International Evidence on Bank Funding Profiles and Performance:

Are Banks "Overbanked"?

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ABSTRACT

We investigate the implications of bank funding and lending strategies for bank performances using a large cross-country data set of individual bank outcomes. We find that increases in a bank's reliance on deposits has adverse implications for its performance, as measured by return on assets. We also find evidence of spillovers from national banking system characteristics, as banks benefit from greater funding stability in their national banking systems. This finding is particularly strong in our domestic bank sub-sample, with foreign banks exhibiting the opposite result. However, the performance of bank system stability measures varies over time, as well as across bank types, and thus presents challenges in determining which measures of national banking characteristics are superior indicators of future bank performance.

Keywords: banks, deposits, securities, liquidity, net-stable-funding-ratio

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1. Introduction

It has long been argued that some economies, particularly in the Asian region, are "overbanked," in the sense that banks account for an abnormally high share of intermediation, while other forms, such as local currency bond markets, are underdeveloped [e.g. Eichengreen and Luengnaruemitchai (2006)]. Some even argue that the underdevelopment of these markets exacerbated the severity of the 1997 Asian financial crisis [e.g. Park and Park (2003)]. Indeed, conditionality requirements for International Monetary Fund support for some countries during that crisis explicitly called for the development of local currency bond markets [e.g. Batten and Hoontrakul 2008].

The notion of overbanking probably goes back to the account of Davis and Gallman (1978) of development difficulties experienced by such diverse countries as Argentina, Australia, the United Kingdom, and Canada at the turn of the twentieth century. They argue that these nations were "overbanked" at the time, as alternative financial markets, such as equity and bond markets were left relatively undeveloped. This structure disrupted their investment capacity, as their almost-exclusive reliance on bank finance suffered from excessive maturity mismatch between funding through short-term deposits and investment in long-term projects [Neal (2009)]. The United States, in contrast to these other countries, was able to weather its shocks during this period more easily because its securities market was more developed.

This debate is also related to the well-known "spare tire" argument of former Chairman Alan Greenspan that the development of securities markets was desirable because it would allow a channel for intermediation to continue to function during episodes of disruption to the

banking sector [Greenspan (1999)]. Bond finance can serve as an alternative to bank finance, particularly in providing long-term credit to smaller firms during normal conditions [e.g. Beck, et al (2009)]. However, its adequacy as a substitute is limited. It has long been recognized that the development of successful banking sectors and bond markets tend to be complements, rather than substitutes [e.g. Spiegel (2012)]. Moreover, while there is some evidence that bond markets provided substitute funding during a crisis, as in Korea during the Asian financial crisis, it was primarily larger firms that were able to access these markets when bank lending dried up [Gormley, et al (2006)]. For smaller borrowers, it is usually the case that when a country's banking system is disrupted its securities market ceases to function as well [e.g. Eichengreen (2007), He (2012)].

If overbanking is a phenomenon that hinders the efficiency of the financial system, the literature would suggest that it should have implications for economic performances. There is a large literature that suggests a positive relationship between financial development and growth [e.g. King and Levine (1993) and Benhaibib and Spiegel (2000)]. There is also a more recent literature that stresses the adverse effect on macroeconomic performances from the illiquidity that follows bank failures [Hart and Zingales (2014)].

In this paper, in contrast to the concept of overbanking at the national level associated with Davis and Gallman (1978), we consider the question of "overbanking" at the individual bank level. If it is possible that overbanking can be detrimental at the banking system level, perhaps there is a point beyond which individual banks rely too heavily on deposit funding, and would benefit from greater reliance on longer-term funding, such as through securities

issuance, that would result in reduced maturity mismatch between their funding and lending activities.[1]

This argument is not in keeping with current regulatory stances, in the sense that deposits are generally considered to be good stable funding sources that are unlikely to run due to deposit insurance. However, such stable sources are likely to be as difficult to increase as they are safe from declines. It may be very costly to raise funds through deposits -- particularly for a bank that specializes in deposit funding – because interest rates will have to be raised on old and new deposits alike. While banks that do rely more heavily on bond finance will obviously be more exposed to shocks originating in that market [e.g. Hale and Santos (2010)], the net impact on risk ex-ante from this increased exposure, which results in lesser exposure to the domestic deposit market, appears to be unclear.

Because of that, a need to raise funds quickly may often correspond to a need to raise funds in securities markets. If that is the case, then banks may benefit from having a presence in securities markets, much as countries benefit from having more developed local securities markets. Banks with greater reliance on securities markets are likely to have established underwriters and clients, and thereby may face superior borrowing opportunities. For example, Lopez and Spiegel (2014) find that unseasoned borrowers paid higher underwriter fees in euro-yen market issues.

We also investigate whether similar arguments hold on aggregate at the level of national banking systems. During the recent global financial crisis, banks worldwide

[1] It would desirable to expand our analysis with more detailed bond financial by individual banks, but Bankscope, our primary data source, does not provide sufficient level of detail to do so. As such, our analysis is in terms of the impact of the share of deposits in the funding portfolio.

encountered difficulties in funding, particularly in raising assets from abroad; see Acharya et al. (2013). The increased difficulty in raising assets from abroad during turbulent times highlights the importance for financial institutions to enjoy stable domestic funding conditions and the potential for spillovers in local funding conditions from balance sheet practices pursued by other banks. Paraphrasing the famous movie quote, as all banks in a national system rely to some extent on local liquid funding, increased draining of liquid assets by one bank in a national system "drinks the milkshake" of available liquid assets for other banks.[2] In such an environment, one would think that reliance on stable funding sources, most notably standard deposits, would be a welcome development. We therefore condition on individual bank and systemwide liquidity funding profiles when assessing the implications of increased reliance on deposit funding.

The bulk of the recent literature concerning systemic issues has stressed concerns about the characteristics of the asset side of bank balance sheets in financial systems. Several papers have constructed metrics to measure the contributions of individual bank assets to financial system vulnerability, such as the "CoVaR" measure proposed by Adrian and Brunnemeier (2011). These metrics stress the degree to which returns on assets in an individual bank are correlated with those of the financial system as a whole, which speaks to the capacity of the financial system's ability to weather financial shocks.

[2] "There Will Be Blood," by Paul Thomas Anderson (2007). A notable exception is a foreign bank subsidiary. If a foreign subsidiary can rely on its parent for funding during difficult times, it may not lead to as prevalent spillovers as a domestic bank. Still, the experience in the recent crisis was that the net liquidity benefits of foreign banks in the wake of a global shock are unclear; see for example, Cetorelli and Goldberg (2012) and de Haas and Lelyveld (2014).

Attention has also been paid to the liability side, and these studies stress the characteristics of individual bank liability structures.[3] For example, Vazquez and Federico (2012) examine the implications of bank funding strategies on firm default probabilities in a global micro data set. Their results support the contention that stable funding at the bank level influences the ability of banks to survive systemic shocks.

We examine the implications of individual bank funding liquidity profiles as well as the overall funding liquidity profiles of national financial systems. For our base year of 2007, our full data set includes around 16,000 individual bank observations. We compare individual bank outcomes, as measured by return on assets (ROA), to simple measures of funding liquidity based on bank assets and liabilities. We measure the reliance of banks on deposits through the ratio of retail deposits to assets, and we measure the stability of a bank's asset portfolio by the share of cash in a bank's liquid assets.

We also use formal measures of bank funding liquidity for which data is readily available. Based on the definition of the Basel Committee on Banking Supervision (2010), we examine bank net-stable-funding ratios (NSFRs), an official metric for bank balance sheet liquidity risk. This ratio measures the overall relationship between the reliance of banks on short-term and unstable funding sources and the duration of a bank's asset portfolio as indicators of potential vulnerability [e.g. Hahm et al (2012)]. However, we are interested in not only examining the composition of an individual bank's assets and liabilities, but also its sensitivity to the activity of its national banking system. To evaluate the national characteristics

[3] Hanson, et al (2011) note the dangers associated with short-term liabilities, particularly wholesale funding which is subject to refusals by creditors to roll over debt. They argue that such runs were central to a number of prominent failures during the global financial crisis, including Northern Rock, Bear Stearns, and Lehman Brothers.

of bank balance sheet positions, we construct national counterparts to the individual bank balance sheet characteristic measures discussed above.

These national metrics create econometric challenges for our analysis, as the use of identical measures of country characteristics would prohibit conditioning for country fixed effects. We address this problem in two ways. First, we create bank-specific measures of their national financial system conditions by measuring the characteristics of the rest of the national banking system, i.e. with the bank in question removed from the national figures. This creates some variability at the bank level within nations, allowing for the inclusion of country fixed effects. Second, we examine the robustness of our results to the substitution of national characteristics that have been shown to influence national economic outcomes during the recent global financial crisis for country fixed effects. We use the set of national indicators identified in Rose and Spiegel (2011) as having been shown in the literature as being successful indicators of relative national outcomes. This examination of the importance of bank characteristics at the national level for individual bank performances is novel to this paper and distinguishes from earlier empirical work [e.g. Vazquez and Federico (2012)].[4]

Our base results for 2007 suggest that an increase in a bank's share of deposit funding is negatively associated with its returns on assets (ROA).[5] This suggests that banks are less profitable the more they rely on standard bank funding sources. We also find that bank profits

[4] In addition to our examination of the role of system balance sheet characteristics, our work differs from that of Vazquez and Federico (2012) in our dependent variable. Vazquez and Federico use a qualitative dependent variable identifying either actual failures or extremely large losses. We concentrate on the simple ROA measure in a continuous specification because regulatory standards differ widely across countries and similar performance may or may not trigger regulatory responses in a large cross section depending on a bank's regulatory jurisdiction.

