Geographic income diversification of large European banks: better or worse?

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Abstract

This study examines the impact of geographic income diversification of large European banks on performance by using unique hand-collected European banking data. By dividing the total operating income into three regions as home country, the rest of Europe and the rest of the world, we find evidence that geographic income diversification reduces bank performance. Moreover, we separately analyze the net effects of shifting operations from home country to the rest of Europe and the rest of world income and find that they reduce the bank performance except for the banks that are already more concentrated in these regions. We also analyze only two regions (home and foreign) and control the effect of board nationality diversity, and show that our results hold.

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1 Introduction

During the last thirty years of European banking, certain factors such as integration of European financial markets, technological innovations and deregulations have fundamentally transformed the banking sector. The transformation of the sector has contributed to the increasing competition in the traditional intermediation activities of European banks. Banks reacted to this intensifying competition by diversifying their activities to other geographies after regulation on the European Company Statute allowed banks to operate without restraint across the EU national borders. This geographical diversification, brought about by competition and seeking new income sources, motivated us to investigate the impacts of geographic income diversification on the performance of large European banks.

Following modern portfolio theory (Markowitz, 1952) in the context of geographic diversification of banks, banks may benefit from diversifying their income by spreading their activities to more than one country. Spreading banking activities to other countries or regions may reduce the risks originating from country-specific macroeconomic shocks and thus stabilize the bank income as long as markets are imperfectly correlated. Some studies on geographic diversification find that geographic diversification may be associated with scale and scope economies (Berger and DeYoung, 2001), improvement in corporate governance (Saunders, 1994), decrease in the exposure to idiosyncratic local shocks and lower cost of funds by expanding their deposit bases (Deng and Elyasiani, 2008). On the contrary, diversification may be related to value loss due to learning and agency costs (Deng and Elyasiani, 2008), scale and scope diseconomies, and insufficient managerial skills or information when the banks enter new markets (Acharya, Hasan, and Saunders, 2006). The performance of European banks should be better examined in the presence of these benefits and losses of geographic diversification

There are several reasons why the focus versus diversification issue is important in the context of large European banks. First, the soundness and performance of the large European banks that dominate the European banking system gain more importance after the 2008 financial crisis. Our findings from the banks' annual reports show that the share of income outside from the home country

was around 40% between 2012 and 2018 for large European banks, which is quite high. High rate of foreign income greatly affects the volume and volatility of large European banks' income, depending on the regions where they are generated. Thus, high geographic diversification has become crucial to understand banks' performance that became critical after the aforementioned 2008 crisis.

Second, the studies on geographic diversification primarily focus on US banks. The issue of concentration versus geographic income diversification has not been addressed thoroughly in empirical studies for large European banks. The few available analyses are based on foreign subsidiaries, but large European banks no longer perform cross-border banking activities by only foreign subsidiaries. Hüttl and Schoenmaker (2016) reveal that a significant share of foreign investments came true via branches, rather than subsidiaries, in 2014. Duijm and Schoenmaker (2021) analyze the loan diversification of European banks and find a positive relationship with bank performance. However, these existing studies on geographic diversification do not measure the diversification by using the total income. On this point, it is important to add that banks also diversify their risks by generating income from non-interest activities. The non-interest activities may generate earning volatility and reduce bank performance (DeYoung and Roland, 2001; Stiroh, 2004; Stiroh and Rumble, 2006). Potential volatility of non-interest income should be taken into account in the geographic diversification analysis along with loan diversification. To overcome these shortcomings, we measure geographic diversification with total income. None of the studies in the literature examine the effect of geographic diversification on the performance of large European banks by using total income generated from different geographies. In this context, we aim to fill this gap in the literature by collecting the total income data of large European banks from three regions: home country, rest of Europe and rest of the world.

Last but not least, the possible effects of climate change on countries' macro- and microeconomies are expected to impact banks in the foreseeable future. During the data collection process, we observe from the annual reports of large European banks that bank managements discuss and even project the climate change risk depending on scenarios and time scales. As firms in different geographies face different transition and physical risks, banks may follow geographic diversification plans for climate change. The scope of these plans may be further expanded due to changing per-

ceptions of outbreaks like the COVID-19 pandemic. The exposure of the banking sector stemmed from outbreaks varies from country to country, and the different exposures will be reflected in each bank's performance. Thus, potential consequences of climate change and the pandemic will impact geographic diversification strategies and the performance of large European banks. The negative or insignificant effects of diversification in the pre-pandemic and climate change period may lead to the conclusion that banks should abandon their diversification policies. Therefore, it is essential for bank managers and regulators to understand the current effects of geographic diversification on bank performance.

In this paper, we analyze the geographic income diversification of large European banks from 2012 to 2018 by using hand-collected data from annual reports. To the best of our knowledge, this is the first study that uses geographic income diversification in examining European bank performance. We decompose the total income as home country income, the rest of Europe income and the rest of the world income (three-regions perspective) and find a negative association between diversification and bank performance. Thus, there is no direct benefit of reliance on geographic income diversification. However, by considering indirect effects, we also calculate the net effects of shifting activities from home country to the rest of Europe and the rest of the world. The net effect of shifting activities to the rest of Europe becomes significantly negative for the 10th, 25th and 50th percentiles, but positive for the 90th percentile. Similarly, the net effect of shifting activities to the rest of the world is negative for the 10th, 25th, 50th and 75th percentiles, but positive for the 90th percentile.

We also decompose the total bank income as home country and foreign income including the rest of Europe (two-regions perspective), and again find an inverse relationship between geographic income diversification and bank performance. The net effect of shifting activities from the home country to the rest of the world is negative for the 10th and 25th percentiles but positive for the 90th percentile. We also control the effects of board diversity (nationality and gender) on performance. Especially banks considering expansion to other regions may evaluate that foreign board members increase performance. Although large banks surged their share of foreign directors from 2012 to 2018, there is an insignificant relationship between nationality diversity and bank performance.

The remainder of the paper is structured as follows. Section 2 covers the literature review on the

effect of diversification on bank performance. Section 3 explains the data, variables, and methodology employed during empirical work. Section 4 contains the empirical results and Section 5 concludes.

2   Literature review

The benefits and the costs of diversification on bank performance are analyzed extensively in the literature. These studies provide mixed results for the effects of bank diversification with respect to diversification types. One part of the literature finds a positive relationship between diversification and bank performance. Portfolio theory offers an explanation that geographically diversified banks can decrease their earnings volatility through the co-insurance effect (Boot and Schmeits, 2000). Banks benefit from diversification by expanding their operations across different products and services (Boyd and Graham, 1988; Rose, 1989; Berger, Demsetz, and Strahan, 1999). Banks also benefit from diversification by cheaper monitoring advantage (Boyd and Prescott, 1986; Iskandar-Datta and McLaughlin, 2007; Drucker and Puri, 2009), lowering cost of funds by expanding their deposit bases and improving internal capital markets (De Haas and Van Lelyveld, 2010; Cetorelli and Goldberg, 2012), enhancing managerial efficiency (Berger and DeYoung, 2001), reducing the exposure to idiosyncratic local shocks (Diamond, 1984; Deng and Elyasiani, 2008; Goetz, Laeven, and Levine, 2016), and improving internal capital markets (Kuppuswamy, Serafeim, and Villalonga, 2014). Lepetit et al. (2008) emphasize the innovative benefit of diversification by increasing competition. Amidu and Wolfe (2013) show that bank competition increases stability as income-type diversification increases.

Different types of diversification might have a positive effect on the performance of the banks. Köhler (2014) examines the performance of German banks and finds that reliance on a higher share of the non-interest income provides a more stable income profile for retail-oriented banks. Saghi-Zedek (2016) shows that European banks benefit from diversification if banks are controlled by banking institutions, institutional investors, industrial companies, or any other combination of these shareholder categories. For geographic diversification, even though many studies focus on US banks, a small portion of the literature focuses on European banks. Duijm and Schoenmaker (2021) find

that cross-border banking reduces banks' risk by lowering the insolvency risk and provides a less volatile income profile for large European banks. Duijm and Schoenmaker (2021) also analyze the bank performance through loan diversification, which covers only the traditional (loan activity) side of banking activities rather than both traditional and non-traditional (non-interest income) sides.

