Did the Funding Structure of Foreign Bank Affiliates Affect Capital Outflows in the Great Recession?: Evidence from U.S. Global Banks

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Abstract   By using country-level data on the foreign affiliates of U.S. global banks in 20 developed and 60 emerging economies from 2006 to 2013, we present consistent evidence that liquidity shocks triggered by a global financial crisis are transmitted to affiliate locations that are important for the parent bank funding sources within the banking group. We find that the funding location of global banks is driven by affiliates' dependence on local deposit funding, by host country-specific characteristics (financial liberalization), and by foreign affiliate-specific characteristics (liquidity constraints). As a result of foreign affiliates' support to their parent banks, funding location may suffer internal capital outflows during a financial crisis. We conclude that internal capital outflows are confined to local funding affiliates with sufficient liquidity operating in fully liberalized financial systems. These results indicate that contrary to the findings of Cetorelli and Goldberg (2012), foreign affiliates financed by local deposits rather than a parent bank's resources were not necessarily a significant source of internal capital outflows from the host country during the global financial crisis. Hence, the benefits of local funding can be achieved without its cost if either high liquidity constraints or low financial liberalization is in place.

Ⅰ. Introduction

During the global financial crisis, global banks were no longer able to use wholesale sources of short-term debt to the extent they had before the crisis because interbank market liquidity became all but nonexistent. Existing research has shown that global banks transmit negative shocks to their capital internationally and hence that capital outflows from foreign affiliates following the financial crisis were to be expected (Peek and Rosengren, 1997; Popov and Udell, 2010). Specifically, to stabilize lending in their home country, parent banks attract internal capital mainly from foreign affiliates with a high reliance on local deposits (Cetorelli and Goldberg, 2012). De Haas and Lelyveld (2014) show that parent banks with more liquid subsidiaries abroad managed to shield their home country operations from the global crisis, because subsidiaries' liquidity supports parent banks' lending. From the perspective of parent banks, borrowing or internal capital outflows from foreign affiliates can thus be viewed as a reflection of the intention to counterbalance the effect of capital shortages in their domestic market (Düwel and Frey, 2012; Rose and Wieladek, 2012).

Although parent banks' efforts to offset the funding pressure caused by a liquidity squeeze in global interbank markets mitigate the activities of shareholders in the home country, they have an aggravating effect on affiliates' depositors or other creditors. For instance, depositors in host markets could not withdraw their time deposits at maturity or borrowers could not draw down their lines of credit in foreign affiliates. Moreover, foreign equity investment may face uncertainty owing to the transfer of profit and local resources from the host to the home country. From the perspective of foreign affiliates' funders, therefore, there is a greater probability of decreasing welfare because of capital flight during the global financial crisis.

In this context, according to Cetorelli and Goldberg (2012), there seems to be a potential "dark side" to foreign affiliates' local deposit funding. Nevertheless, it should be noted that exclusive focus on the costs of local funding overlooks the important benefits of local funding as well as the risk of dependence on flexible wholesale funding, which should be taken into consideration for the sake of the completeness of the analysis. For instance, previous studies have emphasized that banks that finance a larger share of liabilities through deposit funding are less constrained by the global crisis and enjoy more stable operations (Shin, 2009). Moreover, because retail deposits generally act as a buffer to protect individual banks in times of distress, they play an essential role in ensuring financial stability from a macroeconomic perspective. Similarly, extensive works have recognized wholesale funding as a source of uncertainty (Gatev and Strahan, 2006; Ivashina and Scharfstein, 2010; Huang and Ratnovski, 2011; Brunnermeier and Oehmke, 2013).

We aim to reconcile the viewpoint of Cetorelli and Goldberg (2012) with previous findings of funding structure by exploring in detail local funding. For this, by using macro-level information on the internal funds of internationally active U.S. banks from 2006 to 2013, we investigate whether parent banks use affiliates' local deposits as an internal liquidity support measure to manage a liquidity shock. In addition, we introduce two factors associated with capital movement that could be important causes of the different intra-bank capital flows across host countries. That is, we use the variation in financial liberalization (a host country's ability to transfer capital or regulation channel) and variation in liquidity constraints (an affiliate's ability to transfer capital or liquidity channel) apart from a bank's efforts to manage liquidity via internal capital markets (a parent bank's willingness to transfer capital). Therefore, our strategy aims to shed

light on the relationship among financial liberalization, liquidity constraints, and local funding in the propagation of systemic shocks.

Our findings contribute to the banking literature in three main ways. First, we extend the empirical analysis of Cetorelli and Goldberg (2012)[1] by focusing on affiliates' liability structure. While confirming their findings that important funding markets can exist from the perspective of parent banks, we show that affiliates' high reliance on local deposit funding may not be necessarily correlated with internal capital outflows. In contrast to their study, we demonstrate that local funding locations can be identified as "core funding locations"[2] when two conditions for shock transmission are satisfied.

More specifically, cross-border internal capital outflows from local funding locations are determined by the financial liberalization of host countries and liquidity constraints of foreign affiliates during a crisis. This is interpreted as suggesting that the more financially liberalized and lower liquidity constrained a parent bank, the more feasible it would be for it to retrench locally generated resources via internal capital markets. Financial liberalization tends to stimulate capital inflows, thereby increasing competition in the banking sector (Delis, 2012) and decreasing affiliates' risk-adjusted returns, which provides an incentive for parent banks to divert foreign affiliates' resources abroad. Moreover, parent banks can use their internal funds in financially liberalized host countries because of the existence of active internal capital markets (Jeon, Olivero, and Wu, 2013). Further, liquidity-constrained banks refuse a loan since they have less of the needed cushion

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1) Cetorelli and Goldberg (2012) use a data set drawn from the quarterly Federal Financial Institutions Examination Council (FFIEC 009).While using the same data source, in contrast to their study and owing to data availability, we aggregate values by country across the foreign affiliates of all U.S. banks in the host country by using information on individual foreign affiliates.
2) Cetorelli and Goldberg (2012) regard the countries where foreign affiliates of U.S. banks fund their operations largely through local liabilities as "core funding markets" and show that the resources acquired in such funding markets can be transferred to cross-border affiliates or to parent banks.

to protect themselves against a sudden recall of depositors and other creditors while continuing to fund growth (Aggeler and Feldman, 1998). In practice, globally active banks therefore tend to allocate excess liquidity to their liquidity-constrained parties, causing capital outflows from liquidity-unconstrained affiliates.

Second, our findings shed new light on the "flight to quality effect" (Lang and Nakamura, 1995; Bernanke, Gertler, and Gilchrist, 1996) and "flight home effect" (Giannetti and Laeven, 2012). If the flight to quality effect had dominated when parent banks faced negative shocks in their home country, we would have found that internal fund outflows are larger for low quality affiliates that have more volatile cross-border funding. However, we find that local funding affiliates act as funding sources, probably because of the stability of local deposits stemming from the low uncertainty in persistent availability. Further, our findings coexist with the flight home effect in that banks rebalance their portfolios away from foreign borrowers, while they are distinct in that developed countries play a more important role as a "core funding location" than emerging economies.[3]

Third, our study complements that of Schnabl (2012), who finds that foreign affiliates can increase borrowing from parent banks relative to borrowing from international banks that do not have equity holding in them after the Russian default. On the contrary, we find that affiliates can lend their local deposits to overseas parent banks after the Lehman collapse, causing capital outflows. Taken together, internal capital markets can be beneficial to cross-border funding locations, but harmful to core funding locations during the crisis.

The rest of this paper is organized as follows. In the next two sections, we review the existing empirical evidence and formulate our hypotheses.

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3) The flight home effect suggests that parent banks reallocate capital towards home countries from foreign borrowers in advanced and emerging markets alike following a crisis at home.

