How Organizational and Geographic Complexity Influence Performance: Evidence from European Banks

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Abstract

We empirically investigate how bank internationalization, organizational complexity, and geographical complexity stemming from foreign-affiliate type and geographic dispersion affect parent bank stability and profitability. We base our analysis on unique, hand-collected data for the worldwide locations of subsidiaries and branches of EU banks. Our results show that internationalization benefits bank stability by reducing default risk, and it is significantly associated with lower earnings volatility but poorer profitability. With regard to foreign organizational complexity, banks with both foreign subsidiaries and foreign branches are more stable than banks with foreign branches exclusively, which are more stable than banks with only foreign subsidiaries. Nevertheless, higher geographic complexity is associated with lower default risk, higher volatility in earnings, and higher profitability. Further investigation on the sovereign debt crisis and bank size indicates that the sovereign debt crisis in 2011 amplified the relationship and our findings mainly hold for small banks.

JEL classification: G21, G28

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1. Introduction

Throughout the persistent liberalization and deregulation of financial systems around the world, banks have progressively grown from standalone entities to large institutions owning or owned by other companies, which leads to financial conglomerates and bank holding companies (BHC) with numerous domestic and foreign affiliates, including subsidiaries or branches abroad (Herring and Santomero, 1990; and Herring and Carmassi, 2010). Banks have grown in size, in business type, and in affiliate type, and they are more present worldwide, which poses major threats for financial stability (Cetorelli et al., 2014; and Carmassi and Herring, 2016). Regulators are concerned not only about banks being too big to fail, but also about banks becoming too complex to fail.[2] They thus respond worldwide by advocating restrictions on bank size and scope of activities; ring-fencing activities into legally, functionally, and financially separate entities; setting additional capital requirements to build a capital cushion; and defining living wills and recovery and resolution frameworks in case of (systemically important) bank collapses (IMF-BIS-FSB, 2009; Volcker Rule in Dodd-Frank Act U.S. Congress, 2010; Liikanen Report, 2012; and Vickers Report, 2013).

Extant literature explores the advance of internationalization and investigates the impact of such trends on bank performance and stability (see Claessens et al., 2001; Cerutti et al., 2007; Chen and Liao, 2011; Cerutti, 2015; Karyoli and Taboada, 2015; Berger et al., 2017, among others). The mechanisms underlying the association between internationalization and bank performance and stability hinge on two main opposing views. On one hand, the market-risk hypothesis states that because banks share similar risks among different markets around the world, internationalization increases overall bank risk unless the risk is counterbalanced by a lower level of correlation among such markets (Buch et al., 2014; Goetz et al., 2016; Berger et al., 2017). On the other hand, the diversification hypothesis indicates that banks' idiosyncratic risk decreases when they diversify into cross-border activities and banks become less exposed to domestic market shocks (Laeven and Levine, 2007; Goetz et al., 2016; Berger et al., 2017).

In this paper, we extend the literature on bank internationalization by taking into account both foreign organizational and geographic complexity, and examine their impacts on parent bank stability and profitability. Regarding foreign organizational complexity, we look at how banks are organized abroad by considering affiliate type (subsidiaries or branches). These two

[2] IMF-BIS-FSB (2009) defines a complex institution as an institution or financial group that (a) conducts diverse types of activities through numerous legal entities (e.g., simultaneously operating banking, insurance, and securities subsidiaries); (b) operates across borders with centrally managed capital and liquidity (as opposed to simpler networks of domestic subsidiaries); and/or (c) has exposures to new and complex products and markets that have not been sufficiently tested.

affiliate types do not have similar degrees of support and commitment from parent banks (Dell'Ariccia and Marquez, 2010); thus, how foreign organizational complexity influences bank performance and risk is yet unclear. For instance, although subsidiaries need to comply with host country regulatory requirements, branches are extensions of parent banks, and they generally need to implement home country rules. Because multinational banks are present in different world regions, which bring another dimension of complexity, we also investigate the influence of such geographic complexity captured by the dispersion of affiliates across the globe. On one hand, diversifying into various geographical markets around the world lowers parent banks' total exposure to local markets' idiosyncratic risk. On the other hand, increasing the distance between parents and affiliates might bring higher costs and management issues that decrease the benefits of diversification (Deng and Elyasiani, 2008; Goetz et al., 2016; Fang and van Lelyveld, 2014).

This paper uses hand-collected data on the number and location of foreign affiliates around the world for a sample of 825 commercial, cooperative, and savings banks in 28 European Union countries over the 2011-2013 period. We use Hausman-Taylor (HT) estimators in our regressions, which effectively deal with the possible endogeneity issues induced by bank-specific effects and help control for cross-country variations. Our findings reveal that internationalization is beneficial for bank stability as it contributes to lower default risk. We also find strong evidence that internationalization is significantly associated with lower earnings volatility and but poorer profitability. With regard to foreign organizational complexity, we observe that banks with both subsidiaries and branches abroad are more stable (and less profitable) than banks operating in one form only. Besides, banks operating abroad exclusively with branches are more stable than banks that only operate with subsidiaries abroad. Regarding the influence of geographical complexity, we observe that higher geographic dispersion of affiliates is associated with lower default risk, higher earnings volatility, and higher profitability. Further investigation shows that the relationship strengthens during the sovereign debt crisis in 2011, showing that banks engaged in cross-border operations tend to be less vulnerable during crisis times. Moreover, we deepen our investigation and explore whether our findings differ for large and small banks. We observe that although our main findings generally hold for small banks, the findings point to the opposite for large banks.

We contribute to the literature in the following ways. In this research area, some papers look into the relationships among bank internationalization, bank performance, and stability (see Buch et al., 2014; Berger et al., 2017, among others). Others focus on bank foreign organizational and geographical complexity and their impacts on bank performance and

stability (see Krause et al., 2017; Liu et al., 2015; Cetorelli and Goldberg, 2016; Chernobai et al., 2020). We extend this research to account for both foreign organizational and geographic complexity, and we explore their influences on parent bank risk and profitability. To our knowledge, the existing literature generally considers the number of subsidiaries as a proxy and does not investigate the impacts of both the number of affiliates (branches and subsidiaries) and the number of locations. The existing research also generally focuses on U.S. bank holding companies (Liu et al., 2015; Cetorelli and Goldberg, 2016) or a smaller sample of publicly listed banks (Krause et al., 2017). We fill this gap by using a novel hand-collected dataset and a comprehensive sample of 825 private and publicly listed European banks. We build various measures that account for foreign organizational and geographic complexity. Specifically, to isolate the implications for bank stability and performance more accurately, we define three foreign organizational strategies that banks around the world follow: operating with (1) foreign branches exclusively, (2) foreign subsidiaries only, and (3) both branches and subsidiaries abroad. Moreover, previous studies that investigate geographic complexity in banking generally focus on the subsidiary structure abroad (Krause et al., 2017; Liu et al., 2015; Cetorelli and Goldberg, 2016). We extend this literature by considering both the number of branches and subsidiaries in each world region and the total number of regions in which banks operate. Finally, we deepen the analysis and contribution by testing whether banks' individual characteristics such as size and the 2011 European sovereign debt crisis play any role in this relationship.

The rest of the paper is organized as follows. Section 2 presents the related literature and our research focus. Section 3 describes the sample, the methodology and provides details on the variables. Section 4 discusses the empirical findings and further investigations of our main results. In section 5, we perform some robustness checks; section 6 concludes the paper.

2. Related literature and research focus

When global deregulation and liberalization processes occur, banks grow substantially, become more complex, and establish broad networks of affiliates, which include subsidiaries or branches either domestic or abroad. Through their affiliate structures, they perform various activities locally and around the world (Herring and Carmassi, 2010; McCauley et al., 2010, Cetorelli et al., 2014, Berger et al., 2017).

In recent years, many academics investigate the complexity of financial institutions, but there is no consensus on a general definition and its implications. Cetorelli and Goldberg (2014), for example, state that focusing on multinational banks as opposed to purely domestic

ones brings a more comprehensive approach to bank complexity because being a multinational bank adds many layers of complexity. The literature generally measures bank complexity either by bank size (Hughes and Mester, 2013; Cetorelli and Goldberg, 2016) or by number of subsidiaries (Carmassi and Herring, 2013; Laeven et al., 2014; Barth and Wihlborg, 2016, 2017). Yet, bank size and number of subsidiaries cannot fully capture the level of complexity in multinational banks; Cetorelli and Goldberg (2014) thus propose three broad measurement concepts of multinational bank complexity: (1) organizational complexity (the number of separate affiliated entities), (2) geographical complexity (the regions/countries where the organization has affiliates), and (3) business complexity (the types and variety of activities). In this paper, our focus is on the organizational and geographical complexity of multinational banks; we investigate how the extent of internationalization and foreign organizational and geographical complexity affect bank stability and profitability.

A broad literature examines the development of internationalization and cross-border activities, documenting significant penetration of foreign markets and the rise of multinational banks (Kindleberger, 1983; Berger et al., 2000; Claessens and van Horen, 2014). Such papers investigate the impact of such trends on either host countries or home country bank performance and stability (Demirguc-Kunt et al., 1998; Claessens et al., 2001; Clarke et al., 2003; Cerutti et al., 2007; Chen and Liao, 2011; Chou and Shen, 2014; Cerutti, 2015; Karyoli and Taboada, 2015; Berger et al., 2017).

The mechanisms underlying the link between internationalization and bank performance/stability are based on two opposing views. On one hand, the market-risk hypothesis argues that internationalization increases overall bank risk because banks with similar asset portfolios bear a similar level of risk unless a lower level of correlation among different markets offsets that risk. Multinational banks in interlinked systems become riskier, which can severely affect the stability and performance of the whole banking system (see e.g., Buch et al., 2014; Goetz et al., 2016; Berger et al., 2017). Moreover, local competition in foreign markets may increase the time new entrants need to capture market share and build lending relationships, which may deteriorate bank performance (Chari and Gupta, 2008; Berger et al., 2017).

On the other hand, the diversification hypothesis states that as long as the idiosyncratic risks of foreign and domestic assets are imperfectly correlated, diversifying into cross-border activities reduces banks' idiosyncratic risk; they become more stable because they are less exposed to shocks in domestic markets (Laeven and Levine, 2007; Goetz et al., 2016; Berger et al., 2017). Banks thus grow larger abroad in order to exploit potential economies of scale and

scope, market power, competition, activity diversification, and differences in bank regulation and supervision (Clarke et al., 2003). Moreover, Buch et al. (2014) state that multinational banks increase their market power and international activities, which do not necessarily make them risky provided that the monitoring costs of such activities are less than the diversification benefits. Berger et al. (2017) state that both hypotheses may hold simultaneously for different samples of banks; thus, our question is which of these hypotheses dominates for our sample of European banks.

Regarding foreign organizational complexity, Clarke et al. (2003) summarize the literature on the development of bank internationalization and point out that when banks enter foreign markets, they open up either a branch or a subsidiary by setting up new (de novo) entities or by acquiring a domestic bank. Therefore, the choice of an onshore presence calls for the choice of organizational form: branch and/or subsidiary. Dell'Ariccia and Marquez (2010) state that the organizational-structure decision (branch-based or subsidiary-based) reflects a wide range of factors for multinational banks, including different regulations in home and host countries, competitive conditions, and risk-management considerations.

On one hand, a branch structure is an extension of a parent bank and draws on the parent bank's capital. A branch default thus directly affects the whole banking group and vice versa (that is, a banking group collapse pulls all branches down). On the other hand, a subsidiary is a separate and independent entity with its own capital, accounting statements, and financial, regulatory, and legal requirements. Because of its limited liability, a subsidiary's default can be separate from the parent and, reciprocally, a parent bank can default without its subsidiaries defaulting.

Therefore, as Dell'Ariccia and Marquez (2010) state, the decision regarding entering foreign markets via a subsidiary or a branch has important consequences for risk exposure among parent banks. De Haas and van Lelyweld (2010), IMF (2011), and Fiechter et al. (2011) find that, depending on the regulatory and economic conditions in both the home and host countries, foreign bank subsidiaries are more capable of shielding themselves from parent financial distress and are less costly to resolve. Due to the existence of expropriation rules and internal markets with centralized capital and liquidity, a branch gives the parent bank a greater ability to withstand specific shocks through an effective pool of profits and risks from healthy and troubled branches (Dell'Ariccia and Marquez, 2010; Fiechter et al., 2011). As both structures do not imply the same degree of support and level of commitment from foreign parents, how banks' foreign organizational complexity affects performance and risk is unclear.

In this paper, we extend the literature by defining three organizational strategies that banks follow around the world to test more accurately the implications on bank stability and performance. The first strategy consists of operating foreign branches exclusively, the second consists of operating foreign subsidiaries only, and the last one is the dual strategy of combining branches and subsidiaries abroad.

Affiliate location is also important to understand and capture complexity. On one hand, Goetz et al. (2016), who analyze the geographic expansion of bank holding companies (BHC), argue that by diversifying into various markets, parent banks lower their total exposure to local markets' idiosyncratic risk and thus reduce the BHC's risk. By using either the distance between parent bank capital cities and their affiliates or the number of locations where multinational banks operate, Liang and Rhodes (1988), Deng and Elyasiani (2008), and Fang and van Lelyveld (2014) conclude that geographic diversification is significantly associated with an increased value for the banking group, higher risk-adjusted returns, and lower risk.

On the other hand, the aforementioned studies also highlight that an increase in distance between parents and affiliates leads to greater estrangement and is associated with higher costs and management issues that might hinder the benefits of geographic diversification. Overreaching multiple markets might increase the exposure to competition and different economic and regulatory conditions. Indeed, a bank with subsidiaries and/or branches in 10 countries in one world region does not pursue the same goal as a bank with foreign affiliates in 10 foreign countries in different world regions.

Very few empirical studies directly investigate how foreign organizational and geographical complexity affects bank stability and performance; they have mixed findings. Krause et al. (2017) is the closest to ours, as they also examine how bank complexity measures relate to bank stability. However, their focus is different as they do not take branches operating abroad into account and use a smaller sample of 80 publicly listed European banks to assess stability before the global financial crisis (2007) and during the crisis (2008-2010) years. Their findings indicate that higher foreign organizational complexity (proxied by the ratio of parent bank foreign subsidiaries to total subsidiaries) and geographical complexity (proxied by the number of foreign subsidiaries by region) before the crisis decreases bank stability during the crisis period. Their explanation is that the negative effects on bank stability are due to global shock spillovers during the crisis, higher monitoring costs, and agency problems that significantly outweigh the positive diversification effects. In addition, Gong et al. (2018) focus on a sample of U.S. bank holding companies (BHC) and find that as a result of incomplete consolidation of minority-owned subsidiaries, the effective capital ratios are much lower than

what is reported, leading to higher risk-taking behavior. However, Cetorelli and Goldberg (2016) focus on a sample of the U.S. branches of foreign banking organizations (FBOs) and find that as organizational complexity (through the number of subsidiaries) increases, the lending sensitivity of subsidiaries to the wholesale funding shock of 2010 tends to decrease. Their explanation is that synergies and internal complementarities across the different subsidiaries are sufficiently large to justify the costs associated with the informational and other agency frictions within banking organizations. Thus, the complexity of a conglomerate imposes a constraint on its subsidiaries' risky business choices, and its own balance sheet exhibits relatively lower sensitivity to changes in market conditions. Liu et al. (2015), using a sample of U.S. bank holding companies, find that more complex banks have a higher profitability and lower risk, which is in line with the view that diversity in the banking system is crucial for financial stability. Finally, Correa and Goldberg (2020) explore the effect of bank complexity on BHCs' broader risk profiles. Their findings indicate that organizational and geographic complexity tend to provide diversification gains and reduce idiosyncratic and liquidity risks.

3. Sample, methodology, and variables

In this section, we describe our sample, empirical methodology, bank-level variables, and country-level indicators in our empirical framework.

3.1. Sample

The sample is based on hand-collected data about where and how banks are present abroad. The data for bank-level variables and subsidiaries are from the Bureau Van Djik (BvD) Bankscope database and some of the banks' websites. We hand-collect the number and locations of foreign branches from the SNL database. For each bank and its affiliates, we go through bank annual reports and websites to match the collected data and, in cases of discrepancies, we retrieve complementary data. We initially consider all commercial, cooperative, and savings banks in Bankscope in the 28 European Union countries and build a panel of bank and country annual data that spans 2011-2013.[3,4,5] We initially extract information

[3] We focus on banks with these business specializations because the activities are globally similar.

[4] The EU countries are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

[5] At the time of collection, branch data was available only for 2013; historical data was not present. Thus, our database of bank affiliates is limited to 2013. To see whether there is any difference in foreign organizational structure in 2013 versus other years, we check the locations and number of affiliates abroad on banks' websites across five years (2010–2014). We do not

on 1,094 such banks. We next filter the dataset to ensure that all financial information is available each year, which gives a final sample of 825 banks, 102 of which are publicly traded. Overall, the final sample includes 2,176 bank-country-year observations.[6] Bank variables based on financial statements are winsorized at the 1% and 99% levels to limit the influence of outliers and extreme values.

3.2. Empirical methodology

We first investigate the impact of bank internationalization and foreign organizational complexity on bank risk and profitability. Considering the full sample of banks, we analyze the presence of banks abroad, the degree of presence in host countries, and the choice of foreign organizational complexity (i.e., subsidiaries only, branches only, or a dual strategy). We estimate $I_{i,j,t}$ (i.e., the performance of bank *i* from home country *j* at time *t*) through the following equations:

$$I_{i,j,t} = \alpha_0 + \beta_1 International_i + \delta_1 Financial_{i,t} + \delta_2 Country_{j,t} + \varepsilon_{i,j,t} \quad (1)$$

$$I_{i,j,t} = \alpha_i + \beta_1 Organizational_i + \delta_1 Financial_{i,t} + \delta_2 Country_{j,t} + \varepsilon_{i,j,t} \quad (2)$$

Then, focusing solely on the subsample of 160 banks that operate as foreign entities, we estimate the influence of geographic complexity on bank stability, risk-taking behavior, and profitability.

$$I_{i,j,t} = \alpha_i + \beta_1 Geographic_i + \delta_1 Financial_{i,t} + \delta_2 Country_{j,t} + \varepsilon_{i,j,t} \quad (3)$$

where, for bank *i* from country *j* at time *t*, $I_{i,j,t}$ alternatively represents each of the five measures of bank performance: the four bank-risk variables $ln(Zscore_{i,t})$, $ln(Zscore1_{i,t})$, $ln(Zscore2_{i,t})$, as well as $SDROA_{i,j,t}$, and bank profitability ($ROA_{i,j,t}$). $International_i$ in equation (1) is either $Foreign_i$, which equals 1 when the bank is present abroad and zero otherwise, or Nb_Host_i, which is the number of host countries where a bank owns an affiliate. $Organizational_i$

find any significant difference in organizational structure in 2013 relative to 2012 and 2011, unlike for the other years. Consequently, our study is based on 2011–2013 with the assumption that the foreign organizational structure in 2013 holds for 2012 and 2011. Moreover, by taking the sample period as 2011-2013, we avoid the confounding impacts of the 2008-2010 crisis period and the Basel III implementations that started after 2013 in Europe, which brought size caps and limitations for multinational banks' cross-border activity.