In contrast to the literature finding positive effects of diversification, a range of other studies arrive at the counter findings, namely, that bank diversification raises risks. Geographic diversification reduces bank performance due to distance-related monitoring and agency problems caused by the distance between senior managers and branch managers (Brickley, Linck, and Smith Jr, 2003), due to the insufficient managerial skills or lack of information when expanding to new markets (Acharya, Hasan, and Saunders, 2006; Baele, De Jonghe, and Vander Vennet, 2007) and by creating organizational diseconomies due to the relying less heavily on soft information (Berger et al., 2005).

By diversifying the income to the different types as interest and non-interest income, diversifying bank revenue increases income volatility (DeYoung and Roland, 2001; Stiroh and Rumble, 2006). Mercieca, Schaeck, and Wolfe (2007) show a negative relationship between non-interest income and bank performance for the small European banks. Lepetit et al. (2008) examine the product diversification in the European banking industry. Their results show that banks shifting from interest income to non-interest income activities present a greater insolvency risk than banks that primarily perform in traditional intermediation activities. Acharya, Hasan, and Saunders (2006) examine the diversification of Italian banks between 1993 and 1999, and find that both industrial and sectoral loan diversification reduce bank returns. Maudos (2017) suggests that the negative effect of non-interest income share is valid during the crisis periods. Maudos (2017) also asserts that some institutions may be better performing at diversifying their activities than others. DeYoung and Torna (2013) notes the effects of non-interest income for the crisis period and find that the probability of failure depends on the non-interest income types. Similarly, Stiroh (2010) denotes that more volatile non-interest income sources reduce the risk-adjusted returns of banks.

In this study, we extend the literature by analyzing the effect of geographic income diversification using total operating income. Income diversification for European banks is analyzed by three regions (home country, the rest of Europe and the rest of the world) and two regions (home and foreign). To

the best of our knowledge, this is the first study to examine the effect of geographic diversification on the performance of large European banks using total operating income.

3   Data, variables and methodology

We first explain the data and then detail the bank performance measures as dependent variables. Next, we discuss the explanatory variables used in regressions. Summary statistics are also presented in this section. The methodology subsection is meant to provide a description of the research methodology.

3.1   Data

Our sample consists of annual observations in the period between 2012 and 2018 for a set of large European banks established in 14 countries. 45 banks in our sample are established in the following countries: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Ireland, the Netherlands, Portugal, Spain, Sweden, Switzerland, and the UK. We focus on large parent banks since diversification decisions about the entire organization are made at that level. Therefore, subsidiaries are removed from the sample and only parent companies are analyzed. The hand-collected banking data are derived from the banks' annual reports. However, some details, particularly for geographic diversification of income, may not be published in annual reports. In this case, the data is compiled from the registration documents of the banks or from the sustainability reports. In our analysis, all non-euro values are converted to Euro.[1]

3.2   Variables

3.2.1   Dependent variables

Following Stiroh and Rumble (2006), we utilize five performance measures to examine bank performance. The first two performance measures are *RiskROA* and *RiskROE*. *RiskROA* is the return on

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[1]During the data collection process, the restated observations from the previous years are updated.

average asset (net income to average asset ratio) divided by the standard deviation of return on average asset and *RiskROE* is the return on average equity (net income to average equity ratio) divided by the standard deviation of return on average equity. The third performance measure is the *Z-score*, defined as the sum of the return on assets and the equity to asset ratio, divided by the standard deviation of the return on assets. The *Z-score* denotes the number of standard deviations that a bank's rate of return on assets can decrease in one period before it becomes insolvent. Hence, higher *Z-score* gives signal about lower probability of insolvency.(Mercieca, Schaeck, and Wolfe, 2007)

Other two performance measures are standard deviation of return on average asset (*SDROA*) and standard deviation of return on average equity (*SDROE*)[2]. Higher values of *Z-score*, *RiskROA* and *RiskROE* increase risk-adjusted profit, while lower values of *SDROA* and *SDROE* decrease volatility and increase bank performance.

3.2.2 Independent variables

Our main measure of geographic income diversification, *HHIGeo3*, takes into account variation in the breakdown of net operating revenues into three geographic categories: operating income from home country, the rest of Europe and the rest of the world. The underlying reason behind three regions distinction is the data availability and banks' three-regions perspective on geographical diversification. Banks generally publish their geographic operating income according to the perspective of three regions in their annual reports. They mainly operate in home country and the rest of Europe. They also perform in other geographies with relatively little share. Therefore, they mainly categorize them as the rest of the world and publish with this categorization. Only the largest ten banks provide more details about the continents of the rest of the world income, as we summarized in Figure 2. Following three-regions reporting, our primary measure of geographic diversification is calculated by the following Herfindahl-Hirschman Index:

$$HHIGeo3 \quad = \quad (H)^2 + (E)^2 + (W)^2 \tag{1}$$

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[2]Standart deviations for *SDROA* and *SDROE* are calculated as the standart deviations of the last three years of return on asset and return on equity, respectively.

where *H* is the share of home country income, *E* is the share of income from the rest Europe and *W* is the share of the rest of the world income. The variable *HHIGeo3* takes value between 0 and 1. The values out of this range stemmed from negative income are removed from our data pool. The value of 1 shows no diversification (i.e., incomes are fully concentrated in home country). Thus, as *HHIGeo3* increases, the bank becomes more geographically concentrated and less diversified.

Following Stiroh and Rumble (2006) and Mercieca, Schaeck, and Wolfe (2007), revenue diversification is calculated by Herfindahl-Hirschman Index. Net operating revenue is decomposed into two main categories: net interest income and net non-interest income. Revenue diversification is calculated as follows:

$$HHIRevenue \quad = \quad (INTSH)^2 + (NONINTSH)^2 \tag{2}$$

where *INTSH* is the share of interest income and *NONINTSH* is the share of non-interest income. Similarly. as *HHIRevenue* increases, the bank becomes less diversified in terms of income types.

In order to control the effect of bank loans on performance, total loans to asset ratio is defined (*Loans*). Mercieca, Schaeck, and Wolfe (2007) find that loan specialization is positively associated with risk-adjusted return on asset and Z-score. Total deposits to asset ratio (*Deposits*) is used to investigate the effect of deposits on bank performance. The higher deposit to asset ratio implies that the bank specializes in deposits.

Assuming a single European banking market, the Herfindahl-Hirschman Index is also used to measure the level of competition of the large banks in Europe. Bikker and Haaf (2002) defines *HHICompetition* as the sum of the squares of the bank sizes measured as market shares. The higher value of *HHICompetition* means less competition in the banking sector.

One of the main operating costs of banks is the staff cost. Staff cost to asset ratio (*Staff Cost*) is introduced to investigate the effect of staff cost. To measure the effect of firm size (bank size), we use the natural log of total assets (*Asset Size*). A positive association between asset size and bank performance is priori expected. To test the effect of capitalization, we use equity to asset ratio

(*Capital*). Following Stiroh and Rumble (2006) and Mercieca, Schaeck, and Wolfe (2007), we also control the impact of asset growth on bank performance (*Asset Growth*).

As some of the large European Banks do not use Euro, potential effects of currency differences are controlled by *Euro currency* variable. *Euro currency* variable takes value 1, if the home country currency is Euro and zero otherwise.

3.2.3 Descriptive statistics

Figure 1 shows that the average home country income is around 60%, corresponding to six out of ten total income being home country income. The share of the income generated from home country surged about 3.5 percent from 2012 to 2018. However, the share of the income generated from other European countries decreases from 23.9% to 20.8%, which implies a gradual shift from Europe to home country. The share of the rest of the world income is stable during this period.

A more detailed chart of revenue diversification of the largest ten banks, covering five continents, is presented in Figure 2. Since other banks generally publish their revenues for only three regions, the income distribution of only the largest ten banks across five continents could be detailed. According to the chart, the highest share of income is obtained from the home country, followed by the rest of Europe, America, Asia-Pacific and Africa, respectively. While the share of the home country does not change much over the years, other regions can get a share from each other. As can be seen, while the shift to the Asia Pacific region is increasing gradually, Africa's share of total income is getting smaller for large European banks. The interesting point is that compared to other large banks, the share of home country income is about 20% lower for the largest ten banks. It implies that the largest ten banks are more open to foreign income than the other large banks. The share of the rest of the world income is around 16% for our sample, but the share of the rest of the world income is around 31% for the largest ten banks.

Table 1 presents the summary statistics of the dependent and independent variables. The mean of the shares of the female and foreign directors are 21%. Some large banks do not have foreign or female directors. Some other banks attach great importance to board diversity, particularly for gender diversity. One of the reasons is that banks are committed to fulfilling the statutory minimum

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requirement of female representation.