Section 4 explains the empirical methodology and describes the data. Section 5 presents the empirical findings on the flow of internal funds and the results of the robustness tests. Section 6 concludes.

Ⅱ. Related Literature

1. Local Deposit Funding and Internal Capital Flows

Access to wholesale funding might be either prohibitively expensive or even impossible when either individual banks or the banking system as a whole is in distress. As a result, banks that make greater use of non-deposit funding reduce domestic and cross-border credit during times of financial stress (Iyer, Lopes, Peydró, and Schoar, 2010; Cetorelli and Goldberg, 2011; Cornett, McNutt, Strahan, and Tehranian, 2011; Schnabl, 2012; De Haas and Lelyveld, 2014). Furthermore, wholesale funding- dependent banks are more often financially distressed (Čihák and Poghosyan, 2009), and these have been shown to have experienced a worse stock price performance when Lehman Brothers collapsed (Raddatz, 2010) as well as during the crisis in general (Beltratti and Stulz, 2012).

In contrast to wholesale funding, deposit supply tends to increase even in adverse times owing to investors' desire to divert away from the ambiguity of wholesale funding into implicit or explicit protection by deposit insurance. This persistent supply of deposits prevents the costs of financing from increasing at a fast pace in times of crisis (Bruche and Suarez, 2010). Consequently, banks chose to adjust retail deposit volumes upward following the failure of Lehman Brothers (Craig and Dinger, 2013), while downgraded banks increased their use of deposits (Demirgüç-Kunt and Huizinga, 2010).

Most importantly, parent banks can benefit from funding diversification

across both countries and sources in terms of counterbalancing the effect of capital shortage in the home country and reducing the sensitivity of domestic lending to global economic shocks. By contrast, parent banks without a variety of funding sources cannot offset increased funding pressure in the event of adverse economic shocks. Hence, tight liquidity conditions may reduce domestic lending by parent banks that rely on wholesale funding in interbank markets. For parents with deposits in other countries, however, a higher increase in repatriation from their subsidiaries alleviates the adverse effect of a rating downgrade on domestic lending (Karam, Merrouche, Souissi, and Turk, 2014).

Given the current state of the banking literature, research on the motives and determinants of a parent bank's choice for affiliates' local deposits is limited. However, the factors that make local funding locations function as funding sources can be understood from the perspective of funding diversification. In particular, to the extent that parent banks are more exposed to wholesale funding, they will strive to shift their funding mix towards shock-insensitive funding. Thus, they may resort to local deposit funding affiliates that depend on safer and less opaque deposits.

＜Figure 1(a)＞ shows that parent banks have been drawing local deposits from local funding locations[4] since the crisis in order to channel liquidity to home countries. Consequently, those locations in a position to support their parent banks are unlikely to sustain lending to the real economy in host countries. ＜Figure 1(b)＞ shows that total liabilities fell more

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4) We refer to a country where foreign affiliates largely fund their operations through local deposits as a "local funding location." Because this location is more successful at collecting deposits, affiliates have the potential to support their home market activities by increasing internal loans to their parent banks. Our country-level data allow the term "local funding location" to be used interchangeably with "local funding affiliate," although strictly speaking these terms are distinct. Local funding location refers to the country where foreign affiliates rely more on local deposits, while a local funding affiliate has more reliance on local deposits. For example, in the case that the foreign affiliates in South Korea are financed by local deposits, parent banks may identify South Korea as local funding location and its affiliates in South Korea as local funding affiliates. In the country-level data, the demarcation between host country and foreign affiliates therefore is blurred from the perspective of the parent bank.

<Figure 1> Intrabank Position of U.S. Banks

⟨Figure 1(a)⟩ illustrates the net internal position of U.S. foreign affiliates vis- -vis the rest of the banking organizations. The internal position of *Local Funding Location* is computed as the sum of net due to (from) countries with foreign affiliates that have high reliance on local liabilities (countries with an above median ratio of local liabilities to total liabilities for foreign affiliates). The internal position of *Cross-border Funding Location* is computed as the sum of net due to (from) countries with foreign affiliates that have low reliance on local liabilities (countries with a below median ratio of local liabilities to total liabilities for foreign affiliates). ⟨Figure 1(b)⟩ shows the growth in the total liabilities of local funding locations and cross-border funding locations from 2006Q1 to 2010Q4. The total liabilities of local funding (cross-border) location are computed as the sum of the total liabilities of countries where foreign affiliates show high (low) reliance on local liabilities. The data used to construct the figure were obtained from FFIEC 009.

(a) Local and cross-border funding location

(b) Total liabilities of foreign affiliates
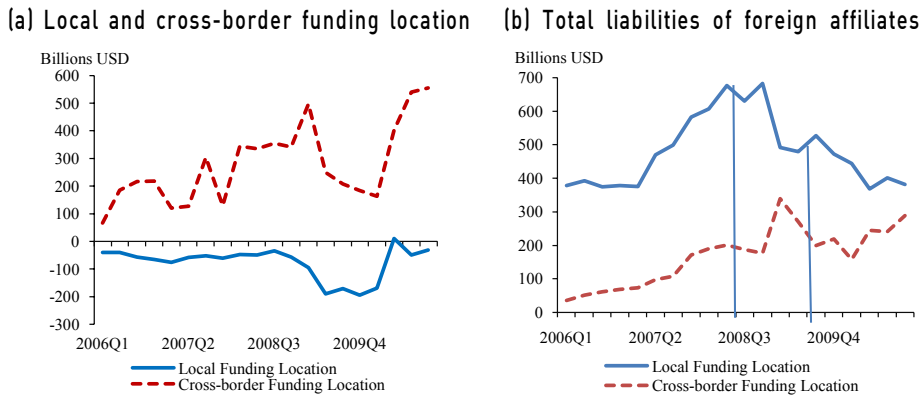
in affiliates largely funded by local deposits and less in affiliates more exposed to cross-border intrabank funding during the global financial crisis. Paradoxically, local deposit funding may not stabilize affiliates' funding, but rather lead to funding problems. However, if foreign affiliates that rely heavily on local deposit financing serve as a funding source in the context of the group's overall strategy, it should come as little surprise that such affiliates decrease their liabilities.

During the global crisis, the stable lending of shareholders in the home country came at the expense of local funding affiliates' creditors and debtors.[5]

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5) Foreign affiliates offered great protection to local depositors based on the support provided by parent banks' capital during the local crisis. In this respect, foreign affiliates' funders may benefit from the free flow of liquidity and capital within the organization as well as from parent banks' support when the local economy is hit by a negative shock. If a subsidiary of a foreign financial institution fails, it is assumed that to maintain its reputation the parent bank will assure the solvency of the subsidiary. Anecdotal evidence suggests that during the 2003 crisis

More specifically, the high risk of the homeward flows of their deposits or local resources may indicate that a foreign affiliate has insufficient liquidity to cover any needs. Therefore, affiliates' depositors and other creditors in the host country carry risk that may be adversely affected by parent banks' liquidity shocks. In addition to these costs of affiliates' funders, affiliates' reduced credit tends to result in worse financial intermediation and the value of financial institutions deteriorating. Further, reduced credit may in turn result in firm closures, reduced consumption, lower aggregate demand, and higher unemployment in the host country (Fisher, 1933; Bernanke, 1983).