[6] We include the banks performing M&As in Europe during the sample period as of their bank complexity situation in 2013. Therefore, banks merged on or before 2013 are taken into account. In total, 61 banks (28 banks in 2012 and 33 banks in 2013) out of 823 banks (7.4%) experience annual total asset growth of above 30% during our 2011-2013 sample period. Such banks are those that presumably experience M&As during the same period. Most studies use a threshold of 30% (see Stiroh and Rumble, 2006; Meslier et al., 2016, among others). To control such operations, we also conduct regressions by including a dummy variable that equals 1 for these 61 banks and 0 otherwise. Our main findings continue to hold. The results are available upon request.

in equation (2) measures foreign organizational complexity alternatively with $Bank\_S_i$, which is a dummy for owning foreign subsidiaries only, or $Bank\_B_i$, which is a dummy for owning foreign branches only, or $Bank\_BS_i$, which is a dummy for owning both affiliate types abroad. $Geographic_i$ in equation (3) measures bank geographic complexity with $GeoComplex_i$, $GeoComplexS_i$, and $GeoComplexB_i$. $Financial_{i,j,t}$ is the vector of bank explanatory characteristics (*logTA, MarketShare, EQ_TA, CIR, IncomeDivers, L_TA, Listed, Coop, Savg*); $Country_{j,t}$ contains the three home country regulatory indexes (*Restrictions*, *Capital*, *Supervision*) and the macroeconomic and institutional variables (*GDPgrowth, LegalStrength*). All dependent and control variables are defined in sections 3.3- 3.5.

Our baseline econometric model investigates the effect of bank internationalization on bank risk and profitability variables. Given all time-invariant and dummy variables, we cannot use the fixed effect (FE) option, which omits those variables. Yet, from the results of the Hausman specification test (Hausman, 1978), the random-effect model (RE) is inconsistent for the estimation of our model. Hence, to take into account all time-invariant variables, we use the Hausman-Taylor (HT) estimator, as it addresses the possible correlation between explanatory variables and is more appropriate (Hausman and Taylor, 1981; Baltagi, 2005; Greene, 2012). An instrumental variable estimator approach is used in the Hausman and Taylor (1981) estimator in which some of the regressors are allowed to correlate with the individual effects. The HT estimator requires partitioning the explanatory variables into exogenous and endogenous variables. The distinction between time-variant variables and time-invariant variables is possible, which can be treated with different types of instruments (see Hausman and Taylor, 1981; Greene, 2003; Baltagi, 2005). In equations (1), (2), and (3), the variables *Size (logTA), MarketShare, IncomeDivers, EQ_TA, RegulCapital, Supervision*, and *GDP growth* are considered as endogenous. Consequently, the HT estimator deals with the possible endogeneity issues induced by bank-specific effects; it also helps to control cross-country variations while allowing for the use of time-invariant variables. The validity of partitioning explanatory variables is testable; we follow Baltagi et al., (2003); Baltagi, (2005); and Bouvatier, (2014) by applying a Hausman test on the difference between the FE and HT estimators as an overidentification test to verify the use of HT as a consistent and more efficient estimator. Therefore, we estimate equations (1), (2), and (3) using the HT estimators with standard errors clustered at the bank level.

3.3. Internationalization and foreign organizational & geographical complexity variables

In this paper, one main objective is to determine the extent to which the internationalization of a bank in terms of its worldwide presence and its foreign structure with branches and/or subsidiaries influence its stability and profitability. As a proxy for internationalization, we create a dummy variable, $Foreign_i$, that equals 1 when bank *i* from home country *j* owns at least one affiliate (subsidiary and/or branch) abroad, and zero otherwise. We also build variable Nb_Host_i to measure the presence of each bank around the world through the number of host countries where there is a foreign affiliate. From the aforementioned definitions of subsidiaries and branches, using the two previous variables only might not fully reflect the impact of internationalization on bank performance. Hence, we deepen the analysis with a focus on the complexity of the foreign structures of multinational banks through the organizational forms they establish abroad. Going further than prior studies (Laeven et al., 2014; Carmassi and Herring, 2013, 2016; and Barth and Wihlborg, 2016, 2017) that use the number of subsidiaries as an indicator of complexity, we build three dummies that more finely map the different strategies banks establish in the period of study. Considering our global sample of 825 banks, $Bank\_S_i$ is a dummy equal to 1 when a bank has a network of foreign subsidiaries only (at least one subsidiary abroad and zero branches) and zero otherwise; $Bank\_B_i$ equals 1 when the bank owns a network of foreign branches only (at least one foreign branch and no foreign subsidiary) and zero otherwise. $Bank\_BS_i$ equals 1 when the bank has a foreign network with both foreign subsidiaries and branches, and zero if not. We present the brief variable descriptions and their sources in appendix table A.3.

Table 1 breaks down the distribution of the 825 banks among the 28 European Union countries and by specialization (440 commercial, 207 cooperative, and 178 savings banks, respectively). Our dataset indicates that French and German banks represent 32% of the whole sample, and Latvia and Greece have the fewest representatives. Out of the 825 banks in the sample, 160 have foreign affiliates. French and German banks have the broadest international presence in 85 and 71 host countries, respectively. We also find that 73 banks are present abroad with foreign subsidiaries exclusively, 33 banks have branches only, and the remaining 54 banks have both types of affiliates abroad.

[Insert **Table 1** here]

To gauge geographic complexity, we consider the dispersion of the different regions where banks operate. Given the social, cultural, political, and economic differences among countries, a presence in one or many countries in one or many world regions does not have the same implications for the mother banks. Once banks penetrate a specific region, they benefit from the experience, allowing them to enter more easily other countries in the same world region. On the basis of the World Bank regional division of all countries around the world, we define the following eight groups: East Asia & Pacific (EAP), Europe (EUR), Central Asia (CA), Latin America & Caribbean (LAC), Middle East & North Africa (MENA), North America (NA), South Asia (SA), and Sub-Saharan Africa (SSA).[7] Following Cetorelli and Goldberg (2014), we construct a normalized Herfindhal index that captures the complexity of foreign banks in world region *r*; it ranges from 0 (lowest complexity) to 1 (highest complexity). Given the construction of *GeoComplex*, the lowest complexity also indicates a presence in a unique region; the highest complexity indicates a presence in all regions with the same number of affiliates. We use the previously defined regions to build an index for each of the 160 banks that have entities abroad:

$$GeoComplex_i = \frac{R}{R-1}\left(1 - \sum_{r=1}^{R}\left(\frac{NbAffiliates_{i,r}}{NbAffiliates_i}\right)^2\right) \qquad (4)$$

where *R* is the total number of regions *r* around the world (i.e., 8), $Nb\_Affiliates_{i,r}$ is the number of affiliates of bank *i* in region *r*, and $Nb\_Affiliates_i$ is the total number of affiliates of bank *i*. Furthermore, we adjust the definition of *GeoComplex* and split the index into the geographic dispersion of subsidiaries and branches. *GeoComplexS* and *GeoComplexB*, respectively, measure the geographic complexity of foreign subsidiaries (with $Nb\_S_{i,r}$ and Nb_S_i) and foreign branches (with $Nb\_B_{i,r}$ and Nb_B_i).[8]

Table 2 presents the distribution of banks by country and the three geographic complexity variables. On average, Swedish banks have the highest number of regions in which they operate foreign affiliates (6.33) and specifically subsidiaries (6.33); French banks establish branches in the highest number of regions (2.27). The average value of the indexes of

[7] The World Bank (WB) regional division of countries consists of seven groups, with Europe and Central Asia (ECA) representing a unique group. Yet, considering the countries and their economic, sociologic, cultural, and political specificities, we divide ECA into Europe (EUR) for countries in ECA and on the European continent; Central Asia (CA) captures the rest. Also, while examining countries in the MENA region, as defined by the WB, we remove Malta and Gibraltar and move them into the newly created Europe region.

8 In appendix table A.1, we present the detailed list of host countries that constitute each of the eight regions. Figure A.1 maps the seven world regions by World Bank subdivision.

geographic complexity, *GeoComplex* and *GeoComplexS*, indicate that the most complex banks originate from Hungary, Sweden, and Portugal.

[Insert **Table 2** here]

3.4. Bank risk and profitability variables

To capture how bank internationalization and complexity affect bank performance, we calculate different indicators of bank risk and profitability. As common in the empirical banking literature, we compute the Z-score to proxy bank stability (Boyd and Graham, 1986; Laeven and Levine, 2009; Demirguc-Kunt and Huizinga, 2010). This time-varying variable serves as the main indicator of riskiness and is calculated as:

$$Zscore_{i,j,t} = \frac{mROA_{i,t} + mEQTA_{i,t}}{SDROA_{i,t}} \quad (5)$$

where $ROA_{i,t}$ is the return on assets of bank *i* in year *t*, $EQTA_{i,j,t}$ is the ratio of total equity to total assets, and $SDROA_{i,j,t}$ is the standard deviation of return on assets. We apply a three-year window[9] and follow a widespread method to calculate the moving averages m$ROA_{i,j,t}$ and m$EQTA_{i,j,t}$ and standard deviations $SDROA_{i,j,t}$. The Z-score measures the distance from bank insolvency, which is the number of standard deviations by which return on assets must fall below its mean to deplete equity. This construction with accounting information enables us to estimate bank distance to default and express an "absolute" level of risk-taking.[10] Given that Z-score is the inverse of the probability of bank failure, higher values reflect higher levels of bank financial stability or lower exposure to bankruptcy risk.

We then follow Goyeau and Tarazi (1992) and Lepetit et al. (2008) for deeper insights and split *Zscore* into its two components (*Zscore1* and *Zscore2*) to measure bank portfolio risk and leverage risk, respectively: [11]

$$Zscore1_{i,j,t} = \frac{mROA_{i,j,t}}{SDROA_{i,j,t}} \quad (6)$$

[9] We calculate the Z-score using four-year and then five-year rolling windows, and our main findings remain consistent.

[10] We also experiment with other Z-score approaches based on Yeyati and Micco (2007) and Lepetit and Strobel (2013) using three-year, four-year, and five-year rolling windows to calculate moving average $mROA_{i,t}$ and standard deviation $SDROA_{i,t}$. In addition, we combine them with the current-period values of $EQTA_{i,t}$. Comparing all regressions, we either find no changes in our main results or that the significance tests favor the "classic" method (the tables are available from the authors upon request).

[11] $Zscore = Zscore1 + Zscore2 = \frac{mROA_{i,j,t}}{SDROA_{i,j,t}} + \frac{mEQTA_{i,j,t}}{SDROA_{i,j,t}}$

$$Zscore2_{i,j,t} = \frac{mEQTA_{i,j,t}}{SDROA_{i,j,t}} \quad (7)$$

This breakdown of Z-score shows whether asset risk or leverage risk drive bank default risk. An increase in *Zscore1* and *Zscore2* indicates lower asset risk and leverage risk, respectively. Because *Zscore*, *Zscore1*, and *Zscore2* distributions are heavily skewed, we follow Laeven and Levine (2009) and Houston et al. (2010), and apply the natural logarithm to smooth the higher values of these variables.[12] In the rest of the paper, we refer to $ln(Zscore_{i,j,t})$, $ln(Zscore1_{i,j,t})$, and $ln(Zscore2_{i,j,t})$ when we refer to different risk measures.

Additionally, we complete the previous risk measures with the three-year rolling-window standard deviation of return on assets $SDROA_{i,j,t}$ for each bank. An increase in the standard deviation indicates higher return volatility and therefore higher risk-taking behaviors. Finally, to measure the profitability of each bank, we consider the three-year moving average of the return on assets.[13]

3.5. Control variables

3.5.1. Bank-level variables

We control for bank size and use the natural logarithm of total assets (*logTA*) as a proxy.[14] There is evidence that large banks benefit from wider customer portfolios, and business or risk diversification might be greater. Either they generate economies of scale and scope that could increase their profitability, or they face agency costs that make them less profitable. Additionally, larger banks have more diversified activities and advanced management skills, which should make them less risky and more stable; alternatively, their "too-big-to-fail" status may exacerbate the incentive to engage in risk-taking activities (see Boyd et al., 2009; Bhagat et al., 2015). Because bank size as a control variable could correlate with bank complexity variables, we check the magnitude of the correlation coefficients in table 5. The correlation coefficients between bank size and bank complexity variables are between 0.07 and 0.40, which are not very high in absolute terms, indicating that they are not highly correlated.

[12] The maximum values of *Zscore* and *Zscore2* are quite high (3944 and 3842, respectively). This is because some banks exhibit a relatively higher ratio of equity to total assets but a very low standard deviation of ROA, which makes the maximum values of *Zscore* and *Zscore2* rather high.

[13] Considering ROA instead of return on equity (ROE) allows us to consider fully a bank's ability to generate earnings from its investments.

[14] Bank total assets range from $15.77 million USD to $580,117 million USD ($580 billion USD), which are reasonable and in line with other empirical studies of European banks (Krause et al., 2017; Lepetit et al., 2008; Danisman and Tarazi, 2020).

We go further and add the ratio of a bank's total assets to its country's total bank assets (*MarketShare*) in order to capture whether the importance of a bank relative to its home banking industry affects its stability. For banks confronted with competition in such local markets, the effect can be ambiguous (Caminal and Matutes, 2002; Boyd and de Nicolo, 2005; Agoraki et al., 2011). Higher *MarketShare* could be associated with higher market power and thus higher risk-taking. However, the impact on profitability is undetermined because such banks can be more or less efficient, which in turn could encourage them to invest in less risky portfolios.

We also control leverage by introducing the ratio of equity to total assets (*EQ_TA*). Highly capitalized banks exhibit higher solvency and therefore can raise funds at lower cost, which might increase their profitability. Higher capital ratios indeed provide a greater cushion against financial distress. This increases a bank's charter value and provides incentives to take less risk (Keeley, 1990; Keeley and Furlong, 1990). However, high levels of capital could also encourage banks to take more risks to ensure a sufficiently high return on equity to shareholders (Koehn and Santomero, 1980; Kim and Santomero, 1988). Moreover, higher capital requirements reduce monitoring incentives of outside investors, which might lead bank insiders to undertake unobservable risky actions that primarily maximize their welfare (Besanko and Kanatas, 1996).

The bank's business model (focus versus diversification) is also likely to affect its performance. Reliance on nontraditional banking activities can be associated with higher risk and profitability (Boyd and Graham, 1986, 1988; Stiroh, 2004; Lepetit et al., 2008; De Jonghe, 2010). Demirguc-Kunt and Huizinga (2010) suggest that expansion into noninterest activities increases return on assets and could offer some risk-diversification benefits, whereas DeYoung and Torna (2013) argue that, during the financial crisis, the probability of bank failure decreases with fee-based income but increases with asset-based nontraditional banking activities. We capture the diversification across sources of income such as interest activities, commission and fees activities, and trading activities with *IncomeDivers* (Laeven and Levine, 2007; Beltratti and Stulz, 2012). Consisting of values between zero and 1, and with higher values indicating greater diversification, the degree of diversification is calculated as:

$$IncomeDivers = 1 - \left| \frac{Net\ Interest\ Income - Other\ Operating\ Incone}{Total\ Operationg\ Income} \right| \qquad (8)$$

We further introduce the ratio of net loans to total assets (*L_TA*) to account for the extent to which banks focus on traditional intermediation activities given that pursuing lending

activities more likely occurs through foreign subsidiaries, whereas promoting modern banking activities by exporting the mother bank's skills and technology is more likely through branches. Banks, where the ratio is higher, can be more profitable and less risky if their loans are also profitable, perform well, and are secured (Acharya et al., 2006).

To determine whether public ownership influences bank profitability and risk, we build *Listed*, which equals 1 if the bank is publicly listed and zero if not. Banks that trade on stock markets should be more profitable and riskier (Barry et al., 2011; Saghi-Zedek and Tarazi, 2015). Finally, to control the difference of influence of bank specialization types on financial performance, *Coop* and *Savg* which equal 1, respectively, for cooperative and savings banks, and 0 otherwise.

We present the descriptive statistics of all individual bank-level variables in our empirical work in table 3. On average, 20% of the banks in the sample have foreign affiliates. Of those, 47% have subsidiaries only; 21% have branches only. This shows that although 32% go abroad under both forms, there is enough heterogeneity in terms of the form of foreign presence. The average number of foreign countries where a bank has a foreign presence is 0.82, with a minimum of 0 and a maximum of 47, which again shows that the strategies can be very different. The mean value of the total number of foreign affiliates (subsidiaries and branches) is 22.03 and ranges from 0 to 4,938. The mean ROA and equity to total assets is 0.60% and 10.49%, respectively, with relatively high variability. The average ratio of loans to assets is 57.08% and ranges from 0.26% to 96.81%. On average, listed banks are 12% of the sample.

[Insert **Table 3** here]

3.5.2. Country-level regulatory, macroeconomic, and institutional variables

Our study focuses on the performance of parent banks that conduct international activities. Considering that these banks face regulation in their home countries, we include home country regulatory variables in our regressions, as local regulators are particularly concerned about parent bank behavior. We follow Barth et al. (2001, 2004, and 2013a) and use data from the Bank Regulation and Supervision Survey by the World Bank to define three regulatory variables. Because the data are not available annually, we use the latest 2012 survey to create the country-level regulation variables for 2011-2013. Various authors have worked on these regulatory parameters, and their findings point to contrasting effects showing that multifaceted bank regulation and supervision might increase or decrease bank risk and profitability (Furlong

and Keeley, 1989; Hellmann et al., 2000; Gonzalez, 2005; Klomp and de Haan, 2012; Barth et al., 2013b; Beck et al., 2013).

Bank Activity Restrictions (*Restrictions*) is an index that assesses the conditions under which banks engage in four categories of activities: securities activities, insurance activities, real estate activities, and nonfinancial businesses (except those businesses that are auxiliary to banking). For each category of activities there are four possibilities weighted from 1 to 4: unrestricted (=1), permitted (=2), restricted (=3), and prohibited (=4), respectively. Hence, the index ranges from the lowest stringency (1) to the highest (16) when the limitations of banking operations are extremely stringent. Capital Regulatory Index (*RegulCapital*) ranges from 0 to 18 and is the sum of 18 binary "yes" or "no" answers regarding the country's overall and initial capital stringency indexes. This variable provides information on certain risk elements, market value losses, and minimum capital rules. Also, it tells us which types of funds initially capitalize a bank and whether the funds are officially verified. Official Supervisor Power (*Supervision*) is an index that evaluates whether supervisory authorities have the power to take specific preventive and corrective actions based on auditing, internal/board/ownership structure, profits and losses, and other balance sheets items. The index ranges from 0 to 22, and a higher value indicates greater power. Beltratti and Stulz (2012) find that better-performing and profitable banks come from strictly regulated countries in terms of *Restrictions, RegulCapital* and *Supervision*.