[5] We did not look at actual bank failure outcomes because closure policies among bank regulators vary widely across countries.

are decreasing in the reliance of the rest of their national banking system on deposits, suggesting adverse spillovers from excess reliance on deposit funding in national systems. In contrast, we obtain insignificant coefficient estimates on the share of cash in a bank's asset portfolio, as well as for the share of cash in the asset portfolio of the rest of the national banking system, although these consistently enter positively, and sometimes significantly in sub-samples examined under our robustness exercises.

Finally, because banks do worse when they pursue more deposit-oriented funding practices and better when they hold a more liquid asset portfolio (after conditioning for national banking system characteristics), it is unsurprising that we obtain insignificant coefficient estimates for a bank's NSFR score. This measure, as discussed below, is based on the relationship between funding stability and asset liquidity. However, we obtain positive and statistically significant point estimates for the NSFR measure of the rest of the national banking system. These results support the conjecture of positive spillovers at the system level of sound funding practices.

We subject these results to a battery of robustness checks. First, we follow Claessens and Van Horen (2014) in estimating a smaller sample including only countries with five or more banks, and then only data from the largest 100 banks in each included country system. This latter reduction is particularly important because our full sample has a substantial number of observations from smaller US banks, as we discuss in more detail below, but still accounts for over 90% of bank asset coverage according to those authors. As we show below, our qualitative results are largely robust to this alternative sample.

We also examine sub-samples representing domestic and foreign banks. Our results here reveal notable differences. Our domestic bank results are particularly strong, with all of

our bank characteristic variables entering with their expected signs for both individual bank and national banking system levels. In contrast, foreign banks benefit from superior own NSFR's, and actually perform worse in national banking systems with superior NSFRs. As discussed below, we believe that the novel negative result we obtain for national NSFR's for foreign banks may reflect competitive advantages enjoyed by foreign banks with superior external sources of funds in liquidity-constrained national banking systems.

We also examine changes in the performances of balance sheet characteristics over time, examining individual annual samples from 2004-2012. The negative results we obtain for deposits, both at the individual and national banking levels, appear to be pretty consistent over time, although these also drop out during the crisis years. Notably, the country characteristics that identify spillovers for individual bank ROAs change over time, with strong evidence for positive spillovers in national banking systems with superior NSFRs prior to the crisis, although after the crisis national banking systems with greater bank cash holdings appear to better predict ROA results, with the NSFR measure becoming insignificant.

We conclude from these results different liquidity measures are informative in different liquidity market conditions, which highlights the challenges in identifying a single measure for desirable national banking system characteristics. For policy purposes, an additional challenge regarding these measures is the question of the the relative importance of setting policy to address conditions most directly during normal and crisis times.

We also substitute a set of country characteristics for country fixed effects. This also allows us to include the country-specific measure of "overbanking" advocated by Eichengreen and Luengnaruemitchai (2006). Our point estimates for this variable indicates a nonlinear

relationship between bank profitability and the share of domestic credit provided by the banking sector suggesting a level that maximizes the profitability of the banking sector.

Finally, we examine the robustness of our base specification results to the inclusion of a number of other balance sheet characteristics, including loans to total assets, recent growth in bank size, and type of banking activity. Our results are largely robust to this alternative specification, with the notable exception of bank cash holdings at the national level now indicating positive stability spillovers with national NSFRs entering insignificantly. This result provides further evidence regarding the ability to rely on a simgle measure of desirable national balance sheet conditions.

The remainder of this paper is divided into 5 sections. The following section reviews our data set and discusses some illustrative summary statistics. The next section discusses our data and econometric methodology. Section 3 discusses our base specification results. Section 4 reviews a battery of robustness tests. Section 5 concludes.

2. Data and model specifications

2.1 Data

We begin our analysis using the Bankscope dataset, which contains publicly available information on financial institutions from countries around the world. The dataset is quite comprehensive in terms of coverage – both across countries and across types of financial institutions within countries – and provides a large selection of firm-specific variables that can be used to construct performance measures and measures of funding liquidity. With respect to

country coverage, our dataset encompasses nearly 200 countries, which clearly includes both developed OECD countries and non-OECD countries. We are comfortable with this large country sample as we wish to examine the impact of the global financial crisis on a wide variety of financial systems and their corresponding liquidity profiles.

Other studies that have employed the Bankscope dataset have limited the number and type of countries used in their analysis.[6] In addition to our larger sample, we also examine a data sample constructed using the approach adopted by Claessens and Van Horen (2014), which includes only countries with more than five active banks reporting to Bankscope in the year in question and only the one hundred largest banks in a country. In their studies, this filtering captures at least 90 percent of these banking systems' assets. Our application of this filtering approach lowers our country sample to 134. In addition, we map our sample to their bank ownership database in order to examine the differential impact of bank balance sheet characteristics on foreign-owned versus domestic banks within a national financial system.[7]

With respect to firm types, we begin with a wide set of institutions in order to better characterize the varied nature of national financial systems. Following the Bankscope classifications, we include standard depository institutions (such as commercial and cooperative banks), specialty finance firms (such as real estate and credit card firms as well as non-bank credit institutions), investment banks, and specialized governmental credit institutions. While

[6] For example, Vazquez and Federico (2012) construct a sample of about 11,000 banks based in the U.S. and Europe, while Vazquez (2012) constructed a sample of 1,700 banks from forty emerging markets and developing countries. De Haas and Lelyveld (2014) use the Bankscope dataset and other sources to construct a sample of the the 150 largest global banks in 2009 with more than one significant foreign bank subsidiary and for which they have three consecutive years of data.

[7] We thank our referees for this suggestion.

national definitions of such entities can vary widely, the Bankscope dataset works to standardize these definitions as well as differences in accounting and reporting standards across countries.[8] To examine the degree to which deposit-taking firms make up a national financial system, we also create aggregate categories of retail-oriented depository firms and other categories.

An important distinction needs to be made regarding unconsolidated firm subsidiaries and consolidated holding companies. Both for categorization and balance sheet variables, the choice between this level of firm aggregation has major effects on the nature of the questions that can be addressed. For example, while aggregation up to the holding company level provides the best view on the overall liquidity profiles of individual banking groups (as per DeHaas and Lelyveld (2014)), it obscures the granular data on national financial systems and the liquidity profiles of the financial subsidiaries within individual countries. Of course, the analysis of the disaggregated subsidiaries cannot encompass the liquidity planning steps that firms make at the aggregate (and potentially cross-country) level. Facing with these operational and data-related challenges, we chose to focus our analysis on the unconsolidated subsidiaries within the Bankscope dataset in order to better understand liquidity funding profiles at the national level.

Our base dataset is currently structured as a subsidiary-level cross section in 2007. We also collect annual data from 2004 through 2012 for robustness tests. Our goal is to better understand both the liquidity profiles of firms and financial systems in cross section for these

[8] Note that Claussens and Van Horen (2014) only include banks and bank holding companies (adjusted for possible double counting) in their dataset. We apply their filter as described above, but to the broader set of firm types in our sample.

years and to provide some preliminary analysis regarding changes in these data over the financial crisis through our robustness exercises.

Given the goals of the paper, the key variables of interest are those summarizing firms' liquidity funding profiles. Historically, the majority of bank liquidity measures have focused on only one side of the balance sheet. For example, based on the liabilities side of the balance sheet, the ratio of total deposits to total liabilities has been used as measure of how stable a bank's funding is; i.e., greater amounts of deposits, especially retail deposits, reflect a more stable funding profile. Regarding the asset side of the balance sheet, liquidity measures attempt to capture the ease with which assets can be used to pay liabilities. A basic measure is the ratio of cash holdings to total assets for which higher values suggest a greater ability to repay liabilities and thus a more stable funding profile.[9]

Recently, more measures that incorporate elements from both sides of the balance sheet have been proposed in order to provide a more comprehensive picture of firms' funding profiles. Several such summary measures have been recently proposed in the literature; for example, see the liquidity mismatch index proposed in Brunnermeier et al. (2011) and empirically implemented by Bai et al. (2013). However, only two measures of them have been codified into international banking regulation by the Basel Committee of Bank Supervisors (BCBS). In December 2010, the BCBS announced the introduction of the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) as liquidity measures that would be used for international regulatory standards that were to be put in place in 2015 and 2018, respectively. The LCR is a summary measure of firm liquidity under stressful conditions that measures the

[9] For a more complete discussion of such measures, see Matz and Neu (2006).

amount of a firm's one-month funding sources and their availability during a stressful episode, as well as the firm's amount of high-quality liquid assets (HQLA) available to address its funding needs. Of course, this measure could be calculated without the stress-testing component, and it would then just be a summary measure relating a firm's short-term liabilities with its cash or HQLA holdings.

