Bank Internationalization and Risk Taking

Allen N. Berger
University of South Carolina, Columbia, SC 29208, USA
Wharton Financial Institutions Center, Philadelphia, PA 19104, USA
CentER – Tilburg University, Tilburg, Netherlands
aberger@moore.sc.edu

Sadok El Ghoul
University of Alberta, Edmonton, AB T6C 4G9, Canada
elghoul@ualberta.ca

Omrane Guedhami
University of South Carolina, Columbia, SC 29208, USA
omrane.guedhami@moore.sc.edu

Raluca A. Roman
University of South Carolina, Columbia, SC 29208, USA
raluca.roman@grad.moore.sc.edu

This draft: February 2013

Abstract

This paper investigates the effects of bank internationalization on risk taking. We find that internationalization increases bank risk taking: the *Z-score* of US banks that engage in foreign activities is lower than that of their purely domestic peers. The results are consistent with the empirical dominance of the *market risk hypothesis*, whereby internationalization increases banks' risk due to market-specific factors (competition, culture, regulatory complexity, economic and political instability, etc.) over the *diversification hypothesis*, whereby internationalization allows banks to reduce risk through increased diversification of their operations. The results continue to hold after conducting a variety of robustness tests, including accounting for endogeneity and sample selection bias. We also find that the magnitude of this difference in risk taking is more pronounced during financial crises than normal times. Additional results suggest that capital market participants recognize the difference in risk taking between international banks and purely domestic banks.

JEL Classification Codes: G21, G28, L25
Keywords: Risk Taking, Internationalization, Banking, Financial Crises

1. Introduction

As observed during the recent global financial crisis, the risk-taking behavior of banks can have a first-order effect on financial and economic stability (Laeven and Levine (2009)). To mitigate the destabilizing potential of such risk taking, international and national organizations have focused on implementing regulations to limit bank risk and avoid future financial crises.[1] Much of the focus of such reforms has been on constraining banks' risk taking within one country. However, Ongena, Popov, and Udell (2012) suggest that banks may engage in regulatory arbitrage, circumventing strict local regulations by taking more risk abroad. This raises the question of how bank internationalization affects the risk-taking behavior of individual banks.

Prior literature identifies various determinants of bank risk taking, including bank capital (e.g., Koehn and Santomero (1980), Kim and Santomero (1994), Holmstrom and Tirole (1997), Allen, Carletti, and Marquez (2011), Mehran and Thakor (2011)), regulation (e.g., Laeven and Levine (2009), Black and Hazelwood (2012), Duchin and Sosyura (2012)), competition (e.g., Keeley (1990), Boyd and De Nicolo (2005), Berger, Klapper, and Turk-Ariss (2009). Martinez-Miera and Repullo (2010)), bank size (e.g., Demsetz and Strahan (1997), Hakenes and Schnabel (2011), Bhagat, Bolton, and Lu (2012)), and governance (e.g., Saunders, Strock, and Travlos (1990), Laeven and Levine (2009), Beltratti and Stulz (2012), Berger, Imbierowicz, and Rauch (2012)). However, to our knowledge no prior study considers the direct link between bank internationalization and risk taking. Further, prior work has little to say about the effects of bank internationalization during financial crises. This paper aims to fill these gaps in the literature.[2]

There are two contrasting views on the impact of internationalization on bank risk taking. On the one hand, the *diversification hypothesis* suggests that international banks may have lower risk because they can diversify their portfolio risk and gain access to global capital markets (e.g., Delong (2001), Amihud, DeLong, and Saunders (2002), Laeven and Levine (2007)). For example, if loan returns across nations are not highly correlated, internationally diversified banks

[1] For example, in its 2012 financial stability report, the International Monetary Fund maintains that "risks to financial stability have increased, as confidence in the global financial system has become very fragile" and "there should be a global discussion on whether some risky bank activities should be directly restricted rather than just making lenders hold more capital." (International Monetary Fund (2012))

[2] Other studies consider internationalization of nonfinancial firms. Considering the effect of internationalization on firm risk, Hughes, Logne, and Sweeny (1975), Rugman (1976)) and Amihud and Lev (1981) document a lower risk for multinational corporations (MNCs), while Bartov, Botnar, and Kaul (1996) find an increase in risk for these firms. Kwok and Reeb (2000) find that the effect of internationalization on the risk of MNCs varies with home and target market conditions, such as country riskiness.

may be safer because they are less exposed to domestic shocks (e.g., Diamond (1984), Demsetz and Strahan (1997)).

It is alternatively possible that international banks may have higher risk due to market-specific factors. We refer to this as the *market risk hypothesis* (e.g., Winton (1999), Amihud, Delong, and Saunders (2002), Méon and Weill (2005)). An international bank inherently faces greater risk in foreign markets due to local market conditions. For instance, the degree of local competition (Chari and Gupta (2008)) will affect the time it takes for a new entrant to establish market share in a foreign market and to create lending relationships (e.g., Berger, Klapper, and Udell (2001)). Another important factor is the local culture (e.g., Li and Guisinger (1992), since it takes time to learn the local market's language, preferences, and informal institutions.

Other market factors include the degree of regulatory, monetary, and legal complexity (e.g., Berger, Buch, DeLong and DeYoung (2004), Alibux (2007)), the degree of economic and political instability (e.g., Shapiro (1985), Brewer and Rivoli (1990)), and the extent of market imperfections and asymmetric information problems in the foreign countries (e.g., Buch and DeLong (2004), Gleason, Mathur, and Wiggings (2006)).[3]

Importantly, both the *diversification hypothesis* and the *market risk hypothesis* may hold simultaneously. All that we can do as researchers is to determine which of these hypotheses has stronger empirical support – i.e., which hypothesis empirically dominates the other. To address this question, we use a sample of 15,988 US banks for the period 1989:Q1 to 2010:Q4, and evaluate whether international or purely domestic banks have more risk. We find that banks that expand into international markets have much higher risk than banks that remain purely domestic, as captured by banks' *Z-score*. This result is consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*, and suggests that the additional local market risks associated with international expansion outweigh the benefits of geographical diversification.

To check the robustness of our results, we re-run our analyses using alternative proxies for bank internationalization and risk taking, alternative samples, and alternative estimation methods. We also address potential endogeneity using omitted correlated variables analysis, instrumental variables estimation, propensity score matching, and Heckman sample selection. In

[3] In addition, under the *home field advantage hypothesis* (Berger, DeYoung, Genay, and Udell (2000)), foreign institutions are generally more efficient than domestic institutions because foreign banks face organizational diseconomies in operating or monitoring from a distance.

each of these robustness checks, we find evidence in support of our main finding that bank internationalization is associated with higher bank risk taking.

In additional analyses, we first examine the impact of internationalization on the components of *Z-score* (capitalization ratio, ROA, and standard deviation of ROA) in an effort to identify the source of the increase in risk taking associated with internationalization. We find that internationalization is associated with a higher capitalization level, which may reflect banks' precautionary measures when expanding abroad, a higher volatility of bank earnings, which may reflect the risk that international banks face as well as management's ability to control risk exposure, and lower profitability, consistent with prior empirical evidence that banks' foreign operations are less efficient compared to those of their domestic rivals (e.g., Berger, DeYoung, Genay, and Udell (2000)). Next, we examine publicly listed banks and banks in listed bank holding companies, since this subsample allows us to examine market-based risk measures. We find that international banks have higher overall bank risk as measured by the standard deviation of stock returns, consistent with the dominance of the *market risk hypothesis* over the *diversification hypothesis*. Analysis using Standard & Poor's credit ratings further suggests that international banks tend to have lower ratings compared to their purely domestic counterparts, consistent with market participants being aware of the higher risk taking of international banks. Finally, we separately examine financial crisis periods and noncrisis periods to investigate whether internationalization affects risk taking differently during financial crises. Our results suggest that the magnitude of the relationship between internationalization and risk taking is higher during financial crises compared to normal times, and more pronounced during market crises (those originating in the capital markets) than banking crises (those originating in the banking sector).[4] This may be due to the higher exposure of banks to international shocks during market crises and/or that banks receive more government help during banking crises.

The remainder of the paper proceeds as follows. Section 2 describes the data, variables, and summary statistics. Section 3 presents the results, and Section 4 gives the robustness tests. Section 5 discusses additional analyses. Section 6 concludes.

[4] Following the definitions in Berger and Bouwman (forthcoming) for financial crises, we identify two banking crises and three market crises. We discuss these crises in more detail in Section 5.3.

2. Data, variables, and summary statistics

2.1 Sample banks

We acquire bank data from quarterly Call Reports, which contain financial information on all commercial banks in the US and are collected as part of bank supervision. Our raw data cover the period 1986:Q1 to 2010:Q4, although our risk measure starts in 1989:Q1 because of our lag structure. Our initial dataset comprises 1,069,609 bank-quarter observations. We omit observations that do not refer to commercial banks according to the Call Reports Indicator, which leaves us with 969,053 observations. We next remove any bank-quarter observations that have missing or incomplete financial data on basic accounting variables such as total assets and common equity, as well as observations that have missing or negative data for income statement variables such as interest expenses, personnel expenses, and non-interest expenses, resulting in 964,150 bank-quarter observations. Following the procedure in Berger and Bouwman (2009), we further refine our sample by excluding observations with i) gross total assets (GTA) less than or equal to $25,000 million and ii) no outstanding loans or deposits (i.e., entities not engaged in deposit-taking and loan-making, which are required for banks to be considered commercial banks).[5] These screens leave us with a final sample of 778,664 bank-quarter observations for 15,988 banks over the entire sample period. To avoid distortions in ratios that use common equity as the denominator, for all observations with total common equity less than 1% of total assets, we replace common equity with 1% of total assets. Finally, we adjust the data to be in real 2010:Q4 terms using the GDP price deflator.

2.2 Bank-level measures

2.2.1 Measures of risk taking

Our main measure of bank risk taking is *Z-Score*, which captures the distance to default, with larger values indicating lower overall bank risk (e.g., Boyd and Runkle (1993), Laeven and Levine (2009), Houston, Lin, Lin, and Ma (2010), Beltratti and Stulz (2012)). This measure is calculated as the sum of a bank's average *ROA* (net income as a percentage of GTA) and average *Capitalization Ratio* (equity capital over GTA) divided by *Stdv.ROA* (the volatility of *ROA*). In our main analysis, we compute banks' average *ROA*, average *Capitalization Ratio*, as well as

[5] Gross total assets (GTA) equals total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve (a reserve for certain foreign loans). Total assets on Call Reports deduct these two reserves, which are held to cover potential credit losses. We add these reserves back to measure the full value of the loans financed.

standard deviation of *ROA* over a 12-quarter period, following a methodology similar to Berger, Klapper, and Turk-Ariss (2009) and Demirgüç-Kunt and Huizinga (2010).

In an effort to comprehensively examine the risk-taking implications of bank internationalization, we also employ several alternative measures of bank risk taking. First, we construct *Z-score* over 8 quarters and 20 quarters, as well as taking the log of the 12-quarter *Z-score*. We next use *Stdv.ROE*, the standard deviation of *ROE* over 12 quarters, where *ROE* is net income as a percentage of total equity, and *Stdv.ROA*, the standard deviation of *ROA* over 12 quarters. We also use the accounting variable *Sharpe Ratio*, which is calculated as the risk-adjusted rate of return on equity (*ROE/Stdv.ROE*), following Demirgüç-Kunt and Huizinga (2010). Finally, we use the nonperforming loans ratio, *NPL Ratio*, a measure of financial stability calculated as the bank-level ratio of nonperforming loans to total loans (e.g., Berger, Klapper, and Turk-Ariss (2009)), and *LLA Ratio*, the ratio of the loan and lease loss allowance over total loans, where higher values indicate greater risk.

2.2.2 Measures of internationalization

We construct several measures of bank internationalization, following Cetorelli and Goldberg (2012). Our main measure of bank internationalization is *Foreign Assets Ratio*, which is the ratio of a bank's foreign assets over its GTA. A larger *Foreign Assets Ratio* indicates a higher degree of internationalization, while a ratio of 0 indicates that a bank has purely domestic operations.

We also specify four alternative measures of internationalization. The first is *Foreign Loans Ratio*, which is the ratio of a bank's foreign loans to the total loans of the bank, where foreign loans are loans extended by offices in the countries in which the offices are physically located. We next employ *Foreign Deposits Ratio*, which is the ratio of foreign deposits over total deposits, where foreign deposits are deposits taken directly by offices in the countries in which the offices are physically located. For both of these ratios, larger values indicate greater bank internationalization.

Our third and fourth alternative measures of internationalization come from Call Report data on international banks' internal funding transfers, that is, "Net Due from foreign offices" and "Net Due to foreign offices", which we refer to simply as "foreign inflows" and "foreign

outflows," respectively.[6] A bank's foreign inflows and outflows reflect direct flows between the parent and its affiliates abroad. Positive values ("net due to") indicate that the head office has borrowed funds from its foreign offices, while negative values ("net due from") indicate that the head office has sent funds to affiliates outside of the US (Cetorelli and Goldberg (2012)). Based on these data, we calculate *Foreign Inflows Ratio* as the ratio of a bank's foreign net inflows to GTA, and *Foreign Outflows Ratio* as the ratio of a bank's foreign net outflows over GTA. As before, larger values indicate a higher degree of internationalization.[7] The idea is that if US parents provide financial support to foreign affiliates suffering from liquidity problems, we might see more foreign outflows—a larger *Foreign Outflows Ratio*—for those banks; similarly, we might see increased foreign inflows to US parents—a larger *Foreign Inflows Ratio*—if the international affiliates are profitable and/or the parents need liquidity.