Panel A in Table 2 shows the descriptive statistics for euro and non-euro area countries. Income generated from home country in the euro-area is 66%, while it is 54% in the non-euro area. Compared to euro area countries, non-euro area banks are less focused on home and diversified their income to the other regions. Banks in non-euro area countries also appoint more foreign directors and female directors than banks in euro area countries.

Panel B in Table 2 demonstrates the differences among the banks in Scandinavian and non-Scandinavian countries. Unsurprisingly, the share of the women on board of Scandinavian banks, 36%, is much higher than in other European banks, 17.5%. The share of the foreign board is also higher in Scandinavian banks. Compared to other European banks, the share of the income generated from Europe is low for large Scandinavian banks. Income generated from the rest of Europe is only 20% for Scandinavian banks, but 36% for other European banks. This implies that compared to other European banks, Scandinavian banks pay extra attention to the rest of the world income.

3.3 Methodology

We empirically analyze the effect of geographic income diversification on bank performance for large European banks using the following model:

$$Y_{it} \quad = \quad \alpha + \beta_{HHIGeo3} HHIGeo3_{it} + \beta_E E_{it} + \beta_W W_{it} + \mathbf{X}_{it} + \gamma_t \qquad (3)$$

where Y_{it} denotes the performance measures (*RiskROA*, *RiskROE*, *Z-score*, *SDROA* and *SDROE*). *HHIGeo3*$_{\text{it}}$ is the geographic diversification parameter, E_{it} and W_{it} are the shares of rest of Europe and rest of the world income, respectively. $\mathbf{X}_{it}$ is the set of control variables. Subscript i refers to the specific bank being observed and subscript t refers to the specific year in which it is observed. γ_t indicates year fixed effects.

Since our data has small n, indicating limited observations, using the difference and system generalized method-of-moments estimators are inappropriate choices (Roodman, 2009). Therefore, we

utilize the pooled OLS regression model to estimate the determinants of bank performance. We also use the random effect model to compare the results.[3] Both random effect and pooled OLS models give very similar results. For the standard errors used in calculating t statistics, we use a robust cluster method that takes into account both correlation and heteroskedasticity in multiple observations of the same bank.

4 Results

4.1 Three-regions perspective

The effects of geographic income diversification on different bank performance measures are presented in Table 3. The first three columns report the risk adjusted bank performances by risk-adjusted return on asset (*RiskROA*), risk-adjusted return on equity (*RiskROE*) and *Z-score*, respectively. The last two columns test the determinants of earning volatility by using the standard deviation of return on asset (*SDROA*) and return on equity (*SDROE*), respectively.

First, we explore the relationship between bank performance and the degree of bank diversification. For all risk-adjusted performance measures, the coefficients of *HHIGeo3* are highly significant and negative, implying that an increase in reliance on geographic income diversification is related to less risk-adjusted profit. Consistently with these results, results in the last two columns for earning volatility show that the coefficients of *HHIGeo3* are statistically significant with the positive signs, indicating that geographically diversified large European banks have more earning volatility. Thus, geographic income diversification per se is no guarantee of better performance and may reduce bank performance. However, the coefficients of *Europe share* is significant and positively for *RiskROA* and *ZSCORE*. *Rest of World* statistically insignificant for all performance measures. At this point, following Stiroh and Rumble (2006), we examine the net effect of geographic diversification as banks diversify income by shifting activities from the home country to the rest of Europe and the rest of the world.

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[3]Based on a Hausman test, we do not reject the hypothesis of random-error in favor of fixed-error and thus we can conclude that of the two alternatives (fixed versus random effects), the random effects model is the better choice.

The sum of the shares of income from home country (H), the rest of Europe (E) and the rest of the world (W) is equal to one. Because $H = 1 - E - W$, we can rewrite our geographic diversification variable in Equation 1 as follows:

$$HHIGeo3 = 1 - 2E - 2W + 2(E \times W) + 2(E)^2 + 2(W)^2 \qquad (4)$$

In Equation 3, β_E represents the direct effect of *Rest of Europe*. The indirect effect of *Europe share* is calculated by taking derivative of Equation 4 with respect to *Rest of Europe*:

$$\frac{\partial HHIGeo3}{\partial E} \quad = \quad -2 + 2W + 4E \qquad (5)$$

The total effect is the sum of direct and indirect effects that equals the derivative of Y with respect to *Rest of Europe*:

$$\frac{\partial Y}{\partial E} \quad = \quad \beta_{HHIGeo3}(-2 + 2W + 4E) + \beta_E \qquad (6)$$

Stiroh and Rumble (2006) examine the net effect of shifting activities from traditional banking operations to non-interest income operations by portfolio perspective. Similarly, in a portfolio of three variables, the variance of the portfolio is determined by the variances of the three variables and their covariances with each other. The benefit of geographic diversification is similar to gains from the covariance effect in a standard portfolio setting. And the total effect is seen by the sum of the direct and the indirect effect in Equation 6.

Our results for the Equation 6 show the net effect of shifting activities from home country to Europe and presented in Table 4 for all performance measures. It is very important to make a distinction between banks that are more concentrated in Europe and banks that are less concentrated. The performance of the banks that are less concentrated in Europe decreases by shifting activities

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to the rest of Europe. The net effect is highly significant and negative for the 10th, 25th and 50th percentiles indicating that the net effect of increasing *Europe share* is the lower bank performance[4].

According to the results in Table 4, a 0.1 increase in *Europe share* is related to a significant decrease of 1.97 in *RiskROA* at the 10th percentile. Similarly, 0.1 increase in *Europe share* is related to a decrease of 1.54 and 0,79 at the 25th and 50th percentiles, respectively. This negative net effect of diversification is valid for other performance measures, too. The country's characteristics and technical issues may play an important role in this negative association. Deng and Elyasiani (2008) emphasize the learning and agency costs in diversification, while Acharya, Hasan, and Saunders (2006) assert that managerial skills and information asymmetry are key issues in entering new markets. These issues in entering new markets may be valid for the less diversified banks, too. Differences in regulatory environments, country-specific political factors and exchange controls or some other costs that may also outweigh the benefits of geographic diversification. Another potential explanation is that geographic diversification decreases bank performance by creating a distance-related monitoring problem stemmed from a distance between senior managers and branch managers (Brickley, Linck, and Smith Jr, 2003). Lastly, different than the problems in seeking benefit from diversification, the main motivation of managers may differ from increasing bank performance through geographic diversification. The agency view argues that managers can obtain private benefits including power and prestige from geographic diversification (Jensen, 1986; Stulz, 1990) and hence managers may not prioritize the performance effect of the geographic diversification. They may have gained power by expanding banks to other regions at a low rate.

Banks that are more concentrated on European income increases their performance by shifting from home to the rest of Europe for *RiskROA* and *Z-score*. 0.1 increase in *Europe share* is related with an increase of 1.28 in *RiskROA* and 5.68 in *Z-score* at the 90th percentile. These banks are generally spread over more than three continents and have been operating there for a long time. They may have solved the aforementioned diversification problems and thus stabilize the income by gaining more experience thanks to a high percentage of banking activities abroad. Also, as Saunders (1994)

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[4]The value of the rest of the world is determined as the median value. Thus, the net effect of an increase in *Europe share* is determined by shifting activities from home country to the rest of Europe, while keeping the rest of the world stable.

suggests, there could be an improvement in corporate governance or they may lower their costs by expanding their deposits from different geographies (Deng and Elyasiani, 2008).

We also analyze the net effect of shifting income activities from home country to rest of the world in Table 5.[5] The net effect is negative for 10th, 25th, 50th and 75th percentiles for all performance measures, except *SDROA*. Shifting to the rest of the world positively affects bank performance only at the 90th percentile for the measures *RiskROA*, *Z-score* and *SDROA*.

Another determinant of bank performance is the diversification of income type as interest and non-interest income (*HHIRevenue*). Similar to Stiroh and Rumble (2006), the results denote that there is a strong and positive link between income type diversification, *HHIRevenue*, and four performance measures; *RiskROA*, *RiskROE*, *Z-score*, and weakly positive relationship with *SDROE*. Because higher values of *HHIRevenue* implies lower diversification, these relationships imply that income type diversification increases bank performance.

As for the specialization variables, while *Loans* increase bank performance for all performance measures except *SDROA*, *Deposits* inversely affect bank performance for all measures. Demirgüç-Kunt and Huizinga (1999) suggest that deposits require more branching network and other expenses, which may negatively affect bank performance.