2. Financial Regulation and Capital Flows

Our discussion on the association between internal capital outflows and financial liberalization is based on two pillars. One pillar is associated with theories emphasizing the risk of and return on private investment and the related portfolio decisions of parent banks from the perspective of the banking group. According to these theories, parent banks may have incentives to draw their internal funds from a specific host country when risk-adjusted returns are relatively low. We argue that, at least potentially, financial liberalization influences risk-adjusted returns on private investments. Financial liberalization may stimulate capital inflows, which increases the competition in the banking sector (Delis, 2012). On the one hand, this high competition places pressure on the profit margins of banks, leading to lower returns in the host country.[6] On the other hand, the reduction

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of Norwegian banks, Nordea Norway, although hit by significant losses (accounting for 1.17% of its gross lending in 2003), was able to limit the reduction of its capital by borrowing from the Nordea Group. Similarly, in Hungary, when the brokerage subsidiaries of foreign banks suffered large losses in the aftermath of the Russian crisis, head offices quickly injected capital (IMF, 2000).

6) In practice, when all banks are simultaneously hit by an identical shock, parent banks may find it difficult to unwind the assets held through their affiliates based exclusively on the return in a specific host country because there may be little difference in returns across them. Therefore, the activities of global banks may be inherently more oriented towards risk factors.

in profit margins increases the fragility of financial institutions, as it makes them take risks in order to try to remain being profitable. Empirical analyses conclude that liberalization is followed by financial crises and that during the recent crisis, financially open economies experienced larger output losses[7] (Demirgüç-Kunt and Detragiache, 2001; Noy, 2004; Ranciere, Tornell, and Westermann, 2006; Iftikhar, 2015).

The second pillar stresses the importance of restrictions on internal capital flows. Here we focus on the existence or absence of formal barriers that allow these parentbanks to allocate their wealth across host countries. Financial liberalization may influence the extent to which formal barriers to cross-border internal capital flows are in place. In other words, in host countries that are more financially open, internal capital can move more easily from foreign affiliates to their parent banks, indicating financial openness and strengthening the operation of internal capital markets (Jeon et al., 2013). In this respect, financial liberalization may have been a driver of internal capital outflows during the crisis. By contrast, although they have high access to local funding, foreign affiliates in less liberalized economies cannot be expected to lend more funds to parent banks or other subsidiaries faced with an adverse shock.

3. Financial Constraints and Capital Flows

Bank liquidity is the ability of the bank to fund increasing assets and meet obligations when due, without incurring unacceptable losses (Bessis, 2009). Liquidity-constrained banks will be reluctant to take out new loans

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7) Unlike the case of returns, given the ambiguity, analyzing the relationship between financial liberalization and investment risk becomes an empirical question. For example, investors may see financial liberalization as a credible signal of government's commitment to sound economic management (Obstfeld, 1998; Stiglitz, 2000). The expected improvement of domestic policies reduces the risk of investing in more liberalized host countries (i.e., it reduces the incentives for internal capital outflows Moreover, earlier studies show that liberalization carries risks which are magnified when countries have yet to attain sufficient levels of financial and institutional development.

because more lending can bring about liquidity risk. The literature on the bank lending channel demonstrates the influence of parent banks' liquidity on the activities of their affiliates (Houston, James, and Marcus, 1997; Campello, 2002). Likewise, to better understand whether affiliates channel financial resources towards parent banks during a crisis, we take into account affiliates' liquidity condition.

The loan-to-deposit (LTD) ratio has been widely used to proxy for bank liquidity in the academic literature. Here, the lower the LTD ratio, the more able a bank is to cover unforeseen needs and meet any additional loan demands (Shen, Xu, and Bai, 2009). For example, some studies investigate the link between liquidity ratios and stress, by using the LTD ratio as an indicator of liquidity problems in banks (Le Leslé, 2012; Betz, Oprică, Peltonen, and Sarlin, 2013). Moore (2010) employs the LTD ratio to assess liquidity trends before, during, and after the global financial crisis. According to World Bank, rising LTD ratios mean tightening liquidity for the banking system. Hence, the significant decrease in LTD ratios in the United States since 2009 confirms that most U.S. banks are highly liquid. Similarly, U.S. banks and bank supervisors have used the LTD ratio as a key indicator signaling liquidity problems in banks.[8] Moreover, as the LTD ratio reflects the reliance of foreign affiliates on financial leverage, it may also be considered to be an indicator of liquidity risk. When the LTD ratio is above 1, a bank is considered to be engaging in pure liquidity

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8) The analysis of the structure of the balance sheet such as the LTD ratio or funding gap provides a broad characterization of the main liquidity risk of banks. Most banks would prefer to fund their loans with core deposits, which are less likely to be withdrawn unexpectedly and hence provide a stable funding base for loans. Consistent with this, the bank's funding gap is defined as follows: *Funding gap = Loans-Core Deposits*. In the short run, banks must bridge the funding gap with short-term borrowings or by selling liquid assets. These temporary fixes create an imbalance in short-term assets and short-term liabilities and this imbalance is simply an alternative way of defining the funding gap: *Funding gap = Short-term borrowing-Liquid assets*. By rearranging both terms, an instructive expression for the LTD ratio can be derived: *LTD ratio = 1+(Short-term borrowing-Liquid assets)/ Deposits* (DeYoung and Jang, 2015). From this straightforward analysis, we find that the LTD ratio is positively related to (Short-term borrowing-Liquid assets). Therefore, LTD ratios can proxy for liquidity constraints. Indeed, the higher the amount of liquid assets relative to short-term borrowing, the lower is the LTD ratio and thus the more excess liquidity banks have.

risk in the short-term (DeYoung and Jang, 2015). Therefore, the funding liquidity risk of foreign affiliates during a global crisis prevents them from lending to parent banks.

Existing literatures offer the evidence that the LTD ratio conveys useful information on the liquidity of banks. Based on a survey of U.S. banks, Aggeler and Feldman (1998) find that the higher the LTD ratio the more likely a bank is to refuse a loan because of liquidity constraints. In other words, banks do not use all these deposits to make loans but rather keep some funds available for withdrawals. Indeed, the yargue that although the liquidity of a bank can be evaluated by using a host of tools and techniques, the LTD ratio remains the measure of balance sheet liquidity that continues to receive the most attention. Berg (2012) further explains the loans-deposits relationship in the context of the financial flow model. According to the model, deposits can create loans since an increase in deposit funding improves the liquidity position of banks and thereby their room to extend loans. Gatev and Strahan (2006) report the LTD ratio can serve as an appropriate measure of bank liquidity, irrespective of business cycle-related fluctuations because deposit withdrawals and loan facility take downs are not positively correlated over the business cycle.

There can be various reasons for the existence of a relationship between local claims and local liabilities. First, such a relationship depends on the expected return in local markets stemming from the structure of the economy and financial system. If foreign affiliates invest actively in host countries with high expected returns and deplete their resources, they reduce their overall ability to lend to parent banks or other related affiliates. On the contrary, if the expected profitability of foreign affiliates falls during an idiosyncratic shock, global banks would intend to curtail investments in that country. Therefore, a lower ratio of local claims to local liabilities

may suggest that global banks reallocate excess funds towards parties with better investment opportunities in the banking group.

For instance, a decrease in this ratio may become more drastic in an environment of very low interest rates driven by economic recession in the host country. Despite a decrease in loan demand, as deposit rates are nominally fixed and independent of interest rates, deposits increase when interest rates are low. In this situation, foreign affiliates tend to collect more deposits than is optimal in terms of the ex-post realization of the loan volume and thus can lend the idle funds to the interbank markets only at a rate lower than the loan interest rate. This unattractiveness of interbank lending may make foreign affiliates find it more efficient to transfer excess deposits to their parent banks in order to avail them for other members of the banking group that have better investment prospects (Houston et al., 1997; Campello, 2002; Ashcraft, 2008).

Second, the relationship depends on the banking group business model. For example, if foreign banks expand into the most liquid market such as international financial centers, their motivation might be based on U.S. dollar funding needs. In such cases, foreign affiliates would be reluctant to increase local claims relative to their own local liabilities in order to leave room to transfer local funds to the headquarters. That is, an affiliate with a low ratio of local claims to local liabilities is likely to function as a core funding location.