2.2.3 Control variables

To isolate the role of internationalization in bank risk taking, we employ a number of control variables for bank characteristics shown to affect a bank's risk outcome.

We first control for *Income Diversification*, since a number of banking studies find that diversification influences risk.[8] Demirgüç-Kunt and Huizinga (2010) and Baele, De Jonghe, and Vander Vennet (2007) find that a greater reliance on non-interest income is linked to more volatile returns. In contrast, Stiroh (2006) finds a negative link between total bank risk and diversification of sources of revenue.[9] We follow Laeven and Levine (2007) and construct *Income Diversification* as 1 – ((Net Interest Income – Other Operating Income)/Total Operating

[6] "Net Due from foreign offices" corresponds to RCON2163 and "Net Due to foreign offices" corresponds to RCON2940 in the Call Report.

[7] Since these variables are net ratios, when one is positive, the other takes the value of zero.

[8] In unreported results, we also run our regression analysis using a measure of asset diversification, which is calculated as 1 – ((Net Loans – Other Operating Assets)/Total Earning Assets). Results for the relation between internationalization and risk-taking do not change. As for *Asset Diversification*, this leads to a higher *Z-score*, suggesting risk diversification benefits.

[9] In a study of European banks, LePetiti, Nys, Rous, and Tarazi (2008) find that increased non-interest income exposure is positively linked to (accounting and equity-based) measures of risk. Stiroh and Rumble (2006) also find that an increased share of volatile non-interest activities outweighs the diversification benefits.

Income). According to this measure of income diversification, firms with equal net interest and non-interest incomes are completely diversified.[10]

Following Demirgüç-Kunt and Huizinga (2010), we next include *Size*, measured as the log of GTA, since prior research shows that bank size is an important determinant of international competitive success (e.g., Hirtle (1991)), and that risk taking varies with bank size. In particular, prior work shows that larger banks have a greater capacity to absorb risk (e.g., Berger, Bouwman, Kick, and Schaeck (2012)), greater economies of scale in foreign exchange management (e.g., Minh To and Tripe (2002)), and more stable earnings (e.g., De Haan and Poghosyan (2012)). Also, larger banks may take higher risk due to safety net policies that can put them under the "too big to fail" umbrella (e.g., O'Hara and Shaw (1990)).

Our third control is the public status of the bank, *Listed*, since prior research shows that this factor affects risk taking (e.g., Barry, Lepetit, and Tarazi (2011), Nichols, Wahlen, and Wieland (2009)). Banks that are publicly traded could have different risk behavior because they tend to be more informationally transparent, and are subject to more monitoring from the capital markets. We construct *Listed* as a dummy variable that takes the value of 1 if a bank is listed on a stock exchange or is part of a bank holding company that is listed on a stock exchange, and 0 otherwise.

Fourth, we control for membership in a bank holding company, *BHC*. Such membership is expected to help a bank with foreign operations strengthen its competitive position because the holding company is required to support its affiliates by injecting capital as needed. Consistent with this view, Houston, James, and Marcus (1997) find that bank loan growth depends on bank holding company membership. We construct *BHC* as a dummy variable that takes the value of 1 if the bank is part of a bank holding company, and 0 otherwise.

Our fifth control is *Overhead Costs*, which captures the bank's operating cost structure. Demirgüç-Kunt and Huizinga (2010) find that banks with high overhead costs have higher fee income and are less stable. Following Demirgüç-Kunt and Huizinga (2010), we construct *Overhead Costs* as the ratio of total bank operating expenses to GTA.

Finally, we control for the regulatory environment. Several studies focus on the relationship between the regulatory environment and bank risk (e.g., Laeven and Levine (2009),

[10] Houston, Lin, Lin, and Ma (2010) also use a diversification index in their study on creditor rights, information sharing, and bank risk taking and find that diversification reduces risk.

Berger and Bouwman (forthcoming)). Following Berger and Bouwman (forthcoming), we control for potential differences in bank stability that can be explained by a bank's primary federal regulator by including three proxies for a bank's regulatory environment. In our analysis, *FED* is dummy variable that equals 1 if the bank is a state-chartered Federal Reserve member, indicating that the Federal Reserve is the bank's primary federal regulator, *OCC* is a dummy variable that equals 1 if the bank has a national bank charter, indicating that the bank's primary federal regulator is the Office of the Comptroller of the Currency, and *FDIC* is a dummy variable that equals 1 if the bank is a state non-member bank, whose primary federal regulator is the Federal Deposit Insurance Corporation. In our regressions, we omit *FDIC* to avoid perfect collinearity.

Following Demirgüç-Kunt and Huizinga (2010), our regressions also include time fixed effects, and errors are clustered at the bank level.

2.3 Summary statistics

Figure 1 plots the evolution of the number of international US commercial banks with foreign assets, foreign loans, foreign deposits, foreign inflows, and foreign outflows over our sample period (1989:Q1-2010:Q4). The figure shows a decline in the number of international US commercial banks with foreign assets over the sample period, from 181 in 1989:Q1 to only 53 in 2010:Q4, which could be due to the consolidation of the banking sector.[11]

A similar pattern obtains in the evolution of internationalization ratios in Figure 2, with *Foreign Assets Ratio* declining from 0.23% to 0.05%, *Foreign Loans Ratio* declining from 0.16% to 0.05%, and *Foreign Inflows Ratio* declining from 0.06% to 0.01%. *Foreign Deposits Ratio* declines to a lesser degree, from 0.35% to 0.18%, which indicates that US commercial banks focus more on deposit-taking and less on loan-making over the sample period. Perhaps somewhat puzzling, *Foreign Outflows Ratio* fluctuates over the sample period, rising from 0.04% in 1989:Q1 to 0.13% in 1994:Q3, and then falling to 0.07% in 2002:Q3 before increasing slightly to 0.09% during the recent financial crisis. This latter increase may reflect parents providing financing to foreign subsidiaries during the crisis period.

In Figure 3 we find that despite the decline in the number of international banks and internationalization ratios, there is an increase in the dollar amount of US commercial banks'

[11] Cetorelli and Goldberg (2012) report in their Table II that the number of global banks was 247 in 1985, 170 in 1995, and 107 in 2005. Our numbers are slightly lower because we focus only on commercial banks, whereas Cetorelli and Goldberg include all banks in the Call Reports.

foreign activities over our sample period using three different measures of internationalization: foreign assets, foreign loans, and foreign deposits. Thus, the decline in the ratios was primarily due to increases in domestic assets over time.

Figure 4 compares the risk-taking behavior (*Z-score*) of international commercial banks with that of their purely domestic peers. This figure also depicts crisis periods, with banking crises (crises originating in the banking sector) represented by dark grey shaded areas and market crises (crises originating in capital markets) by light grey shaded areas following the definitions in Berger and Bouwman (forthcoming) (discussed in more detail in Section 5.3). The figure shows that the *Z-score* of international banks is lower than that of purely domestic banks each year in the sample, with the only exception being a short period prior to the subprime mortgage crisis. When we look at financial crises versus normal time periods, the figure reveals an even deeper decline in *Z-score* for international banks during financial crises, particularly during market crises, the latter result perhaps due to the higher exposure of banks to international shocks during market crises and/or that banks receive more government help during banking crises.

Table 1 provides variable definitions, as well as the average, median, and standard deviation across all banks in the sample for the main variables used in our analyses. In terms of risk taking, commercial banks have a mean (median) 12-quarter *Z-score* of 36.053 (28.287), which indicates that banks are very far from default, a mean *Stdv.ROA* of 0.008, a mean *Stdv.ROE* of 0.035, and a mean *NPL Ratio* of 0.016. Mean (median) The internationalization measures (*Foreign Assets Ratio, International Bank Dummy, Foreign Loans Ratio, Foreign Deposits Ratio, Foreign Inflows Ratio, and Foreign Outflows Ratio*) indicate that on average 0.1-0.3% of US commercial banks' operations are international, with some banks having very intense foreign operations during some of the bank-quarters. In terms of bank-level characteristics, the average commercial bank has a level of *Income Diversification* of 20% (21.6%), with values for this measure as high as 42.4% for some bank-quarters, a *Size* of 11.9, a *Capitalization Ratio* of 9.8%, and *Overhead Costs* of 1.62. About 70% of the commercial banks are owned by a bank holding company (*BHC*) and 14% are listed on an exchange themselves or through the bank holding company that owns them (*Listed*). Moreover, about 10.6% of the banks have the *FED* as a primary regulator, 30.9% have the *OCC* as a primary regulator, and 58.5% have the *FDIC* as a primary regulator.

Table 2 presents the correlation coefficients among the key regression variables. Banks with more international operations (as measured by *Foreign Assets Ratio*) are more negatively

correlated with *Z-score*, which suggests that, consistent with Figure 4, these banks have a higher likelihood of default. Furthermore, international banks tend to have larger *Income Diversification*, are larger (*Size*), are more likely to be publicly listed (*Listed*), are less likely to be a member of a bank holding company (*BHC*), and have higher overhead (*Overhead Costs*). In terms of the regulatory variables, banks that internationalize are more likely to have the *OCC* as their primary regulator and less likely to have the *FED* or the *FDIC* as their primary regulator. This is due to the fact that they tend to be among the larger national chartered banks. Finally, the correlation results indicate that all three instrumental variables (*Minority Interest*, *Percent International Banks*, and *State Exports Ratio*, discussed in detail in Section 4.4) are positively correlated with *Foreign Assets Ratio*, our main measure of internationalization.

3. Empirical results

In this section, we empirically analyze the importance of internationalization for US banks' risk-taking behavior. We begin this analysis by performing univariate tests that compare the risk taking of international versus purely domestic banks. We next conduct multivariate regressions in which we estimate the impact of internationalization on bank risk taking. We then run regressions separately for normal times and financial crisis periods.

3.1 Univariate analysis

We compare the means and medians of our measures of bank risk (*Z-score*, *Stdv.ROA*, *Stdv.ROE*, *Sharpe Ratio*, *NPL Ratio*, and *LLA Ratio*) for the international bank and domestic bank subsamples in Table 3. The results indicate that the mean (median) 12-quarter *Z-score* is 29.21 (20.43) for international banks compared to 36.15 (28.41) for domestic banks. These differences, which are statistically significant at the 1% level, provide initial support for the view that banks with international operations take on more risk.

This result continues to hold when we use alternative measures of risk taking. For instance, the mean (median) 8-quarter *Z-score* is 6.80 (8.74) lower and the mean (median) 20-quarter *Z-score* is 6.42 (6.88) lower for international banks. Moreover, the standard deviation of ROA is larger for international banks compared to their domestic peers, with the difference in the mean (median) equal to 0.0016 (0.0006). Similarly, the mean (median) standard deviation of ROE is 0.0035 (0.0036) lower for international banks compared to purely domestic banks. The *Sharpe Ratio* is smaller for international banks compared to their domestic peers, with the difference in the mean (median) equal to -0.4910 (-0.7208). We also find that the ratio of

nonperforming loans (*NPL Ratio*) and the ratio of loan loss allowances (*LLA Ratio*) are higher for international banks than domestic ones, with the difference in the mean (median) equal to 0.010 (0.006) and 0.012 (0.0068), respectively. Each of the above findings indicates that international banks have riskier assets. Overall, our preliminary evidence provides consistent support for the view that international banks take more risk relative to purely domestic banks.

3.2 Regression analysis

To examine the relationship between internationalization and bank risk taking, we estimate several versions of the following model:

$$Risk_{it-11,t} = \alpha + \beta\, Internationalization_{it-12} + Controls_{it-12} + Time_{t} + \varepsilon_{it}, \qquad (1)$$

where *Risk* is bank risk taking as measured by *Z-score* and the other proxies outlined in Section 2.2.1, *Internationalization* is bank internationalization as measured by *Foreign Assets Ratio* and the other proxies discussed in Section 2.2.2, *Controls* comprises a set of bank-level control variables, *Time* denotes time fixed effects, and ε is an error term. Because risk taking is likely correlated within a bank over time, we adjust standard errors for clustering at the bank level.[12] The risk variables are measured over the 12 quarters from *t-11* to *t* (with some exceptions discussed below), while the independent variables are measured in the quarter *t -12* to ensure that they are predetermined relative to the dependent variable.[13]

The results are presented in Table 4. Model 1 reports results from regressing *Z-score* on *Foreign Assets Ratio* (our main internationalization measure) using ordinary least squares (OLS). After controlling for bank characteristics (income diversification, size, public listing status, bank holding company ownership, overhead costs, and regulatory environment) and time fixed effects, we find that the coefficient on *Foreign Assets Ratio* is negative and statistically significantly at the 1% level. This finding indicates that bank internationalization is significantly associated with greater bank risk taking. This finding is economically significant as well: a 10 percentage point increase in *Foreign Assets Ratio* (0.10) is associated with a decrease in *Z-score* of 6.806 (=0.10×68.064). These results are consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

[12] We consider alternative ways to adjust the standard errors for possible dependence in the residuals in Section 4.3.