The NSFR measure may provide a potentially more useful liquidity profile than the LCR for our analysis because its measurement horizon is one year and because it covers a larger set of balance sheet items, both assets and liabilities.[10] The intuition behind the NSFR is to measure the ratio of funds owed relative to assets available, where these items are weighted by their likelihood of being available. For example, interbank funding is more likely to disappear (i.e., demand repayment) during a market disturbance as compared to retail deposits, and as such, retail deposits receive a lower weighting in the numerator. Similarly, government securities are more readily liquidated to meet short-term funding needs than commercial loans, and thus, commercial loans receive a lower weight in the denominator. In notational terms, the NSFR for bank i in country j at time t is denoted as

$$\mathrm{NSFR}_{ijt} = \frac{\sum_{P} w_p L_{ijp}}{\sum_{Q} w_q A_{ijq}},$$

where P and Q respectively represent the sets of liabilities and assets reported within a given reporting framework. The weights used in these calculations range within the unit interval

[10] The NSFR has been examined in the academic literature using Bankscope by Federico (2013) as well as Vazquez and Federico (2012). The paper by Wu and Hong (2012) does so only for the U.S. using bank-level data gathered from the supervisory Call Reports.

based on their perceived sensitivity to roll-over risk.[11] For example, interbank deposits carry a liability weight of zero, indicating that these deposits are likely to disappear quickly, whereas a weight of 0.85 on current customer deposits suggests that 85% of these deposits are likely to be available. For the asset weights, a weight of zero, as is assigned for cash holdings, suggests that the firm is able to use this asset quickly to meet its debt obligations, whereas a weight of one, as assigned to residential mortgages, suggests that the firm cannot readily liquidate them in order to meet their obligations. Overall then, higher values of $NSFR_{ijt}$ are indicative of a more stable funding profile.

For the BCBS regulatory purposes, the weight formulas are very rich in detail, reflecting details such as maturities and currency types, and are calibrated according to several factors. In contrast, our Bankscope data contains less detail on bank balance sheet items.[12] For this paper, we use the stylized balance sheet and weights constructed by Federico (2013) for use with the Bankscope dataset. Appendix Table A reproduces that weighting scheme.

In addition to the NSFR liquidity measures of individual firms, we are interested in the liquidity profiles of the national financial systems within which these banks operate. We could certainly calculate a national NSFR measure by weighting the aggregate-level balance sheet items within the Bankscope dataset. However, this approach would introduce two econometric shortcomings: First, the relative sizes of the firms would be obscured within such measures;

[11] Please note that the weights do not sum to unity as they are haircuts on individual asset and liability items.

[12] Even with the relatively more detailed U.S. data that is publicly available, important granularity limits are met. As noted by Wu and Hong (2012), the calculation of the LCR and NSFR ratios "… faces several obstacles, such as ambiguities in certain Basel III guidelines, and gaps between the existing Call Report data and the information required for calculating the new liquidity risk ratios. Therefore, we have to use our best judgment when interpreting certain guidelines, and to rely on interpolation and extrapolation techniques to fill data gaps."

that is, this measure would not reflect the disparities in the characteristics in the rest of the national system faced by individual banks. For example, a bank with a very high NSFR and large market share would face a banking system with a below-average NSFR for that country, because its characteristics would be removed from the calculations. Second, since the measure would be identical for all firms in a given country, it would enter equivalently to country fixed effects within our regressions. To address these concerns and still be able to capture the national liquidity profiles that firms operate under, we calculate an NSFR measure within a country for all firms other than the one in question; that is, we calculate the peer NSFR measure as

$$NSFR_{-ijt} = \frac{\sum_{P} w_p L_{-ijp}}{\sum_{Q} w_q A_{-ijq}},$$

where L_{-ijp} and A_{-ijq} respectively represent total liabilities and assets of their type within a country minus firm i's values. This approach to capturing peer effects within a country follows the approach used by Leary and Roberts (2014) for their study of corporate capital structures.

2.2 Model specification

A key objective of our paper is to examine the effect that a firm's funding strategy – measured using contemporaneous liquidity metrics, both for an individual firm and for the aggregation of the other firms within the national banking system in which it operates – have

on bank performance variables. To address this question, we estimate the following regression model using weighted least squares with the log of total assets as weights:

$$Y_{ijt} = \beta_1 L_{ijt} + \beta_2 L_{-ijt} + \beta_3 X_{it} + \beta_4 Z_{jt} + \varepsilon_{ijt},$$

where Y_{ijt} is a bank performance measure of interest for firm i in country j in year t; L_{ijt} is a vector of liquidity metrics; L_{-ijt} is the corresponding vector of aggregate liquidity metrics for all the other firms in country j; X_{it} is a vector of firm characteristics; and Z_{jt} is a vector of country-level characteristics.

The performance measure that we examine is return on assets (ROA), which is calculated as the ratio of net income to total assets. This measure is the clearest one to examine as it directly gauges the net cash flow that the bank generates from its assets under management. The liquidity measures used in our analysis are the aforementioned ratio of total deposits to total assets, ratio of cash holdings to total assets, and the estimated NSFR measure based on the data available from Bankscope. We similarly calculate the aggregate liquidity metrics for all the other firms in country j excluding firm i. In our regression analysis, we examine the use of all three pairs of individual and aggregate liquidity measures together and individually. In terms of the bank-specific explanatory variables X_{it}, our primary specification uses the log of firm assets as a measure of firm size and the firm's leverage ratio calculated as the ratio of the firm's total assets to its total equity capital. We also examine the effects of a number of other characteristics in our robustness tests.

As this is a cross-country empirical analysis, we paid particular attention to how we accounted for and incorporated the country-specific explanatory variables. We first note that

our construction of the aggregate liquidity measures L_{-ijt} create sufficient variability at the bank level to allow us to both capture the effects of the national funding markets and other, country-specific effects. For the purposes of robustness, we specify Z_{jt} in two complementary ways. Our first specification is the standard inclusion of country fixed effects, which provide a necessary, if quite broad, proxy for time-invariant structural differences across countries. Our second specification replaces that simple proxy with a set of national characteristics that have been shown by Rose and Spiegel (2011) to influence national economic outcomes during the recent global financial crisis. In particular, we include as explanatory variables a country's average GDP growth rate over the prior two years, the rate of change in that variable relative to the two years prior to that, an indicator variable for whether it has a pegged exchange rate regime, its current account as a percentage of GDP, the country's credit market regulation score as assigned by Economic Freedom of the World, growth in the country's ratio in bank credit to GDP over the period from 2000-2006, and national reserves (minus gold) as a percentage of GDP. We also consider the ratio of domestic credit provided by the banking sector as a percentage of GDP. This variable provides us with an indicator of how bank-centered – or potentially "overbanked" – a national economy is. To allow for nonlinearities, we include both the ratio and its squared value as explanatory variables.

Table 1 presents summary statistics for the 2007 dataset with countries placed in key geographic categories for our key bank performance variables and our proposed explanatory variables. Note that we winsorize all bank-specific variables at the 99% tails in order to remove extreme outliers. Each entry is a weighted average of the variable by total assets of the banks in the category. For ROA, the full sample average was 1.10%, which is relatively low from a

historical standpoint. For the US banks that make up fully half of the sample, the average ROA was 0.95%. Banks from Eastern Europe, Latin America, developing Asia, and other non-OECD countries have average values well above the sample average, whereas Japanese banks and banks from EU core countries, which account for about one-fifth of the sample, have much lower ROA averages at just 0.26% and 0.74%, respectively.

With regard to the liquidity measures using the 2007 data sample, RETDEP – the ratio of retail deposits to total assets – was 48% for the full sample of banks, suggesting the key role that retail deposits play in the funding strategies of banks worldwide. Most notable are the ratio averages for banks in Japan and developing Asia, which are between 70% and 75%. These relatively high ratios are another indicator of potential "overbanking" in this region of the world and an interesting question to explore within our modeling framework. The US average ratio is also above the average at 55%, which is primarily driven by many of the smaller US banks in the sample. Interestingly, Euro core banks have a lower average ratio between 33%, suggesting that their funding strategies rely more heavily on other funding sources.

The ratio of cash to total assets, which we denote in the results with the variable name CASH, has an average across the whole 2007 sample of almost 2%. We observe a reasonable amount of visible variability across the country groupings. For example, while banks from Eastern Europe, developing Asia, and other non-OECD countries have higher CASH ratios, averaging between 5% and 7%, the average ratios for banks in the US, Japan, and the Euro-core countries are below 2%. This degree of variation highlights how differences across countries' accounting and regulatory standards can lead to challenges in measuring liquidity using

narrowly defined categories. While this liquidity measure is simple to explain, the implications of its variation for our model inference are not clear.