Third, the ratio of local claims to local liabilities is affected by the strength of internal capital markets. In previous studies, a high LTD ratio for a foreign subsidiary has been considered to be an indicator of the strong operation of internal capital markets (Havrylchyk and Juryk, 2006). Jeon et al. (2013) also provide evidence that when parent banks can not lend financial support, the subsidiaries with high LTD ratios will be more

vulnerable to the transmission of financial shocks. Despite strong internal capital markets, however, foreign affiliates engaged in excessive credit activity relative to their deposits are not expected to support parent banks, because of their low liquidity.

Ⅲ. Hypothesis Development

International market integration and the existence of internal capital markets in globally active banks result in the transmission of shocks. Studies that examine the effects of the internal capital market and explain capital flows have not suggested a simple theoretical prediction of the relationship between local funding and the likelihood of capital outflows. Nevertheless, hypotheses can be formulated based on the arguments we expect to have the greatest weights.

The dominant view in the empirical literature is that global banks rebalance their portfolios towards higher quality borrowers when faced with negative shocks. In other words, when their home country experiences a banking crisis, international lenders may retract disproportionally from affiliates with higher credit risk or host countries with weaker creditor protection. Bernanke et al. (1996) and Lang and Nakamura (1995), for example, argue that during recessions, the share of credit flowing to borrowers with more severe asymmetric information and agency problems decreases.

The main argument contradicting the idea of more lending flowing to high quality borrowers is that borrowers might be more efficient if the lenders in the same group are more stable (so-called "high quality lenders"). De Haas and Lelyveld (2014) show that the smaller the extent to which parent banks fund themselves in the wholesale market, the less their

subsidiaries contract credit in the host country. Although the direction in which to operate an internal capital market is the opposite, we can conjecture that the larger the extent to which affiliates fund themselves in the local market, the less their parent banks contract credit in the home country. Foreign affiliates using local deposits are less likely to suffer funding problems and more likely to extend credit to the parent bank. On these grounds the following hypothesis can be formulated in terms of internal capital markets and stable local deposits during a global crisis:

H1: (Parent bank's willingness to transfer capital) *The higher the share of local deposit funding, the more is the host country's capital outflow in times of crisis.*

Hypothesis 1 implies that parent banks have strong willingness to be supported by local funding locations because of their stability. One weakness of this hypothesis is that it does not distinguish between a parent bank's willingness and a host country's ability to transfer internal capital. Given local funding locations, the capital outflows may be limited by the characteristics of both host country and foreign affiliates. To scrutinize the causes of the disparity between core and non-core funding locations, we formulate two hypotheses about the conditions for the international transmission of a global financial crisis to a local funding location.

While financial liberalization and liquidity constraints can influence the likelihood of internal capital outflows, they are also likely to interact with local funding locations. That is, we expect financial liberalization and liquidity constraints to provide feasibilities to repatriate internal funds from local funding locations. In the regressions, therefore, we simultaneously consider local funding, financial liberalization, and liquidity constraints.

<Figure 2> Local Funding Locations, Financial Reforms, and Liquidity Constraints

This figure shows the net internal position of U.S. foreign affiliates vis- -vis the rest of the banking. In (a), local funding locations are divided into high financial reform and low financial reform countries. The internal position of high financial reform countries is computed as the sum of net due to (from) more financially liberalized countries (countries with an above median ratio for the financial reform index). In (b), local funding locations are divided into liquidity-unconstrained and liquidity-constrained affiliates. The internal position of liquidity-unconstrained affiliates is computed as the sum of net due to (from) countries with foreign affiliates that do not have liquidity constraints (countries with a below median ratio for local claims to local liabilities of foreign affiliates). Authors' calculations based on data from FFIEC 009 and Abiad, Detragiache, and Tressel (2010).

(a) Local funding and financial reforms

(b) Local funding and liquidity constraints

Liquidity-unconstrained Affiliates (Local Funding Location)
Liquidity-constrained Affiliates (Local Funding Location)

High Financial Reform Countries (Local Funding Location)
Low Financial Reform Countries (Local Funding Location)
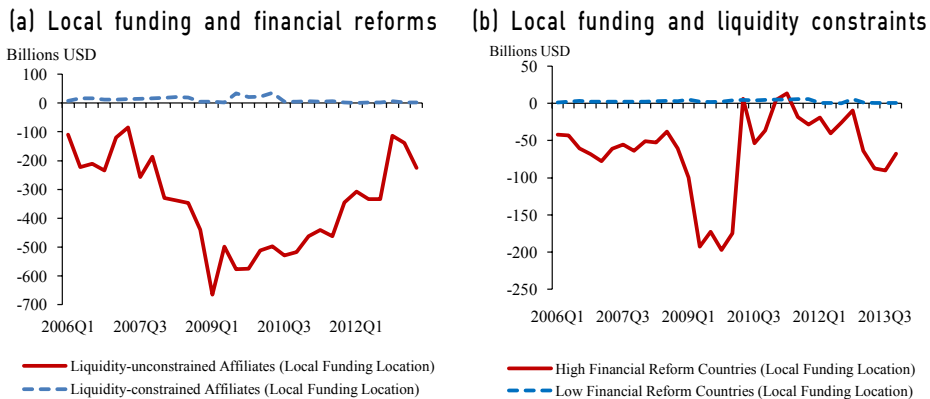
<Figure 2(a)> and <Figure 2(b)> show high and low financial reform countries and liquidity-constrained and -unconstrained foreign affiliates in local funding locations, respectively. Local funding locations with high financial reform and with no liquidity constraints remain in a negative intrabank position. Therefore, they are likely to support parent banks through internal capital markets during a global financial crisis. Hypothesis 2 can beformulated with respect to the interaction between financial liberalization and local funding:

H2: (Host country's ability to transfer capital) *Higher financial liberalization in a host country is expected to strengthen the positive relationship between local funding locations and the occurrence of capital outflows in times of crisis.*

The third hypothesis involves transferring liquidity between banking markets to take advantage of the differences in the balance between loan demand and deposit supply in each market. Less attention has been paid in the literature to our alternative explanation of the ability to transfer internal capital. Given the integration of global financial markets, in practice, banks play a more significant role in the intermediation of cross-border liquidity transfers. This enables those banks to originate assets and liabilities in different markets. Liquidity transfer works in both directions. For example, in markets where liquidity is strong, the excess liquidity generated from a strong local deposit-gathering affiliate can be deployed to buy or finance attractive overseas assets. In markets where liquidity is weak, the opportunity lies in developing stronger sources of offshore funding.

Foreign affiliates with low LTD ratios and domestic loan growth have the potential to be best-placed to export their liquidity to the related parties. In this context, liquidity-unconstrained affiliates are expected to provide financial resources to their crisis-hit parent banks abroad. Conversely, there is less flexibility to move funds out of liquidity-constrained affiliates because of weak liquidity position. Thus,

> H3: (Foreign affiliates' ability to transfer capital) *Higher liquidity constraints in a foreign affiliate are expected to weaken the positive relationship between local funding locations and the occurrence of capital outflows in times of crisis.*

These three hypotheses are tested for the entire sample of 66 countries as well as for each country group separately, since developed countries and emerging markets have different characteristics in terms of financial development and capital mobility. We expect the effects of foreign affiliates' local funding on capital outflows to be stronger for developed countries.