We also consider macroeconomic and institutional variables from the Global Financial Development Database (GFDD 2015) and the World Development Indicators (WDI 2015) from the World Bank. Country characteristics might affect financial stability because banks from a country with stronger institutional factors tend to perform better in normal and crisis periods. The growth rate of real gross domestic product (*GDP growth*) captures business opportunities in the country; we expect more stable and profitable banks when growth is higher. Finally, we consider the variable *LegalStrength*, which measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The strength of legal rights is an index that ranges from 0 to 10 with higher scores indicating that these laws are better designed to expand access to credit.

In table 4, we show the distribution of banks by country, along with the descriptive statistics and sources of all macroeconomic and institutional variables. We observe that the highest number of banks in our sample are from France (146) and Germany (168); the lowest are from Greece (1) and Cyprus (3). We also observe a high variability among countries for all

macroeconomic and institutional variables. Considering the Restrictions variable, we see that the highest activity restrictions for banks are in Poland; the lowest are in Austria, the United Kingdom, and Romania. With regard to *Capital*, the highest bank capital requirements are in Belgium; the lowest are in Sweden. For *Supervision*, countries with the highest supervisory power index values are Estonia, Hungary, Italy, Luxembourg, Portugal, Romania, and Slovenia. The lowest supervisory power index is in Sweden.

[Insert **Table 4** here]

Table 5 shows overall correlation coefficients among all variables. The test statistics reveal no major collinearity issues, which enable us to use the variables simultaneously in the regressions. Moreover, the correlation coefficients between foreign organizational and geographical complexity measures are between -0.39 and 0.40, which are not very high in absolute terms, indicating that these variables measure different aspects.

[Insert **Table 5** here]

4. Econometric results

We first investigate how bank internationalization and foreign organizational complexity with subsidiaries and/or branches affects a parent bank's risk and profitability. Second, we analyze how geographic complexity affects banks' foreign affiliates. Third, we further examine how subsampling banks with different balance sheet sizes and the shock of a sovereign debt crisis might affect bank risk and performance.

4.1. Effect of internationalization and foreign organizational complexity on bank risk and profitability

We report in table 6 the estimated coefficients of equation (1) from the Hausman-Taylor specification. We find that our first proxy for internationalization, *Foreign*, which assesses the presence of a bank abroad, is significantly associated with lower risk and lower profitability (columns 1a to 5a). The coefficients are positive for two risk indicators (*Zscore* and *Zscore2*) and negative for the risk-taking proxy (*SDROA*) and profitability (*ROA*) indicators. Relative to banks with only domestic activities, building a foreign network is positively and significantly

associated with a parent bank's individual financial stability but negatively associated with profitability. Considering the other axis of internationalization, defined by the number of host countries where a bank is present, the effect is similar albeit with a lesser significance of some coefficients. Although banks operating in many foreign countries face lower bankruptcy and leverage risks (higher *Zscore* and *Zscore2*), they engage in fewer risk-taking activities for poorer profitability. On a statistical view, the impact of the foreign presence on bank performance is always greater than the number of host countries. One possible explanation for this result is that as parent banks evaluate the benefits and risk of internationalization at the first stage of the decision to go abroad, the widespread network, which is decided at a second stage, is henceforth associated with an additional effect of small intensity.

Overall, our results indicate that internationalization improves bank stability because it contributes to lower default risk. We also find strong evidence that internationalization is significantly associated with lower earnings volatility but poorer profitability. This is in line with the diversification hypothesis, which states that as long as the idiosyncratic risks of foreign and domestic assets are imperfectly correlated, the idiosyncratic risk of banks decreases after diversifying into cross-border activities. Their stability increases because they become less exposed to shocks in domestic markets (Laeven and Levine, 2007; Goetz et al., 2016; Berger et al., 2017). Multinational banks gain market power, and internationalization makes them more stable presumably because the monitoring and agency costs of such activities are lower than the diversification benefits (Buch et al., 2014).

[Insert **Table 6** here]

The estimations of equation (2), reported in table 7, show the influence of foreign organizational complexity on bank risk and performance. We first analyze the expansion with foreign subsidiaries exclusively (columns 1c to 5c); the results show a decrease in bank exposure to risk (lower probability of default and leverage risk, as well as lower volatility in return on assets and lower profitability, corresponding to higher *Zscore* and *Zscore2*, lower *SDROA*, and lower *ROA*).

Second, relative to the previous organizational strategy, the dummy that captures the structure with foreign branches exclusively (columns 1d to 5d) indicates a stronger negative impact on bank asset risk. The higher reduction in bank risk through branch structure compared to a subsidiary structure may be because branches are extensions of the parent bank and draw on parent bank capital. The parent bank accounts for the assets and activities of branches, and

owning the affiliate directly reduces the parent bank's asset risk (Clarke et al., 2003; Dell'Ariccia and Marquez, 2010).

Third, we focus on complexity with both foreign subsidiaries and branches (columns 1e to 5e); the results show that banks operating both organizations abroad are significantly less profitable. Moreover, such institutions are also less vulnerable in terms of default risk. Leverage risk, the variability of returns, and return on assets decrease. Comparing the three sets of dummies on a statistical angle, banks operating more complex networks of foreign subsidiaries and branches have coefficients with greater absolute values, which make them financially more stable (and less profitable) than banks with foreign branches exclusively. With the exception of a greater effect on asset risk, these banks are more stable than banks owning subsidiaries only abroad.

[Insert **Table 7** here]

Looking at the control variables in table 6 and table 7, the results show that large banks that conduct activities in many countries (table 6) display higher risk, more volatile returns, and higher profitability. Yet, for large banks with international affiliates (table 6), either an exclusive form or a mixed structure (table 7), we only observe more volatile return on assets and higher profitability. This is in line with the literature finding that as banks get larger, they might perceive themselves as too big to fail and may take more risk (Boyd et al., 2009; Bhagat et al., 2015). Banks with more market power are less profitable (lower *ROA*) and globally engage in less risky activities (lower *SDROA*). This is in line with the competition-fragility view, which states that less competition and more market power are beneficial because when there is high pressure on profits due to more competition, the franchise value of banks decreases and risky behavior increases (Keeley, 1990; Suarez, 1994). In all regressions, although better-capitalized banks are only associated with a lower variability of returns, less cost-efficient banks display more asset risk (lower *Zscore1*) and less profitability. Similar to Lepetit et al. (2008) and Saghi-Zedek and Tarazi (2015), our results indicate that on the whole, banks that rely more on nontraditional intermediation activities are riskier (lower *Zscore*, *Zscore1*, and *Zscore2*), and banks with higher ratios of loans to total assets globally exhibit less bank fragility. Conversely, publicly traded banks are less profitable, take less risk, and are less vulnerable than privately owned banks. This finding is the opposite of what was hypothesized (Shehzad et al., 2010; Barry et al., 2011; Saghi-Zedek and Tarazi, 2015). Recent economic shocks probably weigh heavily on financial markets, and actors prefer to reduce their exposure to risk at the expense

of profitability. Finally, as expected, relative to commercial banks, cooperative and savings banks are financially more stable (higher *Zscore, Zscore1,* and *Zscore2;* and lower *SDROA*) but also less profitable.

Regarding the home country variables, we find that the regulatory environment of the parent bank has a strong influence on its risk and profitability. First, across all regressions, banks whose home country regulators put stringent restrictions on banking activities appear less vulnerable, with higher *Zscore*, *Zscore1*, and *Zscore2* and lower *SDROA*. This result aligns with Boyd and Graham (1986) and is direct evidence that engaging in fewer securities, insurance, real estate, and nonfinancial activities tends to reduce bank risk. However, because of the negative, albeit nonsignificant effect on bank profitability, we contradict Barth et al. (2013b), which finds that more restrictions on activities are associated with less bank efficiency and fewer profits, and Pasiouras et al. (2009), who argue that stringent restrictions might force banks to focus on, specialize in, and better perform permitted activities.

Second, stringent capital regulation at home tends to have a strong and conclusive effect on all four risk measures. Parent banks in markets with stringent capital requirements take less risk (lower *SDROA*) and are financially more stable (higher *Zscore*, *Zscore1*, and *Zscore2*). More stringency seems to give banks a propensity to engage in riskless operations and display secured behavior in order to meet the authority's requirements.

Third, regarding the previous variables, the effects of greater home country supervisory power on bank performance are the opposite. Closer monitoring is significantly associated with lower distance to default, higher asset risk, higher leverage risk (lower *Zscore, Zscore1*, and *Zscore2*), as well as lower returns on assets. Stronger supervisory policies do not ensure more stable financial systems (Laeven and Levine, 2009; Barth et al., 2013a; Tabak et al., 2016). Although Chortareas (2012) and Barth et al. (2013b) find that powerful supervision improves the governance and efficiency of bank operations, increases bank profitability, and reduces the volatility of returns. Our results show significant drops in profitability and no impact on bank risk-taking behavior.

Finally, contrary to studies suggesting lower risk and higher profitability for banks in countries with higher GDP annual growth rate (Molyneux and Thornton, 1992; Beltratti and Stulz, 2012; Distinguin et al., 2013), we find that banks from countries with high growth rates appear riskier and more profitable. Additionally, in countries with strong legal rights designed to expand access to credit, banks exhibit higher risk and poorer profitability. During 2011-2013, an environment where collateral and bankruptcy laws were extremely protective of borrowers and lenders ultimately worked against easing lending; banks contributed more in deposit

insurance funds. This might have created a moral hazard, giving banks an incentive to engage in excessive risk-taking operations and thus increase the banking system fragility.

4.2. Impact of geographic complexity on risk and profitability

We report in table 8 the estimations of equation (3) for all affiliates, subsidiaries, and branches.[15] The results globally show that the geographic dispersion of foreign affiliates is strongly and significantly associated with the financial stability of the parent bank, which appears relatively less risky and more profitable but with more volatile returns on assets. More specifically, analyzing the location of all affiliates in different world regions, the coefficients associated with *GeoComplex* indicate that although banks exhibit lower probability of default, asset risk, and leverage risk (higher *Zscore*, *Zscore1*, and *Zscore2*) for higher profitability (higher *ROA*), they also take more risk (higher *SDROA*). Operating affiliates in multiple world regions with different social-economic-cultural characteristics enables banks to manage better and increase the potential benefits of country diversification. Then, considering the geographic dispersion of banks' foreign subsidiaries, we find similar results (i.e., banks establishing subsidiaries in many regions display higher *Zscore*, higher *SDROA*, and higher *ROA*). Conversely, *GeoComplexB* indicates that the dispersion of branches across different world regions is also strongly and significantly negatively associated with bank probability of failure, asset risk, and leverage risk (higher *Zscore*, *Zscore1*, and *Zscore2*) but slightly poorer profitability (significance at 10%).

Considering the rest of the control variables, we discuss some major results that differ from those in table 6 and table 7. For instance, whereas bank size uniformly contributes to lower risk (higher *Zscore*, *Zscore1*, and *Zscore2*), higher market share leads to more risk-taking behavior (lower *Zscore1* and higher *SDROA*) and higher asset risk only when the geographic complexity of subsidiaries is the variable of interest. Moreover, highly capitalized banks and loaned-up banks globally appear less vulnerable (higher *Zscore*, *Zcore1*, and *Zscore2*) but engage more in riskier operations, which increases the variability of returns and the returns as well (higher *SDROA* and *ROA*). We also find that banks that rely more on nontraditional banking activities take more risks and are less profitable. Regarding home country regulation, all coefficients significant at a 5% level maximum indicate that banks facing high restrictions on bank activities from home regulators and banks complying with stringent capital

[15] Note that equation (3) runs on the smaller sample of 160 banks that operate foreign operations around 154 countries in eight world regions, relative to equation (1) and equation (2) that consider the full sample of 825 banks.

requirements tend to have higher returns on assets. Conversely, when facing greater supervisory power from local authorities, parent banks exhibit higher profitability and more return variability. Finally, the growth rate of GDP and the strength of the legal system in the home country are globally negatively associated with bank risk and positively with the risk-taking proxy (*SDROA*) and profitability (*ROA*).

Overall, the results show that the geographic dispersion of foreign affiliates is positively and significantly associated with parent bank stability and profitability. It is, however, also positively associated with the volatility of the parent's return on assets. The results are similar when we focus on the geographical dispersion of only subsidiaries. The results are identical for branches, except for profitability for which the relationship with such dispersion is significantly negative. This could be explained by the fact that a branch is an extension of the parent bank and draws on the parent bank's capital, but a subsidiary is a separate identity with its own capital (Dell'Ariccia and Marquez, 2010). Operating distant branches in foreign countries could lead to higher monitoring costs for the parent bank with potential negative effects on bank profitability (Dell'Ariccia and Marquez, 2010; Brighi and Venturelli, 2016).

[Insert **Table 8** here]

4.3. Further explorations of bank internationalization

We investigate in this section other factors that might change how bank internationalization affects bank risk and profitability. First, to test whether bank size affects the relation between bank foreign presence and bank performance, we analyze different subsamples of banks defined by a threshold of total assets. Second, given that 2011 is the peak of the European sovereign debt crisis, 2011 is a time of great financial instability and we investigate the specific effect during the severity of economic shock.

4.3.1. Bank size

We hypothesize that because size usually gives banks advanced management skills and economies of scale and scope, the effect of internationalization might differ by bank size

(Bhagat et al., 2015; Laeven et al., 2016). We aim to test whether too-big-to-fail banks or large banks under direct regulatory supervision are necessarily complex banks.[16]

To investigate how size affects individual parent bank risk and profitability, we break the full sample into three groups. First, we follow the European Central Bank (ECB) definition that considers a bank significant enough to apply high supervisory standards.[17] We build the ECB subsample of banks with total assets of at least $40 billion USD.[18] Second, because 50% of the banks in the full sample have total of assets of at least $3.2 billion USD, we use the corresponding threshold (i.e., the median of the full sample in table 3) to define the subsample of large banks. Third, we generate the subsample of small banks using banks with total assets under the median value ($3.2 billion USD).[19] For all groups of banks, we run equations (1) and (2) to estimate the specific influence of foreign activities on bank performance.

Contrary to the global sample where we find that stronger internationalization and foreign organizational complexity are associated with lower risk and lower profitability for multinational banks, table 9 indicates the opposite results for ECB banks.[20] First, from equation (1), although banks that are significant for regulatory authorities have slightly higher asset risk and more volatile returns for higher profitability (higher *SDROA* and *ROA*), the dispersion of their foreign operations in many countries no longer strongly affects their performance. Second, regarding foreign organizational complexity, between the exclusive strategy with either subsidiaries or branches only and the mixed model with both affiliate types, most of the results of equation (2) align with equation (1). Although the significance is at a 10% level only, the presence of an ECB bank abroad with subsidiaries exclusively leads to poorer profitability, a higher probability of default and leverage risk, and less risk-taking. Foreign organizational complexity through branches exclusively is the only organizational structure that continues to decrease parent bank individual asset risk in addition to increasing default risk, returns volatility, and profitability. Conversely, the effect of penetration with foreign subsidiaries and

[16] The Basel Committee on Banking Supervision (BCBS, 2013) recommends against using the size of the balance sheet as a measure of complexity among large banks but acknowledges that large banks behave differently from other banks.

[17] https://www.bankingsupervision.europa.eu/banking/list/criteria/html/index.en.html. The four significant criteria of the European Central Bank are size (total assets over 30 billion Euros), economic importance (for the specific country or the EU economy as a whole), cross-border activities (total assets over €5 billion and the ratio of cross-border assets to liabilities in more than one other participating member state to total assets/liabilities is above 20%), and direct public financial assistance (funding from the European Stability Mechanism or the European Financial Stability Facility).

[18] Because our data are in USD, we set the approximate threshold at $40 billion USD, as the average exchange rate in the 2011-2013 period is about 1€ = $1.334946 (World Bank – World Development Indicators database).

[19] Table A.2 in the appendix displays the descriptive statistics for the following subsamples: ECB, Large, and Small banks. When we compare the descriptive statistics for the subsamples, we observe that although *Foreign* and *Nb_Host* have mean values of 0.08 and 0.13 for small banks, for ECB banks these values are 0.61 and 4.94, and for large banks, they are 0.31 and 1.52, respectively. This clearly shows that ECB and large banks have higher internationalization with a higher share of affiliates abroad and a higher number of host countries as compared to small banks.

[20] We report only the results for the variables of interest. Detailed results are available from the authors upon request.

branches is similar to the overall foreign presence (i.e., banks take more risk and are more profitable as *SDROA* and *ROA* show).

Turning to the subsample of large banks, the effects on the volatility of the return on assets disappear.[21] As well, foreign organizational complexity with branches only has no effect on bank performance. Relative to ECB banks, the five last columns of table 9 indicate that large banks that conduct cross-border operations in various host countries face a higher probability of failure, asset risk, and leverage risk (lower *Zscore*, *Zscore1*, and *Zscore2*). Regarding the foreign expansion strategies, although establishing abroad subsidiaries exclusively positively affects bank asset risk only, the more complex strategy with both types of affiliates also affects default risk and leverage risk. Globally, we find that large banks are financially more vulnerable and less profitable than other banks. For the subsample of small banks, our results are generally in line with the global sample (i.e., internationalization and foreign organizational complexity are associated with lower risk and lower profitability).[22,23]

On the whole, our results partly align with Bertay et al. (2013), who find that large banks systematically tend to have poorer profitability but do not display clear, conclusive positive or negative behavior in terms of risk. Indeed, in all regressions, we show that bank size negatively and significantly affects profitability as well as the probability of default, asset risk, leverage risk, and returns variability. This finding supports the view that the size of a bank's balance sheet does not reflect complexity. Too-big-to-fail or significant banks under the direct supervision of the regulatory authority are not necessarily too complex.

[Insert **Table 9** here]

4.3.2. Influence of the crisis on bank risk and profitability

We examine whether the turmoil of the financial system might influence how bank internationalization and foreign complexity affect bank performance. The recent global financial crisis shows how the interconnectedness of financial institutions could spread and amplify shocks. To capture the effect of the acute year of the sovereign debt crisis, we build

[21] Banks are large if they have total assets above the median ($3.2 billion USD) for the full sample.

[22] Banks are small if their total assets are below the median ($3.2 billion USD) of the full sample.

[23] The subsamples of large and small banks are also generated using quartile and quintile rankings. The large-bank subsample isolates banks in the highest quartile and quintile; the small-bank subsample isolates those in the lowest quartile and quintile, respectively. Our results remain consistent under these specifications and are available upon request.

