after and the last one before BRRD implementation for each bank-firm14087858 firm relationship.	Bloomberg (own calculation)
Pre Shock Ln Total Assets (USD)	Natural logarithm of total assets in the quarter of the last loan observation before implementation of the BRRD for each bank-firm relationship	Worldscope
Pre Shock Profitability	Operating income to total assets ratio (%) in the quarter of the last loan observation before implementation of the BRRD for each bank-firm relationship	Worldscope
Pre Shock Equity Ratio	Common equity to total assets ratio (%) in the quarter of the last loan observation before implementation of the BRRD for each bank-firm relationship	Worldscope
Explanatory variables in real effects analysis (bank-firm level)		
Pre Shock Small Loan	Dummy variable being one if the pre-BRRD loan's amount is below the median of all loans' amount in the sample of 26,298 loan observations.	DealScan (own calculation)
Pre Shock Loan Short Term	Dummy variable being one if the pre-BRRD loan's maturity is below the median of all loans' maturity in the sample of 26,298 loan observations.	DealScan (own calculation)
Pre Shock Loan Covenant	Dummy variable being one if for the pre-BRRD loan any of the 15 distinct classes of financial covenants are present.	DealScan (own calculation)
Relationship Strength	Share of a bank's lending volume in the syndicated loan market to a firm in the period between 2010 and 2018 (in %).	DealScan (own calculation)
Explanatory variables in real effects analysis (country level)		
Pre Shock Lending Margin	MFIs lending margins (avg. loan rate - avg. deposit rate) on loans to non-financial corporations (NFC) (pp) in the quarter of the last loan observation before implementation of the BRRD for each bank-firm relationship.	European Central Bank
Pre Shock Lending Spread	Difference between lending rate on new business with non-financial corporations (NFC) and the Main Refinancing Rate (MRR) in the EMU (pp) in the quarter of the last loan observation before implementation of the BRRD for each bank-firm relationship.	European Central Bank

Table 3: List of banks in event analysis

(1) Bank	(2) Country	(3) Large Bank	(4) #Obs. pre implementation	(5) #Obs. from implementation
Core EMU				
BANK FUER TIROL & VORARLBERG	Austria		8	9
ERSTE GROUP BANK AG	Austria	Yes	8	9
OBERBANK AG	Austria		8	9
RAIFFEISEN BANK INTERNATIONA	Austria	Yes	8	9
KBC GROUP NV	Belgium	Yes	8	9
BNP PARIBAS	France	Yes	8	9
CREDIT AGRICOLE SA	France	Yes	8	9
NATIXIS	France	Yes	5	9
SOCIETE GENERALE SA	France	Yes	8	9
COMMERZBANK AG	Germany	Yes	8	9
DEUTSCHE BANK AG-REGISTERED	Germany	Yes	8	9
DEUTSCHE PFANDBRIEFBANK AG	Germany		6	9
DEUTSCHE POSTBANK AG	Germany	Yes	8	9
ABN AMRO BANK NV-CVA	Netherlands	Yes	8	9
ING GROEP NV	Netherlands	Yes	8	9
GIIPS				
ALPHA BANK AE	Greece		8	9
EUROBANK ERGASIAS SA	Greece		8	9
NATIONAL BANK OF GREECE	Greece	Yes	8	9
PIRAEUS BANK S.A	Greece		8	9
BANCA CARIGE SPA	Italy		8	9
BANCA IFIS SPA	Italy		8	9
BANCA MONTE DEI PASCHI SIENA	Italy	Yes	8	9
BANCA POPOLARE DI SONDRIO	Italy		8	9
BANCO BPM SPA	Italy	Yes	8	9
BANCO DI SARDEGNA-RSP	Italy		8	9
BPER BANCA	Italy		8	9
CREDITO VALTELLINESE SPA	Italy		8	9
INTESA SANPAOLO	Italy	Yes	8	9
MEDIOBANCA SPA	Italy	Yes	8	9
UBI BANCA SPA	Italy	Yes	8	9
UNICREDIT SPA	Italy	Yes	8	9
BANCO BPI SA.- REG SHS	Portugal		8	9
BANCO COMERCIAL PORTUGUES-R	Portugal	Yes	8	9
BANCO BILBAO VIZCAYA ARGENTA	Spain	Yes	8	9
BANCO DE SABADELL SA	Spain	Yes	8	9
BANCO SANTANDER SA	Spain	Yes	8	9
BANKIA SA	Spain	Yes	8	9
BANKINTER SA	Spain		8	9
CAIXABANK SA	Spain	Yes	8	9
LIBERBANK SA	Spain		8	9
Non-EMU				
KOMERCNI BANKA AS	Czech Republic		8	9
DANSKE BANK A/S	Denmark	Yes	8	9
JYSKE BANK-REG	Denmark		8	9
OTP BANK PLC	Hungary		8	9
ALIOR BANK SA	Poland		8	9
BANK HANDLOWY W WARSZAWIE SA	Poland		8	9
BANK MILLENNIUM SA	Poland		8	9
BANK OCHRONY SRODOWISKA SA	Poland		8	9
BANK PEKAO SA	Poland		8	9
BANK ZACHODNI WBK SA	Poland		8	7
BNP PARIBAS BANK POLSKA SA	Poland		8	9
ING BANK SLASKI SA	Poland		8	9
MBANK SA	Poland		8	9
PKO BANK POLSKI SA	Poland		8	7
BANCA TRANSILVANIA SA	Romania		8	9
BRD-GROUPE SOCIETE GENERALE	Romania		8	9
SKANDINAVISKA ENSKILDA BAN-A	Sweden	Yes	8	8
SVENSKA HANDELSBANKEN-A SHS	Sweden	Yes	8	8
SWEDBANK AB - A SHARES	Sweden	Yes	8	8

Notes: This table shows the name of banks, their respective country and the number of observations per bank included in the event analysis. A bank is defined to be a large bank if it has average assets above the median of all sample banks' average assets. Countries are classified in subgroups: Core EMU (Austria, Belgium, France, Germany, Netherlands); GIIPS (Greece, Italy, Portugal, Spain); Non-EMU (Czech Republic, Denmark, Hungary, Poland, Romania, Sweden). The columns #Obs. pre implementation and #Obs. from implementation list the number of observations available for each bank out of the 8 quarters before implementation, respectively the implementation quarter and the 8 quarters after implementation that are used in the event analysis.

Table 4: Summary statistics of WACC in event analysis

(1) Bank	(2) Mean WACC	(3) Sd WACC	(4) Mean Cost of Equity	(5) Sd Cost of Equity	(6) Mean Cost of Debt	(7) Sd Cost of Debt	(8) Mean Weight of Equity	(9) Sd Weight of Equity	(10) Mean Weight of Debt	(11) Sd Weight of Debt	(12) #Banks	(13) #Large Banks
Panel A: Summary statistics by country group												
Full Sample	4.127	3.087	13.789	4.789	0.914	0.564	27.124	23.975	72.634	23.873	59	29
Core EMU	2.008	1.205	11.268	4.469	0.431	0.185	14.994	9.086	84.527	9.450	15	12
GIIPS	3.478	1.165	16.928	3.803	1.034	0.407	16.856	10.638	82.915	10.520	25	13
Non-EMU	6.654	4.087	11.650	3.909	1.138	0.715	50.212	28.380	49.716	28.290	19	4
Large Banks	2.622	1.074	14.423	4.550	0.689	0.369	14.528	6.514	85.124	6.791	29	29
Panel B: Summary statistics for individual banks												
Core EMU												
BANK FUER TIROL & VORARLBERG	1.497	0.287	5.398	1.281	0.603	0.342	19.018	2.102	80.982	2.102		
ERSTE GROUP BANK AG	3.881	0.611	16.842	4.907	0.459	0.239	21.551	3.633	77.484	4.249		
OBERBANK AG	1.762	0.327	5.909	0.994	0.569	0.392	22.562	3.645	77.438	3.645		
RAIFFEISEN BANK INTERNATIONA	2.941	0.579	21.264	3.777	0.865	0.520	10.112	2.212	89.888	2.212		
KBC GROUP NV	5.032	0.622	12.272	1.698	0.281	0.080	37.291	1.607	60.334	1.409		
BNP PARIBAS	1.958	0.422	10.956	0.902	0.372	0.151	14.993	2.641	83.684	3.241		
CREDIT AGRICOLE SA	1.191	0.448	10.923	0.658	0.350	0.155	7.864	3.140	91.510	3.553		
NATIXIS	1.041	0.261	11.698	1.251	0.216	0.120	7.197	1.699	92.524	1.659		
SOCIETE GENERALE SA	1.073	0.434	14.293	3.162	0.329	0.269	5.297	1.306	94.703	1.306		
COMMERZBANK AG	0.990	0.298	9.938	0.908	0.227	0.169	7.698	2.548	92.302	2.548		
DEUTSCHE BANK AG-REGISTERED	1.350	0.475	11.348	1.350	0.321	0.365	9.451	2.471	88.972	2.437		
DEUTSCHE PFANDBRIEFBANK AG	0.821	0.354	7.723	0.856	0.510	0.441	3.310	1.074	96.642	1.076		
DEUTSCHE POSTBANK AG	1.437	0.724	4.147	0.753	0.686	0.747	23.898	2.560	76.102	2.560		
ABN AMRO BANK NV-CVA	2.293	0.568	11.984	2.257	0.397	0.228	16.365	2.373	83.635	2.373		
ING GROEP NV	2.852	0.790	14.318	2.550	0.272	0.158	18.302	3.528	81.698	3.528		
GIIPS												
ALPHA BANK AE	3.922	1.264	16.179	1.654	1.591	0.587	17.017	9.021	82.886	9.062		
EUROBANK ERGASIAS SA	3.258	1.193	19.903	4.544	2.074	0.950	7.647	3.222	88.871	3.482		
NATIONAL BANK OF GREECE	4.758	2.088	23.911	2.332	1.208	0.602	15.477	7.412	84.402	7.466		
PIRAEUS BANK S.A	4.057	2.331	22.316	2.631	1.271	0.673	12.803	10.277	87.187	10.266		
BANCA CARIGE SPA	1.983	0.631	17.597	4.362	1.314	0.484	4.715	3.390	95.285	3.390		
BANCA IFIS SPA	7.617	2.222	12.647	2.017	0.986	0.661	56.099	21.690	43.901	21.690		
BANCA MONTE DEI PASCHI SIENA	2.532	1.462	21.721	3.244	1.009	0.282	7.089	5.544	92.881	5.511		
BANCA POPOLARE DI SONDRIO	2.803	0.552	14.289	1.377	0.674	0.146	15.633	3.165	84.367	3.165		
BANCO BPM SPA	2.357	0.630	22.012	2.824	0.522	0.398	8.616	2.550	91.384	2.550		
BANCO DI SARDEGNA-RSP	3.463	1.223	9.616	1.457	1.587	0.736	23.114	7.097	76.886	7.097		
BPER BANCA	3.047	0.639	20.108	2.014	0.940	0.307	11.082	2.477	88.918	2.477		
CREDITO VALTELLINESE SPA	3.084	1.085	21.800	2.746	1.084	0.446	9.526	5.464	90.474	5.464		
INTESA SANPAOLO	3.480	0.630	16.966	1.859	0.879	0.263	16.306	2.679	82.490	2.681		
MEDIOBANCA SPA	4.034	0.860	17.773	1.934	1.357	0.415	16.240	3.051	83.760	3.051		