For the NSFR variable, we observe a total sample average of 0.88 for all the 2007 observations. Recall that NSFR values less than one suggest that the bank has fewer liabilities to cover than available liquid assets, which suggests that the bank has a very stable funding profile. Thus, on average, the full banking sample was in a relatively strong funding position in 2007. Again, with US banks making up about half of the sample, their average NSFR value is very close at 0.87. The average NSFR values for banks in most developed countries tend to be below the sample average; for example, banks in the Euro core countries have an average of 0.77, while Japanese banks have an average value of 0.91. Correspondingly, the average values for developing countries are much higher than one; for example, Latin American banks have an average of 1.12, and banks from non-OECD countries have an average NSFR value of 1.33. These results suggest a substantive amount of cross-country variation in composite liquidity measures that should reflect important differences in bank funding markets across our sample countries.

Recall that we also generate aggregate liquidity measure for all other banks in the country, which we denote in the results as RET_DEPcn, CASH_cn, and NSFR_cn. These variables summarize the corresponding liquidity profiles that a firm's national competitors have. As shown in the table, the average values of RET_DEPcn and CASH_cn are very similar to their single firm averages. However, the NSFR_cn ratios have an average value of 1.28, relative to

the average NSFR value of 0.88. Similarly, the average NSFR_cn ratios for the other country groupings are generally greater than the simple average NSFR ratios.

Regarding the bank characteristic variables that we condition on, the averages of log of total assets (in 2007 US dollars) – denoted as LNASSETS – for the different country groupings are quite similar, but the degree of dispersion varies importantly across the categories; for example, the US has a very large standard deviation due to the many small and few very large banks in the country. For the leverage variable, which we denote as LEV and calculate as the ratio of firm assets to firm equity capital, we have a full sample average of 27.6. The country dispersion around this average is quite large with US banks averaging about 13.5 and Euro core banks averaging 38.2. As with several of the other variables discussed above, national supervisory and accounting standards play an important role in explaining these differences.

With regard to capturing country-level characteristics in our regression specification, we primarily rely on the standard practice of introducing country fixed-effects. However, in the interest of providing better insight into what factors drive these cross-country differences, we conduct a robustness test using instead the set of national indicators identified in Rose and Spiegel (2011) as having been shown in the literature as being successful indicators of relative national outcomes. In particular, we use the following variables:

- growth in domestic credit provided by the banking sector relative to GDP over the period from 2000 through 2006 (denoted as DCB);
- the squared value of DCB, denoted as DCB2, to account for potential nonlinearities;
- average real GDP growth in the years 2006 to 2007;

- the change in average GDP growth in years 2006 to 2007 relative to the value from 2004 to 2005;
- an indicator variable for the pegged exchange rate regime de jure;
- the country's current account as a percentage of GDP;
- the country's credit market regulation score for 2006 as defined by EFW; and
- the country's reserves (minus gold) as a percentage of GDP.

3. Results

3.1 Base specification with country fixed effects

Our base specification results for returns on assets in 2007 with country fixed effects included are shown in Table 2. We report results with all of our funding risk measures included and then -- as these measures are positively correlated -- with them included one at a time. Our base specification with fixed effects has 15,673 observations. Please note that we use robust standard errors and cluster by individual countries for the developed economies and as one group for developing economies.[13]

We obtain a negative and statistically significant coefficient on $RETDEP_{ijt}$ implying that banks that use disproportionately large shares of deposit funding experienced lower returns on assets, holding all else equal. In addition, our point estimates indicate that the impact of increased reliance on deposit funding is substantial. Given a one standard deviation increase,

[13] Clustering by individual emerging market economies resulted in substantively large standard errors in some specifications because some emerging market economies have a very small number of observations. Still, our qualitative results were largely similar. These were provided to the referees and are available from the authors on request.

our point estimate indicates that ROAs would increase by 38 basis points.[14] This result is robust to introducing the measure on its own, as shown in Model 2 where the variable enters with a coefficient of similar magnitude.

We also obtain a large negative coefficient on the reliance on deposits by the rest of the national banking system, $RETDEP\_cn_{ijt}$. Our results indicate that a one standard deviation increase in this variable would be expected to yield nearly a full percentage point decline in ROA_{ijt}. This implies that the net impact of a one standard deviation increase in both a bank's reliance on deposits in its funding and that of the rest of the banking system as well would be expected to yield a net decrease in bank profitability of almost 140 basis points. These results suggest that there are important spillovers to individual banks from the overall liability structure of the national financial system in which it operates.

Our estimated coefficients on the share of assets held in cash $CASH_{ijt}$ and $NSFR_{ijt}$ are insignificant, both in individual regressions and in our joint specification. We also obtain an insignificant coefficient for $CASH\_cn_{ijt}$, the share of assets held in cash by the rest of the national banking system. However, we obtain a significant positive coefficient on the balance sheet stability of the rest of the national banking system, as measured by $NSFR\_cn_{ijt}$. This variable enters positively with statistical significance in both specifications. Given our base specification, our point estimate indicates that a one standard deviation increase in $NSFR\_cn_{ijt}$ is

[14] In our sample, one standard deviation of $RETDEP_{ijt}$ is equal to 0.29, while one standard deviation of $RETDEP\_cn_{ijt}$ is 0.18.

expected to result in a 28 basis point increase in average bank profitability, which supports the conjecture of positive national spillovers in bank balance sheet stability.[15]

Lastly, we also condition on bank leverage, LEV_{ijt}, and the log of bank size, $LNASSETS_{ijt}$. It can be seen that holding all else equal ROA tends to be decreasing in bank leverage and increasing in bank size.[16]

3.2 Truncated CvH sample

Our base sample is heavily populated with observations from the United States. This is not only an issue of coverage; the United States banking system has an exceptional number of small banks. Still, it raises the question of whether or not our results are artifacts of the large share of our sample represented by small U.S. banks. Indeed, in our base specification 8,311 of the 15,673 observations are from the United States.

To address this issue, we follow Claessens and van Horen (CvH, 2014) in truncating the sample to the largest 100 banks in each country and eliminating any country with fewer than five banks. As they report, this truncation particularly eliminates a large number of smaller U.S. banks. Still, it covers 90% of all countries' the banking systems. We repeat our base specifications for this sample.

[15] It is possible that ROA is affected by the riskiness of bank lending. To investigate this possibility, we followed Correa, et al (2014) and interacted total loans to assets with a term representing the LIBOR-OIS spread of the nation in which the bank was operating. All of our results concerning our variables of interest were robust to the inclusions of these variables, which were provided to our referees and are available from the authors on request.

[16] As a robustness check, we also split the sample into OECD and non-OECD samples. We obtained very similar results. In particular, $RETDEP_{ijt}$ continued to enter negatively with statistical significance. The $NSFR\_cn_{ijt}$ variable failed to be significant for the OECD sub-sample, but was significant for the non-OECD sub-sample. These results are also available from the authors upon request.

Our CvH sample results are shown in Table 3. As with our full specification, bank profitability is decreasing in own deposit reliance and national reliance on deposits (i.e., $RETDEP_{ijt}$ and $RETDEP\_cn_{ijt}$). Our point estimates are around the same magnitudes as in our base sample.

However, we obtain interesting coefficient differences with this sample. Notably, while banks' own cash positions remain insignificant, the national cash position is quite positive and significant. This result suggests that a more liquid and stable national financial system contributes to individual firm profitability. Similar results are found regarding our NSFR variables. The coefficients on own and national NSFR are positive, suggesting that improved funding profiles contribute to firm-level ROA. The stronger results for the $NSFR_{ijt}$ variable suggests that the truncation of the sample may have eliminated some of the noise of the smaller, particularly U.S., banks.

Overall however, the results we obtain for the truncated CvH sample are in line with those for the full sample. That is, we continue to observe a negative impact of deposit intensity for the own and national-level variables. However, we observe stronger positive spillover effects from the own and national-level measures of balance sheet stability.

A further interesting detail of our full and CvH samples is the presence of both domestic and multinational banks in most of the national financial systems. As several recent papers have been detailing, the presence and management of multinational banks within national financial systems relative to domestic banks is a complex and nuanced topic.[17] To examine these potential effects in our study, we merged the bank ownership database, provided by

[17] See Cetorelli and Goldberg (2012), Acharya et al. (2013), Claessens and van Horn (2014), and Correa et al. (2014).

Claessens and van Horn (2013) with our CvH sample and developed subsamples of 653 global banks and 1,665 domestic banks.[18]

For the CvH-identified domestic firms, our qualitative baseline regression results, as presented in Table 4, remain intact; that is, higher own and country-level deposit intensity lowers bank ROA, while increased funding stability measured with firm-level NSFR and country-level cash holdings raise ROA. For this subsample, we also observe that firm-level cash holdings support ROA, while country-level NSFR does not. Most interestingly, bank size is not significant for this subsample, suggesting that the size effect previously observed is due to the larger global firms.