We find evidence that the competition variable, *HHICompetition*, has a highly significant and positive relationship with all bank performance measures, implying that the higher the market concentration, the higher the bank performance. There is a positive link between *Staff Cost* and all bank performance measures except *SDROA*. The logarithm of the total assets (*Asset Size*) is controlled to account for size differences. We also find *Asset Size* is positively related only with *RiskROA* and *Z-score*. The results denote that *Asset Growth* is positively associated with bank performance, but there is an insignificant relationship between bank capital and performance.[6]

We also check whether our results hold when we estimate with random effect regression. The results are similar, suggesting that our results are robust to the pooling approach. Table 6 shows

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[5]The methodology used in the calculation of net effect for Europe share is applied in here. The value of *Rest of Europe* is determined as the median value. Thus, the net effect of an increase in *Rest of World* is determined by shifting activities from home country to the rest of the world, while keeping the rest of Europe share stable.

[6]We also control the effects of mergers and acquisitions by generating a dummy variable *M&A* that takes value 1 if a bank acquires another financial institution during the year and zero otherwise. In unreported tables, we yield similar results and they are available upon request.

that the results are very similar to the results estimated by pooled OLS models. Our geographic diversification variable (*HHIGeo3*) increases the performance for all performance measures except *SDROA*.

4.2   Two-regions perspective

We also test the effects of geographic diversification on bank performance using two-regions: home and foreign. This section tests the potential motivation of European banks to diversify in the form of home country and the rest of the world (including the rest of Europe and denoted as *Foreign*). Our key variable *HHIGeo2* is constructed by the Herfindahl-Hirschman Index:

$$HHIGeo2 \quad = \quad (Home)^2 + (Foreign)^2 \qquad (7)$$

where *Home* is the share of home country income and *Foreign* is the share of foreign income. Table 7 shows that *HHIGeo2* is statistically significant for *RiskROA*, *Z-score* and *SDROA*. Thus, the negative impact of diversification is also valid for three performance measures. Similar to three-regions perspective, we also derive the net effect of shifting income from home to foreign. Since $Home + Foreign = 1$, we can rewrite our diversification in Equation 7 as

$$HHIGeo2 \quad = \quad 1 - 2Foreign + 2(Foreign)^2 \qquad (8)$$

The indirect effect of the *Foreign* is calculated by taking derivative of Equation 8 with respect to *Foreign*:

$$\frac{\partial HHIGeo2}{\partial Foreign} \quad = \quad -2 + 4Foreign \qquad (9)$$

The direct effect of increasing foreign income is the coefficient of variable *Foreign* (β_F). The total

effect is the sum of direct and indirect effects, which equals to the derivative of Y with respect to *Foreign*:

$$\frac{\partial Y}{\partial Foreign} \quad = \quad \beta_{HHIGeo2}(-2 + 4Foreign) + \beta_F \tag{10}$$

Table 8 shows that the net effect of shifting activities from home country to foreign decreases the performance for the 10th and 25th percentiles but increases the performance for the 90th percentile. As concentration decreases in home country, expanding to the foreign income share increases the bank performance.

4.3 Board diversity

Consistent with the literature, our results suggest that the diversification measures do not necessarily produce a positive association between bank performance and diversification. Banks spreading to more volatile regions in terms of income may not benefit from diversification. Therefore, region and country selections are very important. The importance of choosing countries and regions addresses the effects of the foreign board members of the banks. The directors are appointed with respect to different criteria to supervise executives and improve bank performance. One of the potential criteria in choosing board members is diversifying members with respect to their national identity (i.e., foreign or domestic). Foreign board members are generally expected to know other regions and protect the bank from exposures of the regions. Differences in nationality are most likely to generate unique sets of information sets that management can use for better decision-making (Carter et al., 2010; Berger and Neugart, 2012). More importantly, internationalization increases the demand of directors who have the required knowledge and connections in foreign markets where the business operates (Carpenter, Sanders, and Gregersen, 2001). Directors with different nationalities introduce experiences and different points of view (El-Masry and Ezat, 2008; Samaha et al., 2012). In this context, we introduce the share of foreign directors (*Board Foreign Share*), as well as the share of female directors (*Board Female Share*) to explore their effects on bank performance. By increasing the

range of perspectives, board diversity for nationality and gender is expected to decrease the volatility of performance (Giannetti and Zhao, 2019).

Information presented in the annual reports were used to determine the gender and nationality composition of the board. In the absence of sufficient information, the first names of the board members are examined for gender and, names and surnames are examined for nationality. When the genders and nationality are not clearly determined by the names and surnames, the matter is clarified by the use of gender and nationality information given in the various websites, including social media accounts.

Table 9 illustrates that there is an insignificant relationship between our performance measures and *Board Foreign Share*.[7] Although banks take account of the balance and range of knowledge, skills and experience, and geographic origin in the selection of foreign board members, diversifying nationality has some disadvantages. Foreign directors may face difficulties in understanding and experiencing accounting rules, laws, regulations and management methods (Masulis, Wang, and Xie, 2012). Diversifying nationality may also create conflicts, misunderstandings and lower decision process (Konrad and Kramer, 2006). These disadvantages of having foreign directors may balance the advantages of having foreign directors in expanding to other regions.

The results also show that *Board Female Share*[8] is positively associated with *RiskROA* and negatively associated with *SDROA*, which implies positive performance for these measures. However, it is statistically insignificant for the other three performance measures. Ruigrok, Peck, and Tacheva (2007) assert that gender diversity, as well as nationality diversity, is a relations-oriented attribute. This relations-oriented attribute may prevent the merit and hence board diversity does not contribute to the bank performance. Social psychological theory suggests that those with majority status may have a disproportionate amount of influence on group decisions. (Westphal and Milton, 2000). In addition, Carter et al. (2010) state that the internal group structure of a board of directors can be such that diverse directors will not affect the board. Karpowitz and Mendelberg (2014) document that women speak more frequently when the share of women in the group increases. Thus, women in

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[7]The share of the foreign board members is calculated as total months performed by foreign directors over total months performed by all directors in a given year.

[8]The share of the female board members is calculated as total months performed by female directors over total months performed by male and female directors in a given year.

bank boards are generally minorities and therefore may not efficiently impact the board decision even though countries implement quota policy[9] for women. Token-based appointment of board members may not improve the performance.

5 Conclusion

Geographic diversification, in terms of increased cross-border income-generating activities to other regions, has played a significant role in the business and growth strategies of large European banks. Spreading banking activities to other countries or regions is expected to reduce risks from country-specific macroeconomic shocks and stabilize bank revenue. However, despite this expectation, diversification does not guarantee this benefit by providing stability of bank revenue against shocks. Some other factors may eliminate the benefits of diversification and reduce bank performance. The focus of this paper is to analyze the effects of geographic income diversification on the performance of large European banks.

Using a unique data set from the bank financial statements, this study decomposes the total income as home country income, the rest of Europe income and the rest of the world income. Our regression results show that geographic income diversification inversely affects bank performance. In this point, because the typical large bank diversifies its income by the direction of increasing the share of the rest of Europe and the rest of the world income, we also analyze the net effect of spreading to other regions by considering direct and indirect effects. Increasing exposure to the rest of Europe and the rest of the world decreases bank performance, except for the banks that are more concentrated in rest of Europe and the rest of the world, respectively. Our investigations also suggest that decomposition of the total income as home country income and rest of the world income does not provide diversification benefits and reduces the performance. The net effect of shifting activities from home country to the rest of the world also reduces the performance for the banks that are less concentrated in the rest of the world and increase it for the more concentrated. Because this study focuses on geographic income diversification, nationality diversity of the board of directors is

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[9]Most of the banks in our sample are imposed a quota by governments. For example, %40 quota was imposed by Norway, Spain and France, while %30 quota is required for Italian and Dutch banks for women representation in large companies

also considered. We find that reliance on foreign board members has an insignificant effect on bank performance. Gender diversity of board increases the bank performance for risk-adjusted return on assets and standard deviation of return on assets measures. The results also suggest that loan specialization and competition increase the bank performance, but deposit specialization reduces it.

Even though portfolio theory expects a positive relationship between bank performance and diversification, most studies in the literature find a negative or insignificant relationship. Our findings confirm the highlighted diversification problems in the literature for the banks and open a new window into diversification literature by showing the adverse effects of geographic income diversification.