[13] We recognize that reverse causality might still be an issue. Some researchers argue that models with lagged potential independent variables help attenuate endogeneity concerns (e.g., Duchin, Ozbas, and Sensoy (2010)). We address concerns related to reverse causality and other sources of endogeneity in detail in Section 4.4.

In Model 2, we replace *Foreign Assets Ratio* with *Bank Internationalization Dummy*, which takes the value 1 if *Foreign Assets Ratio* is strictly positive, and 0 otherwise. We find that the coefficient estimate on *Bank Internationalization Dummy* is -19.551, which is statistically significant at the 1% level. This coefficient estimate is economically material – moving *Bank Internationalization Dummy* from 0 to 1 (i.e., the bank internationalizes), with all other independent variables held at their means, decreases *Z-score* by about half, from 38.617 to 19.066, again consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

Models 3 to 7 of Table 4 report additional results. In Model 3, we exclude too-big-to-fail entities, defined as banks with GTA greater than $100 billion in constant 2010:Q4 dollars. In Model 4, we exclude the 20 most internationally active banking organizations, defined as entities with the largest *Foreign Assets Ratio* in each quarter. In Models 3 and 4, we continue to find that international banks take on more risk, suggesting that our core result is not driven by too-big-to-fail or the most internationally active banks. Next, we report results by bank size to assess whether our main evidence concentrates on a particular bank size interval, since literature finds differences by bank size in terms of portfolio composition (e.g., Berger, Miller, Petersen, Rajan and Stein (2005)). We define small banks as banks with GTA less than $1 billion, medium-sized banks as banks with GTA between $1 billion and $5 billion, and large banks as banks with GTA greater than $5 billion. All size thresholds are in constant 2010:Q4 dollars. In Models 5 to 7, we continue to find that bank internationalization is associated with higher risk across all size classes.

Turning to the bank-level control variables, we find across nearly all models in Table 4 that firm size enters with a positive sign on *Z-score*, consistent with larger banks having better risk management skills and/or greater capacity to absorb losses through risk diversification, consistent with Berger, Bouwman, Kick, and Schaeck (2012). We also find that *Listed* enters with a positive and significant sign on *Z-score*, suggesting that public status tends to be associated with less insolvency risk, consistent with Houston, Lin, Lin, and Ma (2010). We further find that being part of a bank holding company leads to a higher *Z-score*, thus mitigating risk. This result is consistent with the arguments above that a holding company supports its affiliate banks by injecting funding as needed. Next, *Overhead Costs* enters with a negative sign on *Z-score*, consistent with the finding in Demirgüç-Kunt and Huizinga (2010) that banks with higher overhead are less stable. Finally, we look at potential differences across federal bank regulators. We find that the regulatory environment matters for bank risk taking. Specifically, we find that *FED* and *OCC* enter with a positive and significant sign on *Z-score*, indicating that banks

regulated by the Federal Reserve and the OCC take less risk than banks regulated by the FDIC. This result is consistent with Laeven and Levine (2009) and Berger and Bouwman (forthcoming).

4. Robustness tests

4.1 Alternative measures of risk taking

In Table 5, we examine whether our main results are sensitive to alternative measures of bank risk taking. Unless specifically stated otherwise, these measures are also computed over the 12 quarter interval from *t–11* to *t*. We first analyze, in Model 1, the sensitivity of our results to using the log of *Z-score* as the dependent variable. This specification has the advantage of mitigating the impact of outliers on the raw *Z-score*. Next we compute *Z-score* over alternative time intervals. Specifically, the dependent variable is *Z-score* computed over 8 quarters in Model 2 and *Z-score* computed over 20 quarters in Model 3, i.e., from *t–7* to *t* and from *t–19* to *t*, respectively. Next, in Model 4 we use as the dependent variable *Sharpe Ratio*, which is the risk-adjusted return on equity (*ROE/Stdv.ROE*). In Model 5 we use *Stdv.ROE,* the standard deviation of *ROE*, and in Model 6 we use *Stdv.ROA*, the standard deviation of *ROA*. In Model 7, we use *NPL Ratio*, the bank-level ratio of nonperforming loans to total loans. Finally, we report regression estimates using *LLA Ratio*, the ratio of loan loss allowance over total loans, in Model 8. For Models 7 and 8, we simply measure the risk variable for quarter *t*. All regressions include time fixed effects, and standard errors are adjusted for clustering at the bank level. For Models 1, 4, 5 and 6, the independent variables are constructed over quarters *t–12*, since the dependent variable is computed over *t–11* to t. For Model 2, the independent variables are constructed for quarter *t–8*, while for Model 3, the independent variables are constructed for quarter *t–20*. Finally, for Models 7 and 8, we lag the independent variables by 1 quarter as the dependent variables only contain contemporaneous components. In each of the eight specifications, we find that the coefficient on *Foreign Assets Ratio* is statistically significant at the 5% level or better in the direction of internationalization being associated with more risk taking, reinforcing our finding of an empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

4.2 Alternative measures of internationalization

In Table 6, we examine whether our findings persist when we consider alternative measures of internationalization. For ease of comparison, we repeat the results based on *Foreign Assets Ratio*, our primary measure of internationalization, in Model 1. Our alternative proxies for internationalization are as follows: *Foreign Loans Ratio* (the ratio of the bank's total foreign

loans to total loans) in Model 2, *Foreign Deposits Ratio* (the ratio of foreign deposits to total deposits) in Model 3, *Foreign Inflows Ratio* (the ratio of net foreign inflows to total assets) in Model 4, and *Foreign Outflows Ratio* (the ratio of net foreign outflows to bank total assets) in Model 5. All regressions include time fixed effects, and standard errors are adjusted for clustering at the bank level. In each of these regressions, the coefficient on the internationalization variable is negative and statistically significant at the 1% level. Thus, the positive relation between internationalization and risk taking that we document above is robust to using alternative measures of bank internationalization.

4.3 Alternative econometric specifications and standard errors

Table 7 reports results from employing alternative econometric specifications and estimating alternative standard errors. Model 1 again reports the results from our main specification to facilitate comparison with the alternative specifications.

In Models 2 and 3, we exploit the panel nature of our data and estimate bank fixed effects and bank random effects models, respectively, to control for bank heterogeneity. These models help alleviate the concern that omitted unobserved bank-specific determinants might be spuriously responsible for the negative relation we document between internationalization and *Z-score*. In both models, we continue to find support for our earlier results at the 1% level.

In Models 4 to 7, we use alternative methodologies to correct standard errors for heteroskedasticity and autocorrelation of the residuals. First, in Model 4, we report Newey-West standard errors for coefficients estimated by OLS to control for heteroskedasticity and autocorrelation of the standard errors. Second, in Model 5, to alternatively control for time-series dependence, we also employ Prais-Winsten standard errors that extend the Newey-West correction by integrating the panel structure of the data. Third, in Model 6, we make inferences based on the standard errors of the time series of coefficients to account for cross-sectional dependence (Fama and MacBeth (1973)). Fourth, in Model 7, we implement two-way clustering by bank and time to allow for correlations among different banks in the same quarter and across quarters in the same bank as suggested by Thompson (2011). The results in Models 4 to 7 of Table 7 confirm our earlier evidence – we find that the coefficient on *Foreign Assets Ratio* is negative and statistically significant at the 1% level in all cases.

4.4 Endogeneity

In this section, we perform several tests to address the potential endogeneity of our internationalization variable, which could bias our findings. Endogeneity is a concern when there is a violation of the assumption that the error term is uncorrelated with the explanatory variables. There are at least three generally recognized sources of endogeneity: (1) omitted correlated variables bias, (2) measurement error, and (3) reverse causality. In our context, internationalization and bank risk taking may be simultaneously driven by certain variables not included in our regressions. Further, our variable of interest, internationalization, may be imperfectly measured due to difficulty observing and/or quantifying its magnitude. There could additionally be a causal link from risk taking to bank internationalization, as the level of bank risk may affect a bank's internationalization decision (e.g., banks with risky assets could have incentives to internationalize in order to diversify their risk). These three potential problems may lead to correlation between our internationalization proxy and the error term, leading to spurious inferences on the effect of bank internationalization on risk taking. We conduct a series of tests to address each of these competing explanations for our evidence. We also address the related concern of self-selection bias. We discuss each of these tests in turn below.

Omitted correlated variables. One potential concern is that failure to control for certain determinants of risk taking can cause them to be captured in the error term, which can lead to biased results to the extent that such omitted variables are correlated with bank internationalization. Although we saturate the regressions in Table 4 with several bank-level controls to alleviate endogeneity stemming from correlated omitted variables, here we examine whether our earlier results are sensitive to sequentially adding to the baseline model (i.e., Model 1 in Table 4) controls for other determinants of bank risk taking. Specifically, we control for: 1) merger and acquisition activity (*Merger*), which we measure using a dummy variable that takes the value of 1 starting in the time period in which a bank engages in a M&A event with another institution and 0 otherwise, because bad acquisitions can reduce value and increase bank default risk (e.g., Furfine and Rosen (2006)); 2) the degree of competition in the market (*HHI Deposits*), which we measure using the Herfindahl-Hirschman Index (HHI) of market concentration based on the bank's weighted market share of deposits in the Metropolitan Statistical Areas (MSA) or rural counties in which it operates, because prior research shows that competition can affect bank risk;[14] 3) the degree of competition in the market squared (*HHI Deposits_sq*) since Martinez-

[14] HHI is the sum of the squares of the market shares (deposits) of each individual bank. We use the bank deposit data from the FDIC Summary of Deposits for the period 2005 to 2010 combined with data from

Miera and Repullo (2010) suggest a possible nonlinear relationship between market power and bank risk; 4) "too big to fail" banks (*TBTF*) as in Houston, Lin, Lin, and Ma (2010), which we capture using a dummy variable that takes the value of 1 in all quarters in which a bank has GTA greater than or equal to $100 billion (in constant 2010:Q4 dollars), because banks that view themselves as too big to fail may have greater incentives to take on risk; 5) the growth rate of real bank assets (*Assets Growth*) and the growth rate of loans (*Loan Growth*) to proxy for growth opportunities because fast-growing banks might have different income and funding strategies as well as different risk and return outcomes than slower-growing banks (e.g., Laeven and Levine (2007), Demirgüç-Kunt, and Huizinga (2010)); 6) fee income (*Fee Income*), which we capture using the ratio of non-interest income over total operating income, because Demirgüç-Kunt and Huizinga (2010) show that banking strategies that rely largely on generating non-interest income could be very risky; 7) nondeposit funding (*Nondeposit Funding*), which is the ratio of nondeposit funding to total deposits, since Demirgüç-Kunt and Huizinga (2010) show that greater reliance of bank funding on nondeposit sources tends to induce more risk; and 8) liquidity creation (*Liquidity Creation*) from Berger and Bouwman (2009) standardized by bank GTA, because higher liquidity risk may be associated with increased financial fragility.

The results are reported in Panel A of Table 8. To facilitate comparisons, the results for the baseline model (Model 1 in Table 4) are repeated in the first column of Table 8, Panel A. The results indicate that adding the above controls does not materially affect our previous finding that internationalization is associated with higher bank overall risk. All of the additional controls enter with the predicted signs.

Instrumental variables. We use instrumental variable techniques (2SLS, GMM, and LIML) to extract the exogenous component of bank internationalization in assessing the influence of internationalization on risk taking. We employ several instrumental variables previously used in the literature. A proper instrument for internationalization should satisfy the requirements of

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Berger and Bouwman (2009) for the period 1986 to 2004. The "competition-fragility" view (e.g., Keeley (1990), Demsetz, Saidenberg, and Strahan (1996), Carletti and Hartmann (2003)) argues that more banking competition decreases bank profit margins and franchise value, which encourages risk-taking behavior. Alternatively, the "competition-stability" view (Boyd and De Nicolo (2005)) argues that lower competition is associated with financial instability since banks with market power charge higher interest rates on loans to earn more rents, making it difficult for customers to repay the loans. This second view predicts an increase in moral hazard and adverse selection problems, an increase in the volume of nonperforming loans, and greater bank instability. Berger, Klapper, and Turk-Ariss (2009) find that both views may be consistent with the data simultaneously.

relevance and exogeneity, that is, it must correlate with bank internationalization but not be a direct cause of bank risk taking.

Our first instrument is bank-level *Minority Interest*. This variable is a dummy equal to 1 if a bank reports nonzero minority interest in consolidated subsidiaries on its balance sheet, and 0 otherwise. As argued by Dimitrov and Tice (2006) and Li, Qiu, and Wan (2011), this variable indicates whether, at some point in time, the parent bank acquired a majority stake in another institution. Since some acquisitions result in internationalization (cross-border acquisitions are one of the most effective ways to enter a foreign market), *Minority Interest* should be correlated with internationalization.