Generally, these countries have higher financial liberalization and relatively low liquidity constraints. Unlike in developed markets where lower loan growth rates and high savings rates create excess liquidity, rapidly growing emerging markets characterized by growth in lending volumes in excess of GDP growth combined with lower savings ratios suffer major liquidity constraints. Moreover, as infrastructure investment continues to expand in emerging countries, together with consumption growth and a stronger consumer credit culture, liquidity constraints are likely to persist and increase. These differences between the country groups are also expected to determine the effects of local funding share on internal capital outflows.

IV. Methodology and Data Description

1. Methodology

We start by investigating whether the effects of crisis-related liquidity shocks on capital outflows from foreign affiliates are stronger for local funding locations than for cross-border funding locations. This stems from the assumption that local funding locations are a prerequisite to becoming an important funding source for global banks. To test this, we include interaction terms between *Local (Cross-border) Funding* and *Global Crisis* in the regression. The model for our analysis can be specified as below:

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\begin{aligned}
\Delta NetDueTo_{it} = {}& \beta_0 + \beta_1 \cdot Local\ Funding_{it} \cdot Global\ Crisis_t \\
& + \beta_2 \cdot Cross\text{-}border\ Funding_{it} \cdot Global\ Crisis_t \\
& + \beta_3 \cdot Local\ Funding_{it} + \beta_4 \cdot Macro_{it} + \beta_5 \cdot Parents_t \\
& + \beta_6 \cdot Affiliates_{it} + \epsilon_{it}
\end{aligned}
$$

where $\triangle etDueTo_{it}$ is the quarterly change (first difference) in the net intrabank funding positions of all foreign affiliates of U.S. banks[9] in host country i vis-à-vis the rest of the banking organization in quarter t *Local Funding$_{it}$* is a dummy variable that takes the value of one if the ratio of locally raised funds to the total liabilities of all affiliates of U.S. banks in country i in quarter t is above the sample median and zero otherwise *Cross-border Funding$_{it}$* is a dummy variable that takes the value of one if the ratio of locally raised funds to the total liabilities of all affiliates of U.S. banks in country i in quarter t is below the sample median and zero otherwise; *Global Crisis$_t$* is a dummy variable that takes the value of one if the markets dried up following the Lehman bankruptcy (i.e., 2008Q3 to 2009Q2) *Macro$_{it}$* is a vector of country i's characteristics (*kaopen$_{it}$*, and *extrate$_{it}$*); *Parents$_t$* is a vector of aggregated U.S. banks' characteristics (*TotalAsset$_t$*, *Liquidity$_t$*, *Solvency$_t$*, and *Herfindahl$_t$*); and *Affiliates$_{it}$* is a vector of the indicators associated with the foreign affiliates of U.S. banks in country i (*TotalLocalLiabilities$_{it}$* and *ShortMaturityClaims$_{it}$*).

We conjecture that the potential impact of affiliates' local funding on intrabank capital outflows from the host country depends on two factors: the regulation channel and the liquidity channel. For instance, the evidence that the capital outflow is stronger for affiliates with low liquidity constraints and high financial reforms provides support for the existence of liquidity and regulation channel, respectively. To show this explicitly, we divide the countries into four subsamples according to these factors. This suggests a 2×2 matrix consisting of the four combinations of the two levels of financial reforms (i.e., high financial reforms and low financial reforms) and two levels of liquidity constraints (i.e., high liquidity constraints and

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9) Here, U.S. banks represent all legal entities in the United States regardless of whether these are U.S.-owned or foreign-owned. However, because U.S.-owned banks account for more than 70%, we consider U.S. banks to be parent banks and calculate the value of the related variables.

low liquidity constraints).[10]

As for the regression technique, to allow for time-invariant and unobserved factors that drive cross-country differences in internal capital flows, we use a fixed effects model[11] with clustered standard errors at the country level. To avoid endogeneity, the independent variables are lagged by one quarter. Our sample consists of 20 developed and 46 emerging countries. Further, to reduce the effects of outliers, the distribution of the dependent variable in each regression is winsorized at the 1st and 99th percentiles.

2. Data Description

Our main source of information is the quarterly regulatory filings of internationally active banks in the United States for 2006Q1 to 2013Q4.[12] By using FFIEC 009, U.S. chartered banks are required to report the internal positions of each country in the world in each quarter. In the E.16 report "Country Exposure Lending Survey," the data available to us are aggregated information by host country on both foreign affiliates' net internal funding positions and their local liabilities.

From these quarterly filings, we obtain the cross-border internal funding positions: net due from the parent bank to its foreign affiliates. As this position is required to report the net liability position, a negative (positive) number represents that foreign affiliates are net internal lenders (borrowers) to the rest of their banking organizations. Our data show that in emerging

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10) We label these four groups Group HH, Group HL, Group LH, and Group LL Group HH: Financial reform index ≥ median and Local claims/Local liabilities ≥ median, Group HL: Financial reform index ≥ median and Local claims/Local liabilities < median, Group LH: Financial reform index < median and Local claims/Local liabilities ≥ median, and Group LL: Financial reform index < median and Local claims/Local liabilities < median.

11) According to Cetorelli and Goldberg (2012), we used panel-corrected standard errors to include controls for the geographical distance between the United States and the capital cities in the host countries. This econometric methodology does not significantly change the economic and statistical significance of any of the fixed effects results. The results are available upon request.

12) The major change in the reporting requirements on internal funding positions restricts our sample to start from 2006Q1.

economies, the amounts that foreign affiliates borrow from their parent banks increased between the period before and the period after the crisis. However, this pattern is not consistent with foreign affiliates in developed economies, which became subordinated to head office needs in 2008~2009. In offshore financial centers, the funds collected domestically are mainly used as funding flows to parent banks. In fact, the exploration of this cross-country variation is at the very core of the analysis pursued in our study.

To determine whether a host country is assessed as a local funding location from the standpoint of the parent bank, we calculate the ratio of the local liabilities to total liabilities of affiliates by using data from the FFIEC 009 quarterly filings. We also use some of the same data sources to construct the variable for affiliates' liquidity constraints. The financial reform data from the "New Database of Financial Reforms" developed by Abiad et al. (2010) are based on seven highly inter-correlated dimensions.

The control variables are similar to those in Cetorelli and Goldberg (2012). We include each host country's characteristics such as exchange rate regime from Ilzetski, Reinhart, and Rogoff (2009, 2011) and capital account openness from Chin and Ito (2013). We obtain data on all U.S. banks'characteristics such as total asset size, the ratio of liquid assets to total assets, the ratio of total equity to total assets, and a Herfindahl measure of the bank's foreign claims across countries from the FFIEC 031 reports. As for foreign affiliates, from the FFIEC 009 reports, total local liabilities are calculated as the sum of foreign affiliates' liabilitiesin the non-local currency and the local currency. Short maturity claims are the claims of remaining maturity up to and including one year. <Table A1> in the Appendix reports the summary statistics for the variables used in the regressions. The descriptions and sources of variables are in <Table A2> in the Appendix.

Ⅴ. Empirical Results

1. Internal Capital Flows

  We investigate whether the activation of internal liquidity support measures during the global financial crisis was confined to specific local funding locations paying attention to financial liberalization and liquidity constraints. <Table 1> shows the results of this analysis for the full sample (column (1)) and the four subsamples (columns (2) to (5)).

  As shown in column (1), we find that internal capital outflows occurred significantly during the global crisis in local funding locations, whereas this outflow was not significant for cross-border funding locations. This finding implies that parent banks, being more vulnerable to negative liquidity shocks, will tap into deposit funding affiliates with less exposure to this liquidity risk and repatriate their funds. In the context of the group's overall strategy, it is reasonable that less affected, more stable foreign affiliates are in a position to support their parent banks and run down their liquidity buffers. Consequently, parent banks them selves might partially stabilize lending in their home country at the expense of exacerbating affiliates' vulnerability to international liquidity shortages. For this reason, foreign affiliates' local funding can be identified as a potential shock transmission mechanism. This finding is not in line with the finding by Düwel and Frey (2012) showing that affiliates of German banks with a reliance on intrabank funding had to cut back their lending after the default of Lehman Brothers.