Table 5 presents the results of our base specification for the CvH global bank subsample. As suggested by the domestic sample, bank size is positive and significant here. Thus, the size effect is closely interrelated with the ownership structure of banks. The other major difference across the subsamples is the loss of significance for the own deposit ratio and the own and national cash holding variables; in addition, the national deposit ratio variable has decreased in significance. While banks' own NSFR variable remains positive and significant, country-level NSFR is now negative and significant.

This collection of contrasting results suggests that global banking organizations have different funding strategies that meaningfully affect their performance, measured as ROA. The decreased significance of country-level and subsidiary-level funding metrics, such as deposits and cash holdings, suggest a greater emphasis on internal funding of subsidiaries within the

[18] We thank our referee for this useful suggestion. The difference between the 3,846 observations in our CvH sample and the summed 2,318 observations in these subsamples is due to issues of sample timing, firm type, and holding company aggregation.

larger global banks. The positive effect of banks' own NSFR remains plausible; that is, greater funding stability adds to firm performance. However, interestingly, the negative country-level NSFR suggests that in more liquidity-constrained national banking systems, global bank subsidiaries have a competitive advantage from being able to obtain funding from their parent firms. Further analysis of this funding divide between domestic and foreign firms is warranted.

4. Robustness Tests

4.1 Alternative time periods

We chose our sample year to be relatively recent without too much influence from the global financial crisis. Still, one might believe that 2007 itself was not a representative year, as conditions associated with the crisis were already beginning to arise in financial markets in that year. We therefore examined individual annual results from 2004 through 2012. We would consider 2004 through 2006 to be pre-crisis years; 2007 through 2009 to be the crisis years; and 2010 through 2012 to be years of sluggish recovery, particularly due to the weakness in the euro area at that time.

We report the coefficient values for the six funding variables in our base specification as applied to the full and CvH samples for each individual year in Table 6. The coefficient values and significance vary over these years, suggesting potential changes in the relative accuracy of funding stability indicators for bank ROA performances. For the full sample, the pre-crisis years suggest a robust negative impact from increased reliance on own and national-level deposit intensity. This result holds into our base year of 2007 as well. In contrast, cash holdings at the

firm and national levels are rarely significant (although positive in sign), suggesting a lesser influence from this measure of bank performance. For the NSFR measure, own and national ratios were significant in this period, with higher values and more stable funding contributing positively to bank ROA outcomes.

As we move through the crisis period, we observe a waning in the negative influence of deposits and positive influence of banks' own NSFR measure. While country-level NSFR rations retain their positive effect, we observe strong positive and significant coefficients on the own and country-level cash holding variables in 2009. These results during the crisis years, and especially during the international funding crisis of 2009 that necessitated central bank liquidity swap lines, are suggestive of important changes in bank funding conditions.

For the three sample years after the crisis, the most notable change is the negative influence of the own and country-level cash holding variables on ROA; that is, more cash and thus higher asset liquidity on a bank's balance sheet leads to decreased ROA. This result is more in keeping with bank asset management principles, but different from what was observed earlier in the sample. Overall, these suggested patterns of the changing value of bank funding strategies over the past decade raise doubts about the primacy of any individual measure of bank funding strategies for regulatory purposes.[19] They also pose interesting questions for further research, including how to best specify this analysis within a panel data setting.

4.2 Country characteristic conditioning variables substituted for country fixed effects

[19] Similar conclusions were reached by Bongini, et al (2002), who found that regulatory policy based on a plurality of indicators was likely to be a superior strategy for predicting bank failures.

Our results with country characteristic variables substituted for fixed effects are shown in Table 7. We continue to obtain a negative and statistically significant coefficient estimate for $RETDEP_{ijt}$. However, we get some variation in the significance of the other funding variables. The variable for national banking system dependence on deposits $RETDEP\_cn_{ijt}$ becomes insignificant, but we now have a positive and statistically significant coefficient estimate for $CASH_{ijt}$ indicating that banks that held more cash on the asset side of their balance sheet enjoyed higher returns holding all else equal. The coefficient estimates are again similar to those we obtained with country fixed effects included. On the other hand, our coefficient estimates for $CASH\_cn_{ijt}$ enter with the opposite negative sign, significantly so for our base specification in Model 1. Finally, the $NSFR_{ijt}$ and $NSFR\_cn_{ijt}$ are both insignificant.

As was the case with country fixed effects included, we obtain a negative and statistically significant coefficient estimate for LEV_{ijt}. We also continue to obtain a positive and usually statistically significant qwcoefficient estimate for $LNASSETS_{ijt}$.

We also report our coefficient estimates for the included country characteristics. First, we investigate the possibility of "overbanking" by introducing both the share of domestic credit provided by the banking sector, DCB_{ijt}, as well as its square term, DCB_{ijt}^2. This was the measure used by Eichengreen and Luengnaruemitchai (2006). As can be seen in Table 7, we obtain a positive coefficient estimate on DCB_{ijt} and a statistically significant negative coefficient estimate on DCB_{ijt}^2 in our base specification.

This implies that the relationship between domestic credit provided by the banking sector and expected ROAs may be hump-shaped. For example, we plot the expected level of ROA given the point estimates for DCB_{ijt}, as well as its square term, DCB_{ijt}^2. Figure 1 displays

the fitted line from the point estimates for these two variables, conditioning on mean values of the other variables. It is clear that there is a level of domestic credit from the banking sector as a share of GDP that is associated with maximum predicted ROA in the banking sector.

This value is relatively large (over 100%), and roughly corresponds to the level of bank credit creation in France or Sweden. In general, more developed countries have deeper bank penetration. However, restricting ourselves to the non-OECD countries in the sample, we do see the identified pattern of Asian emerging market economies, such as China, Thailand and South Korea, as having more banking activity than Latin American countries, such as Mexico and Brazil. Moreover, some East Asian emerging market economies, such as China and the Republic of Korea, indicate a level of banking penetration beyond that which maximizes bank ROA.

A number of the country characteristic conditioning variables from the Rose-Spiegel (2011) data set enter significantly. The acceleration in the growth rate from two years previously to the last year, *ChgGrth,* consistently obtains a positive coefficient point estimate in our base specification. Among the other variables, banks in countries with exchange rate pegs tend to do worse, and those with lower quality of credit regulation tend to do worse as well.

4.3 Additional bank characteristics

Our base regression specification in Table 2 used only two bank characteristic variables: leverage and log assets. The choice was intentional in that they are key bank characteristics affecting bank performance and ROA. However, many other aspects of bank behavior influence this performance variable. In this section, we include three additional bank-specific variables as

well as variations that reflect the composition of the firms' national banking systems. The first variable is a firm's loans as a percentage of assets, and the corresponding national ratio is calculated for all other firms in the country excluding itself. The second variable is loan growth over the past three year period from 2005 through 2007. The third variable is an indicator variable for whether the firm is a depository institution, and the country-level variable is constructed as the ratio of the assets of a country's depository institutions to total country level assets excluding the firm itself.

The empirical results in Table 8 show that the negative coefficients on the own and country-level deposit ratios are significant, as in Table 2. Three additional findings of note are shown in the table. First, regarding the NSFR variables, the own firm variable is now positive and significant, while the country-level variable is not. This change would suggest that the additional characteristics provide a clearer specification regarding the firm funding strategies and their effect on ROA. However, the overall effect of the NSFR measures remains intact in this robustness test.

Second, the percentage of loan assets in the bank and at the country level without the bank have negative and significant effects on ROA, suggesting that more traditional banks with more lending activity within less traditional banking systems have lower ROAs. These variables are important enough to remove the significance of the coefficients on the retail banking indicator and its country-level analog, although they are significant in specifications (3) and (4) that exclude the deposit ratio variables.

Finally, the introduction of the loan ratio variables weaken the significance of the log asset variable, particularly when the deposit ratio variables are absent from the regression.

This result likely suggests that the size variable by itself masks the subtleties that smaller banks with more traditional banking activities have lower ROA measures than larger firms with additional non-lending sources of revenue. The effect of foreign ownership discussed in Section 4 also likely plays a role here.

Overall, these robustness results suggest more nuanced interpretations of our primary findings in Table 2. However, the general findings of the effect of own and country-level liquidity profiles on bank performance hold here as well.

5. Conclusion

We examine a large cross-country dataset of micro-level banking variables to investigate the implications of bank funding and lending strategies on bank performance, as measured by returns on assets. We find that bank profitability is decreasing in the share of deposits in bank may be "overbanked" by relying too intensely on deposit funding and funding, suggesting that banks could have done better ex-post by relying more on funding through other sources, such securities markets. Moreover, bank profits are also decreasing in the share of deposits in bank funding in the national banking system.

We also find positive spillovers for bank performances from being in a national banking system where other banks have greater overall stability, as measured by the Bank for International Settlements' net-stable-funding-ratio, as well as when other banks hold more liquid asset portfolios, as measured by the cash share. Our results therefore suggest that individual bank profitability is reduced by increased reliance on deposit funding, but those

losses may be mitigated by the benefits of membership in a more stable national banking system.