Our second instrument for bank internationalization is *State Exports Ratio*, which is the ratio of the state's foreign exports to total US exports in a given year. A bank becomes familiar with international companies located within its geographical area in its role as creditor and can learn from their international experience, which can lower its foreign entry costs (Li, Qiu, and Wan (2011)). This argument is consistent with the literature that shows that banks follow their domestic customers into foreign countries (e.g., Brimmer and Dahl (1975), Grosse and Goldberg (1991)). Thus, a high level of state exports can positively impact a bank's decision to internationalize. At the same time, it is unlikely that the level of state exports would affect a bank's risk profile.[15]

Our third instrument is *Percent International Banks*, which is the fraction of the other (*N-1*) international banks in each quarter, similar to Campa and Kedia (2002). A larger fraction indicates a higher degree of internationalization in the banking industry. Campa and Kedia (2002) and Li, Qiu, and Wan (2011) note that this measure captures an industry's propensity to engage in global diversification. We expect that the fraction of international banks is positively related to *Foreign Assets Ratio*, but there is no reason to believe that the industry's tendency to internationalize would directly impact the risk-taking behavior of individual banks.

The results of the IV regressions are reported in Panel B of Table 8. To facilitate comparison, we include the OLS results from Model 1 of Table 4 in the first column. We report

[15] To construct this instrument, we obtain information on banks' headquarters from the Call Reports and manually collect state export data from the US Census Bureau (data are available starting with 1995, so we simply use 1995 data for the prior years).

the first-stage regression results in Model 2 and the second-stage results for the 2SLS, GMM, and LIML specifications in Models 3, 4, and 5, respectively.

The first-stage regression indicates that the three instrumental variables (*Minority Interest*, *State Exports Ratio*, and *Percent International Banks*) are positively related to internationalization, and the first-stage *F*-test of excluded instruments indicates that the instruments are collectively valid. The second-stage regressions (2SLS, GMM, and LIML) indicate that bank internationalization is associated with greater risk, consistent with our main results.

Propensity score matching analysis. To confront the issue of self-selection bias, we use propensity score matching (PSM) analysis, developed by Rosenbaum and Rubin (1983), closely following Lawrence, Minutti-Meza, and Zhang (2012).[16]

PSM analysis involves matching observations based on the probability of undergoing the treatment, which in our case is the probability of choosing to internationalize. More specifically, PSM estimates the effect of internationalization on a bank's risk taking by comparing the risk (*Z-score*) of banks that expand into foreign markets (treatment group) with the risk of banks that have a similar probability of going international but for which no such event takes place (control group). This quasi-experiment is conducted by matching each international bank with a domestic bank sharing similar characteristics as indicated by their propensity scores. The effect of internationalization is calculated as the average difference between the international group and the matched control group. To estimate a bank's propensity score (or probability of internationalizing), we use a probit model in which the dependent variable is a dichotomous internationalization measure that takes a value of 1 if the bank has strictly positive foreign assets, and 0 otherwise, and the independent variables are bank characteristics from our main model, the instrumental variables *Minority Interest*, *State Exports Ratio*, and *Percent International Banks* defined above, as well as time fixed effects.

[16] As noted by Lawrence, Minutti-Meza, and Zhang (2012), PSM has important advantages such as:1) the ability to produce samples in which the treated and untreated entities are similar, thus providing a natural framework to estimate the effects of treatment and firm-level characteristics; 2) independence from an explicit functional form (as opposed to Heckman selection models); and 3) the ability to estimate the treatment effects more directly as well as the ability to alleviate potential nonlinearities related to the treatment effects when the underlying functional form is nonlinear.

We use several matching techniques. First, we use one-to-one matching without replacement, which matches each bank in the international (treated) group to the nearest domestic (untreated) control bank. This technique ensures that we do not have multiple domestic banks assigned to the same international bank, which can lead to a smaller control group than the treated group. Second, we use one-to-one matching with replacement, which performs a similar matching to the first method with the only difference being that each treated bank can be matched to the nearest control bank even if the latter is used more than once (Dehejia and Wahba (2002)). Finally, we use nearest-neighbor matching with n=2 and replacement, and nearest-neighbor matching with n=3 and replacement, which match each international bank with the 2 and 3 domestic banks with the closest propensity scores, respectively.[17]

First, the internationalization effect on risk taking is calculated as the average difference between international banks' risk and the mean risk of their matched neighbors. Second, we use linear regression and the propensity score matched samples in an attempt to control for observable confounders in the process of estimating the causal effects. Panel B of Table 8 reports both univariate results and regression estimates of the effect of internationalization on bank risk taking using the propensity-score matched samples. In the univariate tests, we report *t*-statistics for the difference in risk taking between the treated and control groups for each of the four PSM techniques. Using one-to-one matching without replacement, we find that *Z-score* is 7.05 lower for international banks than for the control group. Using the other three techniques, we obtain differences in *Z-score* of 6.99, 5.19, and 5.27, respectively. All these differences are statistically significant at the 1% level.

Turning to the regression analysis, we regress the risk-taking measure on *Foreign Assets Ratio* and all control variables used in the main regression specification as well as time fixed effects. Again, the standard errors are adjusted for clustering at the bank level. In all matched samples (Models 1 to 4), we continue to find a negative and statistically significant coefficient on *Foreign Assets Ratio*, indicating that international banks take more risk compared to their domestic peers, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*. This evidence from samples matched on their propensity scores helps dispel the competing explanation that our results above spuriously reflect differences in the

[17] In unreported tests, we compare the means of the bank characteristics used in the selection models across the international and domestic bank samples to assess the effectiveness of our propensity matching procedure. Reassuringly, these results indicate that the distributions of the bank characteristics are statistically indistinguishable between the international and domestic samples at conventional levels.

characteristics of international banks and purely domestic banks rather than the effect of internationalization per se on risk taking.

Heckman's (1979) two-stage self-selection model. Another approach that addresses self-selection bias is Heckman's (1979) two-step procedure. This approach controls for self-selection bias induced by banks choosing to expand into foreign markets by incorporating the internationalization decision into the econometric estimation. In the first step, we use a probit model to regress a dummy variable that equals 1 if *Foreign Assets Ratio* is strictly positive, and 0 otherwise, on all control variables from our main specification and the instrumental variables used in Panel B of Table 8 (*Minority Interest*, S*tate Export Ratio*, and *Percent International Banks*). In the second stage, *Z-score* is the dependent variable, and we include the self-selection parameter (inverse Mills' ratio) estimated from the first stage.

The results are reported in Panel D of Table 8. Controlling for potential self-selection bias, the results of the two-step estimation model continue to suggest that internationalization is associated with higher bank risk. In the selection equation, the three instrumental variables are positively related to bank internationalization. In the outcome equation, the internationalization variable enters significantly negatively, suggesting a lower *Z-score* for international banks, consistent with our prior results.

5. Additional analyses

5.1 Z-score decomposition

To shed light on the channels through which bank internationalization affects risk taking, we decompose *Z-score* into its components: *ROA*, *Capitalization Ratio*, and *Stdv.ROA*. In Table 9, we report results of regressions of the three components of *Z-score* on *Foreign Assets Ratio*. The regressions include time fixed effects, and standard errors are adjusted for clustering at the bank level. For ease of comparison, in Model 1, we report the regression results with *Z-score* as the dependent variable from Table 4.

First, as shown by the regression estimates reported in Model 2, we find that bank internationalization is associated with lower profitability as measured by *ROA*, consistent with findings in DeYoung and Noelle (1996), Peek, Rosengren, and Kasirye (1999), and Berger, DeYoung, Genay, and Udell (2000). Our result is also consistent with Goetz, Laeven, and Levine (2012), who find that bank geographical diversification across US states is detrimental to bank performance.

Second, as shown in Model 3, we find that bank internationalization is associated with increased *Capitalization Ratio*, which works to reduce bank risk. This may be due to precautionary measures taken by banks when expanding abroad as well as regulatory and legal requirements designed to avoid bank runs.

Third, as shown in the regression estimates reported in Model 4, we find that bank internationalization is associated with increased volatility in bank profitability as measured by *Stdv.ROA*. This result is expected as banks expanding abroad often face unanticipated difficulties and risky operating environments in the host countries.

Taken together, the results show that while the equity capital effect works to increase banks' *Z-score* and hence decrease bank risk, this effect is not strong enough to offset the effects of lower profitability and higher volatility of returns of international banks.

5.2 Listed banks

In Table 10, we investigate whether our main results are sensitive to examining the subsample of publicly listed banks. To do so, we aggregate banks in the Call Reports at the bank holding company level and merge the resulting sample with CRSP (to obtain stock returns) and Compustat (to obtain S&P credit ratings). An advantage of focusing on listed banks is that we can analyze the impact of bank internationalization on risk taking using several measures of market-based risk. We first employ the 12-quarter *Z-score* as our dependent variable for this subsample of banks in Model 1. Despite the dramatic decrease in the number of observations (29,953 observations on listed banks compared to 600,953 observations for the full sample), we find that our core evidence persists in this reduced subsample of banks.

We also construct two measures of bank market risk based on stock returns. First, we estimate the market model for each bank over each calendar quarter using daily stock returns. Specifically, we regress each bank's stock returns on the CRSP value-weighted index returns and construct *Idiosyncratic Risk* as the standard deviation of the regression's residuals. Second, we compute *Total Bank Risk* as the standard deviation of daily stock returns (Esty (1998)) for each calendar quarter. We use *Idiosyncratic Risk* and *Total Bank Risk* as our measures of bank risk in Models 2 and 3, respectively.

Finally, we create two measures of bank market risk based on credit ratings. First, we convert the long-term issuer credit ratings compiled by Standard & Poor's (S&P) to an ordinal scale. More specifically, we create *S&P Domestic Long-Term Issuer Credit Rating* by assigning a

value of 8 if the bank has an S&P rating of AAA, 7 if AA, 6 if A, 5 if BBB, 4 if BB, 3 if B, 2 if CCC, and 1 if CC. Second, we create the dummy variable *S&P Investment Grade*, which is equal to 1 if the bank has a credit rating of BBB or higher, and 0 otherwise. Higher values of these two variables indicate lower risk. We consider the effect of internationalization on *S&P Domestic Long-Term Issuer Credit Rating* in Model 4 and *S&P Investment Grade* in Model 5. We employ an ordered probit analysis and a simple probit analysis with time fixed effects in Models 4 and 5, respectively.

Consistent with our findings above, the results in Table 10 indicate that international public banks have a higher standard deviation of stock returns and lower credit ratings than purely domestic public banks.

5.3 Internationalization and risk taking during financial crises

In Table 11, we examine the effect of internationalization and bank risk taking during normal times and financial crises to investigate whether internationalization affects risk taking differently during financial crises. Specifically, we first examine the effect of internationalization on risk taking for normal time periods in Model 1 and for financial crises in Model 2. We then examine this effect separately for banking crises (those originating in the banking sector) and market crises (those originating in the capital markets) in Models 3 and 4, respectively. In each of these models, we use our main measure of internationalization, *Foreign Assets Ratio*. To identify financial crises, we follow Berger and Bouwman (forthcoming). Specifically, we identify two banking crises, namely, the credit crunch (1990:Q1-1992:Q4) and the subprime lending crisis (2007:Q3-2009:Q4), and two market crises, namely, the Russian debt crisis / Long Term Capital Management (LTCM) bailout (1998:Q3-1998:Q4), and the dot.com bubble and September 11 terrorist attack (2000:Q2-2002:Q3). The results suggest that the impact of bank internationalization on risk taking is slightly higher during financial crises compared to normal times, as indicated by the coefficient on *Foreign Assets Ratio* in Model 2. When we split financial crises into banking crises and market crises, we find that the effect of internationalization on risk taking is much more pronounced during market crises as indicated in Model 4. This may be due to the higher exposure of banks to international shocks during market crises, and/or that banks receive more government help during banking crises.

6. Concluding remarks

This paper offers the first assessment of the role of internationalization in bank risk taking using US bank data. We find strong, robust evidence that risk taking is higher, the more internationalized is a bank. To identify the effect of bank internationalization on risk taking, we employ a number of different measures of internationalization and risk taking, employ various econometric procedures to control for the endogeneity of bank internationalization, and estimate over several different subsamples of the data. The data consistently suggest that internationalization is associated with higher bank risk, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*. This effect seems to be more pronounced during financial crises.

The paper contributes primarily to two related strands of research. First, this paper contributes to the literature on bank risk taking by introducing internationalization as a factor influencing risk and sets the groundwork for further research on bank internationalization. Although some policymakers, practitioners, and researchers point to the benefits of geographical risk diversification resulting from the internationalization of banks, our results suggest that this effect is dominated by other factors. Specifically, our results suggest that the additional local market risks taken on following international expansion outweigh the benefits of geographical diversification. Second, this paper contributes to the broader literature on internationalization by examining risk taking within one industry rather than across a number of very different industries. After controlling for endogeneity and other possible explanations for our results, we continue to find that bank internationalization contributes to an increase in risk taking in an industry in which risk taking is highly monitored by a large number of stakeholders. These findings suggest that authorities might consider additional supervision or regulation of the activities of international banks.

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Figure 1: Numbers of International US Commercial Banks over Time

Figure 1 looks at the evolution of bank internationalization over our sample period. It plots the number of international US commercial banks for each quarter in our sample period. Several dimensions of bank internationalization are considered: foreign assets, foreign loans, foreign deposits, and foreign inflows and outflows. The sample period illustrated is 1989 Q1 to 2010 Q4.