(1) Bank	(2) Mean WACC	(3) Sd WACC	(4) Mean Cost of Equity	(5) Sd Cost of Equity	(6) Mean Cost of Debt	(7) Sd Cost of Debt	(8) Mean Weight of Equity	(9) Sd Weight of Equity	(10) Mean Weight of Debt	(11) Sd Weight of Debt	(12) #Banks	(13) #Large Banks
UBI BANCA SPA	2.699	0.804	18.975	2.897	1.207	0.634	8.437	2.287	91.563	2.287		
UNICREDIT SPA	2.660	1.088	18.701	3.622	0.900	0.523	9.756	2.857	89.824	3.091		
BANCO BPI SA.- REG SHS	4.580	0.928	16.276	4.916	1.384	0.560	22.821	6.246	77.179	6.246		
BANCO COMERCIAL PORTUGUES-R	4.173	1.019	17.177	1.945	1.477	0.573	16.583	7.690	83.055	7.712		
BANCO BILBAO VIZCAYA ARGENTA	2.784	0.542	14.142	1.027	0.483	0.122	16.792	2.787	83.208	2.787		
BANCO DE SABADELL SA	2.611	0.414	14.806	0.873	0.801	0.236	12.926	1.504	87.074	1.504		
BANCO SANTANDER SA	2.803	0.387	14.955	0.726	0.659	0.130	14.978	2.289	85.022	2.289		
BANKIA SA	2.775	0.609	14.332	1.415	0.610	0.155	15.723	3.318	84.277	3.318		
BANKINTER SA	3.139	0.281	10.848	1.266	0.610	0.134	24.906	2.387	75.094	2.387		
CAIXABANK SA	3.292	0.650	13.216	1.119	0.653	0.173	20.869	3.300	79.131	3.300		
LIBERBANK SA	5.030	3.304	12.944	0.809	0.576	0.642	36.237	22.616	63.763	22.616		
Non-EMU												
KOMERCNI BANKA AS	5.508	1.985	8.331	2.841	0.576	0.528	63.042	4.316	36.958	4.316		
DANSKE BANK A/S	1.557	0.417	9.357	1.653	0.416	0.219	12.721	1.354	86.458	1.407		
JYSKE BANK-REG	1.245	0.389	9.418	2.415	0.518	0.291	8.202	0.747	91.429	0.672		
OTP BANK PLC	10.884	2.792	19.795	4.286	1.485	0.384	51.707	8.357	48.104	8.632		
ALIOR BANK SA	10.400	0.990	13.411	1.164	2.203	0.483	73.082	6.516	26.918	6.516		
BANK HANDLOWY W WARSZAWIE SA	8.716	1.408	11.665	1.227	0.061	0.023	74.413	7.733	25.587	7.733		
BANK MILLENNIUM SA	9.642	1.352	12.811	1.582	1.604	0.191	71.533	4.978	28.467	4.978		
BANK OCHRONY SRODOWISKA SA	4.298	0.682	9.145	1.337	2.263	0.847	28.872	5.689	71.128	5.689		
BANK PEKAO SA	9.509	0.810	11.778	1.290	1.332	0.412	78.468	5.534	21.532	5.534		
BANK ZACHODNI WBK SA	9.623	1.230	11.313	1.574	2.416	0.298	81.112	2.793	18.887	2.793		
BNP PARIBAS BANK POLSKA SA	0.877	0.044	3.528	0.211	0.197	0.003	20.425	0.014	79.575	0.014		
ING BANK SLASKI SA	7.416	0.785	9.231	1.105	0.633	0.254	78.974	2.638	21.026	2.638		
MBANK SA	5.622	0.906	12.668	1.559	0.355	0.144	42.633	4.396	57.367	4.396		
PKO BANK POLSKI SA	7.012	1.020	11.533	1.316	1.650	0.643	54.509	5.007	45.491	5.007		
BANCA TRANSILVANIA SA	13.827	1.658	19.133	5.747	1.592	0.545	83.317	3.704	16.683	3.704		
BRD-GROUPE SOCIETE GENERALE	12.814	2.050	17.987	6.473	1.280	0.346	82.244	1.914	17.756	1.914		
SKANDINAVISKA ENSKILDA BAN-A	2.519	0.513	10.341	0.649	0.724	0.470	18.647	1.856	81.353	1.856		
SVENSKA HANDELSBANKEN-A SHS	2.333	0.339	9.826	0.638	1.204	0.358	13.068	0.815	86.932	0.815		
SWEDBANK AB - A SHARES	2.629	0.397	10.075	0.802	1.101	0.392	17.053	1.377	82.947	1.377		

Notes: Panel A shows summary statistics of banks' funding costs for banks included in the event analysis and by country subgroup. A bank is classified as a large bank if it has average assets above the median of all sample banks' average assets. Countries are classified in the following subgroups: Core EMU (Austria, Belgium, France, Germany, Netherlands); GIIPS (Greece, Italy, Portugal, Spain); Non-EMU (Czech Republic, Denmark, Hungary, Poland, Romania, Sweden). Panel B shows summary statistics of banks' funding costs for each bank included in the event analysis. Means and standard deviations are calculated using the observations on the publication date of the national law implementing the BRRD and the 8 quarters before and after that as used in the event analysis. Source: Bloomberg, own calculations.

Table 5: Summary statistics of ΔSpread and ΔWACC in real-effects analysis (bank-firm level)

(1) Bank	(2) Country	(3) Large Bank	(4) #Matches	(5) Mean ΔSpread	(6) Sd ΔSpread	(7) Mean ΔWACC	(8) Sd ΔWACC
Core EMU							
ERSTE GROUP BANK AG	Austria	Yes	5	-0.181	0.201	-0.107	0.209
KBC GROUP NV	Belgium	Yes	23	-0.048	0.190	-0.011	0.212
BNP PARIBAS	France	Yes	369	-0.034	0.383	0.149	0.182
CREDIT AGRICOLE SA	France	Yes	1	0	.	0.158	.
NATIXIS	France	Yes	20	-0.139	0.346	-0.068	0.145
SOCIETE GENERALE SA	France	Yes	1	0.199	.	-0.326	.
COMMERZBANK AG	Germany	Yes	105	-0.169	0.377	0.114	0.202
DEUTSCHE BANK AG-REGISTERED	Germany	Yes	538	-0.079	0.415	0.045	0.299
ING GROEP NV	Netherlands	Yes	64	-0.010	0.341	0.159	0.238
GIIPS							
NATIONAL BANK OF GREECE	Greece	Yes	1	-0.008	.	-0.477	.
BANCA MONTE DEI PASCHI SIENA	Italy	Yes	2	-0.491	0.106	0.481	0.011
BANCA POPOLARE DI SONDRIO	Italy		1	-0.284	.	0.095	.
BPER BANCA	Italy		1	-0.284	.	0.070	.
MEDIOBANCA SPA	Italy	Yes	2	-1.005	0.621	0.247	0.012
UBI BANCA SPA	Italy	Yes	1	-0.566	.	0.289	.
BANCO BPI SA.- REG SHS	Portugal		3	-0.394	0.300	-0.325	0.267
BANCO COMERCIAL PORTUGUES-R	Portugal	Yes	1	0	.	0.386	.
BANCO BILBAO VIZCAYA ARGENTA	Spain	Yes	98	-0.127	0.373	0.088	0.246
BANCO SANTANDER SA	Spain	Yes	83	-0.118	0.457	0.007	0.194
BANKIA SA	Spain	Yes	17	-0.269	0.624	0.206	0.233
BANKINTER SA	Spain		14	-0.064	0.363	-0.011	0.137
CAIXABANK SA	Spain	Yes	45	-0.229	0.481	0.151	0.267
LIBERBANK SA	Spain		2	-0.757	0.499	0.825	0.537
Non-EMU							
KOMERCNI BANKA AS	Czech Republic		1	0	.	-0.302	.
DANSKE BANK A/S	Denmark	Yes	18	-0.020	0.355	-0.082	0.236
BANK HANDLOWY W WARSZAWIE SA	Poland		1	0	.	-0.137	.
BANK PEKAO SA	Poland		1	0	.	-0.044	.
ING BANK SLASKI SA	Poland		1	0	.	0.055	.
MBANK SA	Poland		1	0	.	0.043	.
SKANDINAVISKA ENSKILDA BAN-A	Sweden	Yes	27	-0.012	0.354	-0.267	0.219
SVENSKA HANDELSBANKEN-A SHS	Sweden	Yes	6	-0.040	0.222	-0.230	0.304
SWEDBANK AB - A SHARES	Sweden	Yes	4	0.008	0.099	-0.246	0.158

Notes: This table provides summary statistics for spreads charged by banks from non-financial firms in the syndicated loan market. Statistics are shown for banks for which it is possible to observe in the matched Bloomberg-Worldscope-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. A bank is classified as a large bank if it has average assets above the median of all sample banks' average assets (based on the sample of banks used for the event analysis). #Matches indicates the maximum number of bank-firm relationships for which a loan before and after BRRD can be observed. ΔSpread is defined as $ln(Spread)_{post-BRRD} - ln(Spread)_{pre-BRRD}$. Mean ΔSpread reports the average ΔSpread among all bank-firm relationships for each bank. If more than one loan is observed per bank-firm relationship before or after implementation of the BRRD and within the period 2010-2018, the one closer to the implementation date is considered. If more than one loan is observed in the same quarter, the average spread for that quarter is calculated. ΔWACC is defined as $ln(WACC)_{post-BRRD} - ln(WACC)_{pre-BRRD}$. Mean ΔWACC reports the average ΔWACC among all bank-firm relationships for each bank using funding costs in the quarters the loans are observed. Source: DealScan, own calculations.

Table 6: Summary statistics of ΔSpread by country group in real-effects analysis

(1) Subgroup	(2) #Banks	(3) #Large Banks	(4) #Matches	(5) Mean ΔSpread	(6) Sd ΔSpread
Full Sample	32	22	1457	-0.160	0.250
Core EMU	9	9	1126	-0.051	0.115
GIIPS	14	9	271	-0.328	0.292
Non-EMU	9	4	60	-0.007	0.015
Large Banks	22	22	1431	-0.152	0.254

Notes: This table provides summary statistics for firms' credit spreads charged by banks in the syndicated loan market. Statistics are shown for country subgroups and based on a list of banks for which it is possible to observe in the matched Bloomberg-Worldscope-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. #Matches indicates the maximum number of bank-firm relationships for which a loan before and after BRRD can be observed. ΔSpread is defined as $ln(Spread)_{post-BRRD} - ln(Spread)_{pre-BRRD}$. Mean ΔSpread reports the average ΔSpread among all bank-firm relationships. When more than one loan is observed before or after implementation of the BRRD and within the period 2010-2018, the one closer to the implementation date is considered. If more than one loan is observed in the same quarter, the average spread is calculated. A bank is classified as a large bank if it has average assets above the median of all sample banks' average assets (based on the sample of banks used for the event analysis). Countries are classified in subgroups: Core EMU (Austria, Belgium, France, Germany, Netherlands); GIIPS (Greece, Italy, Portugal, Spain); Non-EMU (Czech Republic, Denmark, Hungary, Poland, Romania, Sweden). Source: DealScan, own calculations.

Table 7: Summary statistics of further variables in real-effects analysis (bank-firm level)

	Full Sample		***Core EMU***		***GIIPS***		***Non-EMU***	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Further dependent variables (bank-firm level)								
ΔMaturity	0.276	0.447	0.273	0.446	0.300	0.459	0.217	0.415
ΔCovenant	0.065	0.246	0.068	0.253	0.033	0.180	0.133	0.343
ΔLoan Amount	-0.024	0.775	0.018	0.762	-0.195	0.855	-0.045	0.490
Explanatory variables (bank level)								
ΔWACC	0.075	0.260	0.088	0.255	0.081	0.252	-0.191	0.236
ΔCost of Debt	-0.067	0.252	-0.063	0.247	-0.031	0.206	-0.324	0.378
ΔCost of Equity	0.071	0.176	0.094	0.174	0.017	0.141	-0.116	0.195
Pre Shock Ln Total Assets	27.921	0.750	28.174	0.438	27.176	0.920	26.542	0.791
Pre Shock Equity Ratio	4.495	1.533	3.892	0.732	6.864	1.513	5.104	2.060
Pre Shock Profitability	0.064	0.148	0.057	0.085	0.067	0.288	0.181	0.090
$\lvert\Delta WACC^{+}\rvert$	0.151	0.166	0.159	0.165	0.147	0.173	0.023	0.064
$\lvert\Delta WACC^{-}\rvert$	0.076	0.130	0.071	0.124	0.066	0.119	0.213	0.204
$\lvert\Delta Cost\ of\ Debt^{+}\rvert$	0.066	0.097	0.068	0.098	0.063	0.092	0.037	0.106
$\lvert\Delta Cost\ of\ Debt^{-}\rvert$	0.134	0.191	0.131	0.183	0.094	0.148	0.361	0.323
$\lvert\Delta Cost\ of\ Equity^{+}\rvert$	0.111	0.105	0.128	0.107	0.062	0.070	0.022	0.067
$\lvert\Delta Cost\ of\ Equity^{-}\rvert$	0.040	0.105	0.034	0.101	0.046	0.096	0.138	0.165
Explanatory variables (bank-firm level)								
Pre Shock Small Loan	0.274	0.446	0.244	0.430	0.402	0.491	0.250	0.437
Pre Shock Loan Short Term	0.318	0.466	0.320	0.467	0.321	0.468	0.267	0.446
Pre Shock Loan Covenant	0.285	0.450	0.327	0.467	0.118	0.323	0.267	0.446
Relationship Strength	0.403	1.727	0.174	0.696	1.012	3.189	1.966	3.553
Explanatory variables (country level)								
Pre Shock Lending Margin	1.576	0.460	1.465	0.272	2.122	0.657	1.184	0.289
Pre Shock Lending Spread	2.027	0.528	1.801	0.170	2.966	0.473		
N	1457		1126		271		60	

Notes: This table provides summary statistics for the bank-level and country-level control variables used in the real effects analysis. Statistics shown are averages of all bank-firm relationships and based on a list of banks for which it is possible to observe in the matched Bloomberg-Worldscope-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. Source: Bloomberg, Worldscope, DealScan, ECB, own calculations.