We interpret these results as suggesting that there may be benefits to banks from relying less on deposits in their funding portfolios. At the individual bank level, reduced reliance on deposits may result in greater seasoning in securities markets, allowing banks to raise funds more easily during episodes of distress. At the national level, the channel is more opaque, but it may be the case that the local market for bank borrowing through securities is more developed the more dependent other banks in the national system are on securities finance. Alternatively, if securities issued are of longer duration than deposits a bank may find less competitors in its home system for funds through this market when it finds itself distressed.

Our results also indicate some role for bank balance sheet characteristics in the determination of macroeconomic outcomes. For our sample between 2007 and 2012, we find that the correlation between bank ROA and annual GDP growth is 0.255. Our point estimates therefore indicate that a a one standard deviation increase in the share of deposits in the national banking system is predicted to result in a 25 basis point decrease in average income growth. Similarly, a one standard deviation increase in the net stable funding ratio of the national banking system is predicted to result in a 7.5 basis point increase in average income growth. While these numbers are not large, they are certainly non-trivial.

We subjected these results to battery of tests, and by and large they were quite robust, particularly the result of an adverse impact of greater reliance on deposits in funding.

However, we did observe discrepancies between domestic and foreign banks, as well as change in the relative importance of funding strategy indicators over time. While our domestic bank sub-sample yielded results similar to our overall sample, our foreign bank sub-sample yielded quite different results. Most notable was the negative coefficient we obtained on national banking system funding stability, as measured by the national NSFR. Our interpretation of this surprising result was that foreign banks with access to external funding may actually enjoy a competitive advantage in a liquidity-constrained national banking system.

The time variation we observed in the significance of various funding strategy indicators gives us some pause about the ability to use a single best indicator of bank funding stability for all periods. For policy purposes, it is unclear whether guidelines should be designed to meet the needs of banks in normal times that prevail most periods, or in more disruptive ones in which regulatory losses could be quite severe. What does seem apparent is that the relative weights one would want to place on different measures would likely vary over time.

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Table 1: Summary statistics for regressions variables by region

RETDEP			
	mean	sd	count
EU Core	.3497126	.2290198	2611
EU Periphery	.4697421	.2378624	857
Eastern & Other Europe	.5371743	.3028582	996
Latin America	.5252667	.2419059	436
Japan	.7900082	.1845817	587
Developing Asia	.7478993	.2109334	500
United States	.6105338	.3254791	8311
Other (OECD)	.5070124	.1814668	686
Other (non-OECD)	.7198273	.219306	689
Total	.5209982	.2910633	15673
RETDEP_CN			
	mean	sd	count
EU Core	.3146847	.0661602	2611
EU Periphery	.4357751	.1109906	857
Eastern & Other Europe	.5379157	.220765	996
Latin America	.5123646	.1680511	436
Japan	.6620667	.0069427	587
Developing Asia	.7295381	.140743	500
United States	.5762773	.0040742	8311
Other (OECD)	.487332	.0801347	686
Other (non-OECD)	.6861413	.1565674	689
Total	.4788815	.1762842	15673
CASH			
	mean	sd	count
EU Core	.0077556	.0149325	2611
EU Periphery	.0228859	.0571485	857
Eastern & Other Europe	.0601656	.0623852	996
Latin America	.0354	.05407	436
Japan	.0103962	.0087194	587
Developing Asia	.0454455	.0506985	500
United States	.0216869	.0156935	8311
Other (OECD)	.03046	.0358764	686
Other (non-OECD)	.0625339	.068001	689
Total	.0195007	.0347588	15673

CASH_CN			
	mean	sd	count
EU Core	.0090405	.0048181	2611
EU Periphery	.023218	.0140347	857
Eastern & Other Europe	.0603087	.0418157	996
Latin America	.0326054	.0449046	436
Japan	.0122891	.000232	587
Developing Asia	.0456248	.0330205	500
United States	.0215109	.0004091	8311
Other (OECD)	.027681	.015942	686
Other (non-OECD)	.0643862	.0476887	689
Total	.0200194	.020886	15673
NSFR			
	mean	sd	count
EU Core	.7610826	.5583812	2611
EU Periphery	.8982984	.3998646	857
Eastern & Other Europe	1.050263	.408758	996
Latin America	1.067772	.5466903	436
Japan	.9211721	.1413169	587
Developing Asia	.9942192	.2572209	500
United States	.8855665	.3097704	8311
Other (OECD)	1.083995	.592376	686
Other (non-OECD)	1.241546	.6266092	689
Total	.8794351	.4653529	15673
NSFR_CN			
	mean	sd	count
EU Core	1.495282	.1243947	2611
EU Periphery	1.240199	.1130286	857
Eastern & Other Europe	1.045641	.1295134	996
Latin America	.9979597	.0775955	436
Japan	1.120857	.0068976	587
Developing Asia	1.063151	.1243474	500
United States	1.218934	.0126586	8311
Other (OECD)	1.034999	.1769138	686
Other (non-OECD)	.956932	.1633939	689

Total	1.277206	.2185809	15673
DCB			
	mean	sd	count
EU Core	135.7518	23.14443	2611
EU Periphery	147.3149	32.57719	857
Eastern & Other Europe	42.21995	22.57408	996
Latin America	72.91883	23.89833	431
Japan	306.2116	0	587
Developing Asia	123.4301	29.43379	461
United States	226.2894	2.84e-14	8311
Other (OECD)	140.9126	41.81113	686
Other (non-OECD)	98.3724	75.62549	663
Total	168.0261	67.98651	15603
LEV			
	mean	sd	count
EU Core	34.79454	17.85799	2611
EU Periphery	19.54382	11.72538	857
Eastern & Other Europe	11.413	6.962218	996
Latin America	12.75701	5.514347	436
Japan	27.28509	14.91595	587
Developing Asia	18.5787	9.645974	500
United States	12.53348	8.777414	8311
Other (OECD)	24.32012	14.22092	686
Other (non-OECD)	17.1481	11.3677	689
Total	25.49748	16.7971	15673
LNASSETS			
	mean	sd	count
EU Core	24.63168	1.188936	2611
EU Periphery	24.3344	1.232838	857
Eastern & Other Europe	22.48432	1.749772	996
Latin America	23.59853	1.665042	436
Japan	24.47246	1.127579	587
Developing Asia	24.53156	1.074924	500
United States	23.80188	2.05224	8311
Other (OECD)	24.4891	1.200428	686

Other (non-OECD)	22.70242	1.794	689
Total	24.36958	1.423337	15673
ROA2007			
	mean	sd	count
EU Core	.4413082	.877985	2611
EU Periphery	.8865002	.6144617	857
Eastern & Other Europe	1.874901	1.15859	996
Latin America	2.192151	1.644323	436
Japan	.3986989	.4897165	587
Developing Asia	.9896611	.7760197	500
United States	1.277467	1.690453	8311
Other (OECD)	.7308459	.8891817	686
Other (non-OECD)	1.584433	1.644011	689
Total	.7518042	1.088321	15673

Notes: See text for variable definitions. Mean, standard deviation, and number of observations of stated variable for banks from identified geographic region.

Table 2 Base specification
Dependent variable: ROA 2007

	(1)	(2)	(3)	(4)
	ROA_2007	ROA_2007	ROA_2007	ROA_2007
RETDEP	-1.307***	-1.230**		
	(0.477)	(0.497)		
RETDEP_cn	-5.553*	-6.224**		
	(3.165)	(2.784)		
CASH	3.353		2.777	
	(2.281)		(1.933)	
CASH_cn	11.548		8.725	
	(8.795)		(6.315)	
NSFR	0.067			0.054
	(0.160)			(0.136)
NSFR_cn	1.281*			1.722**
	(0.690)			(0.700)
LEV	-0.030***	-0.031***	-0.030***	-0.030***
	(0.005)	(0.005)	(0.006)	(0.006)
LNASSETS	0.023*	0.017	0.058**	0.055***
	(0.013)	(0.014)	(0.023)	(0.013)
Country fixed effects	Yes	Yes	Yes	Yes
r2	0.193	0.188	0.171	0.169
N	15673	15673	15673	15673

Notes: Weighted least squares estimation with weights based on log of total assets. Full sample. Country fixed effects included. Heteroscedasticity- robust standard errors clustered by country for advanced economies; EMEs clustered together. See text for variable definitions. * indicates statistical significance at 10% confidence level, ** indicates significance at 5% confidence level, and *** indicates significance at 1% confidence level.