Sov11, which equals 1 for 2011 and zero otherwise. We include it in the baseline equations to define the following models:[24]

$$I_{i,j,t} = \alpha_0 + (\beta_1 + \beta'_1 Sov11) * International_i + \beta_2 Sov11 + \delta_1 Financial_{i,t} + \delta_2 Country_{j,t} + \varepsilon_{i,j,t} \quad (9)$$

$$I_{i,j,t} = \alpha_i + (\beta_1 + \beta'_1 Sov11) * OrgComplex_i + \beta_2 Sov11 + \delta_1 Financial_{i,t} + \delta_2 Country_{j,t} + \varepsilon_{i,j,t} \quad (10)$$

$$I_{i,j,t} = \alpha_i + (\beta_1 + \beta'_1 Sov11) * Geographic_i + \beta_2 Sov11 + \delta_1 Financial_{i,t} + \delta_2 Country_{j,t} + \varepsilon_{i,j,t} \quad (11)$$

We report in table 10 the estimated coefficients of all three previous equations from the Hausman-Taylor specification.[25]

From equation (9), the dummy *Foreign*, which assesses a bank's presence abroad, significantly indicates lower risk and lower profitability. The coefficients are positive for two risk indicators (*Zscore* and *Zscore2*) and negative for the risk-taking proxy (*SDROA*) and profitability (*ROA*). Moreover, at the peak of the sovereign debt crisis, our results indicate that relative to the other years, the effect of bank presence abroad on risk and profitability is similar in sign, greater in value, and more significant. Looking at the Wald test, we confirm that building a foreign network is often negatively associated with both risk and profitability; such effect intensifies during distress times. Considering the other axis of bank internationalization defined by the wide presence of a bank in different host countries, we observe that whereas during the crisis the banks in multiple countries face lower bankruptcy risk, lower leverage risk, and engage in fewer risk-taking operations for poorer profitability, after the crisis the results express lower *SDROA* and *ROA* only.

In equation (10) we observe the effect of foreign organizational complexity on performance. First, the results of the expansion with foreign subsidiaries exclusively show that although we observe lower returns volatility and lower profitability after the crisis, the effect is more pronounced during the sovereign debt crisis as bank risk decreases (higher *Zscore* and *Zscore2*). The Wald tests confirm that owning foreign subsidiaries diminishes the profitability and exposure to bank risk. Second, having an organizational structure with foreign branches

[24] From the Banque de France (2010, 2012) timeline, the financial crisis started in July 2007 and turned into a global economic crisis in early 2009. The aftermath led to the European sovereign debt crisis, which started in late 2009 in some countries and had profoundly affected all European economies in 2011.

[25] We only report the results for the variables of interest. The rest are available from the authors upon request.

exclusively strongly and negatively affects bank asset risk during the sovereign debt crisis, contrary to the other strategies. Yet, the overall Wald tests point to a lower probability of failure and lower risk-taking behavior. Third, regardless of the state of the banking systems, a dual presence abroad is significantly associated with less profitable and less vulnerable institutions as default risk, leverage risk, volatility of returns, and returns on assets are lower.

Finally, the estimations of equation (11) show that the regional dispersion of foreign affiliates negatively affects the stability of the parent banks, which appear relatively less profitable, riskier, and have more volatility of their returns on assets. Considering the location of all affiliates in different world regions, the coefficients associated with *GeoComplex* indicate that although the probability of default and leverage risk increase during the 2011 sovereign debt crisis, they decrease after the crisis. However, the total effect measure from the Wald test mirror the results of the crisis time with lower *Zscore*, lower *Zscore2*, higher *SDROA*, and lower *ROA*. From the geographic dispersion of foreign subsidiaries, we find no real influence on parent bank default risk, but we do find a strong increase in risk-taking behavior and a slight decrease in profitability (significance at 10%). In contrast, *GeoComplexB* indicates that the dispersion of branches is strongly significant and negatively associated with bank probability of failure, asset risk, and leverage risk (higher *Zscore*, *Zscore1*, and *Zscore2*).

Overall, our findings indicate that the results amplify during the sovereign debt crisis, revealing that banks engaged in cross-border operations tend to be less vulnerable during crisis times, because internationalization helps them resist or smooth economic shocks.

[Insert **Table 10** here]

5. Robustness checks

We conduct additional regressions to analyze the sensitivity of our main results in section 4.

First, we follow previous papers (Barth and Wihlborg, 2016, 2017; Carmassi and Herring, 2013; and Laeven et al., 2014) that use the number of affiliates or subsidiaries to measure bank foreign organizational complexity. We substitute the binary variables in equation (2) by the continuous variables $Nb\_Affiliates_i$, Nb_S_i, and Nb_B_i that respectively represent the natural logarithm of the actual number of all affiliates, all subsidiaries, and all branches bank *i* owns abroad. Our findings are in table 11.

Globally, considering the variables of interest, the regressions mirror some of the previous findings with the dummies of organizational complexity (table 7) and the indexes of geographic

complexity (table 8) in terms of signs but with poorer significance. The results indicate that owning numerous affiliates or branches abroad is positively associated with profitability and negatively with bank risk through lower probability of failure, lower asset risk, and lower leverage risk (higher *Zscore*, *Zscore1*, and *Zscore2*). However, operating multiple foreign subsidiaries only leads to more risk-taking behavior. The rest of bank- and country-related coefficients confirm the previous findings.

[Insert **Table 11** here]

Second, we build additional geographic complexity indexes in which we consider the EU and the Euro Area as other world regions. We run regressions of equation (3), and overall the main results remain unchanged.

Third, we focus on the 102 listed banks and investigate how internationalization and foreign organizational complexity affect bank financial stability and profitability. We report our findings in table 12. From the report of the variables of interest, banks traded on public markets are globally less vulnerable (higher *Zscore*, *Zscore1*, and *Zscore2*) and more profitable (higher *ROA*). Moreover, listed banks with foreign subsidiaries exclusively display higher earnings volatility.

[Insert **Table 12** here]

Fourth, we calculate Z-score (*Zscore*, *Zscore1*, and *Zscore2*), bank risk, and performance measures (*SDROA* and *ROA*) using four- and five-year rolling windows. Our main results are unaffected.

Finally, we estimate baseline equations (1), (2), and (3) taking the average of variables through 2011-2013 and conduct the cross-section regressions using OLS estimators. Our main results globally remain unchanged.[26]

6. Conclusion

We empirically investigate whether bank internationalization, foreign organizational complexity, and geographical complexity affect parent banks' risk and profitability. Specifically, we examine the impact of bank presence abroad, the number of host countries, and the organizational complexity of foreign affiliates through an exclusive business model of subsidiaries only, branches only, or both, as well as the geographic dispersion of affiliates in

[26] The results for all robustness check estimations are available from the authors upon request.

eight world regions. We hand-collect structural data for 2011-2013 from various sources and construct a dataset of 825 commercial, cooperative, and savings banks from the 28 European Union countries.

We find strong evidence that bank presence in foreign markets is significantly associated with lower earnings volatility and lower default risk but also poorer profitability. Looking deeper at the way banks are present abroad, our findings show that banks operating abroad with both foreign subsidiaries and branches are more stable than banks operating foreign branches exclusively, which are also more stable than banks that only operate subsidiaries abroad. Moreover, a closer look at the geographic dispersion of affiliates shows that higher dispersion is beneficial in terms of default risk but is associated with higher risk-taking and higher profitability. Further investigation shows that the results amplify during the sovereign debt crisis, indicating that banks engaged in cross-border operations tend to be less vulnerable during crisis times because internationalization helps them resist or smooth economic shocks. Moreover, we explore the impact of bank size and observe that although our main findings generally hold for small banks, the findings point to the opposite for large banks.

Our findings challenge the idea that bank complexity is detrimental to the stability of banking systems. This has several policy implications. Our findings do not indicate that more stringent home banking regulation systematically and uniformly leads to greater financial stability and higher profitability, but we do find that bank-activity restrictions and stringent capital regulation are negatively associated with bank risk and positively associated with profitability. However, strong supervisory power produces opposite effects on bank performance (i.e., higher risk and poorer profitability). Consequently, regulators and supervisors should be cautious in implementing stringent regulations if their objective is to limit individual bank risk and contagion risk to ensure the soundness of the financial system.

To account for whether the shock of the sovereign debt crisis affects bank performance, we use 2011 as the peak of the crisis. Future research could use different and finer measures to account for cross-country differences in terms of the consequences of the crisis and state interventions. Future research could also focus on other measures of bank complexity (such as business complexity) and investigate possible different channels and outcomes.

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Table 1
Sample of banks

This table displays the distribution of our sample of commercial, cooperative, and savings banks in the 28 European Union countries. Out of 825 banks, 102 are publicly traded and 160 conduct foreign operations. We extract information on specialization types and subsidiary from Bankscope and on branches from the SNL database. "/" indicates unavailable or unknown data.

Country (28 EU)	Number of banks	Listed banks	Commercial banks	Cooperative banks	Savings banks	Banks with a foreign	With foreign subsidiaries	With foreign branches	With both types of	Number of host countries
Austria	89	4	32	20	37	19	10	4	5	23
Belgium	20	/	17	2	1	6	2	1	3	20
Bulgaria	9	2	7	1	1	2	/	/	2	4
Croatia	19	8	19	/	/	4	2	/	2	3
Cyprus	3	0	3	/	/	1	/	/	1	6
Czech Republic	11	1	10	1	/	2	/	2	/	1
Denmark	44	17	22	2	20	5	2	/	3	25
Estonia	3	/	3	/	/	/	/	/	/	/
Finland	7	2	6	1	/	5	3	2	/	8
France	146	19	61	66	19	29	18	3	8	85
Germany	168	4	64	48	56	16	5	5	6	71
Greece	1	/	1	/	/	/	/	/	/	/
Hungary	6	1	6	/	/	1	/	/	1	6
Ireland	3	/	3	/	/	1	/	1	/	5
Italy	82	13	36	24	22	17	12	2	3	36
Latvia	2	/	2	/	/	1	/	/	1	8
Lithuania	5	1	5	/	/	/	/	/	/	/
Luxembourg	29	/	27	/	2	12	7	2	3	19
Malta	4	2	2	1	1	/	/	/	/	/
Netherlands	8	1	7	/	1	5	/	3	2	18
Poland	23	11	21	1	1	2	1	/	1	3
Portugal	14	4	10	/	4	7	2	1	4	25
Romania	8	2	8	/	/	4	3	/	1	2
Slovakia	4	1	3	/	1	/	/	/	/	/
Slovenia	6	/	5	1	/	/	/	/	/	/
Spain	62	6	12	39	11	9	3	3	3	38
Sweden	13	3	12	/	1	3	/	/	3	39
United Kingdom	36	/	36	/	/	9	3	4	2	13
Obs.	825	102	440	207	178	160	73	33	54	

Table 2

Descriptive statistics of geographic complexity

This table displays the distribution of the 160 banks that conduct foreign activities in EU countries and the descriptive statistics of the three indicators of geographic complexity for all foreign affiliates (*GeoComplex*), foreign subsidiaries (*GeoComplex**S***), and foreign branches (*GeoComplex**B***). The detailed method of calculation is in section 3. "/" indicates unavailable or unknown data.

Country (28 EU)	Banks with a foreign	No. host countries	No. world regions (mean)	GeoComplex (mean)	No. world regions_**S** (mean)	GeoComplex**S** (mean)	No. world regions_**B** (mean)	GeoComplex**B** (mean)
Austria	19	23	1.16	0.04	1.13	0.05	1.11	0.01
Belgium	6	20	1.83	0.18	1.80	0.24	1	0
Bulgaria	2	4	1.50	0.21	1.50	0.29	1.50	0.21
Croatia	4	3	1	0	1	0	1	0
Cyprus	1	6	2	0.01	1	0	2	0.01
Czech Republic	2	1	1	0			1	0
Denmark	5	25	2.80	0.19	2.80	0.28	1.33	0.01
Estonia	/	/	/	/	/	/	/	/
Finland	5	8	1.60	0.23	1.67	0.25	1.50	0.18
France	29	85	2.10	0.14	2.08	0.21	2.27	0.20
Germany	16	71	1.81	0.15	1.91	0.20	1.82	0.18
Greece	/	/	/	/	/	/	/	/
Hungary	1	6	2	0.56	2	0.51	2	0.56
Ireland	1	5	1	0			1	0
Italy	17	36	1.06	0.03	1	0	1	0
Latvia	1	8	2	0.25	1	0	2	0.28
Lithuania	/	/	/	/	/	/	/	/
Luxembourg	12	19	1.25	0.13	1.20	0.11	1	0
Malta	/	/						
Netherlands	5	18	1.60	0.07	2.50	0.40	1	0
Poland	2	3	1	0	1	0	1	0
Portugal	7	25	2.57	0.47	2.50	0.49	1	0
Romania	4	2	1	0	1	0	1	0
Slovakia	/	/	/	/	/	/	/	/
Slovenia	/	/	/	/	/	/	/	/
Spain	9	38	2.33	0.24	2.83	0.46	1.83	0.11
Sweden	3	39	6.33	0.44	6.33	0.82	1.67	0.05
United Kingdom	9	13	1.33	0.17	1.20	0.11	1.17	0.05
Obs.	160		160	160	127	127	87	87
Mean			1.74	0.14	1.78	0.19	1.44	0.08
Std. Dev			1.54	0.25	1.57	0.31	1.06	0.17
Median			1	0	1	0	1	0
Min			1	0	1	0	1	0
Max			8	0.89	8	0.95	7	0.68

Table 3
Bank individual characteristics - summary statistics
Note: This table summarizes the descriptive statistics for all bank-level characteristics.

Variable name	Obs.	Mean	Std.Dev.	Median	Min	Max
Internationalization and foreign organizational complexity						
Foreign	2176	0.2	0.4	0	0	1
Nb_Host	2176	0.82	3.76	0	0	47
Bank_S	2176	0.09	0.29	0	0	1
Bank_B	2176	0.04	0.2	0	0	1
Bank_BS	2176	0.06	0.24	0	0	1
Nb_Affiliates	2176	22.03	242.7	0	0	4938
Nb_S	2176	0.78	4.19	0	0	60
Nb_B	2176	21.24	240.15	0	0	4901
Dependent variables						
Risk						
Zscore	2176	243.38	574.97	70.19	1.1	3944.26
ln(Zscore)	2176	4.44	1.32	4.25	0.23	8.28
Zscore1	2176	8.86	15.99	3.36	0	103
ln(Zscore1)	2176	1.29	1.33	1.21	-2.35	4.73
Zscore2	2176	234.05	558.87	66.6	1.75	3841.63
ln(Zscore2)	2176	4.37	1.34	4.2	0.56	8.25
SDROA	2176	0.26	0.57	0.12	0	12.49
Profitability						
ROA	2176	0.6	0.66	0.41	0	8.66
Bank-level variables						
TA	2176	23565.77	77784.06	3190.33	15.77	580117
Size (logTA)	2176	8.15	1.95	8.07	2.76	13.27
MarketShare	2176	1.8	4.97	0.1	0	27.91
EQ_TA	2176	10.49	9.2	8.53	0.92	95.93
IncomeDivers	2176	0.59	0.25	0.62	0	0.98
CIR	2176	61.88	17.55	63.25	6.51	191.14
Loans_TA	2176	57.08	22.95	62.16	0.26	96.81
Listed	2176	0.12	0.32	0	0	1
Coop	2176	0.26	0.44	0	0	1
Savg	2176	0.22	0.41	0	0	1

Table 4

Country characteristics - summary statistics and sources

This table reports country-level regulatory, macroeconomic, and institutional variables computed from various sources and using data from 2011 to 2013. Bank regulation and supervision variables are from the latest survey of Barth et al. (updated 2012) provided by the World Bank (WB); detailed definitions are in section 3. *Restrictions* is the index of restrictions on participation in activities such as securities, insurance, real estate, and ownership in nonfinancial firms; *Capital* is an index of the stringency of requirements related to minimum capital adequacy, risk, market-value losses, sources of funding, and the level of official appraisal; and *Supervision* measures regulatory power to prevent and correct problems regarding auditing, internal/board/ownership structure, profits and losses, and other balance sheets items. Other country characteristics are from the WB Global Financial Development Database (GFDD) and World Development Indicators (WDI). *GDP growth* is the growth rate of real gross domestic product; *LegalStrength* measures the degree to which collateral and bankruptcy laws protect borrowers and lenders and thus facilitate lending. "//" indicates unavailable data, and all variables were winsorized at 1% and 99% levels to limit the influence of outliers.