Table 8: Regression results: Real effects

Dependent Variable: $\Delta Spread$	FE	FE	FE	FE	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Results for $\Delta WACC$									
ΔWACC	0.153	-0.020	-0.054	-0.053	0.056*	-0.026	-0.148	-0.135	-0.131
	(0.092)	(0.135)	(0.130)	(0.129)	(0.032)	(0.067)	(0.128)	(0.107)	(0.106)
ΔWACC* EMU Core		0.267**	0.267**	0.278**			0.242*	0.225*	0.227*
		(0.101)	(0.100)	(0.101)			(0.129)	(0.115)	(0.112)
ΔWACC*Non-EMU		-0.032	0.006	0.012			0.421***	0.412***	0.430***
		(0.148)	(0.151)	(0.129)			(0.129)	(0.108)	(0.106)
Pre Shock Equity Ratio			-0.006	-0.008				0.003	0.002
			(0.012)	(0.012)				(0.018)	(0.018)
Pre Shock Profitability			-0.056	-0.050				-0.059	-0.057
			(0.056)	(0.057)				(0.048)	(0.039)
Pre Shock Ln Total Assets			-0.011	-0.012				0.050	0.047
			(0.010)	(0.011)				(0.034)	(0.032)
Pre Shock Small Loan				-0.181*					-0.031
				(0.105)					(0.024)
Pre Shock Loan Short Term				-0.090*					-0.056***
				(0.052)					(0.013)
Pre Shock Loan Covenant				0.052*					0.067**
				(0.030)					(0.025)
R^2	0.84	0.84	0.85	0.86	0.02	0.03	0.03	0.03	0.04
N	779	779	756	756	1,457	779	1,457	1,437	1,437
Firm FE	YES	YES	YES	YES	NO	NO	NO	NO	NO
Bank-Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Panel B: Results for ΔCost of Debt									
ΔCost of Debt	0.154	0.128	0.099	0.111	0.033	-0.044	0.042	0.090	0.080
	(0.097)	(0.104)	(0.104)	(0.104)	(0.035)	(0.074)	(0.121)	(0.099)	(0.096)
ΔCost of Debt*EMU Core		0.116	0.111	0.116			-0.014	-0.069	-0.057
		(0.100)	(0.099)	(0.096)			(0.126)	(0.115)	(0.108)
ΔCost of Debt*Non-EMU		-0.223	-0.189	-0.179			0.025	-0.023	-0.004
		(0.169)	(0.177)	(0.165)			(0.130)	(0.114)	(0.109)
Pre Shock Equity Ratio			-0.006	-0.008				0.008	0.007
			(0.012)	(0.013)				(0.020)	(0.021)
Pre Shock Profitability			-0.028	-0.022				-0.043	-0.044
			(0.056)	(0.057)				(0.047)	(0.040)
Pre Shock Ln Total Assets			-0.009	-0.009				0.058	0.055
			(0.012)	(0.013)				(0.039)	(0.037)
Pre Shock Small Loan				-0.187*					-0.028
				(0.095)					(0.024)
Pre Shock Loan Short Term				-0.088*					-0.054***
				(0.052)					(0.013)
Pre Shock Loan Covenant				0.030					0.067**
				(0.039)					(0.026)
R^2	0.84	0.84	0.85	0.86	0.02	0.03	0.02	0.03	0.04
N	779	779	756	756	1,457	779	1,457	1,437	1,437
Firm FE	YES	YES	YES	YES	NO	NO	NO	NO	NO
Bank-Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (2). The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are, in panel A, the log difference in WACC and, in panel B and C, the log difference in one of the sub-components of WACC. Further controls include bank and loan characteristics of the pre-BRRD loan. In columns (1) to (4), firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. To include also firms borrowing from a single bank, we include the OLS specifications in columns (5) to (9). Standard errors are clustered at the bank level.

Table 8: Regression results: Real effects cont'd

Dependent Variable: $\Delta Spread$	FE	FE	FE	FE	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel C: Results for ΔCost of Equity									
ΔCost of Equity	0.386**	0.043	0.032	0.029	0.179***	0.146**	-0.020	-0.011	-0.016
	(0.158)	(0.187)	(0.174)	(0.178)	(0.042)	(0.061)	(0.164)	(0.121)	(0.113)
ΔCost of Equity*EMU Core		0.448***	0.445**	0.458**			0.213	0.185	0.191
		(0.162)	(0.165)	(0.166)			(0.169)	(0.134)	(0.124)
ΔCost of Equity*Non-EMU		0.089	0.108	0.144			0.439*	0.428*	0.431**
		(0.247)	(0.246)	(0.223)			(0.244)	(0.218)	(0.192)
Pre Shock Equity Ratio			-0.005	-0.006				0.004	0.004
			(0.014)	(0.015)				(0.019)	(0.020)
Pre Shock Profitability			-0.052	-0.043				-0.043	-0.043
			(0.049)	(0.049)				(0.051)	(0.043)
Pre Shock Ln Total Assets			-0.020	-0.021				0.047	0.044
			(0.014)	(0.014)				(0.033)	(0.032)
Pre Shock Small Loan				-0.152					-0.033
				(0.095)					(0.024)
Pre Shock Loan Short Term				-0.079					-0.053***
				(0.053)					(0.014)
Pre Shock Loan Covenant				0.103**					0.066**
				(0.047)					(0.026)
R^2	0.85	0.85	0.86	0.86	0.03	0.03	0.03	0.03	0.04
N	779	779	756	756	1,457	779	1,457	1,437	1,437
Firm FE	YES	YES	YES	YES	NO	NO	NO	NO	NO
Bank-Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (2). The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are, in panel A, the log difference in WACC and, in panel B and C, the log difference in one of the sub-components of WACC. Further controls include bank and loan characteristics of the pre-BRRD loan. In columns (1) to (4), firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. To include also firms borrowing from a single bank, we include the OLS specifications in columns (5) to (9). Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 9: Real effects: Marginal effects on $\Delta Spread$ over country group

	FE	FE	FE	OLS	OLS	OLS
	(2')	(3')	(4')	(7')	(8')	(9')
Panel A: Marginal effects of $\Delta WACC$						
GIIPS	-0.020	-0.054	-0.053	-0.148	-0.135	-0.131
	(0.135)	(0.130)	(0.129)	(0.128)	(0.107)	(0.106)
Non-EMU	-0.053	-0.048	-0.041	0.273***	0.277***	0.300***
	(0.118)	(0.127)	(0.098)	(0.014)	(0.016)	(0.021)
Core EMU	0.247***	0.212**	0.226**	0.095***	0.090***	0.096***
	(0.084)	(0.085)	(0.090)	(0.019)	(0.025)	(0.023)
N	779	756	756	1,457	1,437	1,437
Panel B: Marginal effects of $\Delta Cost\ of\ Debt$						
GIIPS	0.128	0.099	0.111	0.042	0.090	0.080
	(0.104)	(0.104)	(0.104)	(0.121)	(0.099)	(0.096)
Non-EMU	-0.095	-0.089	-0.068	0.067	0.067	0.076
	(0.165)	(0.170)	(0.151)	(0.048)	(0.051)	(0.049)
Core EMU	0.245**	0.210**	0.228**	0.028	0.021	0.023
	(0.103)	(0.104)	(0.105)	(0.038)	(0.043)	(0.045)
N	779	756	756	1,457	1,437	1,437
Panel C: Marginal effects of $\Delta Cost\ of\ Equity$						
GIIPS	0.043	0.032	0.029	-0.020	-0.011	-0.016
	(0.187)	(0.174)	(0.178)	(0.164)	(0.121)	(0.113)
Non-EMU	0.132	0.140	0.173	0.419**	0.417**	0.415**
	(0.190)	(0.194)	(0.164)	(0.180)	(0.181)	(0.154)
Core EMU	0.491***	0.477***	0.488***	0.193***	0.175***	0.175***
	(0.142)	(0.137)	(0.145)	(0.040)	(0.045)	(0.044)
N	779	756	756	1,457	1,437	1,437

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location. These marginal effects are estimated from specifications (2)-(4) and (7)-(9) in Table 8. The subgroups along with their summary statistics are listed in Table 5. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The explanatory variables of interest are, in panel A, the log difference in WACC and, in panel B and C, the log difference in one of the sub-components of WACC. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 10: Asymmetry interactions: Marginal effects on $\Delta Spread$ over country group

	$\Delta WACC$ (1)	$\Delta Cost\ of\ Debt$ (2)	$\Delta Cost\ of\ Equity$ (3)
Panel A: Marginal effects of $\lvert\Delta WACC^{+}\rvert$			
GIIPS	-0.061	0.193	-0.103
	(0.129)	(0.168)	(0.328)
Non-EMU	-0.562***	-0.040	-0.932
	(0.204)	(0.110)	(0.931)
Core EMU	0.269***	0.392***	0.690***
	(0.092)	(0.104)	(0.168)
Panel B: Marginal effects of $\lvert\Delta WACC^{-}\rvert$			
GIIPS	0.029	-0.066	-0.094
	(0.352)	(0.212)	(0.375)
Non-EMU	-0.064	0.077	-0.234
	(0.131)	(0.183)	(0.177)
Core EMU	-0.167	-0.165	-0.290
	(0.193)	(0.142)	(0.300)
N	756	756	756

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location. These marginal effects are estimated from specifications (1)-(3) in Table OA3. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The explanatory variables of interest are the log difference in WACC or the log difference in one of the sub-components of WACC as indicated in the column header. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 11: Lending margin: Marginal effects on $\Delta Spread$ by country group

	$\Delta WACC$ (1)	$\Delta Cost\ of\ Debt$ (2)	$\Delta Cost\ of\ Equity$ (3)
Panel A: Marginal effects – Conditional on low lending margin			
GIIPS	0.004	0.182	0.284
	(0.214)	(0.157)	(0.194)
Non-EMU	0.017	-0.094	0.071
	(0.102)	(0.183)	(0.178)
Core EMU	0.231**	0.237**	0.643***
	(0.115)	(0.095)	(0.187)
Panel B: Marginal effects – Conditional on high lending margin			
GIIPS	-0.105	-0.007	-0.033
	(0.155)	(0.130)	(0.126)
Non-EMU	0.459	-0.215	0.477**
	(0.317)	(0.427)	(0.198)
Core EMU	0.199**	0.164	0.446***
	(0.100)	(0.121)	(0.131)
N	751	751	751

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location as well as the country-specific lending margin. These marginal effects are estimated from specifications (1)-(3) in Table OA4. The subgroups along with their summary statistics are listed in Table 5. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The marginal effect of the variable as indicated in the column header is calculated conditional on the lending margin being at the 25th percentile (Panel A) and the 75th percentile (Panel B). ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 12: Lending spread: Marginal effects on $\Delta Spread$ over country group

	$\Delta WACC$ (1)	$\Delta Cost\ of\ Debt$ (2)	$\Delta Cost\ of\ Equity$ (3)
Panel A: Marginal effects of $\Delta WACC$ – Conditional on low lending spread			
GIIPS	0.715**	1.026***	1.098***
	(0.353)	(0.280)	(0.416)
Core EMU	0.204**	0.191*	0.524***
	(0.093)	(0.107)	(0.159)
Panel B: Marginal effects of $\Delta WACC$ – Conditional on high lending spread			
GIIPS	0.561*	0.799***	0.833**
	(0.295)	(0.231)	(0.342)
Core EMU	0.119	0.130	0.485***
	(0.098)	(0.084)	(0.133)
N	701	701	701

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location as well as the country-specific lending spread. These marginal effects are estimated from specifications (1)-(3) in Table OA5. The subgroups along with their summary statistics are listed in Table 5. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The lending spread is calculated as the difference between the country-specific lending rate on new business and the main refinancing rate of the ECB (in percentage points). The marginal effect of the variable as indicated in the column header is calculated conditional on the lending spread being at the 25th percentile (Panel A) and the 75th percentile (Panel B). ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 13: Bank-firm relationship strength: Marginal effects on $\Delta Spread$ over country group

	$\Delta WACC$ (1)	$\Delta Cost\ of\ Debt$ (2)	$\Delta Cost\ of\ Equity$ (3)
Panel A: Marginal effects – Conditional on low relationship strength			
GIIPS	0.043	0.112	0.179
	(0.110)	(0.082)	(0.173)
Non-EMU	0.052	-0.077	0.216
	(0.110)	(0.186)	(0.153)
Core EMU	0.260***	0.262***	0.490***
	(0.085)	(0.081)	(0.132)
Panel B: Marginal effects – Conditional on high relationship strength			
GIIPS	0.036	0.109	0.166
	(0.109)	(0.081)	(0.172)
Non-EMU	0.042	-0.078	0.213
	(0.106)	(0.184)	(0.153)
Core EMU	0.247***	0.227**	0.498***
	(0.083)	(0.096)	(0.154)
N	756	756	756

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location as well as the strength of the bank-firm relationship. These marginal effects are estimated from specifications (1)-(3) in Table OA6. The subgroups along with their summary statistics are listed in Table 5. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The marginal effect of the variable as indicated in the column header is calculated conditional on the bank-firm relationship strength being at the 25th percentile (Panel A) and the 75th percentile (Panel B). ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 14: Alternative loan outcomes: Marginal effects on $\Delta Loan\ outcome$ over country group

	Dependent Variable: $\Delta Maturity$			Dependent Variable: $\Delta Loan\ Amount$			Dependent Variable: $\Delta Covenant$		
	$\Delta WACC$	$\Delta Cost\ of\ Debt$	$\Delta Cost\ of\ Equity$	$\Delta WACC$	$\Delta Cost\ of\ Debt$	$\Delta Cost\ of\ Equity$	$\Delta WACC$	$\Delta Cost\ of\ Debt$	$\Delta Cost\ of\ Equity$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GIIPS	0.131	0.121	-0.100	-0.165	-0.315**	-0.038	-0.036	-0.075	-0.015
	(0.084)	(0.095)	(0.154)	(0.208)	(0.131)	(0.207)	(0.061)	(0.067)	(0.074)
Non-EMU	-0.025	0.099	-0.070	-0.110	-0.106	0.110	0.299	0.167	0.557*
	(0.203)	(0.133)	(0.219)	(0.166)	(0.120)	(0.333)	(0.234)	(0.162)	(0.314)
Core EMU	0.111*	0.085	0.005	-0.402***	-0.331**	-0.068	0.083**	-0.005	0.202***
	(0.065)	(0.105)	(0.106)	(0.149)	(0.132)	(0.216)	(0.039)	(0.034)	(0.055)
N	752	752	752	756	756	756	756	756	756