  To assess which countries experience capital outflows when the liquidity dry-up severely impaired interbank markets, we run four subsamples. In columns (2) to (5), we divide the sample at the median according to whether host countries are financially liberalized and whether foreign affiliates are

\<Table 1\> The Influence of Local Funding on Internal Capital Flows

This table reports the fixed effects regressions of the quarterly change in internal capital positions. In columns (2)~(5), we divide the sample of countries into four groups: 1) Group HH: more financially liberalized countries with liquidity−constrained foreign affiliates, 2) Group HL: more financially liberalized countries with liquidity−unconstrained foreign affiliates, 3) Group LH: less financially liberalized countries with liquidity−constrained foreign affiliates, and 4) Group LL: less financially liberalized countries with liquidity−unconstrained foreign affiliates. Standard errors in parentheses are clustered at the host country level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Full sample (1)	Group HH (2)	Group HL (3)	Group LH (4)	Group LL (5)
Global crisis ×Local funding	-2390.323** (1069.173)	1652.446 (1434.565)	-6293.667*** (2160.709)	-6.608 (298.910)	20.386 (139.712)
Global crisis ×Cross-border funding	-1405.256 (1020.856)	24.870 (1017.156)	0.542 (3369.285)	-70.135 (226.222)	-202.492 (271.697)
Local funding	1971.370*** (593.073)	1124.872 (728.027)	2878.465** (1367.897)	72.285 (180.307)	225.851** (110.295)
Kaopen	-15.296 (738.928)	-1160.804 (1427.615)	105.456 (1965.982)	-141.780 (145.474)	-12.118 (132.941)
Exrate Regime	-181.125 (821.455)	171.053 (1633.595)	-1177.116 (2152.296)	-251.912 (321.756)	-45.347 (58.876)
GDP	-1287.915 (1529.354)	-244.758 (2323.360)	-144.302 (4410.775)	546.657 (575.115)	-375.838 (324.756)
Interest rate_Diff	115.997 (99.249)	-97.691 (171.337)	459.807 (402.879)	-1.125 (17.802)	5.960 (8.860)
Exchange rate	-3098.420 (2207.933)	4329.441 (4581.274)	-2.32e+04** (9653.650)	891.879 (1763.531)	558.935 (2178.494)
Total Local Liabilities	-0.010 (0.007)	0.047** (0.022)	-0.034 (0.043)	0.020 (0.023)	0.234*** (0.053)
Short Maturity Claims	-1506.647 (1687.174)	-800.195 (2199.343)	-2271.939 (3550.928)	-88.366 (486.997)	-67.716 (284.481)
Total Asset	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	-0.000** (0.000)	0.000 (0.000)
Solvency	35175.44 (61531.779)	-4.00E+04 (74976.516)	-1.95E+04 (150000.000)	68.348 (15681.139)	-257.988 (9449.624)
Liquidity	-2.56E+04 (25475.997)	-1.51E+04 (29923.376)	3975.828 (56732.132)	3497.537 (6072.830)	2874.465 (3794.528)
Herfindahl	1854.78 (1926.846)	2.98E+02 (2176.306)	5.44E+03 (4377.878)	542.381 (483.040)	-3.593 (300.809)
Constant	17016.048 (16188.110)	9859.962 (24398.853)	13984.327 (45296.939)	-4523.346 (5310.784)	2039.528 (2709.637)
R-squared	0.01	0.03	0.04	0.04	0.18
Observations	1925	506	551	467	143
No. of groups	66	31	31	19	12

liquidity constrained. The coefficient on the interaction term between local funding and the global crisis for Group HL (column (3)) differs appreciably from those for the other groups. Therefore, if we do not separate the samples as shown in column (1), the overall patterns in internal funding dynamics can bias the results towards the existence of a "core funding market" in all countries.

Specifically, we find a significantly negative coefficient on the interaction term only for affiliates that have low liquidity constraints in more financially liberalized countries. This finding suggests that as affiliates with low liquidity constraints have surplus liquidity, they can support parent banks more actively when there is a financial crisis at home, which proves the existence of a liquidity channel. Further, only when a host country is liberalized and deregulated in the financial sector does an increase in affiliates' ex-ante ratio of local liabilities to total liabilities cause repatriation during the shock period. Put another way, capital outflows occur through the regulation channel.

On the contrary, except for column (3), we do not find convincing evidence that local funding affiliates act as liquidity providers to their parent banks in conjunction with a shock. This suggests that foreign affiliates' local deposits matter in explaining how liquidity providers activate under specific conditions in response to global shocks. For example, other affiliates with low liquidity constraints in less financially liberalized countries do not experience internal capital outflows (column (5)), while the coefficients on affiliates with high liquidity constraints are insignificant irrespective of the financial reforms (columns (2) and (4)). Taken together, neither an exclusive regulation nor an exclusive liquidity channel is likely to change positions from local funding locations to core funding locations.

Our finding is interesting because it might be taken as evidence against

Cetorelli and Goldberg (2012), who report that all local funding locations would send even larger net flows to parent banks in times of parent balance sheet disturbances, namely core funding locations. However, based on our results, we identify Group HL as a core funding location and the others as non-core funding locations. This inconsistency with their findings may stem from the fact that when assessing the effects of local funding, they could not allow for various types of country heterogeneity.

We conclude that internal capital outflows and domestic financial instability in local funding locations, especially in times of financial stress, may be caused by a combination of local funding with other country-specific (financial liberalization) and affiliate-specific (liquidity constraints) factors rather than a certain value of local funding perse. That is, the severity of the shock transmission in local funding locations depends on the characteristics of the host country and of the foreign affiliate. Given the similarity in local funding locations, the difference in internal capital flows between core and non-core funding locations is manifest.[13] Core funding locations may thus be net payers of funding support to the head office. During periods of low market liquidity, parent banks protect themselves by hoarding liquidity to the detriment of their affiliates in core funding locations.

Overall, pre-crisis local funding could be the main factor in destabilizing capital flows, where both financial systems are fully liberalized and affiliates have sufficient liquidity. Conversely, if these conditions are not satisfied simultaneously, it is unclear why a local funding location would play an important role in internal capital outflows during the global financial crisis. In this respect, the benefits of local funding can be achieved without the cost of capital outflows if either high liquidity constraints or low

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13) We divided local funding locations into core and non-core funding locations based on the factors of financial liberalization and liquidity constraints.

financial liberalization is in place. In a study of 81 emerging countries during 1995~2009, Lee and Park (2015) find that countries where subsidiaries rely more on local deposits are immune to global financial crisis, although subsidiaries' cross-border borrowing may exacerbate the transmission of the systemic shock. Therefore, the destabilizing role of affiliates' local funding in internal capital flows during the financial crisis should not be hastily generalized.

2. Internal Capital Flows in Emerging Economies

In this section, we present a subsample analysis in the same manner as in the previous section to test whether local funding affiliates both in developed and in emerging economies can play key roles in supporting parent banks. <Table 2> shows that during the crisis, the liquidity risk management by parent banks led to greater outflows from core funding locations in emerging economies (column (2)).[14] By contrast, the interaction terms of global crisis and cross-border funding are insignificant. Hence, there is little evidence that the deleveraging by major global banks after the Lehman collapse led to unexpectedly sharp reversals of the earlier inflows to emerging economies.