Country (28 EU)	Number of banks	Restrictions [1 – 16]	Capital [0 – 18]	Supervision [0 – 22]	GDP growth (%)	LegalStrength [0 – 12]
Austria	89	5	11	10	1.37	6.33
Belgium	20	6	15	9	0,59	5
Bulgaria	9	7	13	9	1,27	7,67
Croatia	19	9	13	10	-1,01	6,33
Cyprus	3	11	13	10	-2,46	7,67
Czech Republic	11	12	4	10	-0,03	5,67
Denmark	44	10	9	10	0,34	7,67
Estonia	3	10	14	11	4,77	6,33
Finland	7	7	13	6	0,17	7
France	146	9	12	9	0,75	5
Germany	168	7	13	8	1,47	6,33
Greece	1	9	12	7	-5,79	4,33
Hungary	6	6	11	11	0,24	6,33
Ireland	3	7	14	7	0,88	7,67
Italy	82	10	11	11	-1,32	3,67
Latvia	2	8	14	10	4,81	8,33
Lithuania	5	9	12	10	4,34	5
Luxembourg	29	10	13	11	1,21	4,33
Malta	4	11	12	11	1,02	3,67
Netherlands	8	6	13	10	-0,43	5,67
Poland	23	14	14	9	2,69	7,67
Portugal	14	8	11	11	-1,96	3,67
Romania	8	5	13	11	1,48	7,67
Slovakia	4	13	11	9	1,89	7
Slovenia	6	8	12	11	-0,98	4,33
Spain	62	7	13	9	-0,96	5,67
Sweden	13	10	2	5	1,86	7
United Kingdom	36	5	10	6	1,05	8,33
Obs.	825	84	84	84	84	84
Country-Year Obs.		2176	2176	2176	2176	2176
Mean		8,04	11,75	9,11	0,66	5,82
Standard Dev.		2,08	2,06	1,38	1,54	1,64
Median		7	12	9	.4	5
Min		5	2	5	-6,37	3
Max		14	15	11	9,56	10
Source		*Barth et al.*	*Barth et al.*	*Barth et al.*	*WB GFDD*	*WB WDI*

Table 5
Correlation matrix
Respectively, these numbers identify the following variables: **1:** Listed | **2:** Coop | **3:** Savg | **4:** Foreign | **5:** Nb_Host | **6:** Bank_S | **7:** Bank_B | **8:** Bank_BS | 9: GeoComplex | 10: GeoComplexS | 11: GeoComplexB |12**:** Size (logTA) | **13:** MarketShare | **14:** EQ_TA | **15:** CIR | **16:** Loans_TA | **17:** IncomeDivers | **18:** ln(Zscore) | **19:** ln(Zscore1) | 20**:** ln(Zscore2) | 21**:** SDROA | 22**:** ROA | **23:** Restrictions | **24:** RegulCapital | **25:** Supervision | **26:** GDP growth | **27:** LegalStrength
* significance at 0.05

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	1																										
2	-0.09*	1																									
3	-0.17*	-0.31*	1																								
4	0.22*	-0.12*	-0.13*	1																							
5	0.26*	-0.08*	-0.08*	0.45*	1																						
6	0.11*	-0.06*	-0.10*	0.65*	0.07*	1																					
7	-0.02	-0.11*	0.01	0.41*	0.06*	-0.07*	1																				
8	0.24*	-0.04*	-0.10*	0.53*	0.60*	-0.08*	-0.05*	1																			
9	0.18*	-0.03	-0.03	0.52*	0.52*	-0.19*	-0.22*	0.40*	1																		
10	0.25*	-0.14*	-0.00	0.71*	0.71*	-0.39*	0.00	0.39*	0.83*	1																	
11	0.37*	0.07	-0.19*	0.67*	0.67*	0.00	-0.26*	0.26*	0.65*	0.57*	1																
12	0.27*	-0.02	-0.05*	0.40*	0.38*	0.19*	0.07*	0.36*	0.31*	0.46*	0.38*	1															
13	0.32*	-0.17*	-0.11*	0.28*	0.36*	0.06*	0.02	0.37*	0.21*	0.34*	0.29*	0.42*	1														
14	-0.02	-0.09*	-0.06*	-0.07*	-0.08*	-0.02	-0.01	-0.09*	0.02	-0.05	0.01	-0.34*	-0.05*	1													
15	-0.07*	0.05*	0.14*	-0.12*	-0.03	-0.06*	-0.09*	-0.06*	0.04	-0.06	0.18*	-0.22*	-0.18*	-0.11*	1												
16	0.04	0.15*	0.04	-0.20*	-0.20*	-0.10*	-0.04	-0.18*	-0.36*	-0.35*	-0.32*	-0.03	-0.03	-0.03	0.04	1											
17	0.16*	0.09*	-0.02	0.10*	0.05*	0.06*	0.03	0.06*	-0.04	-0.09	0.10	0.26*	0.05*	-0.18*	0.08*	0.12*	1										
18	-0.08*	0.26*	0.23*	-0.14*	-0.07*	-0.08*	-0.02	-0.11*	-0.09	-0.13*	0.07	-0.02	-0.16*	0.02	0.09*	0.09*	0.03	1									
19	0.01	0.20*	0.06*	-0.06*	-0.04*	-0.05*	0.04	-0.08*	-0.17*	-0.14*	0.01	0.10*	-0.05*	-0.10*	-0.17*	0.06*	0.05*	0.79*	1								
20	-0.08*	0.27*	0.23*	-0.14*	-0.07*	-0.08*	-0.03	-0.11*	-0.08	-0.13*	0.08	-0.03	-0.17*	0.02	0.10*	0.10*	0.02	0.80*	0.77*	1							
21	-0.01	-0.14*	-0.08*	-0.01	-0.03	0.01	-0.02	-0.01	0.03	0.01	-0.10	-0.11*	0.05*	0.25*	-0.10*	-0.07*	-0.15*	-0.46*	-0.35*	-0.46*	1						
22	0.07*	-0.15*	-0.20*	-0.01	-0.05*	-0.01	0.04	-0.03	-0.06	-0.06	-0.09	-0.09*	0.14*	0.37*	-0.37*	-0.03	-0.13*	-0.27*	0.10*	-0.28*	0.62*	1					
23	0.28*	-0.03	-0.12*	-0.01	0.01	0.03	-0.07*	0.00	-0.04	-0.04	-0.08	0.19*	0.16*	-0.02	-0.13*	0.15*	0.12*	-0.09*	0.02	-0.10*	0.01	0.12*	1				
24	-0.05*	0.12*	-0.01	-0.01	-0.06*	0.03	-0.01	-0.04*	-0.09	-0.23*	0.11	0.05*	-0.05*	-0.10*	0.04*	-0.05*	-0.08*	0.13*	0.10*	0.13*	-0.04	-0.09*	-0.18*	1			
25	0.11*	-0.01	0.05*	0.05*	-0.07*	0.08*	-0.04	0.01	-0.17*	-0.26*	-0.15*	0.03	0.10*	-0.09*	-0.05*	0.07*	0.10*	-0.17*	-0.14*	-0.17*	0.05*	0.02	0.29*	0.09*	1		
26	-0.06*	-0.06*	0.05*	-0.06*	-0.01	-0.05*	-0.02	-0.03	-0.03	0.01	0.10	-0.04	0.03	-0.01	0.03	-0.04	-0.05*	0.06*	0.11*	0.05*	0.04	0.07*	-0.13*	0.07*	-0.32*	1	
27	0.00	-0.12*	0.02	-0.04	-0.01	-0.07*	0.01	0.01	0.02	0.06	0.06	-0.19*	0.07*	0.09*	0.05*	-0.06*	-0.13*	-0.02	-0.06*	-0.02	0.04	0.01	-0.23*	-0.09*	-0.43*	0.38*	1

Table 6
Influence of bank internationalization on bank risk and bank profitability

	Bank foreign presence					Number of host countries				
	Zscore (1a)	Zscore1 (2a)	Zscore2 (3a)	SDROA (4a)	ROA (5a)	Zscore (1b)	Zscore1 (2b)	Zscore2 (3b)	SDROA (4b)	ROA (5b)
Foreign	0.582**	0.362	0.592**	-0.570***	-0.519***					
	(0.29)	(0.29)	(0.29)	(0.14)	(0.13)					
Nb_Host						0.048*	0.008	0.049*	-0.050***	-0.062***
						(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
Size (logTA)	-0.265	-0.096	-0.269	0.239***	0.248***	-0.334**	-0.111	-0.341**	0.230***	0.243***
	(0.17)	(0.17)	(0.18)	(0.08)	(0.07)	(0.15)	(0.16)	(0.15)	(0.07)	(0.07)
MarketShare	4.121*	1.681	4.189*	-2.786***	-1.838*	2.947	2.319	2.907	-2.578***	-1.352
	(2.39)	(2.17)	(2.41)	(1.07)	(0.97)	(1.83)	(1.94)	(1.84)	(1.00)	(0.92)
EQ_TA	1.096	0.114	0.996	-1.611***	0.059	0.778	0.113	0.660	-1.670***	0.017
	(0.92)	(0.89)	(0.92)	(0.40)	(0.35)	(0.83)	(0.87)	(0.83)	(0.39)	(0.34)
CIR	-0.142	-0.899***	-0.107	-0.163	-0.536***	-0.102	-0.924***	-0.062	-0.134	-0.507***
	(0.24)	(0.23)	(0.24)	(0.10)	(0.09)	(0.23)	(0.24)	(0.23)	(0.10)	(0.09)
IncomeDivers	-0.376*	-0.563***	-0.374*	-0.105	-0.047	-0.335*	-0.576***	-0.329*	-0.092	-0.036
	(0.20)	(0.20)	(0.20)	(0.09)	(0.07)	(0.19)	(0.20)	(0.19)	(0.09)	(0.07)
Loans_TA	0.183	0.715***	0.159	-0.270**	-0.040	0.549***	0.651***	0.552***	-0.274**	-0.075
	(0.37)	(0.19)	(0.37)	(0.11)	(0.10)	(0.18)	(0.19)	(0.18)	(0.11)	(0.10)
Listed	0.468***	0.272*	0.483***	-0.182*	-0.117	0.411***	0.330**	0.420***	-0.155*	-0.052
	(0.16)	(0.16)	(0.16)	(0.09)	(0.09)	(0.15)	(0.16)	(0.15)	(0.09)	(0.09)
Coop	2.499**	0.840***	2.607**	-0.390***	-0.385***	1.128***	0.816***	1.152***	-0.343***	-0.343***
	(1.15)	(0.13)	(1.15)	(0.07)	(0.07)	(0.11)	(0.12)	(0.11)	(0.07)	(0.07)
Savg	1.895***	0.917***	1.953***	-0.423***	-0.411***	1.348***	0.882***	1.374***	-0.371***	-0.368***
	(0.45)	(0.14)	(0.45)	(0.08)	(0.08)	(0.12)	(0.13)	(0.12)	(0.08)	(0.07)
Restrictions	0.163***	0.258***	0.159***	-0.092***	0.015	0.153***	0.255***	0.149***	-0.089***	0.015
	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)	(0.02)	(0.02)
RegulCapital	0.159***	0.257***	0.154***	-0.093***	-0.021	0.211***	0.262***	0.209***	-0.099***	-0.027
	(0.05)	(0.04)	(0.05)	(0.02)	(0.02)	(0.03)	(0.04)	(0.03)	(0.02)	(0.02)
Supervision	-0.478***	-0.629***	-0.477***	0.077	-0.164***	-0.379***	-0.611***	-0.376***	0.072	-0.166***
	(0.11)	(0.09)	(0.11)	(0.05)	(0.05)	(0.08)	(0.09)	(0.08)	(0.05)	(0.05)
GDP growth	-0.062***	-0.020	-0.063***	0.022***	0.015**	-0.063***	-0.020	-0.065***	0.022***	0.015**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
LegalStrength	-0.058***	-0.069***	-0.057***	0.007	-0.011*	-0.059***	-0.069***	-0.058***	0.007	-0.011*
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
No. Obs.	2176	2176	2176	2176	2176	2176	2176	2176	2176	2176
No. clusters	825	825	825	825	825	825	825	825	825	825
Hausman test p-value	0.459	0.944	0.436	0.569	0.721	0.488	0.916	0.479	0.676	0.562
Wald test P > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table displays the results of the estimation of equation (1) regarding how bank internationalization affects bank risk and profitability over the 2011-2013 period. All five groups successively represent our five dependent variables. *Zscore* is the natural logarithm of the measure of bank default risk and financial stability; *Zscore1* is the natural logarithm of the measure of bank asset risk; *Zscore2* is the natural logarithm of the measure of bank leverage risk; *SDROA* is the standard deviation of return on assets for a three-year rolling window; and *ROA* is return on assets, which is the ratio of net income to total assets. *Foreign* equals 1 when a bank owns at least one

affiliate abroad and zero otherwise; *Nb_Host* is the number of foreign countries in which a bank has a foreign presence. In addition, *logTA* is the natural logarithm of total assets; *MarketShare* is the ratio of total bank assets to total assets in the country; EQ_TA is equity to total assets, a measure of leverage/bank capitalization; and *IncomeDivers* measures income diversification as follows: $IncomeDivers = 1 - \left|\frac{Net\ Interest\ Income - Other\ Operating\ Incone}{Total\ Operationg\ Income}\right|$. *CIR* is the ratio of cost to income; *Loans_TA* is net loans to total assets; *Listed* equals 1 if the bank is publicly traded and zero otherwise; and *Coop* equals 1 if the bank has a "Cooperative" banking specialization. *Savg* equals 1 if the bank has a "Savings" banking specialization. *Restrictions* is the index of restrictions on participation in bank activities such as securities, insurance, real estate, and ownership in nonfinancial firms; *RegulCapital* is an index of the stringency of requirements related to minimum capital adequacy, risk, market-value losses, sources of funding, and the level of official appraisal; *Supervision* measures regulatory power to prevent and correct problems regarding auditing, internal/board/ownership structure, profits and losses, and other balance sheets items. *GDP growth* is the growth rate of real gross domestic product; *LegalStrength* measures the degree to which collateral and bankruptcy laws protect borrowers and lenders and thus facilitate lending. We use the Hausman-Taylor specification with clustering at the bank level to estimate all equations in our model. We run the Hausman test between the FE and HT estimators to identify the mix of endogenous variables that generate the most consistent HT estimation. We estimate a constant for all equations (not reported). Variables are winsorized at the 1% and 99% levels to limit the influence of extreme values, and the table reports robust standard errors in parentheses and the significance of p-values by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7
Influence of bank foreign organizational complexity on bank risk and bank profitability

	Foreign subsidiaries only					Foreign branches only					Both foreign affiliates				
	Zscore (1c)	Zscore1 (2c)	Zscore2 (3c)	SDROA (4c)	ROA (5c)	Zscore (1d)	Zscore1 (2d)	Zscore2 (3d)	SDROA (4d)	ROA (5d)	Zscore (1e)	Zscore1 (2e)	Zscore2 (3e)	SDROA (4e)	ROA (5e)
Bank_S	0.469**	0.339	0.483**	-0.360***	-0.327***										
	(0.23)	(0.26)	(0.23)	(0.13)	(0.12)										
Bank_B						0.542*	0.560**	0.535*	-0.503***	-0.263					
						(0.31)	(0.27)	(0.31)	(0.19)	(0.18)					
Bank_BS											0.943**	0.092	0.968**	-0.692***	-0.735***
											(0.43)	(0.38)	(0.44)	(0.19)	(0.18)
Size (logTA)	-0.257	-0.078	-0.261	0.243***	0.249***	-0.263	-0.096	-0.266	0.223***	0.222***	-0.203	-0.102	-0.210	0.239***	0.247***
	(0.18)	(0.17)	(0.18)	(0.08)	(0.07)	(0.18)	(0.17)	(0.18)	(0.08)	(0.07)	(0.18)	(0.17)	(0.18)	(0.08)	(0.07)
MarketShare	4.491*	2.469	4.563*	-3.754***	-2.689**	4.454*	2.266	4.516*	-4.452***	-2.872**	-8.240	2.217	-8.412	-2.660**	-1.564
	(2.56)	(2.73)	(2.57)	(1.24)	(1.12)	(2.64)	(2.58)	(2.66)	(1.40)	(1.25)	(6.83)	(2.05)	(6.82)	(1.04)	(0.95)
EQ_TA	1.103	0.188	1.005	-1.637***	0.037	1.046	0.112	0.949	-1.752***	-0.079	1.236	0.129	1.121	-1.633***	0.044
	(0.91)	(0.89)	(0.91)	(0.39)	(0.35)	(0.91)	(0.89)	(0.91)	(0.41)	(0.35)	(0.89)	(0.88)	(0.89)	(0.39)	(0.34)
CIR	-0.126	-0.907***	-0.091	-0.148	-0.527***	-0.091	-0.882***	-0.056	-0.128	-0.509***	-0.212	-0.914***	-0.172	-0.148	-0.524***
	(0.24)	(0.23)	(0.24)	(0.10)	(0.09)	(0.23)	(0.23)	(0.23)	(0.10)	(0.09)	(0.24)	(0.23)	(0.24)	(0.10)	(0.09)
IncomeDivers	-0.370*	-0.569***	-0.368*	-0.093	-0.039	-0.354*	-0.559***	-0.352*	-0.075	-0.026	-0.391**	-0.572***	-0.386*	-0.097	-0.041
	(0.20)	(0.19)	(0.20)	(0.09)	(0.07)	(0.20)	(0.20)	(0.20)	(0.09)	(0.07)	(0.20)	(0.20)	(0.20)	(0.09)	(0.07)
Loans_TA	0.170	0.650*	0.146	-0.184*	0.030	0.163	0.634***	0.140	-0.020	0.101	0.590***	0.648***	0.593***	-0.254**	-0.040
	(0.36)	(0.36)	(0.36)	(0.11)	(0.10)	(0.37)	(0.19)	(0.37)	(0.17)	(0.14)	(0.18)	(0.19)	(0.19)	(0.11)	(0.10)
Listed	0.522***	0.326	0.537***	-0.269***	-0.195**	0.552***	0.344*	0.568***	-0.325***	-0.221**	0.659***	0.331**	0.673***	-0.195**	-0.115
	(0.17)	(0.20)	(0.18)	(0.10)	(0.10)	(0.18)	(0.19)	(0.19)	(0.11)	(0.11)	(0.19)	(0.16)	(0.19)	(0.10)	(0.09)
Coop	2.187*	1.074	2.294**	-0.364***	-0.359***	2.095*	0.839***	2.196*	-0.983*	-0.687	0.906***	0.812***	0.927***	-0.330***	-0.328***
	(1.12)	(1.12)	(1.13)	(0.07)	(0.07)	(1.14)	(0.12)	(1.14)	(0.54)	(0.48)	(0.16)	(0.12)	(0.16)	(0.07)	(0.07)
Savg	1.757***	1.024**	1.814***	-0.391***	-0.381***	1.691***	0.883***	1.745***	-0.597***	-0.479**	1.232***	0.881***	1.257***	-0.377***	-0.371***
	(0.44)	(0.44)	(0.44)	(0.08)	(0.08)	(0.43)	(0.13)	(0.44)	(0.21)	(0.19)	(0.14)	(0.13)	(0.14)	(0.08)	(0.08)
Restrictions	0.148***	0.275***	0.144***	-0.084***	0.022	0.152***	0.255***	0.147***	-0.092***	0.021	0.164***	0.254***	0.161***	-0.093***	0.013
	(0.03)	(0.04)	(0.03)	(0.02)	(0.02)	(0.04)	(0.04)	(0.04)	(0.03)	(0.02)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)
RegulCapital	0.165***	0.268***	0.159***	-0.096***	-0.023	0.173***	0.259***	0.167***	-0.080***	-0.013	0.200***	0.261***	0.198***	-0.102***	-0.029
	(0.05)	(0.06)	(0.05)	(0.02)	(0.02)	(0.05)	(0.04)	(0.05)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)
Supervision	-0.450***	-0.695***	-0.450***	0.064	-0.175***	-0.436***	-0.615***	-0.436***	0.095	-0.158***	-0.462***	-0.614***	-0.459***	0.070	-0.168***
	(0.11)	(0.12)	(0.11)	(0.05)	(0.05)	(0.11)	(0.09)	(0.11)	(0.06)	(0.06)	(0.10)	(0.09)	(0.10)	(0.05)	(0.05)
GDP growth	-0.061***	-0.019	-0.063***	0.022***	0.015**	-0.061***	-0.019	-0.063***	0.022***	0.014**	-0.060***	-0.020	-0.062***	0.022***	0.015**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
LegalStrength	-0.058***	-0.068***	-0.057***	0.007	-0.011*	-0.058***	-0.069***	-0.057***	0.007	-0.012*	-0.056***	-0.069***	-0.056***	0.007	-0.011*
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
No. Obs.	2176	2176	2176	2176	2176	2176	2176	2176	2176	2176	2176	2176	2176	2176	2176
No. clusters	825	825	825	825	825	825	825	825	825	825	825	825	825	825	825
Hausman test p-value	0.448	0.934	0.430	0.740	0.311	0.414	0.924	0.394	0.670	0.174	0.464	0.927	0.448	0.685	0.491
Wald test P > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table displays the results of the estimation of equation (2) regarding how bank foreign organizational complexity affects bank risk and profitability over the 2011-2013 period. All five groups successively represent our five dependent variables. *Zscore* is the natural logarithm of the measure of bank default risk and financial stability; *Zscore1* is the natural logarithm of the measure of bank asset risk; *Zscore2* is the natural logarithm of the measure of bank leverage risk; *SDROA* is the standard deviation of the return on assets for a three-year rolling window; and *ROA* is return on assets, which is the ratio of net income to total assets. *Bank_S* equals 1 when the bank owns

only subsidiaries abroad, and zero otherwise; *Bank_B* equals 1 when the bank owns only branches abroad, and zero otherwise; and *Bank_BS*: equals 1 when the bank owns both foreign subsidiaries and foreign branches, and zero otherwise. In addition, *logTA* is the natural logarithm of total assets; *MarketShare* is the ratio total bank assets to total assets in the country; EQ_TA is equity to total assets, a measure of leverage/bank capitalization; and *IncomeDivers* measures income diversification as follows: $IncomeDivers = 1 - \left|\frac{Net\ Interest\ Income - Other\ Operating\ Incone}{Total\ Operationg\ Income}\right|$. *CIR* is the ratio of cost to income; *Loans_TA* is net loans to total assets; *Listed* equals 1 if the bank is publicly traded and zero otherwise; and *Coop* equals 1 if the bank has a "Cooperative" banking specialization. *Savg* equals 1 if the bank has a "Savings" banking specialization. *Restrictions* is the index of restrictions on participation in bank activities such as securities, insurance, real estate, and ownership power in nonfinancial firms; *RegulCapital* is an index of the stringency of the requirements related to minimum capital adequacy, risk, market-value losses, sources of funding, and the level of official appraisal; *Supervision* measures regulatory power to prevent and correct problems regarding auditing, internal/board/ownership structure, profits and losses, and other balance sheets items. *GDP growth* is the growth rate of real gross domestic product; *LegalStrength* measures the degree to which collateral and bankruptcy laws protect borrowers and lenders and thus facilitate lending. We use the Hausman-Taylor specification with clustering at the bank level to estimate all equations in our model. We run the Hausman test between the FE and HT estimators to identify the mix of endogenous variables that generate the most consistent HT estimation. We estimate a constant for all equations (not reported). Variables are winsorized at the 1% and 99% levels to limit the influence of extreme values, and the table reports robust standard errors in parentheses and the significance of p-values by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8
Influence of bank geographic complexity (All affiliates / subsidiaries / branches) on bank risk and bank profitability