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on the dependent variable as indicated in the column header conditional on the banks' subgroup location. These marginal effects are estimated from specifications (1)-(9) in Table OA7. The subgroups along with their summary statistics are listed in Table 5. The dependent variable is calculated as the difference of the loan outcome variable of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The explanatory variables are the log difference in WACC or the log difference in one of the sub-components of WACC as indicated in the column header. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 15: Robustness demand side: Marginal effects on $\Delta Spread$ over country group

	$\Delta WACC$		$\Delta Cost\ of\ Debt$		$\Delta Cost\ of\ Equity$	
	(1)	(2)	(3)	(4)	(5)	(6)
GIIPS	-0.146	-0.053	-0.155	0.111	-0.416	0.029
	(0.215)	(0.129)	(0.214)	(0.104)	(0.333)	(0.178)
Non-EMU	-0.192	-0.041	-0.063	-0.068	-0.378	0.173
	(0.124)	(0.098)	(0.057)	(0.151)	(0.317)	(0.164)
Core EMU	0.076	0.226**	0.002	0.228**	0.327*	0.488***
	(0.078)	(0.090)	(0.048)	(0.105)	(0.182)	(0.145)

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location. These marginal effects are estimated from specifications (1)-(6) in Table OA8. In columns (1), (3), and (5), only loan observations that occur in the two years before and after the country-specific BRRD date are included in the original regression. In columns (2), (4), and (6), we draw on the whole sample period and include industry as well as firm-country fixed effects next to firm fixed effects. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The explanatory variables of interest are the log difference in WACC or the log difference in one of the sub-components of WACC as indicated in the column header. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 16: Robustness implementation timing: Marginal effects on $\Delta Spread$ over country group

	$\Delta WACC$		$\Delta Cost\ of\ Debt$		$\Delta Cost\ of\ Equity$	
	(1)	(2)	(3)	(4)	(5)	(6)
GIIPS	-0.026	-0.033	0.124	0.124	0.030	0.039
	(0.119)	(0.134)	(0.103)	(0.113)	(0.170)	(0.186)
Non-EMU	-0.048	0.026	-0.080	-0.197	0.173	-0.073
	(0.103)	(0.091)	(0.158)	(0.130)	(0.167)	(0.159)
Core EMU	0.226**	0.291***	0.229**	0.277**	0.485***	0.536***
	(0.092)	(0.075)	(0.106)	(0.110)	(0.178)	(0.147)

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location. These marginal effects are estimated from specifications (1)-(6) in Table OA9. In columns (1), (3), and (5), we include a control variable for the implementation quarter. In columns (2), (4), and (6), we drop banks from countries that implemented the BRRD only in 2016. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The explanatory variables of interest are the log difference in WACC or the log difference in one of the sub-components of WACC as indicated in the column header. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 17: Robustness lead arrangers: Marginal effects on $\Delta Spread$ over country group

	$\Delta WACC$		$\Delta Cost\ of\ Debt$		$\Delta Cost\ of\ Equity$	
	(1)	(2)	(3)	(4)	(5)	(6)
GIIPS	0.032	-0.053	0.133	0.111	0.235	0.029
	(0.169)	(0.129)	(0.122)	(0.104)	(0.279)	(0.178)
Non-EMU	0.062	-0.041	-0.112	-0.068	0.332	0.173
	(0.210)	(0.098)	(0.261)	(0.151)	(0.280)	(0.164)
Core EMU	0.216	0.226**	0.193	0.228**	0.639***	0.488***
	(0.134)	(0.090)	(0.138)	(0.105)	(0.222)	(0.145)
N	505	756	505	756	505	756

Notes: This table shows the marginal effects of the log changes in WACC and its sub-components on $\Delta Spread$ conditional on the banks' subgroup location. These marginal effects are estimated from specifications (1)-(6) in Table OA10. The subgroups along with their summary statistics are listed in Table 5. The dependent variable is $\Delta Spread$, calculated as the log difference of the loan spreads of the two closest loans before and after implementation of the BRRD between the same bank-firm pair. The explanatory variables of interest are the log difference in WACC or the log difference in one of the sub-components of WACC as indicated in the column header. In columns (1), (3) and (5), banks classified in the last two categories of the ranking hierarchy of lead arrangers are excluded. In columns (2), (4), and (6), banks classified in the last category of the hierarchy, that is "Participant" or "Secondary investor", are excluded. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Figure 1: Resolution framework in EU countries

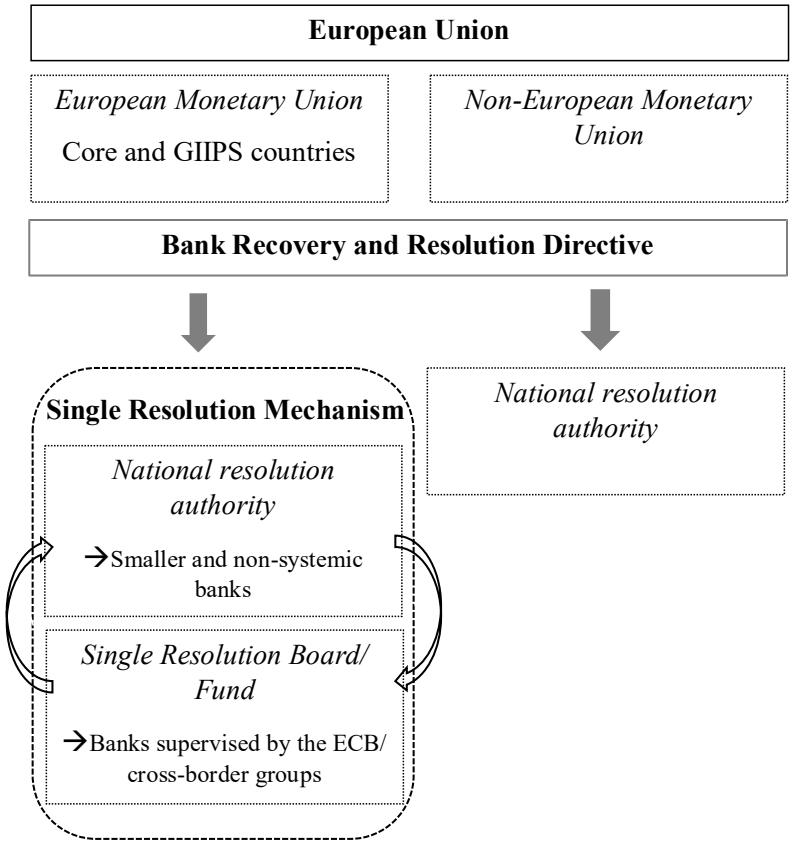
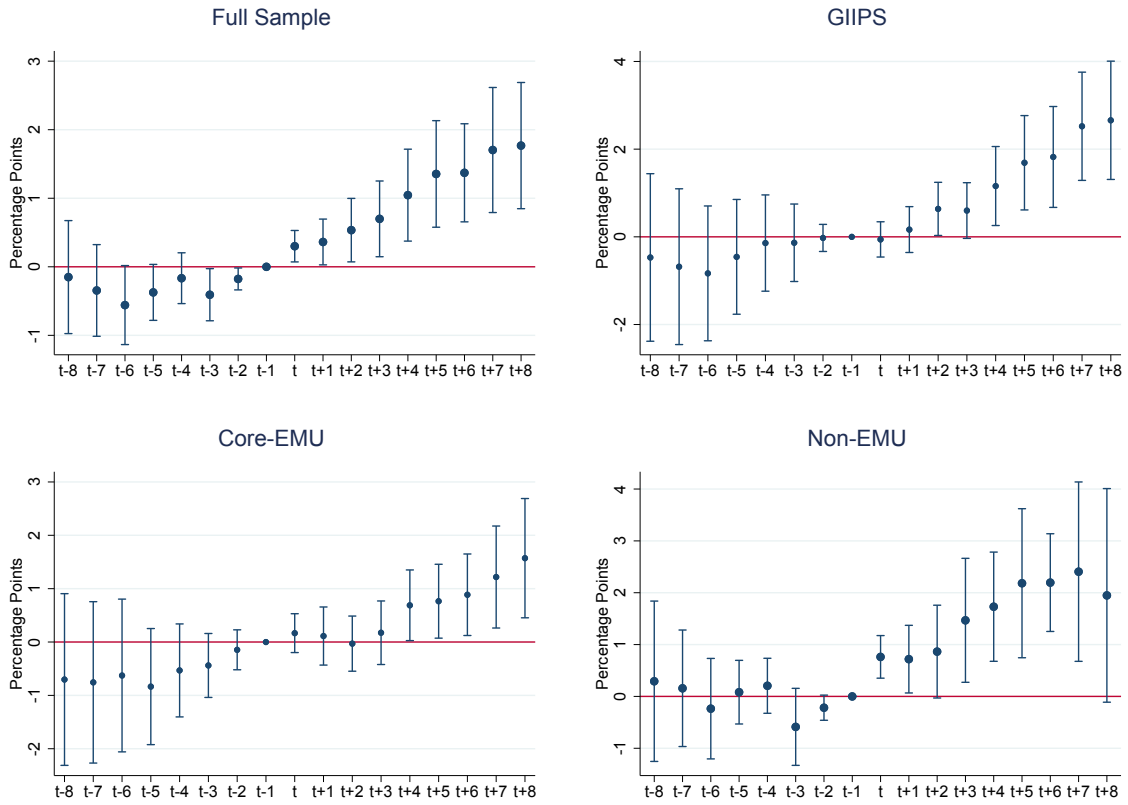


Figure 2: Event analysis: Banks' funding costs around BRRD transposition (WACC)

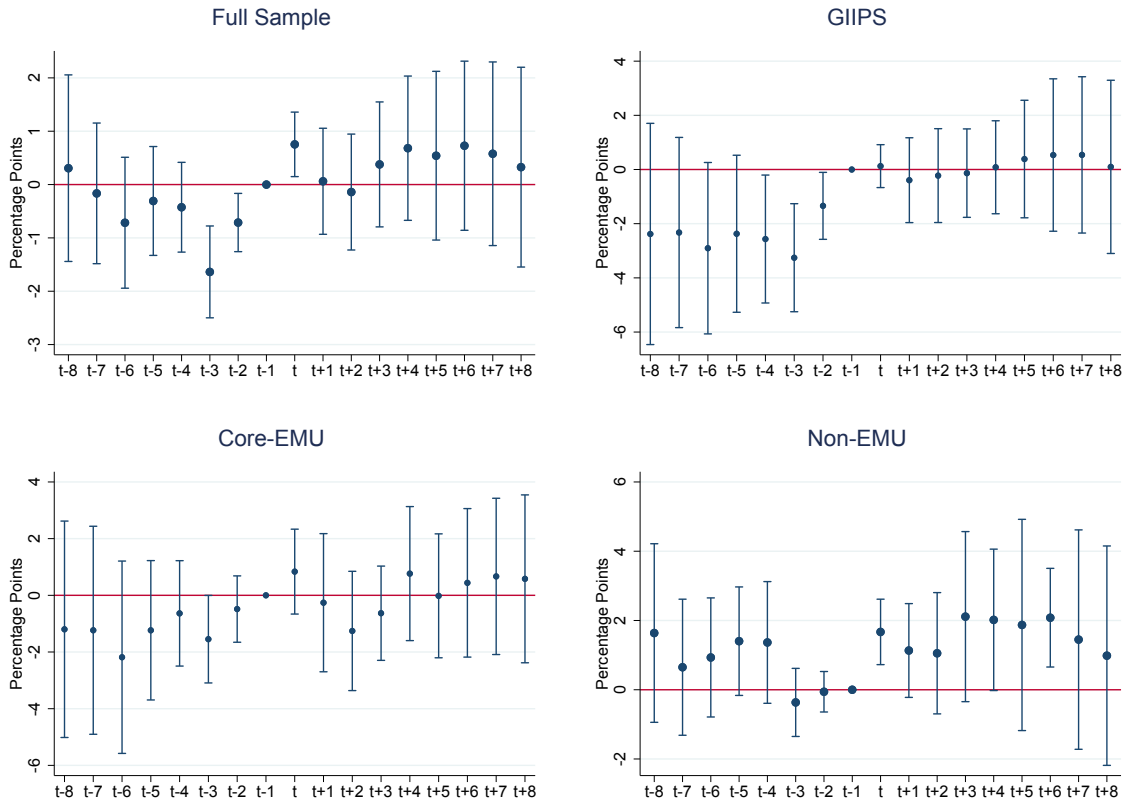


Notes: This figure represents the dynamic impact of the BRRD on the capital costs of banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Weighted Average Cost of Capital (WACC, in %). Each point in the figure represents the coefficient estimate for the indicator variables for the eight quarters before and after the country-specific law implementing the BRRD was published. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Figure 3: Event analysis: Banks' funding costs around BRRD transposition (Cost of equity)