In columns (5) and (6), we divide the developed economies sample intohigh liquidity constraints and low liquidity constraints.[15] As a result, the effect of local funding on capital outflows is more predominant in countries with low liquidity constraints than those with high liquidity constraints. We see that the great majority of internal capital is attracted from affiliates

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14) Although we replace the dummy (i.e., local funding and cross-border funding) with continuous local funding variable, the economic or statistical significance of any of these results do not significantly change (regression results are available upon request).

15) We do not capture the effect of financial liberalization to facilitate capital outflows from local funding locations in developed countries because most developed countries have the highest quartile value of the financial reform index.

in developed economies relative to those in emerging economies. These overall patterns in internal funding dynamics may suggest a dominant role of major financial centers in developed countries such as Switzerland, the United Kingdom, Luxembourg, the Netherlands, and Ireland. Although international financial centers have suitable conditions for being core funding locations, we assume that those two things are slightly overlapping rather than identical.

Next, we test whether the effect of foreign affiliates' local funding on internal capital flows during crisis periods varies across regions, by dividing the countries into six location subsamples, These subsamples follow the World Bank country classification: emerging Asia (ASIA),[16] Eastern Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), Middle East and Northern Africa (MENA), Sub-Saharan Africa (SSA), and developed countries. Our empirical finding confirms the existence of two channels through which global liquidity shocks transmit from local funding locations to parent banks.

Further, these results also offer evidence that this effect differs considerably across regions. We find significantly negative coefficients on the interaction terms between *Local Funding* and *Global Crisis* in the ECA subsample during the crisis period (column (8)). We interpret this finding as suggesting that U.S. banks expropriate the capital and liquidity that has been produced locally by their affiliates in Eastern European countries. Therefore, emerging European countries are expected to suffer intra-fund outflows under severe liquidity pressure from parent banks. Indeed, the financial sectors in the countries of emerging Europe collapsed in response to foreign banks' capital outflows despite official efforts. However, this is not the case in general, indicating that although foreign affiliates in emerging economies with the

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16) For ASIA, we combine East Asia and Pacific with South Asia because of the limited number of observations.

exception of ECA are funded primarily thorough local deposits, they are not influenced more by the global financial crisis.

Our finding in the ECA region can be driven by the fact that parent banks retract from emerging countries with a high level of liberalization and low liquidity constraints.[17] The high financial liberalization in ECA may be related to the integrated financial market, particularly the single currency, which enables European banks to benefit from easier and smoother intra-bank capital flows within the EU. In addition, regulatory and monetary integration make parent banks perceive such host countries as an extension of their home markets (Winkler, 2009). Foreign affiliates in the ECA region might keep the ratio of local claims to local liabilities artificially low to provide local deposits with parent banks.

Our finding might appear to intuitively contradict the results on the stabilizing role of foreign affiliates' local funding documented by Kamil and Rai (2011), who show that high reliance on stable local deposits made foreign affiliates in the LAC region more resilient and better prepared to withstand the global financial crisis. Given a high level of local funding (above median ratio), however, the experience of emerging economies is far from uniform.

A possible explanation for this difference is that Kamil and Rai (2011) restrict the sample to the LAC region, where the behavior of foreign banks fundamentally differs from that observed in other regions. Because specific characteristics across countries cannot be captured by their study, one could erroneously interpret the mixed effect as the effect of local funding perse. In fact, the regulations in most LAC countries require that the local affiliates of foreign banks keep both sides of their balance sheets

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17) ECA countries are much more vulnerable than other emerging economies with respect to these two channels. In fact, emerging European countries exhibit the highest financial reform index values and lowest liquidity constraints among the emerging economies in our data.

<Table 2> The Influence of Local Funding on Internal Capital Flows

This table reports the fixed effects regressions of the quarterly change in internal funding positions. In Panel A, we divide emerging and developed countries into subsamples: 1) Group HH: more financially liberalized countries with liquidity–unconstrained foreign affiliates, 2) Group HL: more financially liberalized countries with liquidity–constrained foreign affiliates, 3) Group LH: less financially liberalized countries with liquidity–unconstrained foreign affiliates, and 4) Group LL: less financially liberalized countries with liquidity–constrained foreign affiliates. In Panel B, we subdivide the sample into regional groups based on the World Bank classification: emerging Asia, Eastern Europe and Central Asia, Latin America and the Caribbean, Middle East and Northern Africa, Sub–Saharan Africa, and developed countries. Standard errors in parentheses are clustered at the host country level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Subsample based on two factors						Panel B: Subsample based on region					
	Emerging countries				Developed countries		emerging Asia	Eastern Europe & Cental Asia	Latin America & Caribbean	Middle East & Northern Asia	Sub-Saharan Africa	Developed countries
	Group HH	Group HL	Group LH	Group LL	Group HH	Group HL						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Global crisis × Local funding	-1.269	-628.856*	-4.107	-59.425	3728.578	-1.78e+04***	108.201	-424.142***	26.717	-30.940	-50.857	-7748.378***
	(536.795)	(327.932)	(365.626)	(185.543)	(2546.355)	(6657.819)	(326.006)	(146.053)	(277.336)	(53.118)	(258.607)	(2355.464)
Global crisis × Cross-border funding	157.568	-1282.109	-63.963	-282.762	206.954	-10300.000	-26.295	-105.908	-78.877	74.228	-34.712	-1579.858
	(374.371)	(964.743)	(284.105)	(309.806)	(1608.082)	(7256.570)	(377.132)	(138.431)	(229.698)	(61.806)	(522.525)	(2466.503)
Local funding	123.480	-236.639	65.406	242.354*	1636.627	10130.561***	-28.275	341.363***	45.402	91.602***	460.276**	5164.505***
	(282.908)	(253.124)	(232.411)	(129.282)	(1236.245)	(3640.236)	(295.222)	(105.062)	(249.430)	(31.613)	(193.769)	(1833.132)
Kaopen	-353.459	105.833	-204.923	67.590	-5327.999	14062.580	-222.622	-160.904	96.607			-3852.027
	(353.233)	(235.769)	(175.217)	(194.833)	(13722.243)	(61324.959)	(221.071)	(166.812)	(157.990)			(25849.728)
Exrate Regime	-58.728	-19.646	-440.916	-69.853			72.311	-316.812*	-5.253		-207.379	
	(396.681)	(171.389)	(476.423)	(93.879)			(205.502)	(173.645)	(208.938)		(380.120)	
GDP	-264.799	-382.448	413.150	-600.116	2425.787	9804.676	1254.630	188.121	-529.442	-18.951	913.276	15389.634
	(857.845)	(718.998)	(674.524)	(429.846)	(7436.775)	(21236.311)	(857.079)	(280.611)	(542.248)	(138.540)	(1377.977)	(10168.725)
Interest rate_Diff	11.674	33.935	4.154	24.285	-73.287	2530.051	5.435	2.333	10.951	1.125	19.187	340.097
	(41.230)	(32.142)	(22.134)	(20.401)	(557.919)	(2240.341)	(28.095)	(19.262)	(22.563)	(13.737)	(28.647)	(870.296)

<Table 2> The Influence of Local Funding on Internal Capital Flows (Continued)