	All affiliates					Subsidiaries					Branches				
	Zscore	Zscore1	Zscore2	SDROA	ROA	Zscore	Zscore1	Zscore2	SDROA	ROA	Zscore	Zscore1	Zscore2	SDROA	ROA
GeoComplex	0.205**	0.324**	0.196**	0.056**	0.535***										
	(0.10)	(0.15)	(0.09)	(0.03)	(0.18)										
GeoComplexS						0.239**	0.086**	0.207**	0.943***	1.290***					
						(0.12)	(0.04)	(0.10)	(0.26)	(0.40)					
GeoComplexB											1.281***	1.410***	1.280***	-0.127	-0.027*
											(0.45)	(0.52)	(0.45)	(0.35)	(0.01)
Size (logTA)	0.352***	0.681***	0.334***	-0.024	0.128***	0.328***	0.567***	0.311***	0.057**	0.230*	0.006**	0.072**	0.002**	-0.038	-0.017*
	(0.11)	(0.17)	(0.11)	(0.07)	(0.04)	(0.11)	(0.15)	(0.10)	(0.02)	(0.12)	(0.00)	(0.03)	(0.00)	(0.04)	(0.01)
MarketShare	-10.615	-13.287	-10.525	2.216***	-1.090	-12.728	-18.820**	-12.469	1.440**	-4.645	-8.161	-12.064	-8.020	2.184***	-1.205
	(7.45)	(8.76)	(7.42)	(0.69)	(2.58)	(8.69)	(9.29)	(8.69)	(0.60)	(2.97)	(8.10)	(9.23)	(8.09)	(0.685)	(1.96)
EQ_TA	2.938***	3.216***	2.856***	0.304***	1.514**	2.388***	2.418***	2.286***	0.886***	1.975***	2.213***	0.083**	2.359**	0.645***	1.317***
	(0.80)	(0.90)	(0.79)	(0.11)	(0.60)	(0.73)	(0.75)	(0.71)	(0.28)	(0.64)	(0.82)	(0.04)	(0.74)	(0.22)	(0.37)
CIR	0.016	-0.868	0.074	0.061**	-0.536***	0.263	-0.695	0.319**	0.102**	-0.487**	-0.04*5	-1.176	0.036	0.076**	-0.656***
	(0.59)	(0.68)	(0.59)	(0.02)	(0.20)	(0.64)	(0.68)	(0.13)	(0.04)	(0.21)	(0.02)	(0.85)	(0.78)	(0.03)	(0.17)
IncomeDivers	-0.625*	-1.064***	-0.605*	0.008**	-0.235**	-0.549	-1.060***	-0.526	0.004**	-0.275**	-1.819***	-2.275***	-1.800***	0.230***	-0.063
	(0.34)	(0.40)	(0.34)	(0.00)	(0.12)	(0.36)	(0.39)	(0.36)	(0.00)	(0.12)	(0.54)	(0.59)	(0.54)	(0.06)	(0.12)
Loans_TA	0.934***	2.041*	0.860**	0.035**	0.868**	0.740***	1.715***	0.653**	0.601***	1.233***	0.750**	2.011***	0.681**	-0.075*	0.690**
	(0.31)	(1.12)	(0.29)	(0.02)	(0.34)	(0.28)	(0.52)	(0.26)	(0.18)	(0.43)	(0.30)	(0.62)	(0.27)	(0.04)	(0.35)
Listed	-1.880	-4.384	-1.730	-0.134*	-1.925	-0.998	-1.653	-0.833	-2.190	-3.125	0.380**	0.455**	0.391**	-0.136	0.040**
	(3.10)	(3.81)	(3.08)	(0.07)	(1.20)	(4.52)	(5.30)	(4.47)	(1.68)	(2.28)	(0.15)	(0.18)	(0.15)	(0.17)	(0.02)
Coop	0.257**	-0.500	0.300**	-0.069	-0.415*	0.184**	-0.635	0.234**	-0.159	-0.562	0.253**	-0.259*	0.284**	-0.013*	-0.273
	(0.10)	(0.67)	(0.12)	(0.12)	(0.22)	(0.08)	(0.82)	(0.10)	(0.26)	(0.38)	(0.11)	(0.15)	(0.12)	(0.01)	(0.28)
Savg	0.024**	-0.975	0.066**	-0.044*	-0.662**	0.380**	-0.391	0.435**	-0.063*	-0.385	0.595***	-0.025**	0.603***	-0.121	-0.405
	(0.02)	(0.92)	(0.03)	(0.02)	(0.30)	(0.15)	(1.02)	(0.17)	(0.03)	(0.52)	(0.21)	(0.01)	(0.21)	(0.17)	(0.28)
Restrictions	0.016**	0.080***	0.012**	-0.017	0.030***	0.058**	0.170***	0.054**	-0.030	0.012**	0.164***	0.365***	0.154***	-0.043	0.090***
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.02)	(0.05)	(0.02)	(0.04)	(0.01)	(0.05)	(0.09)	(0.05)	(0.03)	(0.03)
RegulCapital	-0.128	-0.282	-0.120	-0.005*	-0.116	0.007**	0.041**	0.017**	-0.182	-0.209	0.114***	0.205***	0.111***	-0.030	0.047***
	(0.21)	(0.26)	(0.21)	(0.00)	(0.09)	(0.03)	(0.02)	(0.01)	(0.15)	(0.22)	(0.04)	(0.07)	(0.03)	(0.03)	(0.02)
Supervision	-0.155	-0.234	-0.150	0.039***	-0.065	-0.105*	-0.390	-0.094*	0.221***	0.183***	-0.402	-0.656*	-0.395	0.099***	-0.168
	(0.12)	(0.15)	(0.12)	(0.01)	(0.05)	(0.06)	(0.60)	(0.05)	(0.07)	(0.07)	(0.28)	(0.38)	(0.27)	(0.03)	(0.12)
GDP growth	0.021***	0.048***	0.020***	0.000**	0.010***	0.012**	0.042***	0.011**	0.001**	0.016***	-0.017*	-0.027	-0.015*	0.016***	-0.003*
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.05)	(0.01)	(0.00)	(0.00)
LegalStrength	0.052***	0.031***	0.053***	-0.006	-0.003*	0.047***	0.010**	0.049***	-0.005*	-0.006	-0.005*	-0.013*	-0.005*	0.002**	0.008***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.15)	(0.00)	(0.00)	(0.00)
No. Obs.	425	425	425	425	425	338	338	338	338	338	225	225	225	225	225
No. clusters	160	160	160	160	160	127	127	127	127	127	87	87	87	87	87
Hausman test p-value	0.856	0.832	0.856	0.660	0.313	0.971	0.884	0.974	0.669	0.633	0.837	0.809	0.836	0.918	0.364
Wald test P > chi2	0.004	0.001	0.004	0.040	0.000	0.021	0.003	0.019	0.131	0.000	0.003	0.001	0.003	0.024	0.000

This table displays the results of the estimation of equation (3) regarding how bank geographic complexity affects bank risk and profitability over the 2011-2013 period. All five groups successively represent our five dependent variables. *Zscore* is the natural logarithm of the measure of the bank default risk and financial stability; *Zscore1* is the natural logarithm of the measure of bank asset risk; *Zscore2* is the natural logarithm of the measure of bank leverage risk; *SDROA* is the standard deviation of the return on assets on a three-year rolling window; and *ROA* is return on assets, which is the ratio of net income to total assets. *GeoComplex* measures the geographic dispersion of bank foreign affiliates in different world regions (columns 1–5), *GeoComplexS* measures geographic dispersion of bank foreign subsidiaries in different world regions (columns 6–10), and *GeoComplexB* measures geographic dispersion of bank foreign branches in different world regions (columns 11–15). In addition, *logTA* is the natural logarithm of total assets; *MarketShare* is the ratio of bank total assets to total assets in the country; EQ_TA is equity to total assets, a measure of leverage/bank capitalization; and *IncomeDivers*: measures income diversification as follows: $IncomeDivers = 1 - \left|\frac{Net\ Interest\ Income - Other\ Operating\ Incone}{Total\ Operationg\ Income}\right|$. *CIR* is the ratio of cost to income ratio; *Loans_TA* is net loans to total assets; *Listed* equals 1 if the bank is publicly traded and zero otherwise; and *Coop* equals 1 if the bank has a "Cooperative" banking specialization. *Savg* equals 1 if the bank has a "Savings" banking specialization. *Restrictions* is the index of restrictions on participation in bank activities such as securities, insurance, real estate and ownership in nonfinancial firms; *RegulCapital* is an index of the stringency of the requirements related to minimum capital adequacy, risk, market-value losses, sources of funding, and the level of official appraisal; *Supervision* measures regulatory power to prevent and correct problems regarding auditing, internal/board/ownership structure, profits and losses, and other balance sheets items; *GDP growth* is the growth rate of real gross domestic product; *LegalStrength* measures the degree to which collateral and bankruptcy laws protect borrowers and lenders and thus facilitate lending. We use the Hausman-Taylor specification with clustering at the bank-level to estimate equations in our model. We run the Hausman test between the FE and HT estimators to identify the mix of endogenous variables that generate the most consistent HT estimation. We estimate a constant for all equations (not reported). Variables are winsorized at the 1% and 99% levels to limit the influence of extreme values, and the table reports robust standard errors in parentheses and the significance of p-values by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9
Effect of bank size on bank risk and bank profitability

	ECB: TA > $40 billion USD					Large: TA > median ($3.2 billion USD)					Small: TA < median ($3.2 billion USD)				
	Zscore	Zscore1	Zscore2	SDROA	ROA	Zscore	Zscore1	Zscore2	SDROA	ROA	Zscore	Zscore1	Zscore2	SDROA	ROA
Foreign	-0.574	-0.096*	-0.607	0.123***	0.044**	-0.695**	-0.661**	-0.691**	0.102	-0.08	0.255	0.196	0.268	-0.100	-0.088
	(0.41)	(0.06)	(0.42)	(0.03)	(0.02)	(0.27)	(0.31)	(0.27)	(0.10)	(0.09)	(0.21)	(0.23)	(0.21)	(0.10)	(0.12)
No. Obs.	262	262	262	262	262	1088	1088	1088	1088	1088	1088	1088	1088	1088	1088
No. of clusters	106	106	106	106	106	420	420	420	420	420	429	429	429	429	429
Hausman test p-value	0.919	0.71	0.932	0.971	0.808	0.257	0.131	0.266	0.887	0.169	0.1953	0.4656	0.1918	0.2322	0.242
Wald test Prob > chi2	0.01	0.001	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nb_Host	-0.054	-0.017	-0.055	0.012*	-0.001*	-0.076**	-0.126***	-0.073**	0.013	-0.030***	0.058	0.049	0.062	-0.043	-0.036
	(0.04)	(0.04)	(0.04)	(0.01)	0.00	(0.03)	(0.04)	(0.03)	(0.01)	(0.01)	(0.10)	(0.12)	(0.11)	(0.05)	(0.06)
No. Obs.	262	262	262	262	262	1088	1088	1088	1088	1088	1088	1088	1088	1088	1088
No. of clusters	106	106	106	106	106	420	420	420	420	420	429	429	429	429	429
Hausman test p-value	0.94	0.486	0.944	0.993	0.822	0.728	0.955	0.698	0.32	0.154	0.2766	0.3057	0.2736	0.8626	0.100
Wald test Prob > chi2	0.016	0.001	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bank_S	-0.273*	-1.311	-0.204*	-0.042*	-0.059*	-0.572	-1.051**	-0.538	0.01	-0.362**	0.672**	0.724*	0.683**	-0.327**	-0.284
	(0.16)	(1.13)	(0.11)	(0.02)	(0.04)	(0.38)	(0.52)	(0.37)	(0.13)	(0.17)	(0.34)	(0.43)	(0.34)	(0.16)	(0.21)
No. Obs.	262	262	262	262	262	1088	1088	1088	1088	1088	1088	1088	1088	1088	1088
No. of clusters	106	106	106	106	106	420	420	420	420	420	429	429	429	429	429
Hausman test p-value	0.962	0.491	0.97	0.964	0.789	0.101	0.12	0.124	0.608	0.152	0.305	0.648	0.426	0.211	0.107
Wald test Prob > chi2	0.059	0.122	0.057	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bank_B	-0.258*	1.734***	-0.438*	0.104**	0.192***	0.161	0.619	0.129	-0.103	0.184	0.663*	1.012**	0.656*	-0.244	-0.123
	(0.14)	(0.57)	(0.26)	(0.04)	(0.07)	(0.44)	(0.65)	(0.43)	(0.15)	(0.22)	(0.39)	(0.51)	(0.39)	(0.19)	(0.26)
No. Obs.	262	262	262	262	262	1088	1088	1088	1088	1088	1088	1088	1088	1088	1088
No. of clusters	106	106	106	106	106	420	420	420	420	420	429	429	429	429	429
Hausman test p-value	0.962	0.593	0.972	0.968	0.807	0.113	0.089	0.136	0.503	0.139	0.425	0.874	0.411	0.227	0.105
Wald test Prob > chi2	0.068	0.048	0.065	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bank_BS	-0.677	-0.197*	-0.697	0.125***	0.033**	-0.648*	-1.221**	-0.613*	0.112	-0.375**	-0.056	0.093	-0.044	-0.001	0.087
	(0.54)	(0.12)	(0.54)	(0.04)	(0.01)	(0.36)	(0.49)	(0.36)	(0.15)	(0.18)	(0.64)	(0.78)	(0.64)	(0.30)	(0.41)
No. Obs.	262	262	262	262	262	1088	1088	1088	1088	1088	1088	1088	1088	1088	1088
No. of clusters	106	106	106	106	106	420	420	420	420	420	429	429	429	429	429
Hausman test p-value	0.95	0.685	0.956	0.977	0.787	0.962	0.609	0.119	0.762	0.844	0.9723	0.9918	0.4111	0.2344	0.2284
Wald test Prob > chi2	0.038	0.024	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table displays the results of the estimation of equation (1) and equation (2) regarding the effects of bank internationalization and foreign organizational complexity on bank risk and profitability over the 2011-2013 period for the following three subsamples: ECBs, large banks, and small banks. *Zscore* is the natural logarithm of the measure of bank default risk and financial stability; *Zscore1* is the natural logarithm of the measure of bank asset risk; *Zscore2* is the natural logarithm of the measure of bank leverage risk; *SDROA* is the standard deviation of the return on assets for a three-year rolling window; and *ROA* is return on assets, which is the ratio of net income to total assets. *Foreign* equals 1 when the bank owns at least one affiliate abroad, and zero otherwise, and *Nb_Host* is the number of foreign countries in which a bank has a foreign presence. *Bank_S* equals 1 when the bank owns only subsidiaries abroad, and zero otherwise; *Bank_B* equals 1 when the bank owns only branches abroad, and zero otherwise; and *Bank_BS* equals 1 when the bank owns both foreign subsidiaries and foreign branches, and zero otherwise. We use the Hausman-Taylor specification with clustering at the bank-level to estimate all equations of our model. We run the Hausman test between the FE and HT estimators to identify the mix of endogenous variables that will generate the most consistent HT estimation. Variables were winsorized at the 1% and 99% levels to limit the influence of extreme values, and the table reports robust standard errors in parentheses and the significance of p-values by * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 10
Effect of sovereign debt crisis on bank risk and bank profitability