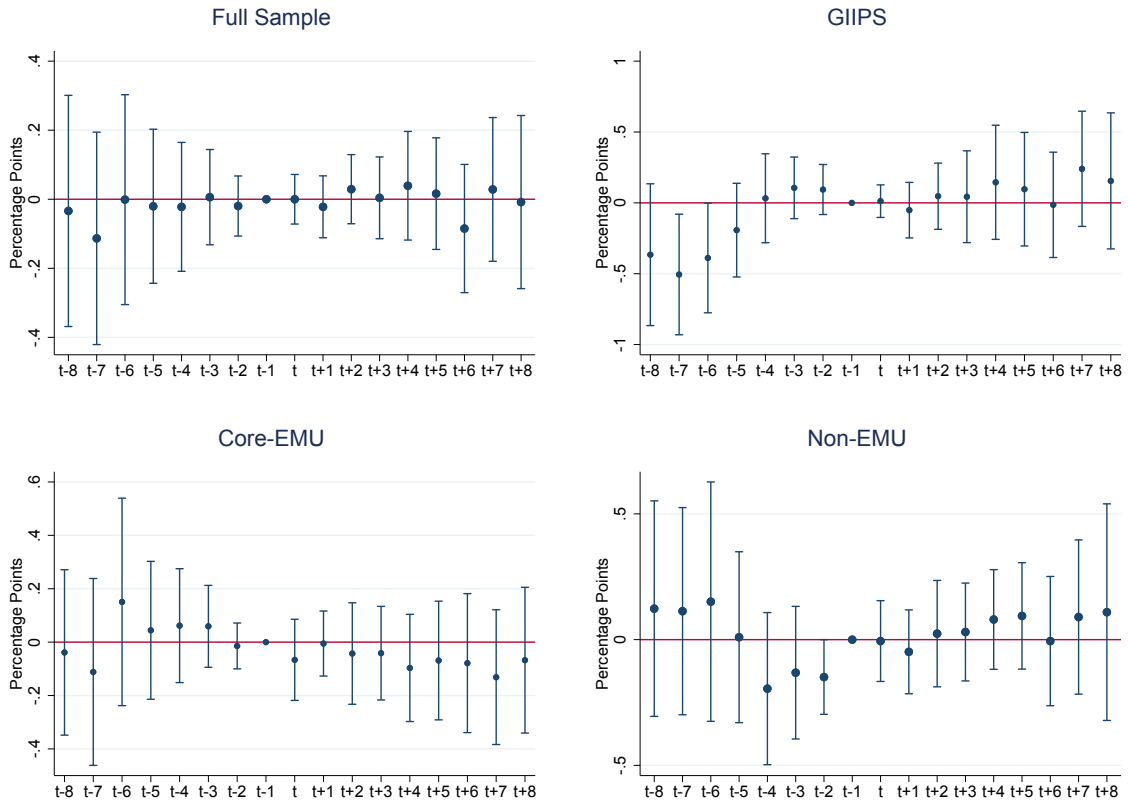


Notes: This figure represents the dynamic impact of the BRRD on the cost of equity for banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$Cost\ of\ Equity_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Cost of Equity (in %). Each point represents the coefficient estimate for the indicator variables for the eight quarters before and after BRRD introduction at the country level. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Figure 4: Event analysis: Banks' funding costs around BRRD transposition (Cost of debt)

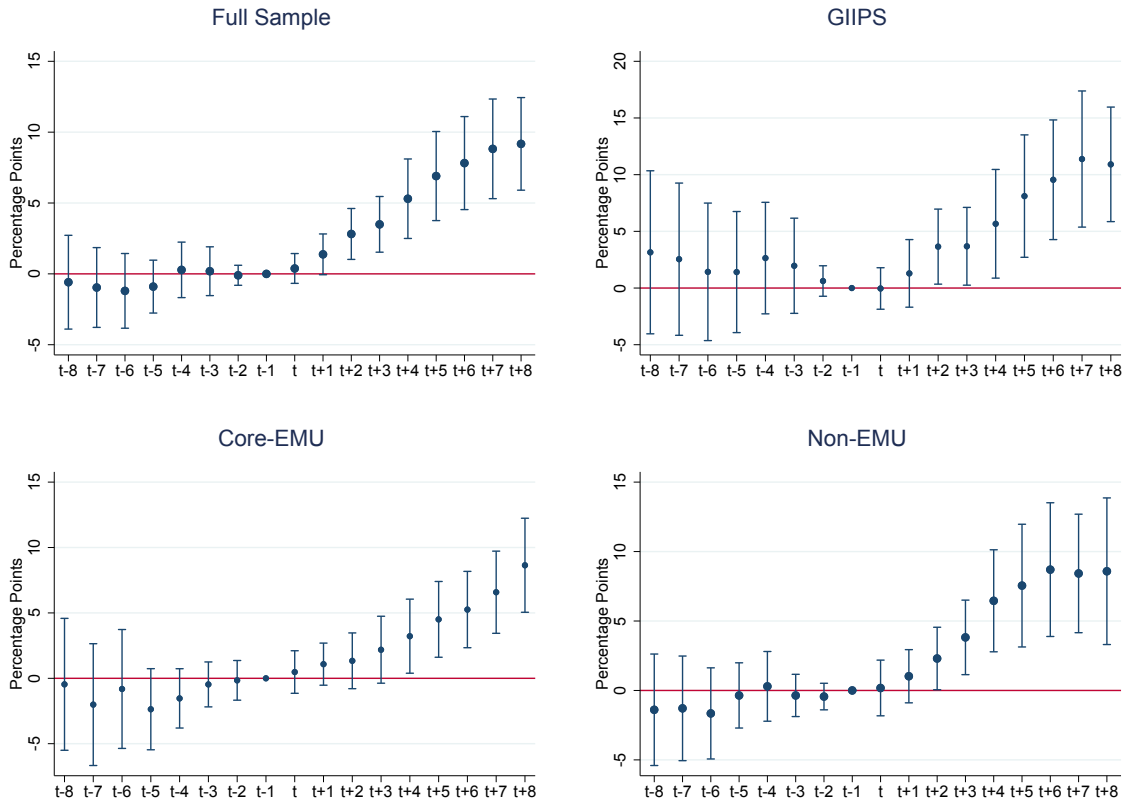


Notes: This figure represents the dynamic impact of the BRRD on the cost of debt for banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$Cost\ of\ Debt_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Cost of Debt (in %). Each point represents the coefficient estimate for the indicator variables for the eight quarters before and after BRRD introduction at the country level. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Figure 5: Event analysis: Banks' funding composition around BRRD transposition (Weight of equity)

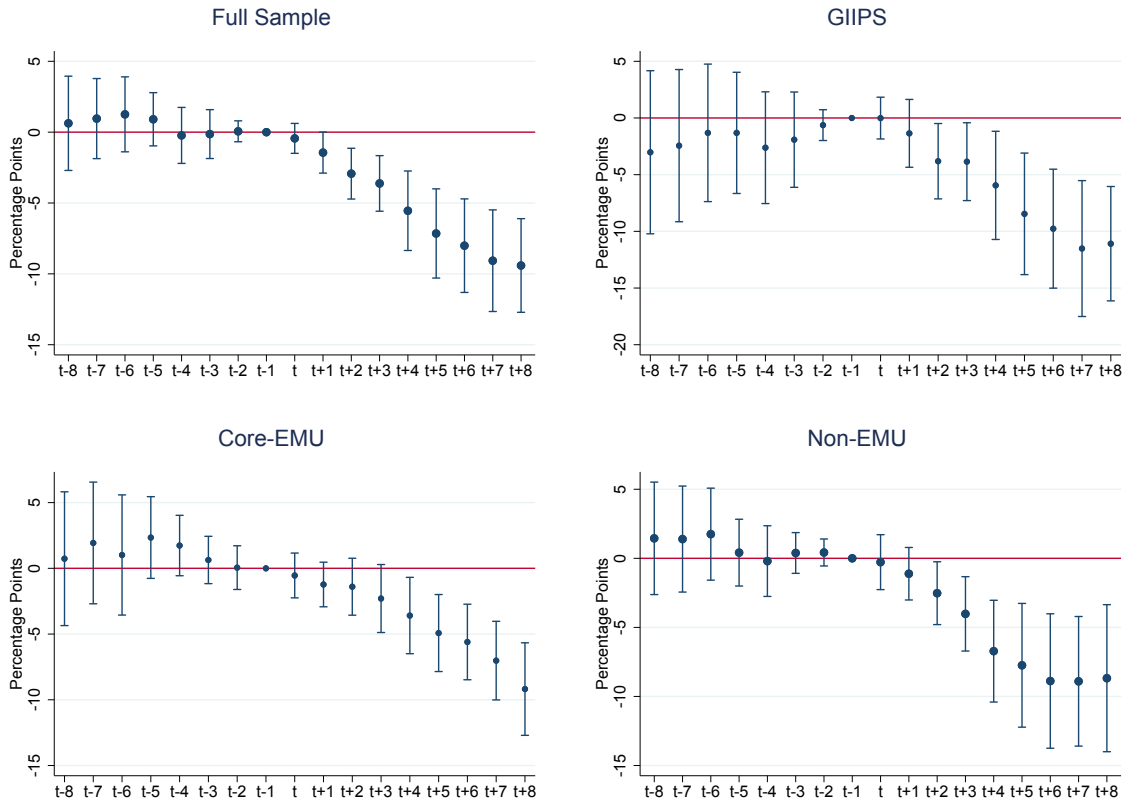


Notes: This figure represents the dynamic impact of the BRRD on the weight of equity in the WACC for banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$Weight\ of\ Equity_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Weight of Equity ($(\frac{E}{D+E})$). Each point represents the coefficient estimate for the indicator variables for the eight quarters before and after the country-specific law implementing the BRRD was published. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Figure 6: Event analysis: Banks' funding composition around BRRD transposition (Weight of debt)



Notes: This figure represents the dynamic impact of the BRRD on the weight of debt in the WACC for banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$Weight\ of\ Debt_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Weight of Debt ($(\frac{D}{D+E})$). Each point represents the coefficient estimate for the indicator variables for the eight quarters before and after the country-specific law implementing the BRRD was published. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Online Appendix

This appendix is for Online Publication and provides further tables and figures.

Table OA1: Event analysis: Banks' funding costs around BRRD transposition (WACC)

Dependent Variable: $WACC$				
	Estimates in Full Sample	Marginal Effect in GIIPS	Marginal Effect in Core EMU	Marginal Effect in Non-EMU
	(1)	(2)	(3)	(4)
$BRRD_{-8}$	-0.150	-0.471	-0.703	0.292
	(0.412)	(0.954)	(0.804)	(0.773)
$BRRD_{-7}$	-0.345	-0.681	-0.756	0.157
	(0.334)	(0.888)	(0.755)	(0.561)
$BRRD_{-6}$	-0.558*	-0.833	-0.627	-0.236
	(0.288)	(0.768)	(0.715)	(0.484)
$BRRD_{-5}$	-0.373*	-0.456	-0.835	0.082
	(0.204)	(0.654)	(0.544)	(0.306)
$BRRD_{-4}$	-0.166	-0.142	-0.532	0.205
	(0.185)	(0.548)	(0.435)	(0.265)
$BRRD_{-3}$	-0.407**	-0.135	-0.439	-0.587
	(0.190)	(0.441)	(0.299)	(0.371)
$BRRD_{-2}$	-0.177**	-0.024	-0.146	-0.218*
	(0.080)	(0.154)	(0.187)	(0.121)
BRRD	0.301**	-0.059	0.166	0.763***
	(0.115)	(0.201)	(0.182)	(0.205)
$BRRD_1$	0.362**	0.166	0.112	0.719**
	(0.167)	(0.261)	(0.272)	(0.326)
$BRRD_2$	0.535**	0.637**	-0.030	0.864*
	(0.231)	(0.303)	(0.258)	(0.447)
$BRRD_3$	0.700**	0.600*	0.174	1.468**
	(0.276)	(0.317)	(0.297)	(0.597)
$BRRD_4$	1.045***	1.159**	0.688**	1.731***
	(0.335)	(0.450)	(0.331)	(0.526)
$BRRD_5$	1.355***	1.690***	0.765**	2.183***
	(0.388)	(0.538)	(0.346)	(0.718)
$BRRD_6$	1.371***	1.822***	0.886**	2.196***
	(0.357)	(0.575)	(0.382)	(0.471)
$BRRD_7$	1.704***	2.522***	1.218**	2.406***
	(0.456)	(0.617)	(0.477)	(0.864)
$BRRD_8$	1.768***	2.658***	1.572***	1.949*
	(0.460)	(0.674)	(0.558)	(1.029)
R^2	0.90			
N	991			
Quarter and Bank FE	YES			

Notes: This table reports the estimates of the event study regression obtained from estimating equation (1):

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Weighted Average Cost of Capital (WACC, in %). $BRRD_j$ represents the coefficient estimate for the indicator variables for the j quarter before and after the country-specific law implementing the BRRD was published. We exclude the quarter before the national BRRD law was published, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3 and results are shown in Column (1). Columns (2)-(3) add to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law by a country for each of those banks. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. The coefficients are the same as the ones visualized in Figure 2. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA2: Event analysis: Banks' funding costs around BRRD transposition (WACC)

Dependent Variable: $WACC$	WACC	Cost of Equity	Cost of Debt	Weight of Equity	Weight of Debt
	(1)	(2)	(3)	(4)	(5)
BRRD$(0/1)_{ct}$	0.189	1.009**	-0.001	-0.706	0.668
	(0.153)	(0.385)	(0.045)	(0.709)	(0.714)
R^2	0.89	0.81	0.68	0.95	0.95
N	989	989	989	989	989
Quarter and Bank FE	YES	YES	YES	YES	YES

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: This table reports the estimates of the following regression model:

$$Y_{bct} = \alpha_b + \gamma_t + \beta BRRD(0/1)_{ct} + \epsilon_{bct}$$

The dependent variable is Weighted Average Cost of Capital (WACC, in %) or one of its subcompoments as indicated in the column header. $BRRD(0/1)_{ct}$ is a dummy variable that turns one once a country has published the law implementing the BRRD, before that date, it is zero. The sample comprises all banks as listed in Table 3. The observation period includes the eight quarters before and after publication of the national law by a country for each of those banks. The regression specification includes time and bank fixed effects. Standard errors are clustered at the bank level.