The policy implications of the findings in our paper are threefold. First, our results appear to suggest that any analysis of geographic diversification of large European banks should rely upon wider measures of bank performance beyond extracting profit from other regions. Exploring the negative effect of geographic income diversification on bank performance may be of beneficial in the debate of policy recommendations with regards to large European banks. Large banks that concentrated more on their own country income should be more careful when moving to other regions to improve bank performance. Second, foreign board members who are expected to contribute to expanding to other regions may be selected more rigorously in the presence of these negative effects of geographic income diversification if banks have the motivation to benefit from these board members in the direction of bank performance. Alternatively, banks may motive existing foreign board members to better understand bank performance in the presence of geographic diversification. Third, as we understand from the annual reports, large European banks prepare themselves for the climate change process by considering the potential risks of their geographic markets. However, our results imply that geographic diversification does not provide a diversification benefit, except for the banks with more concentrated shares in the rest of Europe or the rest of the world. Therefore, large European banks should not only project the macroeconomic risks of climate change, but they should also carefully analyze the current performance of their foreign markets in the presence of climate change, as well as pandemic outbreaks.

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Figure 1: Average of income shares by geographic areas for European banks

This figure provides the average of home shares, the rest of Europe shares and the rest of the world shares for all banks in our sample between 2012 and 2018.
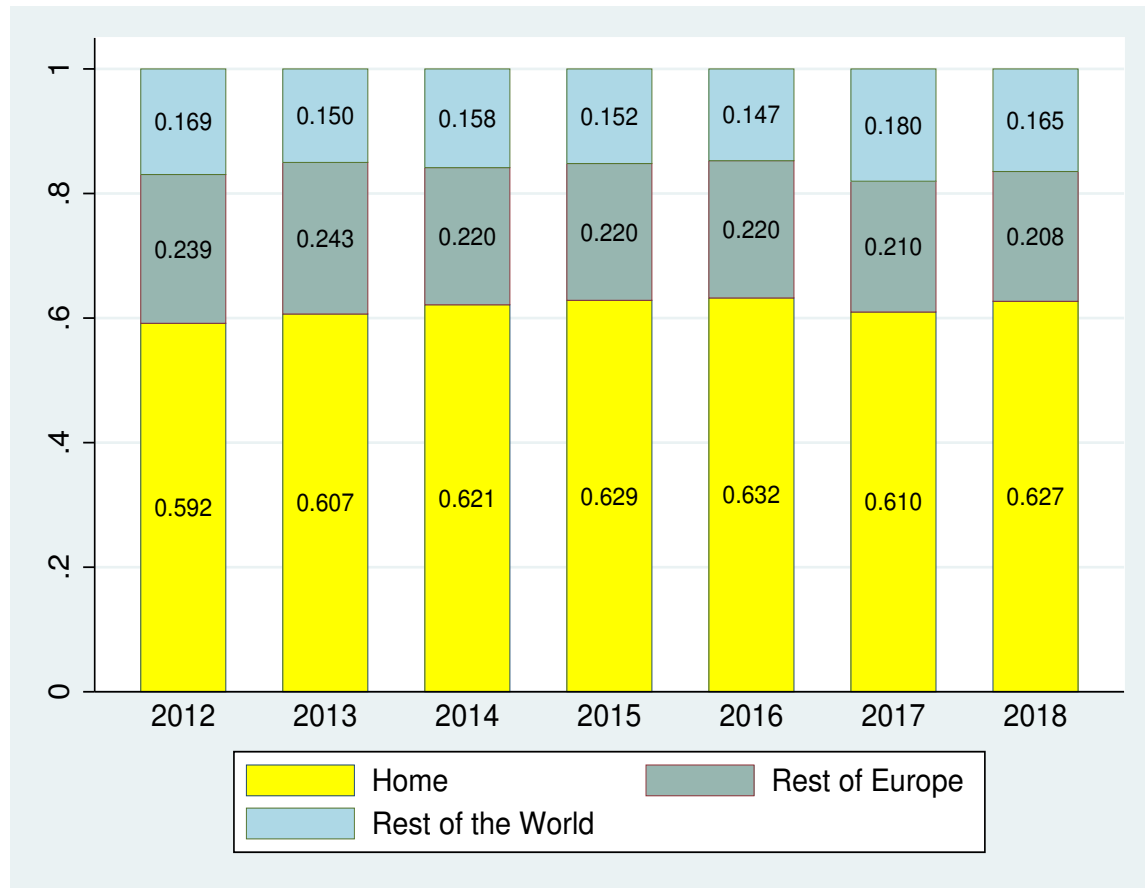
Figure 2: Average of income shares by geographic areas for the largest ten European banks

This figure provides the average of income shares by geographic regions for the largest ten banks between 2012 and 2018.
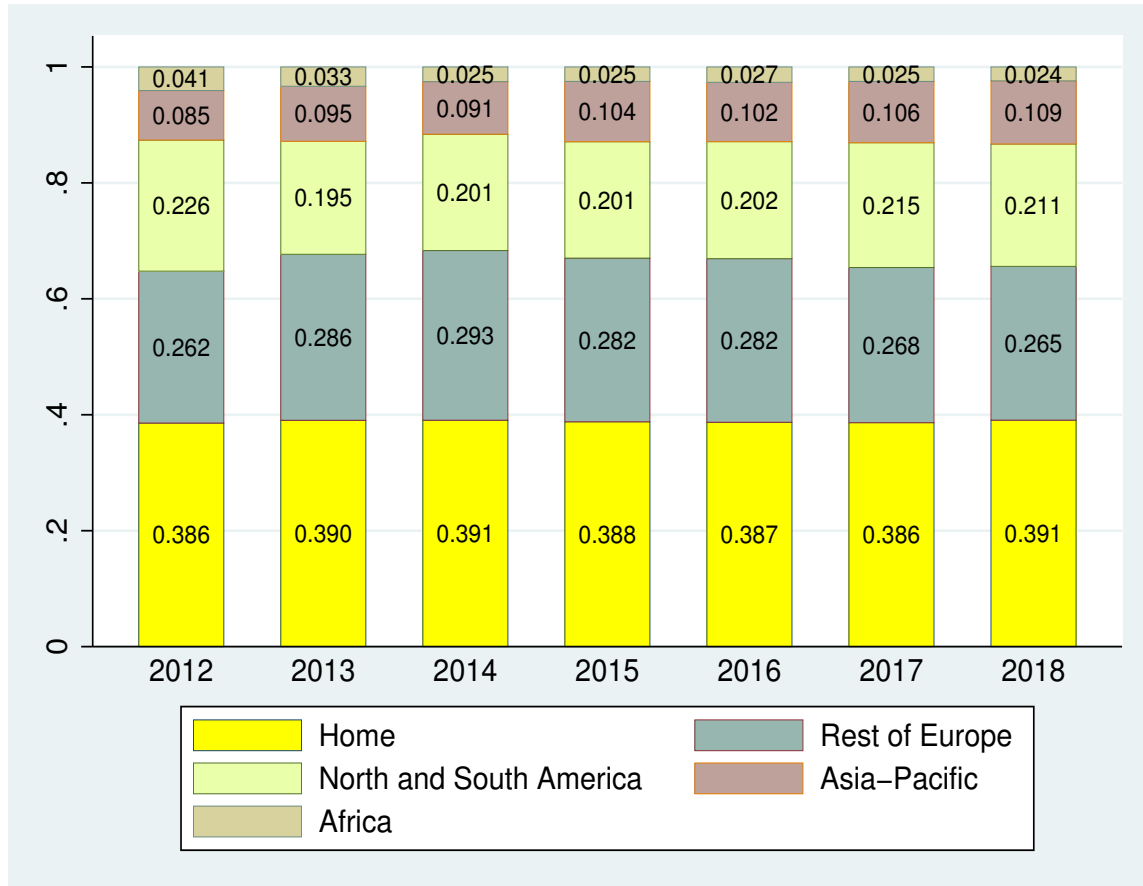
Table 1: **Descriptive Statistics**
This table provides descriptive statistics for European banks in our sample between 2012 and 2018. *RiskROA* is the risk adjusted return on asset. *RiskROE* is the risk-adjusted return on equity. *Z-score* is the sum of the return on assets and the equity to asset ratio. *SDROA* is the standart deviation of return on assets. *SDROE* is the standart deviation of return on equity. *HHIGEO2* is the geographic diversification variable for two regions case. *HHIGEO3* is the geographic diversification variable for three regions case. *Board Foreign Share* is the share of foreign board member. *Board Female share* is the share of female board member. *Home* is the share of home country income. *Foreign* is the share of foreign income. *Rest of Europe* is the share of income from rest of Europe. *Rest of World* is the share of income from the rest of the world. *HHIRevenue* and *HHICompetition* shows Herfindahl-Hirschman Index values for income-type diversification and the competition, respectively. *Loans* is the ratio of total loans to total assets. *Deposits* is the ratio of the total deposits to total assets. *Staff Cost* is the ratio of the staff expense to total assets. *Asset Size* is the natural logarithm of total assets. *Capital* is the ratio of the total equity to total assets. *Asset Growth* is the annual growth of total assets. *Euro Currency* is the dummy variable which takes the value of 1 when home country currency is Euro.