	Zscore	Zscore1	Zscore2	SDROA	ROA
Foreign (β_1)	0.590**	0.313	0.602**	-0.569***	-0.584***
	(0.28)	(0.30)	(0.28)	(0.15)	(0.14)
Sov11*Foreign (β'_1)	0.794***	0.493	0.805***	-0.632***	-0.591***
	(0.29)	(0.31)	(0.30)	(0.15)	(0.14)
Sov11	-0.033	0.129	-0.042	0.009	0.121***
	(0.09)	(0.10)	(0.09)	(0.04)	(0.03)
No. Obs.	2176	2176	2176	2176	2176
No. of clusters	825	825	825	825	825
Wald test: $\beta_1 + \beta'_1$	1.384**	0.805	1.407**	-1.201***	-1.174***
Hausman test p-value	0.735	0.531	0.688	0.532	0.149
Wald test Prob > chi2	0.000	0.000	0.000	0.000	0.000
Nb_Host (β_1)	0.050*	0.002	0.052*	-0.050***	-0.069***
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
Sov11*Nb_Host (β'_1)	0.060**	0.003	0.062**	-0.053***	-0.072***
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
Sov11	0.008	0.178*	-0.001	-0.006	0.122***
	(0.09)	(0.09)	(0.09)	(0.04)	(0.03)
No. Obs.	262	262	262	262	262
No. of clusters	106	106	106	106	106
Wald test: $\beta_1 + \beta'_1$	-0.087*	-0.039**	-0.087*	0.025***	-0.012**
Hausman test p-value	0.987	0.761	0.989	0.989	0.941
Wald test Prob > chi2	0.036	0.064	0.032	0.004	0.000
Bank_S (β_1)	0.436*	0.255	0.452*	-0.307**	-0.359***
	(0.23)	(0.26)	(0.24)	(0.13)	(0.13)
Sov11*Bank_S (β'_1)	0.623**	0.484*	0.636**	-0.398***	-0.364***
	(0.25)	(0.28)	(0.25)	(0.13)	(0.13)
Sov11	0.009	0.156*	0.000	-0.003	0.117***
	(0.09)	(0.09)	(0.09)	(0.04)	(0.03)
No. Obs.	2176	2176	2176	2176	2176
No. of clusters	825	825	825	825	825
Wald test: $\beta_1 + \beta'_1$	1.058**	0.739	1.088**	-0.705***	-0.723***
Hausman test p-value	0.188	0.947	0.153	0.609	0.674
Wald test Prob > chi2	0.000	0.000	0.000	0.000	0.000
Bank_B (β_1)	0.514*	0.390	0.511*	-0.524***	-0.294*
	(0.30)	(0.29)	(0.30)	(0.19)	(0.17)
Sov11*Bank_B (β'_1)	0.786**	0.671**	0.779**	-0.552***	-0.283*
	(0.31)	(0.31)	(0.32)	(0.19)	(0.17)
Sov11	0.014	0.165*	0.005	-0.013	0.114***
	(0.09)	(0.09)	(0.09)	(0.04)	(0.03)
No. Obs.	2176	2176	2176	2176	2176
No. of clusters	825	825	825	825	825
Wald test: $\beta_1 + \beta'_1$	1.301**	1.061*	1.289**	-1.076***	-0.577*
Hausman test p-value	0.128	0.988	0.107	0.928	0.763
Wald test Prob > chi2	0.000	0.000	0.000	0.000	0.000
Bank_BS (β_1)	0.999**	0.349	1.033**	-0.681***	-0.817***
	(0.42)	(0.46)	(0.42)	(0.20)	(0.19)
Sov11*Bank_BS (β'_1)	1.136***	0.345	1.176***	-0.695***	-0.835***
	(0.44)	(0.48)	(0.44)	(0.20)	(0.19)
Sov11	0.016	0.186*	0.007	-0.009	0.120***
	(0.09)	(0.10)	(0.09)	(0.04)	(0.03)
No. Obs.	2176	2176	2176	2176	2176
No. of clusters	825	825	825	825	825
Wald test: $\beta_1 + \beta'_1$	0.110**	0.005	0.114**	-0.103***	-0.141***
Hausman test p-value	0.464	0.784	0.417	0.914	0.459
Wald test Prob > chi2	0.000	0.000	0.000	0.000	0.000
GeoComplex (β_1)	0.051**	-0.749	0.090**	0.129***	0.058**
	(0.02)	(0.89)	(0.04)	(0.04)	(0.03)

Sov11*GeoComplex (β'_1)	-0.241*	-1.157	-0.191*	0.067**	-0.166
	(0.14)	(0.90)	(0.11)	(0.03)	(0.29)
Sov11	-0.058	0.216***	-0.073	0.039***	0.136***
	(0.16)	(0.07)	(0.16)	(0.01)	(0.04)
No. Obs.	425	425	425	425	425
No. of clusters	160	160	160	160	160
Wald test: $\beta_1 + \beta'_1$	-0.190*	-1.91	-0.101*	0.196***	-0.108*
Hausman test p-value	0.959	0.988	0.957	0.865	0.529
Wald test Prob > chi2	0.006	0.001	0.006	0.007	0.000
GeoComplexS (β_1)	-0.335	-1.104	-0.295	0.259***	0.056**
	(0.63)	(0.85)	(0.63)	(0.07)	(0.03)
Sov11*GeoComplexS (β'_1)	-0.275	-1.157	-0.227*	0.175***	-0.101*
	(0.65)	(0.87)	(0.14)	(0.05)	(0.06)
Sov11	-0.039*	0.182***	-0.049*	-0.025	0.071***
	(0.02)	(0.06)	(0.02)	(0.05)	(0.02)
No. Obs.	338	338	338	338	338
No. of clusters	127	127	127	127	127
Wald test: $\beta_1 + \beta'_1$	-0.610	-2.261	-0.522	0.434***	-0.045*
Hausman test p-value	0.995	0.977	0.995	0.895	0.883
Wald test Prob > chi2	0.018	0.019	0.014	0.004	0.000
GeoComplexB (β_1)	1.516***	1.542***	1.531***	-0.172	-0.227*
	(0.51)	(0.57)	(0.51)	(0.34)	(0.14)
Sov11*GeoComplexB (β'_1)	1.065***	1.000**	1.074***	-0.141	-0.127*
	(0.40)	(0.41)	(0.40)	(0.34)	(0.07)
Sov11	-0.003**	0.184***	-0.016*	0.058***	0.153***
	(0.00)	(0.07)	(0.01)	(0.02)	(0.05)
No. Obs.	225	225	225	225	225
No. of clusters	87	87	87	87	87
Wald test: $\beta_1 + \beta'_1$	2.581***	2.542***	2.605***	-0.313	-0.345*
Hausman test p-value	0.973	0.931	0.974	0.989	0.553
Wald test Prob > chi2	0.031	0.017	0.029	0.108	0.000

This table displays the results of the estimation of equations (4), (5), and (6) regarding the effects of bank internationalization, foreign organizational complexity, and geographic complexity on bank risk and profitability over the 2011-2013 period. All five groups successively represent our five dependent variables. *Zscore* is the natural logarithm of the measure of bank default risk and financial stability; *Zscore1* is the natural logarithm of the measure of bank asset risk; *Zscore2* is the natural logarithm of the measure of bank leverage risk; *SDROA* is the standard deviation of the return on assets for a three-year rolling window; and *ROA* is return on assets, which is the ratio of net income to total assets. *Foreign* equals 1 when the bank owns at least one affiliate abroad and zero otherwise, and *Nb_Host* is the number of foreign countries in which a bank has a foreign presence. *Bank_S* equals 1 when the bank owns only subsidiaries abroad, and zero otherwise; *Bank_B* equals 1 when the bank owns only branches abroad, and zero otherwise; and *Bank_BS* equals 1 when the bank owns both foreign subsidiaries and foreign branches, and zero otherwise. *GeoComplex* measures the geographic dispersion of bank foreign affiliates in different world regions, *GeoComplexS* measures geographic dispersion of bank foreign subsidiaries in different world regions, and *GeoComplexB* measures the geographic dispersion of bank foreign branches in different world regions. *Sov11* equals 1 if the year is 2011, and zero otherwise. We use the Hausman-Taylor specification with clustering at the bank level to estimate all equations of our model. We run the Hausman test between the FE and HT estimators to identify the mix of endogenous variables that generate the most consistent HT estimation. We estimate a constant for all equations (not reported). Variables are winsorized at 1% and 99% levels to limit the influence of extreme values, and the table reports robust standard errors in parentheses and the significance of p-values by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11

Robustness checks of influence of bank foreign organizational complexity on bank risk and bank profitability

	Number of all affiliates					Number of subsidiaries					Number of branches				
	Zscore	Zscore1	Zscore2	SDROA	ROA	Zscore	Zscore1	Zscore2	SDROA	ROA	Zscore	Zscore1	Zscore2	SDROA	ROA
Nb_Affiliates	0.098*	0.154**	0.097*	-0.001	0.072***										
	(0.06)	(0.07)	(0.05)	(0.03)	(0.03)										
Nb_S						-0.073	-0.180	-0.067	0.055**	0.005					
						(0.17)	(0.22)	(0.17)	(0.02)	(0.08)					
Nb_B											0.169*	0.243**	0.168*	-0.023	0.038*
											(0.09)	(0.11)	(0.09)	(0.04)	(0.06)
Size (logTA)	0.050	0.138*	0.045	-0.003	0.007	0.088	0.248**	0.080	0.001	0.048*	-0.033	0.003	-0.037	-0.029	-0.034
	(0.13)	(0.07)	(0.13)	(0.03)	(0.04)	(0.16)	(0.11)	(0.16)	(0.04)	(0.03)	(0.17)	(0.22)	(0.17)	(0.04)	(0.06)
MarketShare	-7.621	-10.496	-7.546	0.385	-3.137	-6.335	-12.976	-5.973	-0.229	-4.283	-7.732	-11.168	-7.621	1.914**	-1.115
	(7.72)	(8.26)	(7.75)	(2.00)	(2.29)	(8.89)	(9.86)	(8.89)	(2.33)	(2.72)	(8.15)	(9.16)	(8.14)	(0.94)	(1.93)
EQ_TA	1.764**	0.622	1.782**	0.778***	1.222***	1.078*	0.230	1.086*	0.897***	1.344***	2.143*	-0.193	2.290*	0.683**	1.219**
	(0.73)	(1.39)	(0.74)	(0.30)	(0.40)	(0.58)	(1.47)	(0.58)	(0.32)	(0.44)	(1.26)	(3.68)	(1.31)	(0.35)	(0.50)
CIR	-0.321	-1.130*	-0.269	0.121*	-0.489***	0.293	-0.581	0.345	0.022	-0.515***	-0.061	-1.197	0.020	0.079	-0.655***
	(0.61)	(0.64)	(0.61)	(0.07)	(0.18)	(0.69)	(0.73)	(0.69)	(0.19)	(0.19)	(0.77)	(0.84)	(0.77)	(0.17)	(0.17)
IncomeDivers	-0.674*	-1.103***	-0.658*	0.017	-0.198*	-0.499	-1.019**	-0.480	-0.034	-0.269**	-1.821***	-2.276***	-1.802***	0.231*	-0.061
	(0.35)	(0.37)	(0.36)	(0.10)	(0.10)	(0.41)	(0.43)	(0.41)	(0.11)	(0.11)	(0.53)	(0.58)	(0.53)	(0.12)	(0.12)
Loans_TA	1.067**	1.907*	1.017**	0.128	0.909***	0.460	0.843	0.444	0.537***	0.961***	0.683	1.988**	0.611	-0.081	0.679*
	(0.53)	(1.12)	(0.52)	(0.27)	(0.31)	(1.23)	(1.35)	(1.23)	(0.20)	(0.37)	(1.37)	(0.88)	(1.37)	(0.31)	(0.35)
Listed	0.192	0.010	0.211	-0.052	-0.017	0.267	0.432*	0.260	-0.087	0.109	0.278	0.238	0.293	-0.102	-0.019
	(0.42)	(0.49)	(0.42)	(0.09)	(0.15)	(0.52)	(0.26)	(0.52)	(0.13)	(0.21)	(0.65)	(0.84)	(0.64)	(0.15)	(0.25)
Coop	0.567**	-0.015	0.601**	-0.150	-0.394**	0.571**	-0.212	0.617**	-0.201	-0.482**	0.357	-0.110	0.388	-0.033	-0.255
	(0.26)	(0.55)	(0.27)	(0.11)	(0.17)	(0.29)	(0.70)	(0.30)	(0.15)	(0.22)	(0.66)	(0.88)	(0.65)	(0.15)	(0.27)
Savg	0.566**	0.076	0.579**	-0.113	-0.383**	0.634**	-0.053	0.672**	-0.018	-0.254	0.723**	0.171	0.730**	-0.143	-0.357
	(0.26)	(0.58)	(0.27)	(0.11)	(0.18)	(0.29)	(0.71)	(0.30)	(0.14)	(0.26)	(0.36)	(0.94)	(0.36)	(0.17)	(0.28)
Restrictions	0.113**	0.277***	0.106**	-0.032*	0.073**	0.106**	0.225**	0.101**	-0.036*	0.033*	0.151**	0.343*	0.141*	-0.041	0.088**
	(0.05)	(0.11)	(0.05)	(0.02)	(0.04)	(0.05)	(0.11)	(0.04)	(0.02)	(0.02)	(0.08)	(0.21)	(0.07)	(0.04)	(0.04)
RegulCapital	0.120**	0.213*	0.117**	-0.024	0.049**	0.138***	0.223*	0.134**	-0.017	0.059**	0.124*	0.209**	0.121*	-0.031	0.043*
	(0.05)	(0.11)	(0.05)	(0.02)	(0.02)	(0.05)	(0.12)	(0.05)	(0.02)	(0.03)	(0.06)	(0.10)	(0.06)	(0.03)	(0.02)
Supervision	-0.333*	-0.627***	-0.321*	0.061**	-0.211***	-0.343*	-0.717***	-0.323	0.052**	-0.203**	-0.435	-0.684*	-0.428	0.101**	-0.167
	(0.19)	(0.23)	(0.19)	(0.02)	(0.07)	(0.20)	(0.26)	(0.20)	(0.03)	(0.09)	(0.27)	(0.37)	(0.27)	(0.04)	(0.12)
GDP growth	0.017	0.036**	0.017	0.002	0.008*	-0.004	0.024	-0.005	0.004	0.012**	-0.016	-0.028	-0.015	0.016**	-0.004
	(0.03)	(0.02)	(0.03)	(0.01)	(0.00)	(0.04)	(0.04)	(0.04)	(0.01)	(0.01)	(0.05)	(0.05)	(0.05)	(0.01)	(0.01)
LegalStrength	0.043**	0.015	0.044**	-0.005	-0.007	0.045**	0.007	0.047**	-0.006	-0.008	-0.006	-0.014	-0.006	0.002	0.008*
	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)	(0.02)	(0.04)	(0.02)	(0.01)	(0.01)	(0.04)	(0.05)	(0.05)	(0.01)	(0.00)
No. Obs.	425	425	425	425	425	338	338	338	338	338	225	225	225	225	225
No. clusters	160	160	160	160	160	127	127	127	127	127	87	87	87	87	87
Hausman test p-	0.855	0.823	0.855	0.679	0.336	0.971	0.854	0.976	0.696	0.620	0.834	0.826	0.832	0.919	0.385
Wald test P > chi2	0.003	0.000	0.003	0.007	0.000	0.006	0.006	0.005	0.003	0.000	0.015	0.006	0.014	0.105	0.000

This table presents the robustness checks of the estimation of equation (2) regarding the effects of bank foreign organizational complexity on bank risk and profitability over the 2011-2013 period. *Zscore* is the natural logarithm of the measure of bank default risk and financial stability, *Zscore1* is the natural logarithm of the measure of bank asset risk, and *Zscore2* is the natural logarithm of the measure of bank leverage risk. *SDROA* is the standard deviation of the return on assets for a three-year rolling window; *ROA* is return on assets, which measures profitability as the ratio of net income to total assets. *Nb_Affiliates* is natural logarithm of the total number of foreign

affiliates owned by a bank, *Nb_S* is the natural logarithm of the number of foreign subsidiaries owned by a bank, and *Nb_B* is the natural logarithm of the number of foreign branches owned by a bank. In addition, *logTA* is the natural logarithm of total assets, and *MarketShare* is the ratio of total bank assets to total assets in the country. EQ_TA is equity to total assets, a measure of leverage/bank capitalization; *IncomeDivers* is measure of income diversification as follows: $IncomeDivers = 1 - \left|\frac{Net\ Interest\ Income - Other\ Operating\ Incone}{Total\ Operationg\ Income}\right|$. *CIR* is the ratio of cost to income; *Deposits_TA* is customer deposits and short-term funding to total assets; *Loans_TA* is net loans to total assets; and *Listed* equals 1 if the bank is publicly traded and zero otherwise. *Coop* equals 1 if the bank has a "Cooperative" banking specialization; *Savg* equals 1 if the bank has a "Savings" banking specialization. *Restrictions* is the index of restrictions on participation in bank activities such as securities, insurance, real estate, and ownership in nonfinancial firms; *RegulCapital* is an index of the stringency of the requirements related to minimum capital adequacy, risk, market-value losses, sources of funding, and the level of official appraisal; *Supervision* measures regulatory power to prevent and correct problems regarding auditing, internal/board/ownership structure, profits and losses, and other balance sheets items. *GDP growth* is the growth rate of real gross domestic product; *Concentration* is the proportion of assets held by the three largest banks in a country over the total assets of the banking sector; and *LegalStrength* measures the degree to which collateral and bankruptcy laws protect borrowers and lenders and thus facilitate lending. We use the Hausman-Taylor specification with clustering at the bank-level to estimate the 10 equations in our model. Variables are winsorized at 1% and 99% levels to limit the influence of extreme values, and the table reports robust standard errors in parentheses and the significance of p-values by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12
Effect of bank foreign presence and foreign organizational complexity on bank risk and bank profitability for listed banks

	Zscore	Zscore1	Zscore2	SDROA	ROA
Foreign	0.171*	0.025	0.196*	0.050*	0.174**
	(0.10)	(0.66)	(0.11)	(0.03)	(0.08)
Size (logTA)	-0.357	-0.284	-0.365	0.076***	-0.116
	(0.27)	(0.29)	(0.27)	(0.03)	(0.08)
No. Obs.	256	256	256	256	256
No. of clusters	102	102	102	102	102
Hausman test p-value	0.582	0.575	0.570	0.291	0.229
Wald test Prob > chi2	0.042	0.002	0.042	0.000	0.000
Nb_Host	0.059*	0.043***	0.061*	-0.011	0.012**
	(0.03)	(0.01)	(0.03)	(0.01)	(0.00)
Size (logTA)	-0.482*	-0.375	-0.491*	0.117*	-0.148*
	(0.27)	(0.29)	(0.27)	(0.07)	(0.08)
No. Obs.	256	256	256	256	256
No. of clusters	102	102	102	102	102
Hausman test p-value	0.517	0.587	0.502	0.071	0.281
Wald test Prob > chi2	0.040	0.003	0.038	0.000	0.000
Bank_S	-0.237	-0.434	-0.217	0.129**	-0.028
	(0.46)	(0.47)	(0.47)	(0.06)	(0.27)
Size (logTA)	-0.331	-0.216	-0.340	0.095***	-0.109
	(0.23)	(0.25)	(0.23)	(0.03)	(0.08)
No. Obs.	256	256	256	256	256
No. of clusters	102	102	102	102	102
Hausman test p-value	0.588	0.570	0.578	0.241	0.338
Wald test Prob > chi2	0.025	0.001	0.025	0.000	0.000
Bank_B	0.491*	1.452***	0.442*	0.046	0.335**
	(0.25)	(0.51)	(0.23)	(0.37)	(0.16)
Size (logTA)	-0.360	-0.264	-0.367	0.101*	-0.114
	(0.23)	(0.24)	(0.23)	(0.06)	(0.08)
No. Obs.	256	256	256	256	256
No. of clusters	102	102	102	102	102
Hausman test p-value	0.595	0.611	0.587	0.126	0.306
Wald test Prob > chi2	0.047	0.002	0.045	0.000	0.000
Bank_BS	0.493**	0.146*	0.521**	-0.204	0.162**
	(0.22)	(0.08)	(0.23)	(0.22)	(0.08)
Size (logTA)	-0.369	-0.293	-0.375	0.101*	-0.114*
	(0.23)	(0.25)	(0.23)	(0.06)	(0.07)
No. Obs.	256	256	256	256	256
No. of clusters	102	102	102	102	102
Hausman test p-value	0.580	0.601	0.569	0.629	0.219
Wald test Prob > chi2	0.052	0.003	0.051	0.000	0.000

This table displays the results of the estimation of equations (1) and (2) regarding the effects of bank internationalization and foreign organizational complexity on bank risk and profitability over the 2011-2013 period for listed banks. *Zscore* is the natural logarithm of the measure of the bank default risk and financial stability, *Zscore1* is the natural logarithm of the measure of bank asset risk, and *Zscore2* is the natural logarithm of the measure of bank leverage risk. *SDROA* is the standard deviation of the return on assets for a three-year rolling window; *ROA* is return on assets, which is the ratio of net income to total assets. *Foreign* equals 1 when the bank owns at least one affiliate abroad, and zero otherwise; *Nb_Host* is the number of foreign countries in which a bank has a foreign presence; and *Bank_S* equals 1 when the bank owns only subsidiaries abroad, and zero otherwise. *Bank_B* equals 1 when the bank owns only branches abroad, and zero otherwise; *Bank_BS* equals 1 when the bank owns both foreign subsidiaries and foreign branches, and zero otherwise. We use the Hausman-Taylor specification with clustering at the bank-level to estimate all equations of our model. We run the Hausman test between the FE and HT estimators to identify the mix of endogenous variables that generate the most consistent HT estimations. Variables are winsorized at the 1% and 99% levels to limit the influence of extreme values, and the table reports robust standard errors in parentheses and the significance of p-values by * p < 0.1, ** p < 0.05, *** p < 0.01.