Table OA3: Regression results: Asymmetry interactions

Dependent Variable: $\Delta Spread$	$\Delta WACC$ (1)	$\Delta Cost\ of\ Debt$ (2)	$\Delta Cost\ of\ Equity$ (3)
$\lvert\Delta WACC^{+}\rvert$	-0.061		
	(0.129)		
$\lvert\Delta WACC^{+}\rvert$ * Core EMU	0.330***		
	(0.107)		
$\lvert\Delta WACC^{+}\rvert$ * Non-EMU	-0.500**		
	(0.197)		
$\lvert\Delta WACC^{-}\rvert$	0.029		
	(0.352)		
$\lvert\Delta WACC^{-}\rvert$ * Core EMU	-0.196		
	(0.356)		
$\lvert\Delta WACC^{-}\rvert$ * Non-EMU	-0.093		
	(0.349)		
$\lvert\Delta Cost\ of\ Debt^{+}\rvert$		0.193	
		(0.168)	
$\lvert\Delta Cost\ of\ Debt^{+}\rvert$ * Core EMU		0.198	
		(0.214)	
$\lvert\Delta Cost\ of\ Debt^{+}\rvert$ * Non-EMU		-0.233	
		(0.159)	
$\lvert\Delta Cost\ of\ Debt^{-}\rvert$		-0.066	
		(0.212)	
$\lvert\Delta Cost\ of\ Debt^{-}\rvert$ * Core EMU		-0.099	
		(0.224)	
$\lvert\Delta Cost\ of\ Debt^{-}\rvert$ * Non-EMU		0.144	
		(0.280)	
$\lvert\Delta Cost\ of\ Equity^{+}\rvert$			-0.103
			(0.328)
$\lvert\Delta Cost\ of\ Equity^{+}\rvert$ * Core EMU			0.793*
			(0.403)
$\lvert\Delta Cost\ of\ Equity^{+}\rvert$ * Non-EMU			-0.829
			(0.907)
$\lvert\Delta Cost\ of\ Equity^{-}\rvert$			-0.094
			(0.375)
$\lvert\Delta Cost\ of\ Equity^{-}\rvert$ * Core EMU			-0.197
			(0.350)
$\lvert\Delta Cost\ of\ Equity^{-}\rvert$ * Non-EMU			-0.140
			(0.379)
R^2	0.86	0.86	0.86
N	756	756	756
Bank-Country FE	YES	YES	YES
Firm FE	YES	YES	YES
Loan Controls	YES	YES	YES
Bank Controls	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (3). The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are the log difference in WACC (or a sub-component) as well as bank and loan characteristics of the pre-BRRD loan. The explanatory variable $\Delta WACC$ is split up into its positive ($\lvert\Delta WACC^{+}\rvert$) and negative ($\lvert\Delta WACC^{-}\rvert$) part. Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA4: Regression results: Lending margin

Dependent Variable: $\Delta Spread$	$\Delta WACC$ (1)	$\Delta Cost\ of\ Debt$ (2)	$\Delta Cost\ of\ Equity$ (3)
Lending Margin	0.125***	0.051	0.118***
	(0.035)	(0.043)	(0.024)
Lending Margin * Core EMU	-0.320**	-0.260**	-0.320***
	(0.117)	(0.113)	(0.086)
Lending Margin * Non-EMU	0.312	-0.084	0.347
	(0.264)	(0.310)	(0.213)
Δ WACC	0.232		
	(0.425)		
Δ WACC * Lending Margin	-0.195		
	(0.211)		
Δ WACC * Core EMU	0.066		
	(0.493)		
Δ WACC * Lending Margin * Core EMU	0.138		
	(0.261)		
Δ WACC * Non-EMU	-1.135		
	(0.734)		
Δ WACC * Lending Margin * Non-EMU	0.984*		
	(0.507)		
Δ Cost of Debt		0.576	
		(0.346)	
Δ Cost of Debt * Lending Margin		-0.338	
		(0.199)	
Δ Cost of Debt * Core EMU		-0.187	
		(0.381)	
Δ Cost of Debt * Lending Margin * Core EMU		0.208	
		(0.214)	
Δ Cost of Debt * Non-EMU		-0.418	
		(0.490)	
Δ Cost of Debt * Lending Margin * Non-EMU		0.122	
		(0.462)	
Δ Cost of Equity			0.943*
			(0.532)
Δ Cost of Equity * Lending Margin			-0.566*
			(0.315)
Δ Cost of Equity * Core EMU			0.112
			(0.598)
Δ Cost of Equity * Lending Margin * Core EMU			0.213
			(0.368)
Δ Cost of Equity * Non-EMU			-1.718*
			(0.926)
Δ Cost of Equity * Lending Margin * Non-EMU			1.291**
			(0.586)
R^2	0.86	0.86	0.87
N	751	751	751
Firm FE	YES	YES	YES
Bank-Country FE	YES	YES	YES
Loan Controls	YES	YES	YES
Bank Controls	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (2) and including a triple interaction with the lending margin. The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are the log difference in WACC (or a sub-component) as well as bank and loan characteristics of the pre-BRRD loan. An interaction of the funding cost variable with the pre-defined lending margin at the country level is included. Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA5: Regression results: Lending spread

Dependent Variable: $\Delta Spread$	$\Delta WACC$	$\Delta Cost\ of\ Debt$	$\Delta Cost\ of\ Equity$
	(1)	(2)	(3)
Lending Spread	0.039	-0.078	0.035
	(0.083)	(0.087)	(0.075)
Lending Spread * Core EMU	0.251**	0.327***	0.216***
	(0.092)	(0.076)	(0.057)
Δ WACC	1.717**		
	(0.765)		
Δ WACC * Lending Spread	-0.571**		
	(0.248)		
Δ WACC * Core EMU	-0.961		
	(1.115)		
Δ WACC * Lending Spread * Core EMU	0.256		
	(0.496)		
Δ Cost of Debt		2.503***	
		(0.645)	
Δ Cost of Debt * Lending Spread		-0.842***	
		(0.223)	
Δ Cost of Debt * Core EMU		-1.910**	
		(0.764)	
Δ Cost of Debt * Lending Spread * Core EMU		0.613*	
		(0.321)	
Δ Cost of Equity			2.819***
			(0.921)
Δ Cost of Equity * Lending Spread			-0.982***
			(0.296)
Δ Cost of Equity * Core EMU			-2.044
			(1.414)
Δ Cost of Equity * Lending Spread * Core EMU			0.839
			(0.658)
R^2	0.86	0.86	0.87
N	701	701	701
Bank-Country FE	YES	YES	YES
Firm FE	YES	YES	YES
Loan Controls	YES	YES	YES
Bank Controls	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (2) and including a triple interaction with the lending spread. The sample covered includes all EMU banks as listed in Table 5 for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are the log difference in WACC (or a sub-component) as well as bank and loan characteristics of the pre-BRRD loan. An interaction of the funding cost variable with the pre-defined lending spread is included. The lending spread is calculated as the difference between the country-specific lending rate on new business and the main refinancing rate of the ECB (in percentage points). Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA6: Regression results: Bank-firm relationship strength

Dependent Variable: $\Delta Spread$	$\Delta WACC$ (1)	$\Delta Cost\ of\ Debt$ (2)	$\Delta Cost\ of\ Equity$ (3)
Relationship Strength	0.037**	0.024	0.030***
	(0.014)	(0.015)	(0.009)
Relationship Strength * Core EMU	-0.044**	-0.052**	-0.042**
	(0.016)	(0.021)	(0.018)
Relationship Strength * Non-EMU	-0.042***	-0.020	-0.029***
	(0.015)	(0.014)	(0.009)
Δ WACC	0.044		
	(0.110)		
Δ WACC * Relationship Strength	-0.039		
	(0.024)		
Δ WACC * Core EMU	0.219**		
	(0.093)		
Δ WACC* Relationship Strength * Core EMU	-0.041		
	(0.087)		
Δ WACC * Non-EMU	0.010		
	(0.123)		
Δ WACC * Relationship Strength * Non-EMU	-0.021		
	(0.048)		
Δ Cost of Debt		0.112	
		(0.082)	
Δ Cost of Debt * Relationship Strength		-0.017	
		(0.043)	
Δ Cost of Debt * Core EMU		0.156*	
		(0.080)	
Δ Cost of Debt * Relationship Strength * Core EMU		-0.204	
		(0.152)	
Δ Cost of Debt * Non-EMU		-0.190	
		(0.186)	
Δ Cost of Debt * Relationship Strength * Non-EMU		0.011	
		(0.044)	
Δ Cost of Equity			0.182
			(0.173)
Δ Cost of Equity * Relationship Strength			-0.085***
			(0.021)
Δ Cost of Equity * Core EMU			0.307**
			(0.138)
Δ Cost of Equity * Relationship Strength * Core EMU			0.134
			(0.241)
Δ Cost of Equity * Non-EMU			0.035
			(0.215)
Δ Cost of Equity * Relationship Strength * Non-EMU			0.064
			(0.040)
R^2	0.86	0.86	0.87
N	756	756	756
Firm FE	YES	YES	YES
Bank-Country FE	YES	YES	YES
Loan Controls	YES	YES	YES
Bank Controls	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (2) and including a triple interaction with the strength of the bank-firm relationship. The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are the log difference in WACC (or a sub-component) as well as bank and loan characteristics of the pre-BRRD loan. An interaction of the funding cost variable with the pre-defined measure for the strength of the bank-firm relationship is included. Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA7: Regression results: Alternative loan outcomes

	Dependent Variable: $\Delta Maturity$			Dependent Variable: $\Delta Loan\ Amount$			Dependent Variable: $\Delta Covenant$		
	$\Delta WACC$	$\Delta Cost\ of\ Debt$	$\Delta Cost\ of\ Equity$	$\Delta WACC$	$\Delta Cost\ of\ Debt$	$\Delta Cost\ of\ Equity$	$\Delta WACC$	$\Delta Cost\ of\ Debt$	$\Delta Cost\ of\ Equity$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ WACC	0.131			-0.165			-0.036		
	(0.084)			(0.208)			(0.061)		
Δ WACC* EMU Core	-0.020			-0.237			0.118**		
	(0.085)			(0.216)			(0.054)		
Δ WACC*Non-EMU	-0.156			0.055			0.335		
	(0.212)			(0.282)			(0.242)		
Δ Cost of Debt		0.121			-0.315**			-0.075	
		(0.095)			(0.131)			(0.067)	
Δ Cost of Debt*EMU Core		-0.035			-0.015			0.070	
		(0.121)			(0.111)			(0.066)	
Δ Cost of Debt*Non-EMU		-0.022			0.210			0.242	
		(0.149)			(0.196)			(0.174)	
Δ Cost of Equity			-0.100			-0.038			-0.015
			(0.154)			(0.207)			(0.074)
Δ Cost of Equity*EMU Core			0.106			-0.029			0.217***
			(0.202)			(0.232)			(0.062)
Δ Cost of Equity*Non-EMU			0.031			0.148			0.573*
			(0.262)			(0.410)			(0.331)
R^2	0.80	0.80	0.80	0.81	0.81	0.81	0.82	0.82	0.82
N	752	752	752	756	756	756	756	756	756
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank-Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (2) whereas the dependent variable is varied across different loan outcomes. The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable as indicated in the column header is calculated as the difference of the loan outcome variable between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are the log difference in WACC or the log difference in one of the sub-components of WACC as indicated in the column header. Further controls include bank characteristics of the pre-BRRD loan. Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA8: Regression results: Robustness demand side