	N	Mean	sd	p1	p25	p50	p75	p99
RiskROA	287	16.11	58.54	-0.13	4.08	7.73	13.75	99.56
RiskROE	287	14.31	36.09	-0.12	3.51	6.64	14.30	127.19
Z-score	287	68.31	257.62	1.68	17.20	32.20	53.50	653.02
SDROA	287	0.00	0.00	0.00	0.00	0.00	0.00	0.01
SDROE	287	0.09	0.31	0.00	0.01	0.02	0.05	2.12
HHIGeo2	299	0.67	0.15	0.50	0.53	0.63	0.77	1.00
HHIGeo3	299	0.61	0.19	0.34	0.46	0.58	0.74	1.00
Board Foreign Share	293	0.21	0.20	0.00	0.00	0.16	0.36	0.71
Board Female Share	293	0.21	0.14	0.00	0.11	0.21	0.31	0.50
Home	299	0.62	0.26	0.05	0.41	0.67	0.83	1.00
Foreign	299	0.38	0.26	0.00	0.17	0.33	0.59	0.95
Rest of Europe	299	0.22	0.18	-0.00	0.07	0.18	0.35	0.73
Rest of World	299	0.16	0.23	-0.01	0.01	0.05	0.19	0.95
HHIRevenue	299	0.56	0.47	0.34	0.41	0.48	0.57	2.70
HHICompetition	299	0.04	0.00	0.04	0.04	0.04	0.04	0.04
Loans	299	0.55	0.17	0.00	0.44	0.59	0.67	0.85
Deposits	299	0.53	0.19	0.04	0.41	0.53	0.66	0.90
Staff Cost	299	0.01	0.00	0.00	0.00	0.01	0.01	0.02
Asset Size	299	12.90	0.97	11.00	12.19	12.98	13.65	14.61
Capital	299	0.06	0.02	-0.00	0.05	0.06	0.07	0.15
Asset Growth	299	-0.01	0.10	-0.31	-0.07	-0.01	0.03	0.24
Euro Currency	299	0.66	0.47	0.00	0.00	1.00	1.00	1.00

Table 2: **Descriptive Statistics by Groups**
Panel A provides descriptive statistics for euro (currency) area and non-euro area banks. Panel B provides descriptive statistics for Scandinavian and non-Scandinavian banks. Number of observations (N) and mean values are reported for each group. p-statistics shows the significance of the difference between two groups in each panel.

| | Panel_A | | | | |
	Euro N	Mean	Non-euro N	Mean	p
RiskROA	187	13.80	100	20.42	0.362
RiskROE	187	15.47	100	12.15	0.459
Z-score	187	59.65	100	84.50	0.437
SDROA	187	0.00	100	0.00	0.248
SDROE	187	0.12	100	0.04	0.034
HHIGeo2	197	0.67	102	0.65	0.157
HHIGeo3	197	0.62	102	0.60	0.310
Board Foreign Share	197	0.14	96	0.34	0.000
Board Female Share	197	0.19	96	0.27	0.000
Home	197	0.66	102	0.54	0.000
Foreign	197	0.34	102	0.46	0.000
Rest of Europe	197	0.22	102	0.23	0.654
Rest of World	197	0.12	102	0.24	0.000
HHIRevenue	197	0.56	102	0.55	0.873
HHICompetition	197	0.04	102	0.04	0.737
Loans	197	0.58	102	0.49	0.000
Deposits	197	0.56	102	0.47	0.000
Staff Cost	197	0.01	102	0.01	0.010
Asset Size	197	12.88	102	12.94	0.607
Capital	197	0.06	102	0.06	0.086
Asset Growth	197	-0.01	102	-0.02	0.236

| | Panel_B | | | | |
	Scandinavian N	Mean	Non-Sc N	Mean	p
RiskROA	38	36.60	249	12.98	0.020
RiskROE	38	17.19	249	13.88	0.599
Z-score	38	159.40	249	54.41	0.019
SDROA	38	0.00	249	0.00	0.003
SDROE	38	0.02	249	0.10	0.110
HHIGeo2	40	0.63	259	0.67	0.081
HHIGeo3	40	0.60	259	0.61	0.706
Board Foreign Share	40	0.28	253	0.19	0.009
Board Female Share	40	0.37	253	0.19	0.000
Home	40	0.61	259	0.62	0.952
Foreign	40	0.39	259	0.38	0.952
Rest of Europe	40	0.36	259	0.20	0.000
Rest of World	40	0.03	259	0.18	0.000
HHIRevenue	40	0.60	259	0.55	0.532
HHICompetition	40	0.04	259	0.04	0.736
Loans	40	0.50	259	0.56	0.050
Deposits	40	0.34	259	0.56	0.000
Staff Cost	40	0.00	259	0.01	0.000
Asset Size	40	12.66	259	12.94	0.085
Capital	40	0.05	259	0.06	0.009
Asset Growth	40	-0.00	259	-0.02	0.527

Table 3: **OLS estimations with HHIGeo3 for the bank performance**
This table gives OLS regression results for our five performance measures. *HHIGeo3*, *HHIRevenue* and *HHICompetition* shows Herfindahl-Hirschman Index values for geographic diversification, income-type diversification and the competition, respectively. *Rest of Europe* is the ratio of the rest of Europe income to total income. *Rest of World* is the ratio of the rest of the world income to total income. Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at the bank level. ***, **, and * denote significance at less than 1%, 5%, and 10% levels (two-sided), respectively.

	RiskROA	RiskROE	Z-score	SDROA	SDROE
HHIGeo3	18.012***	7.369**	80.514***	-0.002**	-0.055**
	(3.925)	(3.643)	(12.637)	(0.001)	(0.023)
HHIRevenue	-1.947***	-1.345***	-6.634***	0.002	0.011*
	(0.469)	(0.365)	(2.310)	(0.001)	(0.006)
HHICompetition	17091.208***	10703.232***	73254.465***	-3.578***	-91.178***
	(4425.464)	(2496.050)	(16239.915)	(1.291)	(27.785)
Rest of Europe	13.389***	4.277	59.190***	-0.000	-0.001
	(3.809)	(3.505)	(13.159)	(0.001)	(0.025)
Rest of World	2.836	-1.798	15.613	-0.001	0.011
	(3.228)	(2.150)	(12.950)	(0.001)	(0.018)
Loans	12.783***	6.528*	36.878***	-0.001	-0.035*
	(3.376)	(3.638)	(12.226)	(0.001)	(0.018)
Deposits	-12.804**	-9.430**	-57.026***	0.004***	0.104***
	(6.229)	(3.869)	(15.583)	(0.002)	(0.030)
Staff Cost	1045.610***	708.951***	1869.044**	0.023	-3.673**
	(369.319)	(169.190)	(918.808)	(0.063)	(1.770)
Asset Size	2.035**	0.918	9.757***	-0.000	-0.005
	(0.760)	(0.654)	(2.577)	(0.000)	(0.007)
Capital	-20.056	-31.892	140.293	0.012	-0.186
	(36.745)	(22.040)	(102.980)	(0.011)	(0.188)
Asset Growth	15.976**	12.676***	61.867***	-0.004*	-0.041*
	(6.043)	(3.334)	(21.455)	(0.002)	(0.021)
Euro Currency	1.080	-1.728	1.885	-0.001	-0.000
	(1.178)	(1.241)	(4.355)	(0.000)	(0.008)
Constant	-693.777***	-421.971***	-2978.364***	0.141***	3.653***
	(167.662)	(95.582)	(620.494)	(0.048)	(1.067)
Year FE	Yes	Yes	Yes	Yes	Yes
N	273	259	272	287	275
R-sqr	0.233	0.255	0.255	0.367	0.242
Adjusted R-sqr	0.182	0.203	0.205	0.327	0.191

Table 4: **The net effects of shifting operations from home to the rest of Europe**
Net effect results below are derived from the regressions from Table 3 for the values of *Rest of Europe* (E) at different percentiles. The rest of Europe shares for the 10th, 25th, 50th, 75th, and 90th percentiles are 0.01, 0.07, 0.18, 0.35 and 0.47, respectively. Direct effect corresponds to estimated coefficient of the variable *Rest of Europe*. Indirect effect corresponds to the change in *HHIGeo3* from an increase in E, as derived in Equation 5: $\beta_{HHIGeo3} \times (-2 + 2W + 4E)$. The sum of the direct and indirect effects is reported as the net effect. Robust standard errors are in parentheses. ***, **, and * denote significance at less than 1%, 5%, and 10% levels (two-sided), respectively.