Table 3 Truncated sample
Dependent variable: ROA 2007

	(1)	(2)	(3)	(4)
	ROA_2007	ROA_2007	ROA_2007	ROA_2007
RETDEP	-0.849***	-0.730***		
	(0.161)	(0.173)		
RETDEP_cn	-4.546**	-4.902***		
	(1.996)	(1.444)		
CASH	0.680		0.503	
	(0.501)		(0.504)	
CASH_cn	11.223***		4.551*	
	(2.933)		(2.398)	
NSFR	0.202***			0.160***
	(0.043)			(0.040)
NSFR_cn	1.824*			1.888***
	(0.912)			(0.449)
LEV	-0.036***	-0.035***	-0.033***	-0.034***
	(0.009)	(0.010)	(0.011)	(0.011)
LNASSETS	0.029	0.016	0.019	0.027
	(0.031)	(0.030)	(0.020)	(0.021)
Country fixed effects	Yes	Yes	Yes	Yes
r2	0.232	0.226	0.219	0.222
N	3846	3846	3846	3846

Notes: Truncated sample from Claessens and van Horen (2014). Weighted least squares estimation with weights based on log of total assets. Country fixed effects included. Heteroscedasticity- robust standard errors clustered by country for advanced economies; EMEs clustered together. See text for variable definitions. * indicates statistical significance at 10% confidence level, ** indicates significance at 5% confidence level, and *** indicates significance at 1% confidence level.

Table 4 Domestic banks
Dependent variable: ROA 2007

	(1)	(2)	(3)	(4)
	ROA_2007	ROA_2007	ROA_2007	ROA_2007
RETDEP	-0.544***	-0.342***		
	(0.121)	(0.113)		
RETDEP_cn	-5.822*	-3.819**		
	(3.099)	(1.436)		
CASH	1.326***		1.332***	
	(0.239)		(0.289)	
CASH_cn	23.912***		15.991***	
	(1.341)		(1.295)	
NSFR	0.343***			0.315***
	(0.092)			(0.080)
NSFR_cn	0.593			1.253
	(2.024)			(1.095)
LEV	-0.036***	-0.035***	-0.035***	-0.036***
	(0.011)	(0.011)	(0.011)	(0.011)
LNASSETS	0.013	0.005	0.018	0.031
	(0.030)	(0.026)	(0.021)	(0.022)
Country fixed effects	Yes	Yes	Yes	Yes
r2	0.339	0.327	0.327	0.334
N	1665	1665	1665	1665

Notes: Domestic bank sub-sample. Bank country of ownership from Claessens and van Horen (2014). Weighted least squares estimation with weights based on log of total assets. Weighted least squares estimation with weights based on log of total assets. Country fixed effects included. Heteroscedasticity- robust standard errors clustered by country for advanced economies; EMEs clustered together. See text for variable definitions. * indicates statistical significance at 10% confidence level, ** indicates significance at 5% confidence level, and *** indicates significance at 1% confidence level.

Table 5 Foreign banks
Dependent variable: ROA 2007

	(1)	(2)	(3)	(4)
	ROA_2007	ROA_2007	ROA_2007	ROA_2007
RETDEP	-0.981	-0.648		
	(0.584)	(0.606)		
RETDEP_cn	-5.840*	-4.471		
	(3.025)	(3.388)		
CASH	0.275		0.042	
	(1.737)		(1.776)	
CASH_cn	-5.660		-8.975	
	(7.525)		(7.540)	
NSFR	0.269***			0.181**
	(0.086)			(0.081)
NSFR_cn	-5.721***			-5.654***
	(0.824)			(0.881)
LEV	-0.035***	-0.036***	-0.035***	-0.034***
	(0.007)	(0.008)	(0.008)	(0.008)
LNASSETS	0.279**	0.248**	0.243**	0.263**
	(0.116)	(0.116)	(0.106)	(0.103)
Country fixed effects	Yes	Yes	Yes	Yes
r2	0.349	0.337	0.333	0.339
N	653	653	653	653

Notes: Foreign bank sub-sample. Bank country of ownership from Claessens and van Horen (2014). Weighted least squares estimation with weights based on log of total assets. Weighted least squares estimation with weights based on log of total assets. Country fixed effects included. Heteroscedasticity- robust standard errors clustered by country for advanced economies; EMEs clustered together. See text for variable definitions. * indicates statistical significance at 10% confidence level, ** indicates significance at 5% confidence level, and *** indicates significance at 1% confidence level.

Table 6: Base specification in other years

	RETDEP	RETDEP_cn	CASH	CASH_cn	NSFR	NSFR_cn
ROA_2004: full	-1.097**	-5.717**	2.485**	6.854	0.064	1.566*
	(0.455)	(2.202)	(1.008)	(5.794)	(0.094)	(0.869)
ROA_2004: CvH	-0.366**	-4.534***	0.356	-9.469**	0.042	1.557**
	(0.155)	(1.209)	(0.474)	(3.670)	(0.100)	(0.750)
ROA_2005: full	-1.327***	-4.607**	2.253	-7.849	0.278**	3.108***
	(0.435)	(1.968)	(2.404)	(7.695)	(0.122)	(0.765)
ROA_2005: CvH	-0.685***	-4.600***	-0.758	-12.844**	0.309***	2.524***
	(0.164)	(1.015)	(1.208)	(5.194)	(0.070)	(0.768)
ROA_2006: full	-1.344***	-6.751***	2.783	22.653***	0.246**	2.982***
	(0.403)	(1.706)	(2.459)	(8.062)	(0.120)	(0.872)
ROA_2006: CvH	-0.852***	-5.375***	-0.232	12.764***	0.254***	2.242**
	(0.138)	(0.818)	(0.435)	(3.491)	(0.037)	(0.831)
ROA_2007: full	-1.307***	-5.553*	3.353	11.548	0.067	1.281*
	(0.477)	(3.165)	(2.281)	(8.795)	(0.160)	(0.690)
ROA_2007: CvH	-0.849***	-4.546**	0.680	11.223***	0.202***	1.824*
	(0.161)	(1.996)	(0.501)	(2.933)	(0.043)	(0.912)
ROA_2008: full	-0.594	-5.921***	4.006	8.135	-0.033	0.978*
	(0.418)	(2.068)	(3.215)	(10.063)	(0.152)	(0.556)
ROA_2008: CvH	-0.178	-9.675***	0.263	-1.160	0.230***	-1.319*
	(0.154)	(1.811)	(0.565)	(2.394)	(0.061)	(0.686)
ROA_2009: full	-0.518	-1.036	2.385**	6.598**	0.055	1.660***
	(0.400)	(1.499)	(1.068)	(2.948)	(0.072)	(0.437)
ROA_2009: CvH	-0.002	-4.650***	0.886***	-2.550**	0.096**	1.386**
	(0.137)	(1.183)	(0.211)	(1.223)	(0.043)	(0.611)
ROA_2010: full	-1.001*	-2.742	-1.294**	0.119	0.226	-0.441
	(0.504)	(2.407)	(0.521)	(2.302)	(0.135)	(1.085)
ROA_2010: CvH	-0.416***	-3.281**	-0.844***	0.901	0.135***	-1.116
	(0.141)	(1.348)	(0.187)	(1.464)	(0.033)	(0.988)
ROA_2011: full	-1.077**	-2.287	-1.494***	-6.547***	0.261**	0.367
	(0.477)	(2.183)	(0.174)	(1.170)	(0.105)	(1.152)
ROA_2011: CvH	-0.559***	-9.914***	-1.709***	-16.866***	0.147**	-0.149
	(0.189)	(2.105)	(0.239)	(3.380)	(0.055)	(0.736)
ROA_2012: full	-0.972	-2.182	-0.983***	6.756***	0.259***	0.252
	(0.591)	(2.832)	(0.250)	(0.986)	(0.073)	(1.106)
ROA_2012: CvH	-0.116	2.785**	-0.716***	8.230***	0.215***	1.846
	(0.180)	(1.215)	(0.242)	(1.990)	(0.065)	(1.513)

Notes: Base specification for individual years 2004-2012. Truncated sample from Claessens and van Horen (2014). Weighted least squares estimation with weights based on log of total assets. Weighted least squares estimation with weights based on log of total assets. Country fixed effects included. Heteroscedasticity- robust standard errors clustered by country for advanced economies; EMEs clustered together. See text for variable definitions. * indicates statistical significance at 10% confidence level, ** indicates significance at 5% confidence level, and *** indicates significance at 1% confidence level.