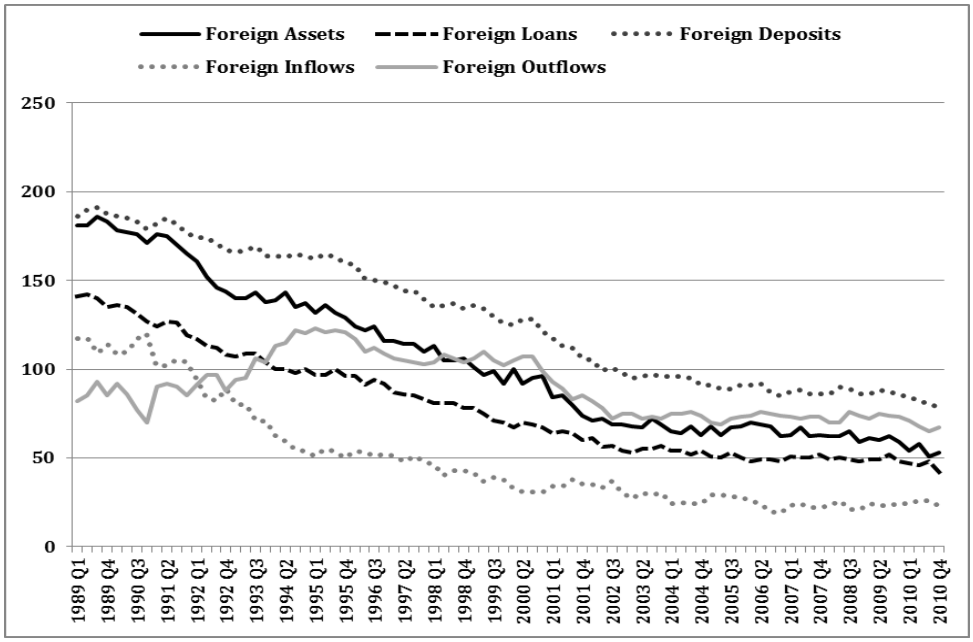

Figure 2: Different Internationalization Ratios over Time

Figure 2 plots the average internationalization ratios of US commercial banks by quarter. Several dimensions of bank internationalization are considered: foreign assets, foreign loans, foreign deposits, foreign inflows and foreign outflows. The sample period illustrated is 1989 Q1 to 2010 Q4.

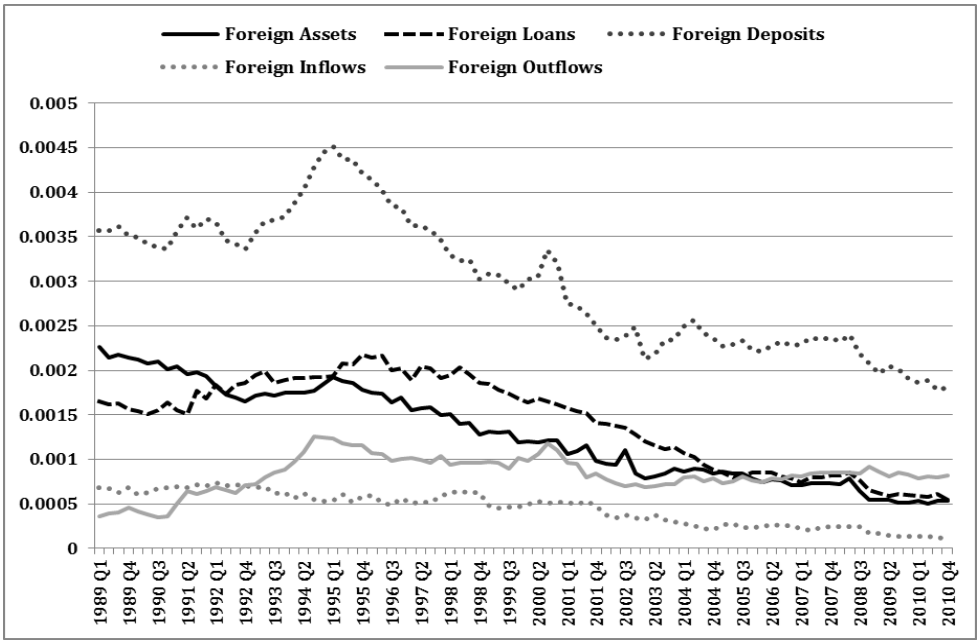

Figure 3: Total Volumes of International Activities over Time

Figure 3 plots the actual dollar amount (billions) of US commercial banks' foreign activities by quarter. Several dimensions of bank internationalization are considered: foreign assets, foreign loans, foreign deposits, foreign inflows and foreign outflows. The sample period illustrated is 1989 Q1 to 2010 Q4.

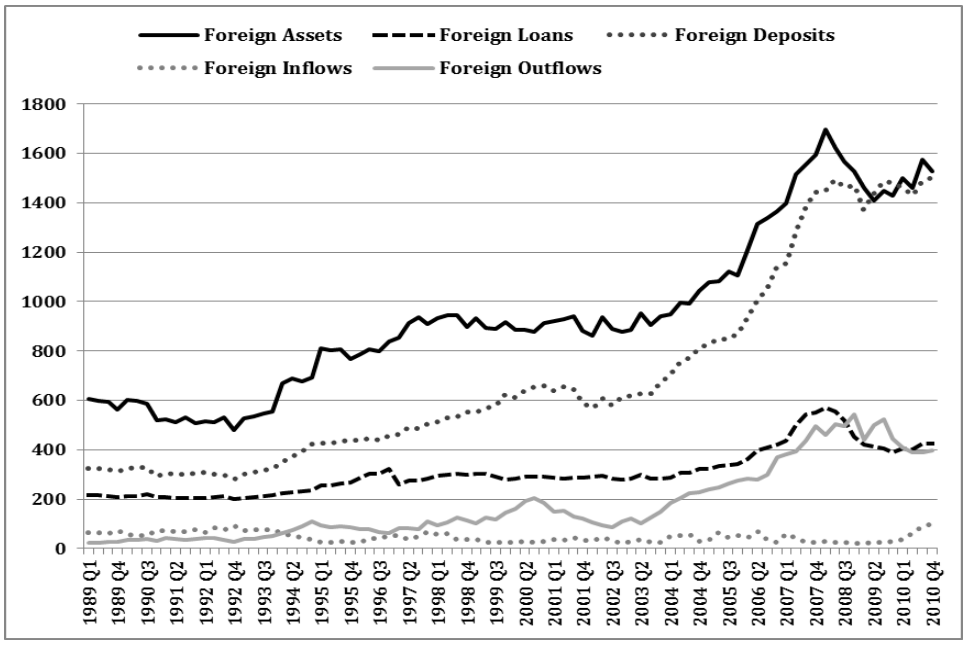

Figure 4: Average *Z-score* for International Banks vs. Domestic Banks over Time

Figure 4 compares the risk-taking behavior (*Z-score*) of international commercial banks versus purely domestic banks during our sample period. This figure depicts crisis periods in shaded grey areas: banking crises (Banking_Crises) are represented by areas in dark grey and market crises (Market_Crises) are shown in light grey. Given that *Z-score* is calculated using data over the previous 12 quarters, the sample period depicted is 1989 Q1 to 2010 Q4.

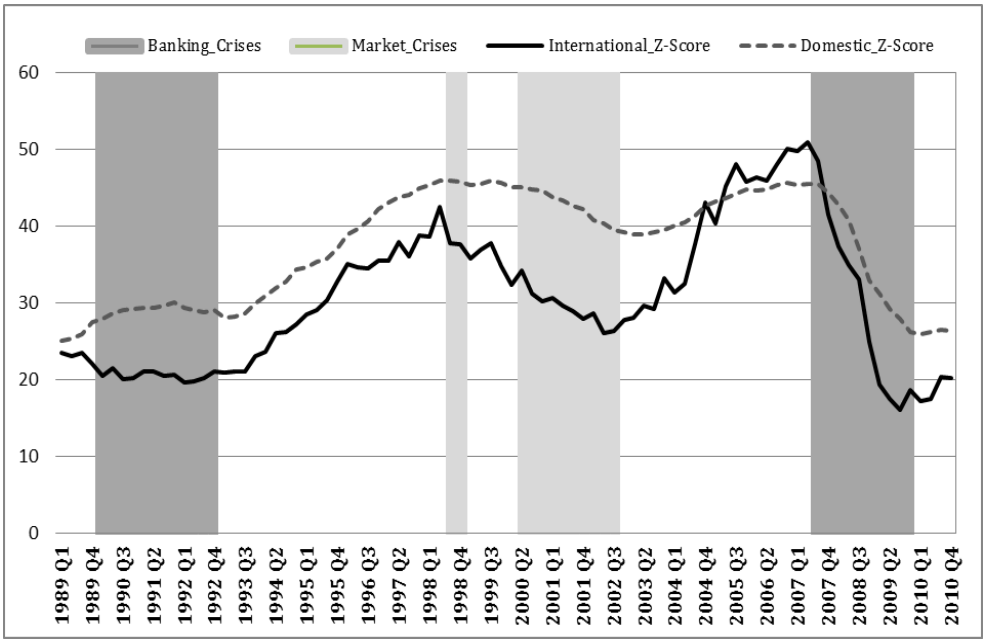

Table 1. Definitions and Summary Statistics (Bank-level Data)

This table presents variables definitions and reports summary statistics for the full samples of US commercial banks used in the analysis. All variables using dollar amounts are expressed in real 2010 Q4 dollars using the implicit GDP price deflator.

Variable	***Definition***	***Mean***	***Median***	***Std***
Risk-taking Variables				
Z-score (12 quarters)	A bank-level measure of financial risk calculated as Avg.(ROA)+Avg.(Equity/GTA) / Stdv.ROA; a larger value indicates lower overall bank risk. Averages of ROA and EQ/TA as well as the standard deviation of ROA are computed over the previous 12 quarters (*t-11* to *t*), this being our main specification.	36.053	28.287	30.754
Z-score (8 quarters)	A bank-level measure of financial risk calculated as Avg.(ROA)+ Avg.(Equity/GTA) / Stdv.ROA; a larger value indicates lower overall bank risk. Averages of ROA and Equity/GTA as well as the standard deviation of ROA are computed over the previous 8 quarters (*t-7* to *t*).	42.561	32.564	38.504
Z-score (20 quarters)	A bank-level measure of financial risk calculated as Avg.(ROA)+ Avg.(Equity/GTA) / Stdv.ROA; a larger value indicates lower overall bank risk. Averages of ROA and Equity/GTA as well as the standard deviation of ROA are computed over the previous 20 quarters (*t-19* to *t*).	29.805	23.830	24.374
Sharpe Ratio	The risk-adjusted return on equity defined as ROE/Stdv.ROE. ROE is determined as the ratio of net operating income over total equity..	6.477	3.238	157.687
Stdv.ROA	For each quarter, the standard deviation of ROA is calculated as the quarterly standard deviation over the previous 12 quarters (*t-11* to *t*). ROA is determined as the ratio of net operating income over GTA.	0.008	0.004	0.016
Stdv.ROE	For each quarter, the standard deviation of ROE is calculated as the quarterly standard deviation over the previous 12 quarters (*t-11 to t*.) ROE is determined as the ratio of net operating income over total equity	0.035	0.031	0.021
NPL Ratio	A measure of financial stability: the bank-level ratio of nonperforming loans to total loans; a higher value indicates a riskier loan portfolio.	0.016	0.009	0.025
LLA Ratio	A measure of risk defined as the ratio of loan loss allowance over bank total loans; a higher value indicates higher risk.	0.022	0.018	0.021
Idiosyncratic Risk	A measure of bank idiosyncratic risk for each calendar quarter using bank stock daily returns and determined as the difference between market risk (stock return volatility, Var ($R_{i,t}$)) and systematic risk (β^2*Var($R_{m,t}$). Beta is computed from the market model, where the CRSP value-weighted index is the market proxy as in Sosyura and Duchin (2012).	0.025	0.021	0.020
Total Bank Risk	Sum of idiosyncratic and systematic risk proxied by stock return volatility, computed as the volatility of daily returns for each calendar quarter.	0.027	0.022	0.021
S&P Credit Rating	S&P Domestic Long-Term Issuer Credit Rating averaged over the quarter; a lower rating indicates higher risk.	1.529	1.000	1.325
S&P Investment Grade	A dummy variable equal to 1 if the bank has a credit rating of BBB or higher (investment grade), and 0 otherwise.	0.146	0.000	0.353