Dependent Variable: $\Delta Spread$	$\Delta WACC$		$\Delta Cost\ of\ Debt$		$\Delta Cost\ of\ Equity$	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ WACC	-0.146	-0.053				
	(0.215)	(0.129)				
Δ WACC* EMU Core	0.222	0.278**				
	(0.183)	(0.101)				
Δ WACC*Non-EMU	-0.046	0.012				
	(0.223)	(0.129)				
Δ Cost of Debt			-0.155	0.111		
			(0.214)	(0.104)		
Δ Cost of Debt*EMU Core			0.157	0.116		
			(0.180)	(0.096)		
Δ Cost of Debt*Non-EMU			0.093	-0.179		
			(0.206)	(0.165)		
Δ Cost of Equity					-0.416	0.029
					(0.333)	(0.178)
Δ Cost of Equity*EMU Core					0.743*	0.458**
					(0.401)	(0.166)
Δ Cost of Equity*Non-EMU					0.039	0.144
					(0.388)	(0.223)
Pre Shock Equity Ratio	0.003	-0.008	0.009	-0.008	0.011	-0.006
	(0.007)	(0.012)	(0.010)	(0.013)	(0.010)	(0.015)
Pre Shock Profitability	0.007	-0.050	0.021	-0.022	-0.025	-0.043
	(0.036)	(0.057)	(0.034)	(0.057)	(0.046)	(0.049)
Pre Shock Ln Total Assets	-0.009	-0.012	-0.012*	-0.009	-0.018**	-0.021
	(0.006)	(0.011)	(0.006)	(0.013)	(0.008)	(0.014)
Pre Shock Small Loan	-0.142	-0.181*	-0.135	-0.187*	-0.128	-0.152
	(0.161)	(0.105)	(0.158)	(0.095)	(0.151)	(0.095)
Pre Shock Loan Short Term	-0.035	-0.090*	-0.032	-0.088*	-0.028	-0.079
	(0.087)	(0.052)	(0.087)	(0.052)	(0.085)	(0.053)
Pre Shock Loan Covenant	-0.108***	0.052*	-0.093***	0.030	-0.064***	0.103**
	(0.020)	(0.030)	(0.013)	(0.039)	(0.013)	(0.047)
R^2	0.90	0.86	0.90	0.86	0.90	0.86
N	475	756	475	756	475	756
Firm FE	YES	YES	YES	YES	YES	YES
Bank-Country FE	YES	YES	YES	YES	YES	YES
Industry FE	NO	YES	NO	YES	NO	YES
Firm-Country FE	NO	YES	NO	YES	NO	YES

Notes: This table shows the regression results obtained from estimating equation (2). The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are the log difference in WACC (or a sub-component) as indicated in the column header as well as bank and loan controls of the pre-shock loan. Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. In columns (1), (3), and (5), only loan observations that occur in the two years before and after the country-specific BRRD date are included. In columns (2), (4), and (6), we draw on the whole sample period and include industry as well as firm-country fixed effects next to firm fixed effects. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA9: Regression results: Robustness implementation timing

Dependent Variable: $\Delta Spread$	$\Delta WACC$		$\Delta Cost\ of\ Debt$		$\Delta Cost\ of\ Equity$	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ WACC	-0.026	-0.033				
	(0.119)	(0.134)				
Δ WACC* EMU Core	0.253**	0.324***				
	(0.100)	(0.099)				
Δ WACC*Non-EMU	-0.022	0.059				
	(0.136)	(0.121)				
Δ Cost of Debt			0.124	0.124		
			(0.103)	(0.113)		
Δ Cost of Debt*EMU Core			0.105	0.153		
			(0.103)	(0.102)		
Δ Cost of Debt*Non-EMU			-0.204	-0.321**		
			(0.171)	(0.114)		
Δ Cost of Equity					0.030	0.039
					(0.170)	(0.186)
Δ Cost of Equity*EMU Core					0.456***	0.497***
					(0.160)	(0.170)
Δ Cost of Equity*Non-EMU					0.143	-0.113
					(0.221)	(0.206)
IntroDate	0.004		0.005		0.000	
	(0.005)		(0.005)		(0.006)	
Pre Shock Equity Ratio	-0.008	-0.007	-0.008	-0.006	-0.006	-0.004
	(0.012)	(0.014)	(0.012)	(0.014)	(0.015)	(0.018)
Pre Shock Profitability	-0.059	-0.039	-0.032	-0.008	-0.044	-0.034
	(0.052)	(0.063)	(0.051)	(0.063)	(0.039)	(0.053)
Pre Shock Ln Total Assets	-0.009	-0.015	-0.006	-0.013	-0.020	-0.026
	(0.010)	(0.012)	(0.011)	(0.014)	(0.014)	(0.016)
Pre Shock Small Loan	-0.185	-0.226**	-0.191*	-0.227***	-0.153	-0.193**
	(0.114)	(0.084)	(0.104)	(0.074)	(0.100)	(0.084)
Pre Shock Loan Short Term	-0.082	-0.079	-0.079	-0.076	-0.078	-0.062
	(0.051)	(0.049)	(0.051)	(0.048)	(0.051)	(0.048)
Pre Shock Loan Covenant	0.052	0.043	0.030	0.015	0.102*	0.097*
	(0.032)	(0.033)	(0.040)	(0.042)	(0.050)	(0.053)
R^2	0.86	0.86	0.86	0.86	0.86	0.87
N	756	690	756	690	756	690
Firm FE	YES	YES	YES	YES	YES	YES
Bank-Country FE	YES	YES	YES	YES	YES	YES

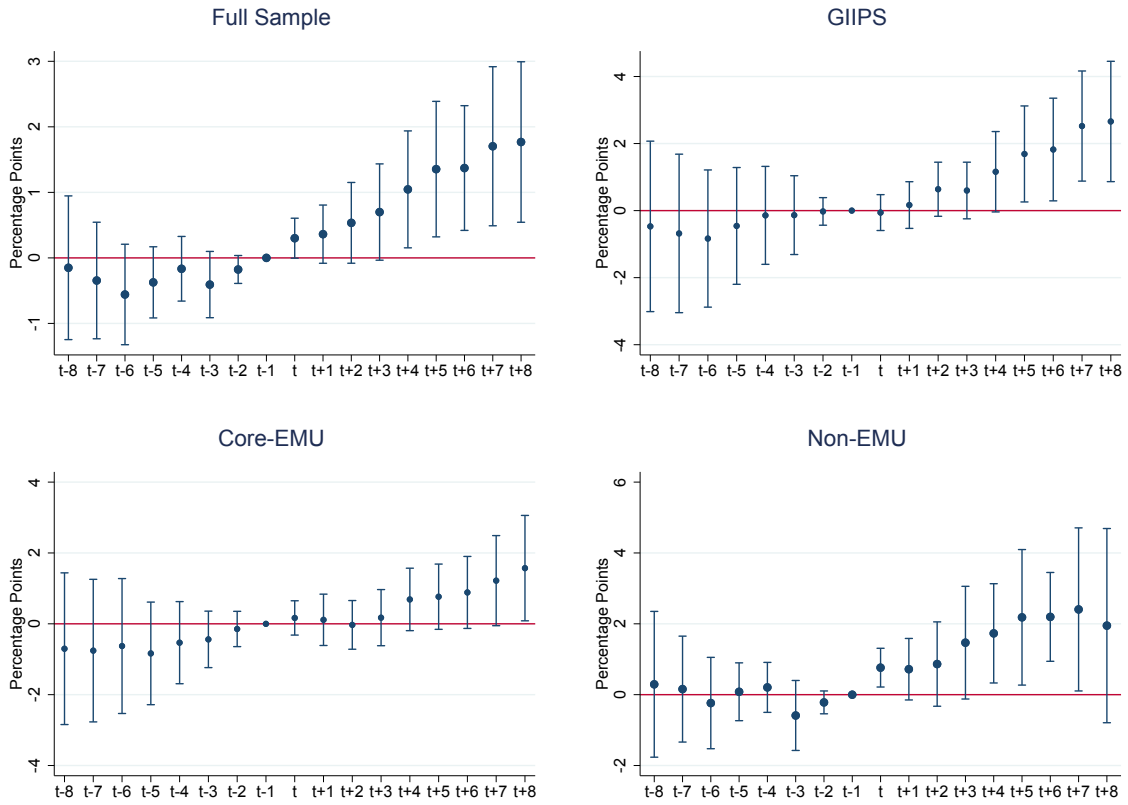
Notes: This table shows the regression results obtained from estimating equation (2). The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are the log difference in WACC (or a sub-component) as indicated in the column header as well as bank and loan controls of the pre-shock loan. Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. In columns (1), (3), and (5), we include a control variable for the BRRD implementation quarter $IntroDate$. In columns (2), (4), and (6), we drop banks from countries that implemented the BRRD only in 2016. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Table OA10: Regression results: Robustness lead arrangers

Dependent Variable: $\Delta Spread$	$\Delta WACC$		$\Delta Cost\ of\ Debt$		$\Delta Cost\ of\ Equity$	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ WACC	0.032	-0.053				
	(0.169)	(0.129)				
Δ WACC* EMU Core	0.185*	0.278**				
	(0.101)	(0.101)				
Δ WACC*Non-EMU	0.030	0.012				
	(0.183)	(0.129)				
Δ Cost of Debt			0.133	0.111		
			(0.122)	(0.104)		
Δ Cost of Debt*EMU Core			0.061	0.116		
			(0.081)	(0.096)		
Δ Cost of Debt*Non-EMU			-0.245	-0.179		
			(0.245)	(0.165)		
Δ Cost of Equity					0.235	0.029
					(0.279)	(0.178)
Δ Cost of Equity*EMU Core					0.403	0.458**
					(0.242)	(0.166)
Δ Cost of Equity*Non-EMU					0.096	0.144
					(0.306)	(0.223)
Pre Shock Equity Ratio	0.010	-0.008	0.011	-0.008	0.012	-0.006
	(0.016)	(0.012)	(0.017)	(0.013)	(0.016)	(0.015)
Pre Shock Profitability	-0.037	-0.050	-0.019	-0.022	-0.028	-0.043
	(0.095)	(0.057)	(0.095)	(0.057)	(0.078)	(0.049)
Pre Shock Ln Total Assets	0.003	-0.012	0.005	-0.009	-0.007	-0.021
	(0.016)	(0.011)	(0.019)	(0.013)	(0.018)	(0.014)
Pre Shock Small Loan	0.066	-0.181*	0.042	-0.187*	0.100	-0.152
	(0.114)	(0.105)	(0.099)	(0.095)	(0.123)	(0.095)
Pre Shock Loan Short Term	-0.174**	-0.090*	-0.161*	-0.088*	-0.165**	-0.079
	(0.076)	(0.052)	(0.079)	(0.052)	(0.080)	(0.053)
Pre Shock Loan Covenant	0.077	0.052*	0.017	0.030	0.067	0.103**
	(0.168)	(0.030)	(0.174)	(0.039)	(0.180)	(0.047)
R^2	0.85	0.86	0.85	0.86	0.87	0.86
N	505	756	505	756	505	756
Firm FE	YES	YES	YES	YES	YES	YES
Bank-Country FE	YES	YES	YES	YES	YES	YES

Notes: This table shows the regression results obtained from estimating equation (2). The sample covered is listed in Table 5 which presents the list of banks for which it is possible to observe in the Worldscope-Bloomberg-DealScan dataset at least one bank-firm relationship with one loan before and one loan after the implementation of the BRRD. The dependent variable $\Delta Spread$ is calculated as the log difference of the loan spreads between the same bank-firm pair of the two closest loans before and after implementation of the BRRD. The explanatory variables are, in panel A, the log difference in WACC and, in panel B and C, the log difference in one of the sub-components of WACC. Further controls include bank and loan characteristics of the pre-BRRD loan. In columns (1), (3) and (5), banks classified in the last two categories of the ranking hierarchy of lead arrangers are excluded. In columns (2), (4), and (6), banks classified in the last category of the hierarchy, that is "Participant" or "Secondary investor", are excluded. Firm fixed effects are included such that only firms that borrow from at least two banks before and after the implementation date appear in the sample. Standard errors are clustered at the bank level. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

Figure OA1: Event analysis: Banks' funding costs around BRRD transposition (WACC) – 99% Confidence interval

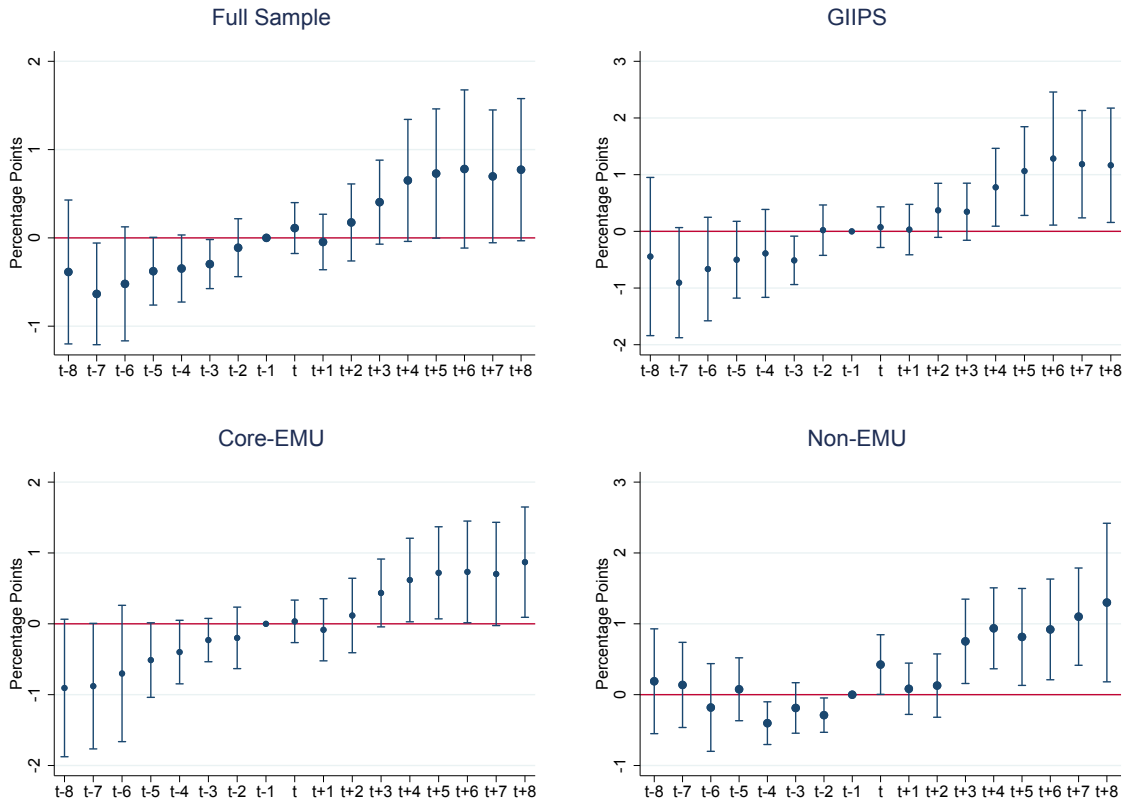


Notes: This figure represents the dynamic impact of the BRRD on the capital costs of banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Weighted Average Cost of Capital (WACC, in %). Each point in the figure represents the coefficient estimate for the indicator variables for the eight quarters before and after the country-specific law implementing the BRRD was published. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 99% confidence bands.