Table 7: Controlling for country characteristics (no fixed effects)

	(1)	(2)	(3)	(4)
	ROA 2007	ROA 2007	ROA 2007	ROA 2007
RETDEP	-1.491***	-1.444***		
	(0.451)	(0.477)		
RETDEP_cn	0.569	0.602*		
	(0.384)	(0.339)		
CASH	4.558**		4.246***	
	(1.784)		(1.413)	
CASH_cn	-3.316*		-1.339	
	(1.652)		(1.480)	
NSFR	0.021			0.025
	(0.188)			(0.156)
NSFR_cn	-0.297			-0.099
	(0.300)			(0.274)
LEV	-0.032***	-0.032***	-0.031***	-0.031***
	(0.004)	(0.004)	(0.004)	(0.005)
LNASSETS	0.017**	0.009	0.054*	0.046**
	(0.007)	(0.008)	(0.028)	(0.019)
DCB	0.003*	0.002	-0.001	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
DCB2	-0.000**	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Growth	0.043	0.054	0.048	0.050
	(0.056)	(0.065)	(0.069)	(0.076)
ChgGrth	0.033*	0.028	0.037	0.029
	(0.018)	(0.022)	(0.022)	(0.023)
ExRtPeg	-0.317***	-0.344***	-0.290**	-0.348***
	(0.112)	(0.119)	(0.139)	(0.127)
CA	-0.001	-0.001	0.007	0.002
	(0.010)	(0.009)	(0.007)	(0.007)
CredRegQ	-0.128*	-0.093	-0.201***	-0.151*
	(0.069)	(0.091)	(0.073)	(0.076)
GDCB00_06	0.003	0.003	0.006*	0.005
	(0.003)	(0.004)	(0.003)	(0.003)
RES	-0.282	-0.090	-0.440	-0.108
	(0.825)	(0.777)	(0.997)	(0.798)
r2	0.120	0.110	0.088	0.080
N	12831	12831	12831	12831

Notes: Weighted least squares estimation with weights based on log of total assets. Country fixed effects included. Heteroscedasticity- robust standard errors clustered by country for advanced economies; EMEs clustered together.

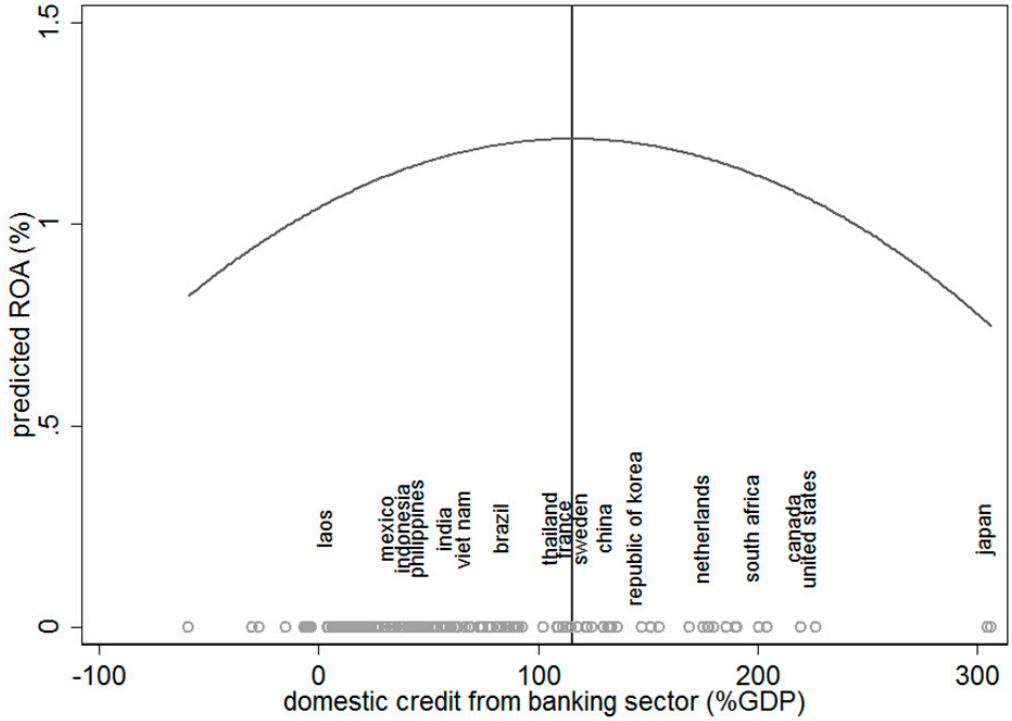
See text for variable definitions. * indicates statistical significance at 10% confidence level, ** indicates significance at 5% confidence level, and *** indicates significance at 1% confidence level.

Table 8: Controlling for additional funding characteristics (with country fixed effects)

	(1)	(2)	(3)	(4)
	ROA_99_2007: full sample (WLS)	ROA_99_2007: full sample (WLS)	ROA_99_2007: full sample (WLS)	ROA_99_2007: full sample (WLS)
RETDEP	-1.279**	-1.156**		
	(0.525)	(0.526)		
RETDEP_cn	-6.656*	-7.147**		
	(3.513)	(2.860)		
CASH	2.430		2.095	
	(1.665)		(1.579)	
CASH_cn	9.342		7.470	
	(7.375)		(4.887)	
NSFR	0.232***			0.158*
	(0.083)			(0.078)
NSFR_cn	0.368			1.360**
	(1.190)			(0.618)
loans_over_assets_99	-0.668***	-0.968***	-1.004***	-0.898***
	(0.127)	(0.141)	(0.199)	(0.205)
loans_over_assets_cn_miss_99	-5.665***	-5.668***	-4.572***	-6.015***
	(1.036)	(1.489)	(1.562)	(1.409)
ldassets_99	-0.004	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.002)	(0.003)
ldassets_cn_miss_99	0.013	0.019	0.003	0.006
	(0.014)	(0.014)	(0.015)	(0.013)
retail_bank	-0.195	-0.190	-0.532***	-0.525***
	(0.189)	(0.200)	(0.147)	(0.145)
retassets_share_cn_miss_99	-1.016	-0.894	-1.623*	-1.960**
	(0.908)	(0.934)	(0.906)	(0.822)
LEV	-0.034***	-0.035***	-0.035***	-0.034***
	(0.007)	(0.007)	(0.007)	(0.007)
LNASSETS	0.013	0.007	0.043*	0.043**
	(0.013)	(0.014)	(0.024)	(0.021)
Country fixed effects	Yes	Yes	Yes	Yes
r2	0.229	0.223	0.208	0.208
N	14800	14800	14800	14800

Notes: Weighted least squares estimation with weights based on log of total assets. Country fixed effects excluded. Heteroscedasticity- robust standard errors clustered by country for advanced economies; EMEs clustered together. See text for variable definitions. * indicates statistical significance at 10% confidence level, ** indicates significance at 5% confidence level, and *** indicates significance at 1% confidence level.

Figure 1



Note: Predicted ROA is based on estimates from the base specification with country characteristics (Table 5, model 1). We hold constant all right-hand-side variables other than domestic credit and domestic credit squared using their average values in the sample.

Appendix Table A.

NSFR weights as per Federico (2012)

ASSETS	RSF	LIABILITIES AND EQUITY	ASF
1. Total Earning Assets		1. Interest-bearing Liabilities	
1.a. Net Loans		1.a. Total Deposits, Money Market and Short-term Funding	
1.a.i. Gross Loans		1.a.i. Total Customer Deposits	
Residential Mortgage Loans	1.00	Customer Deposits - Current	0.85
Other Mortgage Loans	1.00	Customer Deposits - Savings	0.70
Other Consumer/ Retail Loans	0.70	Customer Deposits - Term	0.70
Corporate & Commercial Loans	0.85	1.a.ii. Deposits from Banks	0.00
Other Loans	1.00	1.a.iii. Repos and Cash Collateral	0.00
1.a.i. (Reserve for impared loans)	-1.00	1.a.iv. Other Deposits and Short-term Borrowings	0.00
1.b. Other Earning Assets		1.b. Total Long Term Funding	
1.b.i. Loans and Advances to Banks	0.00	1.b.ii. Senior Debt Maturing after 1 Year	0.75
1.b.ii. Total Securities		1.b.iii. Subordinated Borrowing	1.00
Reverse Repos and Cash Collateral	0.00	1.b.iv. Other Funding	0.75
Trading Securities and at FV through Income	0.15	1.c. Derivatives (NETTED IN ASSET SIDE)	
Derivatives (NETTED IN ASSET SIDE)	0.90	1.d. Trading Liabilities	0.00
Available for Sale Securities	0.15	2. Non-interest Bearing Liabilities	
Held to Maturity Securities	1.00	Fair Value Portion of Debt	0.00
At-equity Investments in Associates	1.00	Credit impairment reserves	0.00
Other Securities	1.00	Reserves for Pensions and Other	0.00
1.b.iii. Investment in Property	1.00	Current Tax Liabilities	0.00
1.b.iv. Insurance Assets	1.00	Deferred Tax Liabilities	0.00
1.b.v. Other Earning Assets	1.00	Other Deferred Liabilities	0.00
2. Non Earning Assets		Discontinued Operations	0.00
Cash and Due From Banks	0.00	Insurance Liabilities	0.00
Foreclosed Real Estate	1.00	Other Liabilities	0.00
Fixed Assets	1.00	3. Hybrid Capital	
Goodwill	1.00	Pref. Shares and Hybrid Capital accounted for as Debt	1.00
Other Intangibles	1.00	Pref. Shares and Hybrid Capital accounted for as Equity	1.00
Current Tax Assets	1.00	4. Total Equity	
Deferred Tax Assets	1.00	Common Equity	1.00
Discontinued Operations	1.00	Non-controlling Interest	1.00
Other Assets	1.00	Securities Revaluation Reserves	1.00
		Foreign Exchange Revaluation Reserves	1.00
		Fixed Asset Revaluations	1.00