Variable	*Definition*	*Mean*	*Median*	*Std*
Internationalization Variables				
Foreign Assets Ratio	A measure of bank internationalization determined as the ratio of foreign total assets over GTA of the bank; a larger value indicates a higher degree of internationalization and a ratio of 0 refers to purely domestic banks.	0.001	0.000	0.021
International Bank Dummy	A dummy variable which takes a value of 1 if ratio of the foreign total assets over GTA of the bank is positive and 0 otherwise.	0.015	0.000	0.120
Foreign Loans Ratio	A measure of bank internationalization determined as the ratio of foreign total loans over total loans of the bank; a larger value indicates a higher degree of internationalization.	0.002	0.000	0.025
Foreign Deposits Ratio	A measure of bank internationalization determined as the ratio of foreign total deposits over total deposits of the bank; a larger value indicates a higher degree of internationalization.	0.003	0.000	0.038
Foreign Inflows Ratio	A measure of bank internationalization determined as the ratio of foreign total inflows over GTA of the bank; a larger value indicates a higher degree of internationalization.	0.001	0.000	0.011
Foreign Outflows Ratio	A measure of bank internationalization determined as the ratio of foreign total outflows over GTA of the bank; a larger value indicates a higher degree of internationalization and banks that do not have any foreign assets will take a value of 0.	0.001	0.000	0.012
Main Bank Characteristics				
Income Diversification	A measure of diversification across different sources of income, calculated as 1- | (Net Interest Income - Other Operating Income)/Total Operating Income|. Source: Laeven and Levine (2007).	0.200	0.216	0.158
Size	The log of GTA.	11.904	11.649	1.168
Listed	A dummy variable that takes a value of 1 if the bank is listed on a stock exchange or is part of a bank holding company that is listed on a stock exchange.	0.146	0.000	0.353
BHC	A dummy variable that takes a value of 1 if the bank is owned by a bank holding company.	0.695	1.000	0.460
Overhead Costs	A proxy for the bank's cost structure calculated as the ratio of overhead expenses to GTA.	1.621	1.592	0.362
FED	A dummy variable indicating whether the bank is a state-chartered Federal Reserve member, that is, the Federal Reserve is the bank's primary federal regulator.	0.106	0.000	0.308
OCC	A dummy variable indicating whether the bank has a national bank charter, that is, the bank's primary federal regulator is the OCC.	0.309	0.000	0.462
FDIC	A dummy that takes a value of 1 for non-member banks that have the Federal Deposit Insurance Corporation (FDIC) as a primary regulator.	0.585	1.000	0.493
Other Variables				
Capitalization Ratio	The bank-level capitalization ratio, measured as Equity Capital over GTA; a lower ratio indicates higher bank distress.	0.098	0.089	0.042
ROA	Ratio of net income over bank GTA.	0.009	0.011	0.027
Merger	A dummy variable that takes a value of 1 from the moment that the entity engaged in a M&A event and 0 otherwise.	0.162	0.000	0.369

Variable	*Definition*	*Mean*	*Median*	*Std*
Other Variables				
HHI Deposits	A measure of bank concentration, measured by the Herfindahl-Hirschman Deposits Index, with higher values indicting greater market concentration.	0.097	0.080	0.088
TBTF	A dummy variable that takes a value of 1 in all quarters when the bank has GTA greater than or equal to $100 Billion.	0.009	0.000	0.092
Asset Growth	The growth rate of real bank GTA.	0.072	0.008	6.727
Loan Growth	The growth rate of bank total loans.	0.264	0.011	58.476
Fee Income	The ratio of non-interest income to total operating income.	0.101	0.084	1.619
Nondeposit Funding	The ratio of non-deposit funding to total deposits.	0.057	0.023	0.093
Catfat (Liquidity Creation)	A measure of bank liquidity risk standardized by bank GTA. Source: Berger and Bouwman (2009).	0.261	0.227	1.868
Financial Crises	A dummy variable that takes a value of 1 for a financial crisis period and 0 otherwise following Berger and Bouwman (forthcoming).	0.346	0.000	0.476
Banking Crises	A dummy variable that takes a value of 1 for a banking crisis period and 0 otherwise. A banking crisis is a crisis that originated in the banking sector following Berger and Bouwman (forthcoming).	0.223	0.000	0.416
Market Crises	A dummy variable which that a value of 1 for a market crisis period. A market crisis is a crisis that originated in the capital markets following Berger and Bouwman (forthcoming).	0.123	0.000	0.328
Normal Times	A dummy variable that takes a value of 1 for a normal time period and 0 otherwise. A normal time period is a period other than a banking or market crisis following Berger and Bouwman (forthcoming).	0.654	1.000	0.476
Time FE	Time fixed effects, represented by dummy variables for each quarter of the sample period.			
Instrumental Variables				
Minority Interest	Minority interest dummy that takes a value of 1 if a firm reports a nonzero amount for minority interest on its balance sheet.	0.014	0.000	0.118
State Exports Ratio	Measure of export activity of each state in the US, calculated as the ratio of state foreign exports to total US exports in a given year. Exports data is only available starting with 1995, so simply use the 1995 data for the prior periods.	0.032	0.016	0.039
Percent International Banks	Fraction of the other (*N-1*) international banks within the industry in a given quarter.	0.015	0.015	0.005

Table 2. Correlation Coefficients for Selected Variables

This table reports correlation coefficients for the key bank variables used in the regression analysis. Table 1 shows definitions for all variables. * indicates significance at the 1% level.

	Foreign Assets Ratio	*Z-score*	*Income Diversification*	*Size*	*Listed*	*BHC*	*Overhead Costs*	*FED*	*OCC*	*Minority Interest*	*State Exports Ratio*	*Percent International*
Foreign Assets Ratio	1											
Z-score	-0.0226*	1										
Income Diversification	0.0765*	0.0401*	1									
Size	0.2292*	0.1275*	0.1739*	1								
Listed	0.0486*	0.0625*	0.1303*	0.4234*	1							
BHC	-0.0060*	0.0770*	0.0293*	0.0559*	0.0696*	1						
Overhead Costs	0.0190*	-0.2585*	0.4312*	-0.0722*	0.0379*	-0.0811*	1					
FED	0.0365*	0.0358*	-0.0284*	0.0760*	0.0643*	0.0228*	-0.0464*	1				
OCC	0.0068*	0.0179*	0.0561*	0.1301*	0.0922*	-0.0228*	0.0859*	-0.2308*	1			
Minority	0.1394*	0.0132*	0.0333*	0.2631*	0.1137*	0.0165*	-0.0292*	0.0394*	0.0156*	1		
State Exports Ratio	0.0330*	-0.0608*	-0.1405*	0.0480*	-0.0282*	-0.2601*	0.0364*	-0.0385*	0.1148*	0.0092*	1	
Percent International	0.0266*	-0.1423*	0.5571*	-0.0775*	0.0682*	-0.0853*	0.7302*	-0.0568*	0.1145*	-0.0702*	-0.0085*	1

Table 3. Internationalization and Risk Taking: Univariate Analysis

This table reports univariate comparison tests for international banks versus purely domestic banks. We report both difference in means and difference in medians between the characteristics of international and domestic banks. Table 1 shows definitions for all variables.

	Domestic Banks			International Banks			Difference in Means International - Domestic		Difference in Medians International - Domestic	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variable	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**	**Difference**	**T-Stat**	**Difference**	**Wilcoxon M-W Stat**
Z- score (12 quarters)	690,300	36.1567	28.4108	10,376	29.2161	20.4395	-6.9406	-22.9	-7.9713	-32.6
Z- score (8 quarters)	690,300	42.6623	32.6934	10,376	35.8577	23.9503	-6.8046	-17.9	-8.7431	-29.5
Z- score (20 quarters)	690,300	29.9010	23.9328	10,376	23.4755	17.0507	-6.4255	-26.8	-6.8821	-34.5
Stdv.ROA	751,406	0.0075	0.0038	11,270	0.0091	0.0043	0.0016	10.5	0.0006	10.0
Stdv.ROE	751,406	0.0350	0.0313	11,270	0.0385	0.0349	0.0035	17.5	0.0036	14.9
Sharpe Ratio	678,290	6.9604	3.2498	10,212	6.4694	2.5289	-0.4910	0.3	-0.7208	-21.7
NPL Ratio	767,162	0.0163	0.0089	11,499	0.0268	0.0148	0.0105	44.3	0.0059	43.5
LLA Ratio	767,165	0.0216	0.0176	11,499	0.0344	0.0244	0.0128	65.4	0.0068	59.7
Income Diversification	767,163	0.1983	0.2136	11,582	0.3367	0.4240	0.1384	94.2	0.2104	101.0
Size	767,165	11.8486	11.6329	11,582	15.5607	15.7906	3.7121	370.0	4.1577	164.5
Listed	767,165	0.1403	0.0000	11,582	0.4936	0.0000	0.3533	110.0	0.0000	107.0
BHC	767,165	0.6965	1.0000	11,582	0.5856	1.0000	-0.1110	-25.7	0.0000	-25.7
Overhead Costs	767,165	1.6193	1.5897	11,582	1.7390	1.7676	0.1197	35.3	0.1779	34.3
FED	767,165	0.1052	0.0000	11,499	0.1886	0.0000	0.0834	28.8	0.0000	28.8
OCC	767,165	0.3056	0.0000	11,499	0.5247	1.0000	0.2190	50.5	1.0000	50.5

Table 4. Internationalization and Risk Taking: Regression Analysis

This table reports regression estimates of the relation between the internationalization of US commercial banks and their risk-taking behavior using *Z-score* (12 quarters) as the dependent variable. The main internationalization measure is the *Foreign Assets Ratio*. We report in the table our main model, OLS with time fixed effects and clustering by bank (main model) for the full sample (Model 1), and several subsamples/robustness models such as: a model that uses the *International Bank Dummy* (Model 2), a model which excludes too-big-to-fail (*TBTF*) banks (Model 3), a model that excludes the top 20 banks with the most intensive foreign activity each quarter (Model 4), and models by bank size with small (Model 5) being a bank with GTA < 1 Bil., medium (Model 6) being a bank with GTA between 1 and 5 Bil., and large (Model 7) being a bank with GTA over 5 Bil. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: *Z-score*						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Independent Variables:	**Full Sample**	**Full Sample**	**Exclude *TBTF***	**Exclude Top 20**	**Small Size**	**Medium Size**	**Large Size**
Foreign Assets Ratio	-68.064***		-61.465***	-90.924***	-47.035***	-49.981***	-31.945***
	(-8.725)		(-6.139)	(-7.072)	(-4.105)	(-4.704)	(-2.706)
International Bank Dummy		-19.551***					
		(-11.808)					
Income Diversification	0.957	0.923	1.327	0.910	1.782	-12.203*	-16.791*
	(0.720)	(0.695)	(0.996)	(0.683)	(1.345)	(-1.701)	(-1.652)
Size	2.496***	3.038***	3.250***	2.604***	5.447***	2.757***	1.323
	(11.514)	(13.714)	(14.254)	(11.958)	(20.255)	(2.710)	(1.476)
Listed	2.893***	2.847***	2.827***	2.821***	4.264***	2.253	6.214***
	(4.672)	(4.641)	(4.528)	(4.549)	(6.512)	(1.269)	(2.989)
BHC	1.300***	1.120***	1.125***	1.295***	0.615	4.485**	0.674
	(3.457)	(2.988)	(2.993)	(3.444)	(1.634)	(2.060)	(0.272)
Overhead Costs	-38.817***	-38.526***	-38.647***	-38.899***	-38.379***	-31.110***	-25.345***
	(-54.022)	(-53.653)	(-53.434)	(-53.984)	(-51.450)	(-12.741)	(-7.874)
FED	2.475***	2.472***	2.455***	2.530***	2.473***	-0.541	0.505
	(3.743)	(3.753)	(3.709)	(3.818)	(3.619)	(-0.226)	(0.124)
OCC	1.300***	1.380***	1.430***	1.299***	1.543***	-0.665	-8.614***
	(2.996)	(3.194)	(3.304)	(2.995)	(3.551)	(-0.329)	(-2.646)
Constant	53.255***	46.567***	44.337***	58.119***	24.793***	61.110***	40.689***
	(19.109)	(16.353)	(15.163)	(21.352)	(7.450)	(4.663)	(2.720)
Time FE	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Observations	600,055	600,055	593,939	598,340	557,607	29,295	13,153
R-squared	0.148	0.150	0.151	0.148	0.161	0.147	0.166
N-Clusters(Bank)	13,448	13,448	13,402	13,439	12,901	1,324	428