Figure OA2: Event analysis: Banks' funding costs around BRRD transposition (WACC) – Weighted regression

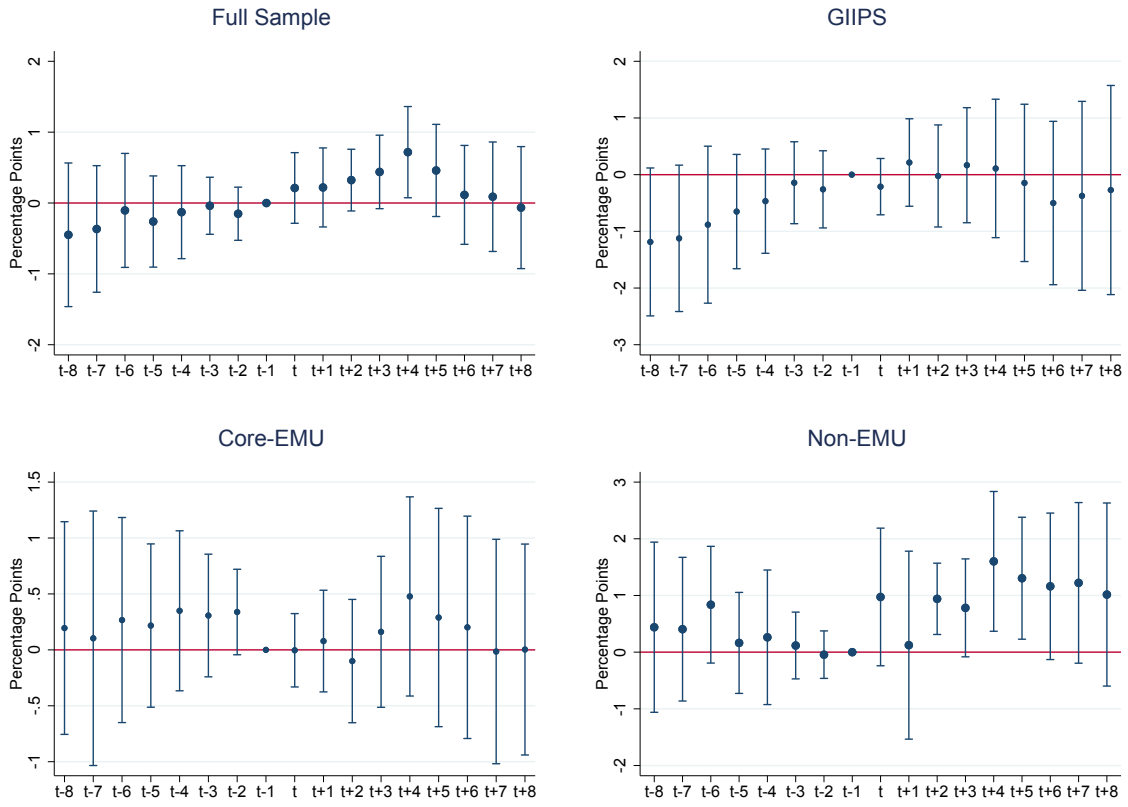


Notes: This figure represents the dynamic impact of the BRRD on the capital costs of banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1), whereas observations are weighted by bank size:

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Weighted Average Cost of Capital (WACC, in %). The weights are defined as the average of total assets over the period 2010-2018. Each point in the figure represents the coefficient estimate for the indicator variables for the eight quarters before and after the country-specific law implementing the BRRD was published. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Figure OA3: Event analysis: Banks' funding costs around BRRD transposition (WACC) – Placebo test

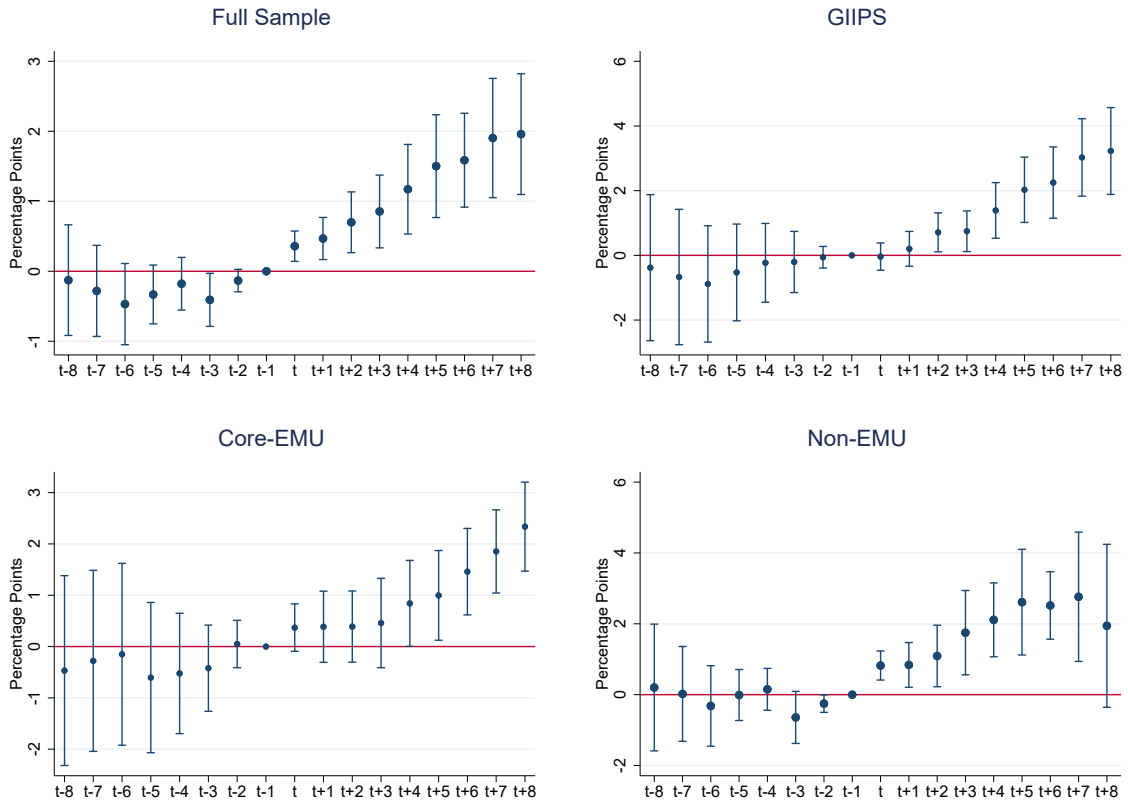


Notes: This figure represents the dynamic impact of the placebo date for BRRD on the capital costs of banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,placebo+j} + \epsilon_{bct}$$

The dependent variable is Weighted Average Cost of Capital (WACC, in %). Each point in the figure represents the coefficient estimate for the indicator variables for the eight quarters before and after the placebo date for the country-specific law implementing the BRRD. For each country, we shift the BRRD law date three years backward. We exclude the quarter before placebo BRRD date, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after the placebo BRRD date for each of those banks. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Figure OA4: Event Analysis: Banks' funding costs around BRRD transposition (WACC) – First available date on BRRD national implementation

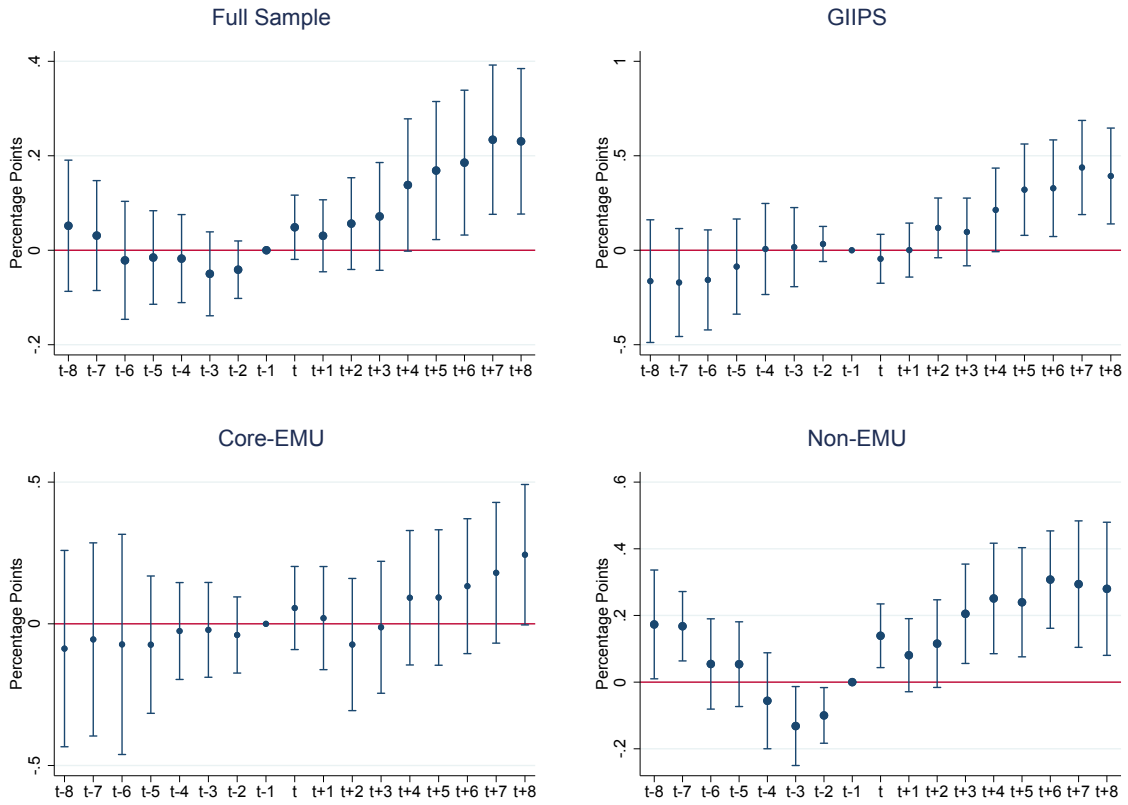


Notes: This figure represents the dynamic impact of the BRRD on the capital costs of banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,1stdate+j} + \epsilon_{bct}$$

Each point in the figure represents the coefficient estimate for the indicator variables for the eight quarters before and after the first legal document on the BRRD was published by a country. We exclude the quarter before the first legal document on the BRRD was published by a country, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$ Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the first legal document on the BRRD by a country for each of those banks. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

Figure OA5: Event Analysis: Banks' funding costs around BRRD transposition (WACC) – Natural logarithm



Notes: This figure represents the dynamic impact of the BRRD on the capital costs of banks in the sample. It reports estimates of the event study regression obtained from estimating equation (1):

$$WACC_{bct} = \alpha_b + \gamma_t + \sum_{j=-8}^{j=8} \beta_j BRRD(0/1)_{c,law+j} + \epsilon_{bct}$$

The dependent variable is Weighted Average Cost of Capital (WACC, natural logarithm). Each point in the figure represents the coefficient estimate for the indicator variables for the eight quarters before and after the country-specific law implementing the BRRD was published. We exclude the quarter before the directive is transposed into national law, thus estimating the dynamic effects relative to that quarter. The full sample includes all banks listed in Table 3. The other graphs present the results obtained from adding to equation (1) two interaction terms of the BRRD indicator variables with subsample dummies ($\sum_{j=-8}^{j=8} \gamma_j BRRD(0/1)_{c,law+j} \times$ Core EMU(0/1) and $\sum_{j=-8}^{j=8} \omega_j BRRD(0/1)_{c,law+j} \times$Non-EMU(0/1)) and show marginal effects of $BRRD_j$ conditional on a bank being located in a subsample. The observation period includes the eight quarters before and after publication of the national law for each of those banks. The regression specification uses time and bank fixed effects. Standard errors are clustered at the bank level. Coefficient estimates are surrounded by 95% confidence bands.

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