	RiskROA	RiskROE	Z-score	SDROA	SDROE
Direct Effect (Rest of Europe)	13.389**	4.277	59.190***	-0.000	-0.001
	(3.809)	(3.505)	(13.159)	(0.001)	(0.025)
Indirect Effect 10th	-33.091***	-13.537**	-147.916***	0.004**	0.102**
	(7.211)	(6.692)	(23.215)	(0.002)	(0.043)
Net Effect 10th	-19.702***	-9.260*	-88.726***	0.004**	0.101***
	(6.720)	(5.038)	(19.226)	(0.002)	(0.039)
Indirect Effect 25th	-28.813***	-11.787**	-128.793***	0.003**	0.089**
	(6.279)	(5.827)	(20.214)	(0.002)	(0.037)
Net Effect 25th	-15.424***	-7.510*	-69.603***	0.003**	0.088**
	(5.945)	(4.318)	(16.839)	(0.001)	(0.035)
Indirect Effect 50th	-21.316***	-8.720**	-95.284***	0.002**	0.066**
	(4.645)	(4.311)	(14.955)	(0.001)	(0.027)
Net Effect 50th	-7.927*	-4.443	-36.093***	0.002**	0.065**
	(4.726)	(3.234)	(13.273)	(0.001)	(0.028)
Indirect Effect 75th	-9.069***	-3.710**	-40.538***	0.001**	0.028**
	(1.976)	(1.834)	(6.362)	(0.000)	(0.012)
Net Effect 75th	4.320	0.567	18.652*	0.001	0.027
	(3.544)	(2.639)	(10.944)	(0.001)	(0.023)
Indirect Effect 90th	-0.514***	-0.210**	-2.297***	0.000**	0.002**
	(0.112)	(0.104)	(0.360)	(0.000)	(0.001)
Net Effect 90th	12.875***	4.067	56.894***	0.000	0.001
	(3.767)	(3.435)	(12.960)	(0.001)	(0.025)

Table 5: **The net effects of shifting operations from home to the rest of the world**
Net effect results below are derived from the regressions from Table 3 for the values of *Rest of World* (W) at different percentiles. The rest of the world shares for the 10th, 25th, 50th, 75th, and 90th percentiles are 0.00, 0.01, 0.05, 0.19 and 0.54, respectively. Direct effect corresponds to estimated coefficient of the variable *Rest of World*. Indirect effect corresponds to the change in *HHIGeo3* from an increase in W, as derived in Equation 5: $\beta_{HHIGeo3} \times (-2 + 2E + 4W)$. The sum of the direct and indirect effects is reported as the net effect. Robust standard errors are in parentheses. ***, **, and * denote significance at less than 1%, 5%, and 10% levels (two-sided), respectively.

	RiskROA	RiskROE	Z-score	SDROA	SDROE
Direct Effect (Rest of World)	2.836	-1.798	15.613	-0.001	0.011
	(3.228)	(2.150)	(12.950)	(0.001)	(0.018)
Indirect Effect 10th	-29.604***	-12.111**	-132.330***	0.003**	0.091**
	(6.451)	(5.987)	(20.769)	(0.002)	(0.038)
Net Effect 10th	-26.768***	-13.909**	-116.717***	0.002	0.102**
	(8.199)	(6.310)	(25.293)	(0.002)	(0.043)
Indirect Effect 25th	-28.746***	-11.760**	-128.497***	0.003**	0.089**
	(6.265)	(5.814)	(20.167)	(0.002)	(0.037)
Net Effect 25th	-25.910***	-13.558**	-112.884***	0.002	0.099**
	(8.025)	(6.147)	(24.777)	(0.002)	(0.042)
Indirect Effect 50th	-25.868***	-10.583**	-115.633***	0.003**	0.080**
	(5.637)	(5.232)	(18.148)	(0.001)	(0.033)
Net Effect 50th	-23.032***	-12.381**	-100.020***	0.002	0.091**
	(7.447)	(5.605)	(23.078)	(0.001)	(0.038)
Indirect Effect 75th	-16.146***	-6.605**	-72.175***	0.002**	0.050**
	(3.519)	(3.265)	(11.328)	(0.001)	(0.021)
Net Effect 75th	-13.310**	-8.404**	-56.562***	0.001	0.061**
	(5.575)	(3.864)	(17.838)	(0.001)	(0.028)
Indirect Effect 90th	9.453***	3.867**	42.254***	-0.001**	-0.029**
	(2.060)	(1.912)	(6.632)	(0.001)	(0.012)
Net Effect 90th	12.289***	2.069	57.867***	-0.002*	-0.018
	(3.134)	(2.914)	(14.096)	(0.001)	(0.022)

Table 6: **Random-Effect estimations with HHIGeo3 for the bank performance**
This table gives Random-Effect regression results for our five performance measures. *HHIGeo3*, *HHIRevenue* and *HHICompetition* shows Herfindahl-Hirschman Index values for geographic diversification, income-type diversification and the competition, respectively. *Rest of Europe* is the ratio of the rest of Europe income to total income. *Rest of World* is the ratio of the rest of the world income to total income. Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at the bank level. ***, **, and * denote significance at less than 1%, 5%, and 10% levels (two-sided), respectively.

	RiskROA	RiskROE	Z-score	SDROA	SDROE
HHIGeo3	17.519***	6.648*	80.514***	-0.001	-0.052**
	(3.951)	(3.874)	(12.637)	(0.001)	(0.023)
HHIRevenue	-1.846***	-1.149***	-6.634***	0.002	0.004
	(0.472)	(0.345)	(2.310)	(0.001)	(0.005)
HHICompetition	17226.216***	11229.752***	73254.465***	-3.445***	-94.260***
	(4431.196)	(2478.997)	(16239.915)	(1.210)	(27.834)
Rest of Europe	13.106***	4.150	59.190***	0.001	0.002
	(3.870)	(3.292)	(13.159)	(0.002)	(0.029)
Rest of World	2.779	-1.518	15.613	-0.002	0.016
	(3.264)	(2.172)	(12.950)	(0.002)	(0.021)
Loans	12.748***	6.825*	36.878***	-0.002	-0.048**
	(3.392)	(3.541)	(12.226)	(0.001)	(0.022)
Deposits	-12.621**	-9.324**	-57.026***	0.004**	0.088**
	(6.235)	(4.217)	(15.583)	(0.002)	(0.035)
Staff Cost	1046.418***	692.662***	1869.044**	0.021	-4.708**
	(372.349)	(168.444)	(918.808)	(0.069)	(2.002)
Asset Size	2.042***	0.962	9.757***	-0.000	-0.006
	(0.755)	(0.672)	(2.577)	(0.000)	(0.007)
Capital	-19.492	-27.395	140.293	0.001	-0.072
	(36.126)	(22.768)	(102.980)	(0.010)	(0.241)
Asset Growth	15.371***	10.224***	61.867***	-0.002	-0.018
	(5.857)	(3.487)	(21.455)	(0.001)	(0.019)
Euro Currency	1.062	-1.601	1.885	-0.001	0.002
	(1.190)	(1.238)	(4.355)	(0.001)	(0.008)
Constant	-698.866***	-442.863***	-2978.364***	0.136***	3.796***
	(167.854)	(94.190)	(620.494)	(0.045)	(1.067)
Year FE	Yes	Yes	Yes	Yes	Yes
N	273	259	272	287	275
N cluster	45	45	45	45	45
R-sqr (overall)	0.233	0.253	0.255	0.345	0.230

Table 7: **OLS estimations with HHIGeo2 for the bank performance**
This table gives OLS regression results for our five performance measures. *HHIGeo3*, *HHIRevenue* and *HHICompetition* shows Herfindahl-Hirschman Index values for geographic diversification, income-type diversification and the competition, respectively. *Foreign* is the ratio of the rest of world income (including Europe) to total income. Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at the bank level. ***, **, and * denote significance at less than 1%, 5%, and 10% levels (two-sided), respectively.