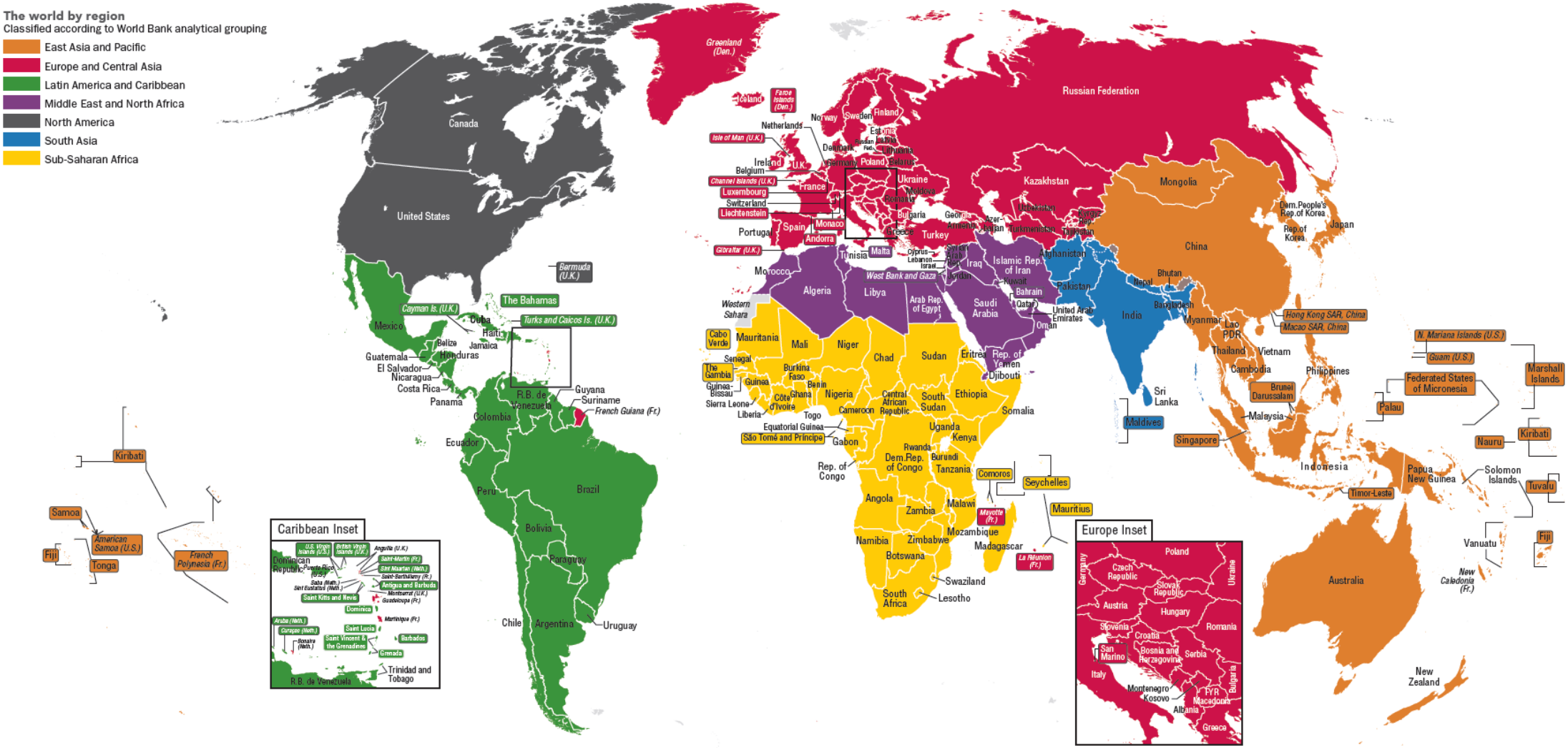
Appendix

Table A.1

World regions (8), classification of host countries (154), and distribution of banks foreign affiliates

East Asia & Pacific (EAP) 25	Australia, Brunei Darussalam, Burma/Myanmar, Cambodia, China, Fiji, French Polynesia, Hong Kong, Indonesia, Japan, Korea, Lao PDR, Macau, Malaysia, Mongolia, New Caledonia, New Zealand, Philippines, Singapore, Taiwan, Thailand, Timor-Leste, Vanuatu, Vietnam, Wallis and Futuna	Number of EU banks with foreign activity – 26 Number of foreign affiliates – 226 Number of foreign subsidiaries – 81 Number of foreign branches – 145
Europe (EUR) 44	Albania, Andorra, Austria (EU), Belarus, Belgium (EU), Bosnia and Herzegovina, Bulgaria (EU), Croatia (EU), Cyprus (EU), Czech Republic (EU), Denmark (EU), Estonia (EU), Finland (EU), France (EU), Germany (EU), Gibraltar, Greece (EU), Hungary (EU), Ireland (EU), Italy (EU), Kosovo, Latvia (EU), Liechtenstein, Lithuania (EU), Luxembourg (EU), Macedonia, Malta (EU), Moldova, Montenegro, Netherlands (EU), Norway, Poland (EU), Portugal (EU), Romania (EU), San Marino, Serbia, Slovakia (EU), Slovenia (EU), Spain (EU), Sweden (EU), Switzerland, Turkey, Ukraine, United Kingdom (EU)	Number of EU banks with foreign activity – 150 Number of foreign affiliates – 5424 Number of foreign subsidiaries – 297 Number of foreign branches – 5127
Central Asia (CA) 8	Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation, Turkmenistan, Uzbekistan	Number of EU banks with foreign activity – 25 Number of foreign affiliates – 1368 Number of foreign subsidiaries – 25 Number of foreign branches – 1343
Latin America & Caribbean (LAC) 18	Antigua and Barbuda, Argentina, Bahamas, Brazil, Cayman Islands, Chile, Colombia, Curacao, Dominican Republic, Haiti, Mexico, Panama, Paraguay, Peru, Puerto Rico, St. Pierre and Miquelon, Uruguay, Venezuela	Number of EU banks with foreign activity – 21 Number of foreign affiliates – 7048 Number of foreign subsidiaries – 72 Number of foreign branches – 6976
Middle East & North Africa (MENA) 15	Algeria, Bahrain, Djibouti, Egypt, Israel, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Tunisia, the United Arab Emirates	Number of EU banks with foreign activity – 10 Number of foreign affiliates – 92 Number of foreign subsidiaries – 25 Number of foreign branches – 67
North America (NA) 3	Bermuda, Canada, the United States of America	Number of EU banks with foreign activity – 19 Number of foreign affiliates – 2172 Number of foreign subsidiaries – 90 Number of foreign branches – 2082
South Asia (SA) 6	Bangladesh, India, Maldives, Nepal, Pakistan, Sri Lanka	Number of EU banks with foreign activity – 6 Number of foreign affiliates – 34 Number of foreign subsidiaries – 5 Number of foreign branches – 29
Sub-Saharan Africa (SSA) 35	Angola, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Chad, Congo, Congo Rep. Dem., Côte d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, Tanzania, Uganda, Zambia, Zimbabwe	Number of EU banks with foreign activity – 21 Number of foreign affiliates – 81 Number of foreign subsidiaries – 44 Number of foreign branches – 37

Figure A.1
Map of countries in seven world regions



Note: These regions include economies at all income levels, and may differ from common geographic usage or from regions defined by other organizations. For more information see https://datahelpdesk.worldbank.org/knowledgebaserticles/906519-world-bank-country-and-lending-groups.

Source: *World Bank – World Development Indicator (2017) – http://databank.worldbank.org/data/download/site-content/wdi/maps/2017/world-by-region-wdi-2017.pdf*

Table A.2
Descriptive statistics subsamples of banks
In this table, we summarize the descriptive statistics of the subsamples of ECB banks (106), large banks (420), and small banks (405) over the 2011-2013 period for all bank-level characteristics. Data is from Bankscope, SNL database and banks websites; detailed definitions are in section 3.

	ECB banks (TA > $40 billion)						**Large banks (TA > median $3.2 billion)**						**Small banks (TA < median $3.2 billion$)**					
Variable name	Obs.	Mean	StdDev.	Median	Min	Max	Obs.	Mean	StdDev.	Median	Min	Max	Obs.	Mean	StdDev.	Median	Min	Max
Foreign organizational complexity																		
Foreign	262	0.61	0.49	1	0	1	1088	0.31	0.46	0	0	1	1088	0.08	0.27	0	0	1
Nb_Host	262	4.94	9.66	1	0	47	1088	1.52	5.2	0	0	47	1088	0.13	0.53	0	0	6
Nb_Affiliates	262	171.52	680.64	1	0	4938	1088	43.71	341.92	0	0	4938	1088	0.34	2.49	0	0	40
Bank_S	262	0.24	0.43	0	0	1	1088	0.14	0.35	0	0	1	1088	0.04	0.20	0	0	1
Nb_S	262	5.1	10.96	1	0	60	1088	1.48	5.83	0	0	60	1088	0.08	0.38	0	0	3
Bank_B	262	0.05	0.22	0	0	1	1088	0.06	0.23	0	0	1	1088	0.02	0.16	0	0	1
Nb_B	262	166.42	674.19	0	0	4901	1088	42.23	338.4	0	0	4901	1088	0.26	2.36	0	0	38
Bank_BS	262	0.32	0.47	0	0	1	1088	0.12	0.32	0	0	1	1088	0.01	0.10	0	0	1
Dependent variables																		
Risk																		
Zscore	262	114.57	278.8	50.62	3.53	3944.3	1088	254.89	596.84	70.47	1.1	3944.26	1088	231.87	552.28	69.92	3.26	3944.26
ln(Zscore)	262	4.01	1.09	3.92	1.26	8.28	1088	4.43	1.38	4.26	0.23	8.28	1088	4.44	1.26	4.25	1.18	8.28
Zscore1	262	6.43	12.39	2.66	0.01	103	1088	10.32	18.17	3.83	0.01	103	1088	7.40	13.32	3.10	0.00	103.00
ln(Zscore1)	262	1.11	1.15	0.98	-2.35	4.73	1088	1.42	1.35	1.34	-2.35	4.73	1088	1.16	1.29	1.13	-2.35	4.73
Zscore2	262	107.91	268.33	46.51	2.59	3841.6	1088	244.15	579.22	66.72	1.75	3841.63	1088	223.95	537.82	66.53	2.46	3841.63
ln(Zscore2)	262	3.93	1.12	3.84	0.95	8.25	1088	4.36	1.4	4.2	0.56	8.25	1088	4.39	1.28	4.20	0.90	8.25
SDROA	262	0.18	0.23	0.12	0	1.98	1088	0.23	0.61	0.1	0	12.49	1088	0.29	0.53	0.15	0.00	6.83
Profitability																		
ROA	262	0.5	0.5	0.34	0	2.8	1088	0.58	0.65	0.4	0	8.66	1088	0.61	0.67	0.41	0.00	7.48
Bank-level control variables																		
TA (million USD)	262	154438	174725	55502	40002	580117	1088	46016.49	105340.1	13576.4	3194.35	580117	1088	1115.06	871.36	915.69	15.77	3186.31
Size (logTA)	262	11.4	1	10.92	10.6	13.27	1088	9.72	1.19	9.52	8.07	13.27	1088	6.57	1.11	6.82	2.76	8.07
MarketShare	262	7.45	8.57	3.11	0.21	27.91	1088	3.4	6.6	0.34	0.03	27.91	1088	0.21	0.93	0.02	0.00	18.45
EQ_TA	262	6.68	4.22	6.17	0.92	49.24	1088	8.53	5.65	7.77	0.92	95.93	1088	12.44	11.39	9.21	0.92	93.21
IncomeDivers	262	0.68	0.21	0.72	0	0.98	1088	0.64	0.24	0.69	0.00	0.98	1088	0.55	0.24	0.57	0.00	0.98
CIR	262	58.29	16.52	61.33	6.51	109.26	1088	58.53	16.20	60.07	6.51	191.14	1088	65.24	18.21	66.67	6.51	191.14
Loans_TA	262	50.85	22.82	53.56	0.79	91.78	1088	57.34	23.22	63.71	0.26	96.81	1088	56.82	22.69	60.29	0.26	96.81
Listed	262	0.32	0.47	0	0	1	1088	0.17	0.38	0.00	0.00	1.00	1088	0.07	0.25	0.00	0.00	1.00
Coop	262	0.18	0.38	0	0	1	1088	0.27	0.44	0.00	0.00	1.00	1088	0.25	0.43	0.00	0.00	1.00
Savg	262	0.19	0.39	0	0	1	1088	0.20	0.40	0.00	0.00	1.00	1088	0.23	0.42	0.00	0.00	1.00

Table A.3
Variable definitions and sources
Note: This table summarizes the brief definitions and sources for all variables.

Variable name	Definition	Source
Internationalization		
Foreign	Equals 1 when the bank owns at least one foreign affiliate (subsidiary and/or branch), and zero otherwise.	Bankscope, SNL, and Web pages
Nb_Host	Number of foreign countries in which a bank has a foreign presence.	Bankscope, SNL, and Web pages
Foreign organizational complexity		
Bank_S	Equals 1 when the bank owns foreign subsidiaries only, and zero otherwise.	Bankscope and Web pages
Bank_B	Equals 1 when the bank owns foreign branches only, and zero otherwise.	SNL and Web pages
Bank_BS	Equals 1 when the bank owns both foreign subsidiaries and foreign branches, and zero otherwise.	Bankscope, SNL, and Web pages
Geographical complexity		
GeoComplex	A normalized Herfindhal index that captures the geographical complexity of foreign banks in different world regions; ranges from 0 (lowest complexity) to 1 (highest complexity).	Bankscope, SNL, and Web pages
GeoComplexS	A normalized Herfindhal index that measures the geographic complexity of foreign subsidiaries.	Bankscope and Web pages
GeoComplexB	A normalized Herfindhal index that measures the geographic complexity of foreign branches.	SNL and Web pages
Dependent variables		
Risk		
Zscore	Zscore = (mROA + mEQ_TA) / σROA, a measure of the bank default risk.	Bankscope
ln(Zscore)	Natural logarithm of *Zscore.*	
Zscore1	Zscore1 = mROA / σROA, a measure of bank asset risk.	Bankscope
ln(Zscore1)	Natural logarithm of *Zscore1*.	
Zscore2	Zscore2 = mEQ_TA / σROA, measure of bank leverage risk.	Bankscope
ln(Zscore2)	Natural logarithm of *Zscore2*.	
SDROA	Standard deviation of return on assets *t*-year rolling (%).	Bankscope
Profitability		
ROA	Return on assets = net income to total assets (%).	Bankscope
Bank-level variables		
TA	Total assets (millions USD).	Bankscope
Size (logTA)	Natural logarithm of total assets.	
MarketShare	Total bank assets to total assets in the country (%).	Bankscope
EQ_TA	Equity to total assets, a measure of leverage/bank capitalization (%).	Bankscope
IncomeDivers	One minus the absolute value of the difference between net interest income and other operating income, divided by total operating income, a measure of income diversification (%).	Bankscope
CIR	Ratio of cost to income (%).	Bankscope
Loans_TA	Net loans to total assets (%).	Bankscope
Listed	Equals 1 if the bank is publicly traded and zero otherwise.	Bankscope and Web pages
Coop	Equals 1 if the bank has a "Cooperative" banking specialization.	Bankscope and Web pages
Savg	Equals 1 if the bank has a "Savings" banking specialization.	Bankscope and Web pages
Country-level variables		

Restrictions	Index that assesses the conditions under which banks can engage in four activities: securities, insurance, real estate, and nonfinancial businesses. It ranges from 1 (the lowest stringency) to 16 (highest).	The World Bank, Bank Regulation and Supervision Survey
RegulCapital	Ranges from 0 to 18 and shows the country's overall and initial capital stringency regulations.	The World Bank, Bank Regulation and Supervision Survey
Supervision	Index that evaluates whether supervisory authorities have the power to take specific preventive and corrective actions. It ranges from 0 to 22; higher values indicate greater power.	The World Bank, Bank Regulation and Supervision Survey
GDP growth	The growth rate of the real gross domestic product.	The World Bank, World Development Indicators
LegalStrength	Measures the degree to which collateral and bankruptcy laws protect borrowers and lenders. It ranges from 0 to 10, with higher scores indicating that these laws are better designed to expand access to credit.	The Global Financial Development Database