Table 5. Different Measures of Risk Taking

This table reports OLS regression estimates of the relation between the internationalization of US commercial banks and their risk-taking behavior using *Foreign Assets Ratio* as a measure of bank internationalization. We show models with alternative risk-taking measures: *Log of Z-score* (over prior 12 quarters), *Z-score* (over prior 8 quarters), *Z-score* (over prior 20 quarters), *Sharpe Ratio* (over prior 12 quarters), *Stdv.ROA, Stdv.ROE, NPL Ratio,* and *LLA Ratio*. We use an OLS model with time fixed effects and clustering by bank. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: Different Measures of Risk							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Independent Variables:	***Log of Z-score*** **(over 12 quarters)**	***Z-score*** **(over 8 quarters)**	***Z-score*** **(over 20 quarters)**	***Sharpe Ratio*** **(12 quarters)**	***Stdv.ROA*** **(over 12 quarters)**	***Stdv.ROE*** **(over 12 quarters)**	***NPL Ratio*** **(Nonperforming Loans)**	***LLA Ratio*** **(Loan Loss Allowance)**
Foreign Assets Ratio	-1.999***	-78.231***	-59.208***	-29.948***	0.009**	0.035***	0.055**	0.061***
	(-6.544)	(-8.224)	(-8.759)	(-3.706)	(2.475)	(6.420)	(2.135)	(2.865)
Income Diversification	0.197***	-0.617	3.357***	2.543	0.000	0.001	-0.003**	-0.000
	(5.029)	(-0.423)	(2.625)	(0.812)	(0.575)	(0.778)	(-2.503)	(-0.357)
Size	0.024***	3.282***	1.894***	1.507**	0.000**	-0.001***	0.001***	0.000***
	(4.278)	(13.780)	(9.136)	(2.417)	(2.309)	(-9.392)	(6.056)	(2.639)
Listed	0.076***	5.055***	0.496	2.636*	-0.000	-0.002***	-0.004***	0.001***
	(4.626)	(7.533)	(0.819)	(1.727)	(-1.378)	(-7.547)	(-13.455)	(2.696)
BHC	0.060***	1.783***	0.664*	-0.631	-0.001***	-0.001***	-0.001***	-0.002***
	(5.751)	(4.339)	(1.869)	(-0.575)	(-8.397)	(-3.369)	(-5.024)	(-6.690)
Overhead Costs	-1.334***	-44.649***	-32.296***	-5.240***	0.010***	0.020***	0.016***	0.006***
	(-63.319)	(-56.272)	(-47.134)	(-4.574)	(18.781)	(44.892)	(25.312)	(7.661)
FED	0.063***	2.573***	2.461***	-1.654***	-0.000***	-0.001***	-0.001***	-0.001**
	(3.692)	(3.594)	(3.881)	(-2.857)	(-2.903)	(-4.070)	(-3.385)	(-2.005)
OCC	0.021*	1.208**	1.396***	-0.293	0.000	-0.001**	0.000*	0.001***
	(1.797)	(2.531)	(3.419)	(-0.334)	(0.510)	(-2.219)	(1.955)	(4.328)
Constant	4.391***	49.990***	40.611***	-3.071	-0.005***	0.017***	0.004*	0.009***
	(58.182)	(16.309)	(15.686)	(-0.394)	(-2.962)	(10.864)	(1.954)	(4.618)
Time FE	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Observations	599,746	656,175	498,015	591,760	600,055	600,055	762,671	762,674
R-squared	0.185	0.138	0.144	0.000	0.036	0.125	0.115	0.063
N-Clusters	13,423	14,389	11,868	13,365	13,448	13,448	15,750	15,750

Table 6. Different Measures of Bank Internationalization

This table reports OLS regression estimates of the relation between the internationalization of US commercial banks and their risk-taking behavior using *Z-score (12 quarters)* as the dependent variable. We show models with five alternative internationalization measures: *Foreign Assets Ratio, Foreign Loans Ratio, Foreign Deposits Ratio, Foreign Inflows Ratio* and *Foreign Outflows Ratio.* We use an OLS model with time fixed effects and clustering by bank. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: *Z-score*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Independent Variables:	***Foreign Assets Ratio***	***Foreign Loans Ratio***	***Foreign Deposits Ratio***	***Foreign Inflows Ratio***	***Foreign Outflows Ratio***
Internationalization Ratio	-68.064***	-50.636***	-43.267***	-55.998***	-69.301***
	(-8.725)	(-9.045)	(-8.281)	(-6.075)	(-4.433)
Income Diversification	0.957	0.883	1.220	0.804	0.989
	(0.720)	(0.665)	(0.918)	(0.604)	(0.743)
Size	2.496***	2.375***	2.571***	2.174***	2.251***
	(11.514)	(10.996)	(11.762)	(9.904)	(10.194)
Listed	2.893***	3.019***	2.855***	3.166***	3.131***
	(4.672)	(4.867)	(4.613)	(5.086)	(5.046)
BHC	1.300***	1.296***	1.241***	1.320***	1.283***
	(3.457)	(3.448)	(3.304)	(3.506)	(3.411)
Overhead Costs	-38.817***	-38.732***	-38.746***	-38.815***	-38.788***
	(-54.022)	(-53.890)	(-54.025)	(-53.940)	(-53.921)
FED	2.475***	2.482***	2.469***	2.389***	2.392***
	(3.743)	(3.748)	(3.733)	(3.583)	(3.589)
OCC	1.300***	1.370***	1.263***	1.392***	1.348***
	(2.996)	(3.155)	(2.912)	(3.197)	(3.098)
Constant	53.255***	54.567***	52.318***	57.071***	56.159***
	(19.109)	(19.646)	(18.621)	(20.276)	(19.794)
Time FE	**YES**	**YES**	**YES**	**YES**	**YES**
Observations	600,055	600,055	600,055	600,055	600,055
R-squared	0.148	0.147	0.148	0.146	0.146
N. Clusters	13,448	13,448	13,448	13,448	13,448

Table 7. Alternative Econometric Specifications

This table reports regression estimates of the relation between the internationalization of US commercial banks and their risk-taking behavior using models with alternative econometric specifications. We report results for an OLS model with time fixed effects and clustering by bank (Model 1), a fixed effects model with both time and bank fixed effects (Model 2), a random effects model with bank random effects and time fixed effects (Model 3), We also report a model with Newey-West standard errors correction and 2 lags (Model 4), a model with Prais-Winsten standard errors (Model 5), a model with Fama-MacBeth standard errors (Model 6), and a model with two-way clustering by bank and time (Model 7). Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: *Z-score*						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Independent Variables:	**OLS w/ Time FE & Bank Clusters**	**Model Time & Bank FE**	**Model Time & Bank RE**	**Newey-West w/Lags**	**Prais-Winsten**	**Fama MacBeth**	**Two-way Clustering By Bank & Time**
Foreign Assets Ratio	-68.064***	-11.360***	-17.942**	-61.317***	-31.286***	-66.712***	-61.317***
	(-8.725)	(-3.155)	(-2.465)	(-25.476)	(-5.818)	(-16.430)	(-7.015)
Income Diversification	0.957	-13.190***	-12.193***	15.963***	-5.907***	2.082	15.963***
	(0.720)	(-36.478)	(-13.171)	(42.188)	(-26.760)	(1.588)	(9.819)
Size	2.496***	0.391***	1.032***	1.531***	2.609***	2.748***	1.531***
	(11.514)	(3.631)	(4.019)	(22.949)	(28.974)	(11.020)	(4.015)
Listed	2.893***	1.615***	2.129***	4.212***	2.985***	2.070***	4.212***
	(4.672)	(6.821)	(2.796)	(18.769)	(10.157)	(5.562)	(5.759)
BHC	1.300***	-0.172	0.115	0.629***	0.756***	1.239***	0.629
	(3.457)	(-1.522)	(0.322)	(5.199)	(5.373)	(7.266)	(1.434)
Overhead Costs	-38.817***	-17.118***	-18.930***	-28.725***	-4.763***	-38.502***	-28.725***
	(-54.022)	(-89.214)	(-41.026)	(-168.170)	(-36.639)	(-59.272)	(-26.439)
FED	2.475***	1.297***	1.389*	2.691***	1.885***	2.479***	2.691***
	(3.743)	(4.584)	(1.765)	(13.065)	(7.196)	(18.656)	(3.950)
OCC	1.300***	0.796***	0.804	2.083***	0.554***	1.457***	2.083***
	(2.996)	(2.755)	(1.355)	(16.168)	(3.290)	(9.583)	(4.061)
Constant	53.255***	50.947***	42.312***	62.457***	15.067***	66.084***	62.457***
	(19.109)	(35.925)	(13.079)	(75.380)	(13.716)	(27.934)	(17.232)
Time FE	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**	**NO**
Bank FE	**NO**	**YES**	**YES**	**NO**	**NO**	**NO**	**NO**
Observations	600,055	600,055	600,055	600,055	600,055	600,055	600,055
R-squared	0.148	0.498	0.102		0.162	0.105	0.102
N-Clusters(Bank)	13,448		13,448				13,447

Table 8. Endogeneity

Panel A: Potential Omitted Correlated Variables

This table reports OLS regression estimates of the relation between the internationalization of US commercial banks and their risk-taking behavior using *Foreign Assets Ratio* as a measure of bank internationalization. We show several models with additional possible omitted variables that could influence the risk-taking behavior of banks: *Merger*, *HHI Deposits*, *HHI Deposits_Sq*, *TBTF*, *Assets Growth*, *Loan Growth*, *Fee Income*, *Nondeposit Funding*, and *Liquidity (Catfat)*. We use an OLS model with time fixed effects and clustering by bank. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: *Z-score*									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Independent Variables:	***Main***	***Merger***	***HHI Deposits***	***HHI Deposits_Sq***	***TBTF***	***Assets Growth***	***Loan Growth***	***Fee Income***	***Nondeposit Funding***	***Liquidity (Catfat)***
Foreign Assets Ratio	-68.064***	-68.452***	-69.404***	-69.363***	-51.460***	-51.361***	-51.364***	-51.363***	-47.472***	-46.968***
	(-8.725)	(-8.745)	(-8.707)	(-8.703)	(-7.070)	(-7.056)	(-7.057)	(-7.056)	(-6.949)	(-6.796)
Income Diversification	0.957	0.946	0.371	0.407	0.520	0.517	0.515	0.517	3.744***	3.752***
	(0.720)	(0.711)	(0.278)	(0.303)	(0.388)	(0.386)	(0.384)	(0.386)	(2.789)	(2.795)
Size	2.496***	2.538***	2.668***	2.660***	3.308***	3.309***	3.309***	3.309***	3.983***	3.991***
	(11.514)	(11.231)	(11.761)	(11.613)	(14.071)	(14.073)	(14.073)	(14.074)	(16.384)	(16.308)
Listed	2.893***	2.912***	2.970***	2.967***	2.875***	2.875***	2.875***	2.875***	3.390***	3.387***
	(4.672)	(4.705)	(4.789)	(4.781)	(4.653)	(4.653)	(4.653)	(4.653)	(5.545)	(5.539)
BHC	1.300***	1.320***	1.157***	1.162***	1.026***	1.027***	1.027***	1.026***	1.049***	1.045***
	(3.457)	(3.514)	(3.068)	(3.080)	(2.729)	(2.731)	(2.731)	(2.730)	(2.807)	(2.796)
Overhead Costs	-38.817***	-38.810***	-38.708***	-38.728***	-38.362***	-38.363***	-38.362***	-38.361***	-37.148***	-37.129***
	(-54.022)	(-54.068)	(-53.640)	(-53.316)	(-52.937)	(-52.938)	(-52.937)	(-52.935)	(-51.860)	(-51.785)
FED	2.475***	2.473***	2.439***	2.439***	2.534***	2.533***	2.533***	2.533***	2.696***	2.690***
	(3.743)	(3.742)	(3.688)	(3.688)	(3.846)	(3.846)	(3.846)	(3.846)	(4.116)	(4.108)
OCC	1.300***	1.301***	1.319***	1.323***	1.355***	1.355***	1.355***	1.355***	1.408***	1.410***
	(2.996)	(2.999)	(3.038)	(3.048)	(3.132)	(3.133)	(3.134)	(3.134)	(3.274)	(3.279)
Merger		-0.485	-0.584	-0.581	-0.905*	-0.905*	-0.905*	-0.905*	-1.147**	-1.152**
		(-0.929)	(-1.119)	(-1.113)	(-1.745)	(-1.745)	(-1.745)	(-1.745)	(-2.221)	(-2.228)
HHI Deposits			-6.918***	-6.148*	-8.049**	-8.049**	-8.049**	-8.047**	-8.133**	-8.177**
			(-3.532)	(-1.716)	(-2.257)	(-2.257)	(-2.257)	(-2.256)	(-2.286)	(-2.298)
HHI Deposits_Sq				-1.788	1.499	1.498	1.498	1.495	2.492	2.594
				(-0.319)	(0.268)	(0.268)	(0.268)	(0.268)	(0.444)	(0.462)
TBTF					-20.646***	-20.631***	-20.630***	-20.630***	-19.639***	-19.215***

					(-9.455)	(-9.448)	(-9.448)	(-9.448)	(-8.903)	(-8.214)
Assets Growth						-0.007**	-0.006*	-0.006*	-0.006**	-0.006**
						(-2.073)	(-1.853)	(-1.853)	(-1.972)	(-1.979)
Loan Growth							-0.001***	-0.001***	-0.001***	-0.001***
							(-2.624)	(-2.624)	(-2.971)	(-2.966)
Fee Income								-0.010	-0.009	-0.009
								(-0.305)	(-0.321)	(-0.320)
Nondeposit Funding									-26.105***	-26.089***
									(-13.705)	(-13.693)
Liquidity (Catfat)										-0.000
										(-0.683)
Constant	53.255***	58.861***	59.969***	60.045***	52.314***	52.303***	52.302***	52.300***	44.627***	44.520***
	(19.109)	(21.221)	(21.572)	(21.505)	(18.302)	(18.297)	(18.296)	(18.295)	(15.327)	(15.180)
Time FE	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Observations	600,055	600,048	598,948	598,948	598,948	598,947	598,947	598,947	598,947	598,947
R-squared	0.148	0.148	0.148	0.148	0.151	0.151	0.151	0.151	0.155	0.155
Number of Clusters	13,448	13,448	13,401	13,401	13,401	13,401	13,401	13,401	13,401	13,401