	RiskROA	RiskROE	Z-score	SDROA	SDROE
HHIGeo2	10.515***	3.335	45.558***	-0.004*	-0.042
	(3.529)	(3.459)	(12.658)	(0.002)	(0.028)
HHIRevenue	-1.649	-1.188*	-5.206	0.002*	0.013*
	(0.999)	(0.606)	(4.144)	(0.001)	(0.007)
HHICompetition	16927.164***	10365.732***	72081.504***	-3.539***	-90.462***
	(4365.151)	(2540.809)	(16242.100)	(1.276)	(27.683)
Foreign	3.113	-0.968	15.073	-0.001	0.018
	(3.555)	(2.008)	(13.174)	(0.001)	(0.018)
Loans	14.206***	6.833	42.813***	-0.001	-0.036*
	(3.810)	(4.128)	(14.182)	(0.001)	(0.019)
Deposits	-11.061*	-8.111*	-49.373***	0.005***	0.099***
	(5.905)	(4.655)	(15.793)	(0.002)	(0.031)
Staff Cost	861.273**	608.275***	1035.876	-0.003	-3.354*
	(339.356)	(146.598)	(888.614)	(0.076)	(1.877)
Asset Size	1.449*	0.608	7.134**	-0.000	-0.004
	(0.751)	(0.617)	(2.776)	(0.000)	(0.006)
Capital	-22.373	-33.873	133.109	0.013	-0.179
	(36.780)	(23.607)	(104.802)	(0.011)	(0.188)
Asset Growth	15.634**	12.292***	61.727***	-0.003*	-0.045**
	(5.889)	(3.273)	(21.088)	(0.002)	(0.020)
Euro Currency	0.702	-1.874	-0.004	-0.001	0.001
	(1.296)	(1.304)	(4.790)	(0.000)	(0.008)
Constant	-673.848***	-401.711***	-2871.293***	0.141***	3.595***
	(164.783)	(96.466)	(616.499)	(0.049)	(1.067)
Year FE	Yes	Yes	Yes	Yes	Yes
N	273	259	272	287	275
R-sqr	0.214	0.240	0.227	0.379	0.236
Adjusted R-sqr	0.165	0.190	0.179	0.342	0.189

Table 8: **The net effects of shifting operations from home to foreign**
Net effect results below are derived from the regressions from Table 7 for the values of Foreign share (F) at different percentiles. The foreign shares for the 10th, 25th, 50th, 75th, and 90th percentiles are 0.06, 0.17, 0.33, 0.59, and 0.76, respectively. Direct effect corresponds to estimated coefficient of the variable *Foreign*. Indirect effect corresponds to the change in *HHIGeo2* from an increase in F, as derived in Equation 9: $\beta_{HHIGeo2} \times (-2 + 4F)$. The sum of the direct and indirect effects is reported as the net effect. ***, **, and * denote significance at less than 1%, 5%, and 10% levels (two-sided), respectively.

	RiskROA	RiskROE	Z-score	SDROA	SDROE
Direct Effect (Foreign)	3.113	-0.968	15.073	-0.001	0.018
	(3.555)	(2.008)	(13.174)	(0.001)	(0.018)
Indirect Effect 10th	-18.449***	-5.852	-79.934***	0.007**	0.074
	(6.192)	(6.070)	(22.210)	(0.003)	(0.048)
Net Effect 10th	-15.336**	-6.820	-64.861***	0.006**	0.092*
	(7.073)	(5.828)	(21.391)	(0.003)	(0.050)
Indirect Effect 25th	-13.826***	-4.386	-59.902***	0.005**	0.056
	(4.640)	(4.549)	(16.644)	(0.002)	(0.036)
Net Effect 25th	-10.713*	-5.354	-44.829***	0.004**	0.073*
	(5.784)	(4.421)	(17.140)	(0.002)	(0.039)
Indirect Effect 50th	-7.260***	-2.303	-31.454***	0.003**	0.029
	(2.437)	(2.388)	(8.739)	(0.001)	(0.019)
Net Effect 50th	-4.147	-3.271	-16.381	0.002*	0.047*
	(4.266)	(2.649)	(12.946)	(0.001)	(0.025)
Indirect Effect 75th	3.774***	1.197	16.351***	-0.001**	-0.015
	(1.267)	(1.242)	(4.543)	(0.001)	(0.010)
Net Effect 75th	6.886*	0.229	31.424**	-0.002	0.003
	(3.800)	(2.643)	(15.395)	(0.001)	(0.022)
Indirect Effect 90th	11.133***	3.532	48.238***	-0.004**	-0.045
	(3.737)	(3.663)	(13.403)	(0.002)	(0.029)
Net Effect 90th	14.246***	2.563	63.311***	-0.005*	-0.027
	(5.213)	(4.650)	(21.897)	(0.003)	(0.036)

Table 9: **OLS estimations with HHIGeo3 and board diversity for the bank performance**
This table gives OLS regression results for our five performance measures. *HHIGeo3*, *HHIRevenue* and *HHICompetition* shows Herfindahl-Hirschman Index values for geographic diversification, income-type diversification and the competition, respectively. *Board Foreign Share* is the share of foreign board members. *Board Female share* is the share of female board members. *Rest of Europe* is the ratio of the rest of Europe income to total income. *Rest of World* is the ratio of the rest of the world income to total income. Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at the bank level. ***, **, and * denote significance at less than 1%, 5%, and 10% levels (two-sided), respectively.

	RiskROA	RiskROE	Z-score	SDROA	SDROE
HHIGeo3	18.231***	6.884*	84.641***	-0.002**	-0.053**
	(4.170)	(3.806)	(12.936)	(0.001)	(0.026)
HHIRevenue	-2.077***	-1.601***	-7.240***	0.002*	0.012**
	(0.589)	(0.433)	(2.535)	(0.001)	(0.006)
HHICompetition	15304.372***	10518.596***	72049.138***	-3.087**	-93.980***
	(4201.546)	(2681.753)	(16230.362)	(1.287)	(27.961)
Board Foreign Share	-1.668	-3.383	-8.992	0.000	0.032
	(3.722)	(3.266)	(14.225)	(0.001)	(0.031)
Board Female Share	13.030**	4.816	20.459	-0.003**	-0.001
	(5.036)	(4.627)	(16.282)	(0.001)	(0.026)
Rest of Europe	12.553**	5.171	64.075***	0.000	-0.018
	(4.688)	(3.497)	(15.978)	(0.001)	(0.038)
Rest of World	3.784	-0.393	19.422	-0.001	0.001
	(3.632)	(2.317)	(14.342)	(0.001)	(0.017)
Loans	12.184***	6.372*	34.886***	-0.001	-0.033*
	(3.092)	(3.179)	(11.730)	(0.001)	(0.018)
Deposits	-11.475*	-8.550**	-56.815***	0.004***	0.099***
	(5.741)	(3.572)	(15.398)	(0.001)	(0.033)
Staff Cost	1155.532***	763.212***	2163.125**	0.005	-4.090**
	(372.914)	(171.005)	(926.593)	(0.060)	(1.778)
Asset Size	1.251	0.410	8.638***	-0.000	-0.003
	(0.801)	(0.713)	(2.779)	(0.000)	(0.006)
Capital	-22.655	-32.834	147.117	0.011	-0.184
	(36.913)	(23.613)	(107.122)	(0.010)	(0.204)
Asset Growth	12.956*	10.468***	55.860**	-0.003*	-0.037*
	(6.649)	(3.006)	(23.672)	(0.002)	(0.021)
Euro Currency	1.726	-2.222	2.483	-0.001	0.006
	(1.429)	(1.365)	(5.072)	(0.001)	(0.009)
Constant	-618.272***	-408.668***	-2925.006***	0.121**	3.733***
	(158.795)	(102.719)	(622.908)	(0.049)	(1.081)
Year FE	Yes	Yes	Yes	Yes	Yes
N	267	253	266	281	269
R-sqr	0.247	0.264	0.255	0.382	0.241
Adjusted R-sqr	0.190	0.204	0.198	0.337	0.183