Panel B: IV Model

Panel B represents the results of instrumental variables (IV) estimation that controls for the endogeneity of bank internationalization. We employ three IVs: (1) a bank-level IV, *Minority Interest* (the binary indicator of minority interest payment); (2) a geographic IV, *State Exports Ratio* (the ratio of foreign exports of the state in which a bank is headquartered to US total exports in a given year), where data on state exports are available only from 1995 to 2010, so we simply use the 1995 data for the prior periods; and (3) an industry-level IV, *Percent International Banks* (the fraction of the other (*N-1*) international banks within the banking industry in a given quarter). The row labeled "*F*-statistic" reports the *F*-statistic of the test on whether the three IVs are jointly significant in the first-stage regression. We report IV 2SLS, IV GMM and IV LIML results. All models include time fixed effects. We also report the OLS main results to facilitate comparison. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: *Z-score*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Independent Variables:	**OLS**	**IV 2SLS First Stage**	**IV 2SLS Second Stage**	**IV GMM Second Stage**	**IV LIML Second Stage**
Foreign Assets Ratio	-68.064***		-465.192***	-767.659***	-536.275***
	(-8.725)		(-16.777)	(-29.266)	(-14.930)
Minority Interest		0.018***			
		(17.504)			
State Exports Ratio		0.015***			
		(22.530)			
Percent International Banks		0.662***			
		(18.010)			
Income Diversification	0.957	0.003***	2.348***	2.882***	2.597***
	(0.720)	(12.084)	(6.565)	(8.084)	(6.947)
Size	2.496***	0.005***	4.753***	6.344***	5.157***
	(11.514)	(45.602)	(31.899)	(44.904)	(27.285)
Listed	2.893***	-0.004***	0.970***	-0.567***	0.626***
	(4.672)	(-29.368)	(4.726)	(-2.834)	(2.688)
BHC	1.300***	-0.000***	0.994***	0.824***	0.940***
	(3.457)	(-4.148)	(11.412)	(9.479)	(10.419)
Overhead Costs	-38.817***	0.001***	-38.455***	-39.107***	-38.388***
	(-54.022)	(2.806)	(-207.097)	(-212.193)	(-200.425)
FED	2.475***	0.002***	3.058***	3.446***	3.163***
	(3.743)	(12.040)	(20.363)	(23.012)	(20.122)
OCC	1.300***	-0.001***	0.784***	0.131	0.692***
	(2.996)	(-21.932)	(8.270)	(1.411)	(6.908)
Constant	53.255***	-0.062***	26.036***	8.283***	21.168***
	(19.109)	(-43.899)	(14.238)	(4.731)	(9.224)
Time FE	**YES**	**YES**	**YES**	**YES**	**YES**
Observations	600,055	599,773	599,773	599,773	599,773
R-squared	0.148	0.073	0.069	0.068	0.039
F-Statistic		2076.499***			

Panel C: Propensity Score Matching

Panel C reports the difference in *Z-score*, our main measure of risk, between the global and domestic US banks, estimated by propensity score matching (PSM) with four different matching methods. The propensity scores are computed from a probit model using the same variables as in our main effects model and the instrumental variables *Minority Interest, State Exports Ratio,* and *Percent International Banks*. The *t*-statistics are reported in parentheses. Panel B also shows regression estimates of the relation between the internationalization of US commercial banks and their risk-taking behavior using the matched samples obtained via the four propensity score methods: 1-1 matching without replacement (Model 1), 1-1 matching with replacement (Model 2), nearest neighbor (n=2) (Model 3), and nearest neighbor (n=3) (Model 4). Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable: *Z-score*				
Propensity Score Matching Estimation	**Treated (International)**	**Controls**	**Difference**	**T-stat**
1-1 Matching without replacement	29.31	36.06	-6.75	-13.41
1-1 Matching with replacement	29.31	36.30	-6.99	-2.90
Nearest neighbor (n=2)	29.31	36.13	-6.82	-3.80
Nearest neighbor (n=3)	34.44	36.02	-6.71	-4.35

Dependent Variable: *Z-score*				
	(1)	**(2)**	**(3)**	**(4)**
Independent Variables:	**PSM: 1:1 Matching without replacement**	**PSM: 1:1 Matching with replacement**	**PSM: Nearest neighbor (n=2)**	**PSM: Nearest neighbor (n=3)**
Foreign Assets Ratio	-24.602***	-23.621***	-26.679***	-28.435***
	(-3.496)	(-3.481)	(-3.871)	(-4.093)
Income Diversification	-13.608*	-9.898	-9.885	-11.688*
	(-1.843)	(-1.476)	(-1.610)	(-1.880)
Size	-0.646	-0.647	-1.020**	-0.977**
	(-1.286)	(-1.282)	(-2.219)	(-2.149)
Listed	6.090***	5.591***	5.043***	4.475***
	(3.482)	(3.260)	(3.311)	(3.103)
BHC	1.305	0.480	2.097	2.213
	(0.745)	(0.271)	(1.357)	(1.532)
Overhead Costs	-28.663***	-29.192***	-30.390***	-31.452***
	(-11.270)	(-10.427)	(-12.434)	(-14.154)
FED	1.375	-0.155	1.299	1.844
	(0.435)	(-0.048)	(0.467)	(0.723)
OCC	-6.724***	-5.924***	-4.551**	-4.103**
	(-3.051)	(-2.650)	(-2.455)	(-2.368)
Constant	79.121***	79.365***	85.389***	86.892***
	(9.492)	(9.719)	(11.929)	(12.934)
Time FE	**YES**	**YES**	**YES**	**YES**
Observations	17,606	14,418	18,733	22,366
R-squared	0.158	0.153	0.153	0.150
N-Clusters(Bank)	2,102	2,078	2,916	3,511

Panel D: Heckman Selection Model

Panel D reports the results of Heckman's two-step treatment effect model used to correct the self-selection in internationalization. The selection (internationalization) equation uses *International Bank Dummy* as the dependent variable; the variable takes the value of 1 if the bank has foreign assets in any given quarter. We employ three IVs: (1) a bank-level IV, *Minority Interest* (the binary indicator of minority interest payment); (2) a geographic IV, *State Exports Ratio* (the ratio of foreign exports of the state in which a bank is headquartered to US total exports in a given year), where data on state exports are available only from 1995 to 2010, so we simply use the 1995 data for the prior periods; and (3) an industry-level IV, *Percent International Banks* (the fraction of the other (*N-1*) international banks within the banking industry in a given quarter). The outcome equation uses *Z-score* as the dependent variable. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	**(2)**
	Selection Equation	**Outcome Equation**
Independent Variables:	***International Bank Dummy***	***Z-score***
International Bank Dummy		-25.901***
		(-54.194)
Minority Interest	0.064**	
	(2.243)	
State Exports Ratio	4.770***	
	(30.660)	
Percent International Banks	67.393*	
	(1.756)	
Income Diversification	1.234***	1.019***
	(21.033)	(3.177)
Size	0.642***	3.336***
	(135.787)	(68.132)
Listed	-0.390***	2.731***
	(-23.953)	(18.405)
BHC	-0.214***	1.048***
	(-16.030)	(13.037)
Overhead Costs	0.211***	-38.420***
	(8.394)	(-228.753)
FED	0.099***	2.507***
	(4.957)	(18.596)
OCC	-0.009	1.381***
	(-0.628)	(16.272)
Constant	-12.469***	42.919***
	(-33.090)	(60.253)
Inverse Mills Ratio		5.274***
		(19.696)
Time FE	**YES**	**YES**
Observations	599,773	599,773
R-squared	0.5167	0.151

Table 9. Z-score Decomposition

This table reports OLS regression estimates of the relation between the internationalization of US commercial banks and the components of *Z-score*, our main risk taking behavior measure, as dependent variables: *ROA*, *Capitalization Ratio*, and *Stdv.ROA*. We use *Foreign Assets Ratio* as a measure of bank internationalization. We use an OLS model with time fixed effects and clustering by bank. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: *Z-score* & Components			
	(1)	**(2)**	**(3)**	**(4)**
Independent Variables:	***Z-score***	***ROA***	***Capitalization Ratio***	***Stdv. ROA***
Foreign Assets Ratio	-68.064***	-0.018***	0.050**	0.009**
	(-8.725)	(-6.152)	(2.016)	(2.475)
Income Diversification	0.957	0.011***	0.002	0.000
	(0.720)	(14.418)	(0.703)	(0.575)
Size	2.496***	0.000*	-0.004***	0.000**
	(11.514)	(1.743)	(-11.474)	(2.309)
Listed	2.893***	0.000	-0.003***	-0.000
	(4.672)	(0.551)	(-3.660)	(-1.378)
BHC	1.300***	0.000	-0.011***	-0.001***
	(3.457)	(0.323)	(-17.886)	(-8.397)
Overhead Costs	-38.817***	-0.006***	-0.030***	0.010***
	(-54.022)	(-11.590)	(-13.605)	(18.781)
FED	2.475***	-0.001***	-0.002***	-0.000***
	(3.743)	(-4.208)	(-2.606)	(-2.903)
OCC	1.300***	0.000	-0.001**	0.000
	(2.996)	(0.330)	(-2.080)	(0.510)
Constant	53.255***	0.010***	0.208***	-0.005***
	(19.109)	(7.150)	(37.888)	(-2.962)
Time FE	**YES**	**YES**	**YES**	**NO**
Observations	600,055	600,055	600,055	600,055
R-squared	0.148	0.101	0.136	0.036
N-Clusters(Bank)	13,448	13,448	13,448	13,448

Table 10. Accounting and Market Risk Measures for Listed Banks

This table reports results of models using several measures of market risk: *Z-score*, *Idiosyncratic Risk*, *Total Bank Risk*, *S&P Credit Rating*, and *S&P Investment Grade*, where it reports OLS regression estimates of the relation between the internationalization of US listed commercial banks and their risk-taking behavior for the first three measures of risk, and ordered logit and logit estimates for the last two risk measures. We use *Foreign Assets Ratio* as a measure of bank internationalization. All models include time fixed effects. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: Risk				
	(1)	**(1)**	**(2)**	**(3)**	**(4)**
Independent Variables:	***Z-score***	***Idiosyncratic Risk***	***Total Bank Risk (Idiosyncratic + Systematic)***	***S&P Credit Rating***	***S&P Investment Grade***
Foreign Assets Ratio	-60.236***	0.016***	0.015***	-1.392***	-6.222***
	(-4.534)	(4.129)	(3.614)	(-2.851)	(-12.125)
Income Diversification	14.606**	-0.004	-0.004	2.583***	1.550***
	(1.983)	(-1.095)	(-1.096)	(10.427)	(5.418)
Size	-0.659	-0.003***	-0.003***	1.513***	1.900***
	(-0.907)	(-8.776)	(-6.597)	(66.624)	(56.538)
BHC	-0.600	-0.004	-0.004*	-0.016	0.432***
	(-0.176)	(-1.614)	(-1.745)	(-0.161)	(2.958)
Overhead Costs	-46.186***	0.012***	0.012***	0.523***	1.523***
	(-12.036)	(6.319)	(6.480)	(4.539)	(9.692)
FED	5.632**	-0.001	-0.001*	0.546***	0.466***
	(2.072)	(-1.235)	(-1.686)	(10.829)	(7.315)
OCC	8.195***	-0.002***	-0.003***	0.457***	0.534***
	(3.149)	(-3.187)	(-3.513)	(9.222)	(8.887)
Constant	137.480***	0.051***	0.040***		-34.738***
	(10.593)	(11.499)	(8.937)		(-54.267)
Time FE	**YES**	**YES**	**YES**	**YES**	**YES**
Observations	29,953	29,847	29,847	29,953	28,917
R-squared/Pseudo-R	0.155	0.308	0.319	0.449	0.612
N-Clusters(Bank)	941	941	941		

Table 11. Internationalization and Bank Risk Taking during Financial Crises

This table reports OLS regression estimates of the relation between the internationalization of US commercial banks and their risk-taking behavior during crises versus normal times. The construction of normal times and financial crisis periods follows Berger and Bouwman (forthcoming). We use an OLS model with time fixed effects and clustering by bank. We use *Foreign Assets Ratio* as a measure of bank internationalization. All independent variables are observed 12 quarters prior. Table 1 shows definitions for all variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: *Z-score*			
	(1)	**(2)**	**(3)**	**(4)**
Independent Variables:	***Normal Times***	***Financial Crises***	***Banking Crises* Only**	***Market Crises* Only**
Foreign Assets Ratio	-65.928***	-70.972***	-53.862***	-103.895***
	(-7.700)	(-9.627)	(-7.828)	(-7.788)
Income Diversification	1.272	0.475	5.110***	-8.075***
	(0.916)	(0.320)	(3.355)	(-3.192)
Size	2.841***	1.959***	0.607***	4.809***
	(12.420)	(8.516)	(2.716)	(11.597)
Listed	2.985***	2.683***	4.219***	-1.412
	(4.512)	(3.925)	(5.858)	(-1.108)
BHC	1.563***	0.877**	0.654	1.639**
	(3.986)	(2.134)	(1.576)	(2.311)
Overhead Costs	-38.281***	-39.647***	-35.984***	-45.233***
	(-52.521)	(-48.199)	(-43.258)	(-34.602)
FED	2.493***	2.444***	1.717**	3.686***
	(3.610)	(3.459)	(2.398)	(3.209)
OCC	1.057**	1.688***	1.703***	1.719**
	(2.348)	(3.646)	(3.701)	(2.249)
Constant	48.102***	88.350***	80.809***	56.792***
	(16.379)	(29.992)	(28.498)	(11.329)
Time FE	**YES**	**YES**	**YES**	**YES**
Observations	369,778	230,277	153,764	76,513
R-squared	0.151	0.141	0.113	0.118
N-Clusters(Bank)	13,275	12,510	11,723	7,771