	Emerging countries				Developed countries		emerging Asia	Eastern Europe & Cental Asia	Latin America & Caribbean	Middle East & Northern Asia	Sub-Saharan Africa	Developed countries
	Group HH	Group HL	Group LH	Group LL	Group HH	Group HL						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Exchange rate	213.187 (3106.672)	1523.781 (3394.360)	3406.562 (2833.205)	1384.190 (2687.594)	4445.801 (9134.660)	-5.14e+04** (23730.245)	5889.181 (12447.653)	-298.613 (206.086)	2259.290 (2676.958)	97.330 (352.593)	-17700.000 (13993.799)	-15200.000 (12535.876)
Total Local Liabilities	0.253*** (0.037)	0.004 (0.041)	0.016 (0.026)	0.271*** (0.064)	0.040 (0.029)	-0.028 (0.020)	-0.027 (0.034)	0.037 (0.039)	-0.093*** (0.021)	0.072 (0.075)	0.260*** (0.093)	-0.030** (0.012)
Short Maturity Claims	990.067 (814.548)	220.740 (833.690)	-206.346 (619.768)	-94.904 (332.254)	-452.712 (3484.531)	-382.724 (8484.634)	633.162 (839.170)	-334.048 (387.326)	30.284 (572.730)	-127.253 (93.268)	119.269 (1005.107)	-1505.243 (4606.837)
Total Asset	0.000 (0.000)	0.000 (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.001)	-0.001 (0.003)	-0.000** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)
Solvency	9026.205 (29127.926)	-3014.335 (21393.042)	7246.162 (19399.438)	-694.821 (11637.995)	-6.99E+04 (144000.000)	18072.933 (473000.000)	1292.463 (30448.552)	-1.77E+04 (14000.672)	18085.531 (23574.953)	3702.300 (4969.026)	-1.81E+04 (34351.350)	-3.33E+04 (234000.000)
Liquidity	-3011.257 (10028.939)	690.147 (9478.697)	5189.107 (7492.909)	2422.921 (4749.710)	-4.42E+04 (52313.999)	-2.27E+05 (160000.000)	-2.06e+04* (10668.868)	3865.979 (4434.689)	6356.911 (8117.043)	-1240.054 (1726.892)	-3069.187 (9740.994)	-2.01e+05** (86717.777)
Herfindahl	29.899 (799.424)	1564.172** (697.614)	464.194 (593.618)	38.975 (362.941)	864.570 (3951.893)	7885.282 (13194.214)	530.008 (663.891)	268.995 (307.676)	499.689 (521.042)	-50.086 (118.068)	894.931 (696.774)	-197.572 (5517.051)
Constant	1017.857 (7128.761)	1863.923 (6726.060)	-4020.346 (6377.893)	4386.082 (3774.794)	-625.572 (79260.747)	-2.23E+04 (249000.000)	-5743.708 (7736.033)	-412.636 (3021.952)	1263.450 (4815.344)	248.609 (1155.297)	-6487.569 (10568.639)	-9.23E+04 (113000.000)
R-squared	0.17	0.04	0.05	0.21	0.05	0.08	0.06	0.11	0.06	0.08	0.30	0.06
Observations	277	333	375	112	299	302	245	217	453	227	213	603
No. of groups	19	17	15	10	16	18	8	7	15	9	7	20

currency-matched, thereby impeding transfer affiliates' liquidity to the headquarters. In addition, the financial autonomy in the LAC region granted to foreign affiliates makes them less integrated with the rest of the banking group and consequently this region has not been struck severely by deleveraging.

Finally, from a financial stability perspective, global banks' access to local deposits can be evaluated as a potential driving force behind the capital outflows from developed countries (column (12)). In sum, the evidence for both developed and emerging economies suggests that the destabilizing impact of core funding location is a global rather than a regional phenomenon. In other words, it is not the region that determines the core funding location, but rather the specific characteristics of both host countries and foreign affiliates. Therefore, although the capital flight from those affiliates are far more pronounced for developed countries, foreign affiliates in emerging economies can also serve as an international funding center that channels local funds collected from host markets into the head office through internal capital markets.

3. Robustness Check

To verify the robustness of these results, we estimate four tests. First, in <Table 3>, for countries where foreign affiliates depend more on local deposits, we use the interactions of *Global Crisis* with each group indictor as regressors. The coefficient on (*Global Crisis×Group HL*) is significantly negative, implying that local funding locations that couple high financial liberalization with low liquidity constraints experienced substantial capital outflows during the global crisis (column (1)). In columns (2) and (3), we replace the crisis dummy variable with a continuous indicator

<Table 3> Robustness 1: The Influence of Local Funding on Internal Capital Flows

This table summarizes the robustness check regressions for internal capital flows by considering alternative measures of the shock and interacting the shock with the group dummy variable. We limit our sample to countries with foreign affiliates that have high reliance on local liabilities (countries with an above median ratio for the local liabilities to total liabilities of foreign affiliates). We divide each sample of emerging and developed countries into four groups. They are defined as: 1) Group HH: more financially liberalized countries with liquidity-constrained foreign affiliates, 2) Group HL: more financially liberalized countries with liquidity-unconstrained foreign affiliates, 3) Group LH: less financially liberalized countries with liquidity-constrained foreign affiliates, and 4) Group LL: less financially liberalized countries with liquidity-unconstrained foreign affiliates. Standard errors in parentheses are clustered at the host country level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Shock	Emerging countries					Developed countries				
	Global Crisis			Local Crisis		Global Crisis			Local Crisis	
	DUMMY	KCFSI	Tightening lending standard	EMPI	DUMMY	DUMMY	KCFSI	Tightening lending standard	EMPI	DUMMY
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Shock × Group HH	-333.163 (323.667)	-87.94 (84.747)	-93.278* (48.565)	-23.453 (61.395)	-281.431 (219.024)	-4101.848 (4303.095)	-1907.102 (1175.036)	-1.29e+04* (6961.836)	-251.633 (1019.848)	-4758.977 (3780.306)
Shock × Group HL	-495.856** (198.273)	-192.265*** (70.408)	-143.583*** (45.276)	-48.724 (39.014)	-130.931 (138.759)	-1.11e+04*** (3220.409)	-3750.340*** (852.757)	-2.00e+04*** (5212.131)	41.678 (549.213)	2034.088 (1879.819)
Shock × Group LH	-225.583 (307.928)	-71.653 (95.864)	-5.115 (56.838)	7.534 (72.275)	36.743 (227.641)					
Shock × Group LL	-271.06 (296.884)	-80.217 (82.476)	-15.659 (54.343)	-3.459 (53.549)	85.676 (242.795)					
Kaopen	103.292 (141.301)	23.969 (153.734)	44.105 (79.565)	94.719 (144.271)	115.059 (143.054)	8194.052 (40994.103)	17858.379 (40432.785)	12480.987 (40774.176)	-129.231 (43532.823)	-3106.794 (43115.510)
Exrate Regime	-6.515 (97.603)	28.074 (116.466)	0.037 (62.181)	29.447 (100.273)	23.430 (99.909)					
GDP	-222.365 (416.635)	-276.987 (216.788)	-113.984 (99.415)	-50.413 (434.513)	-7.368 (423.413)	-3683.178 (11298.897)	-8534.36 (11158.576)	-7749.433 (11250.801)	-3670.395 (12708.097)	-4696.656 (12676.004)

\<Table 3\> Robustness 1: The Influence of Local Funding on Internal Capital Flows (Continued)

Shock	Emerging countries					Developed countries				
	Global Crisis			Local Crisis		Global Crisis			Local Crisis	
	DUMMY	KCFSI	Tightening lending standard	EMPI	DUMMY	DUMMY	KCFSI	Tightening lending standard	EMPI	DUMMY
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Interest rate_Diff	18.713 (18.155)	21.623 (19.412)	5.165 (8.109)	13.565 (17.624)	13.200 (17.591)	-233.670 (1115.043)	551.085 (1119.881)	646.485 (1139.696)	-415.768 (1199.333)	-275.529 (1195.801)
Exchange rate	1805.589 (2282.517)	2016.531 (1583.833)	341.552 (566.165)	2051.966 (2334.419)	2318.397 (2350.254)	16.975 (13674.474)	9888.755 (13552.802)	10281.641 (13724.239)	6169.504 (11526.793)	8109.938 (15104.596)
Total Local Liabilities	0.048 (0.036)	-0.121*** (0.033)	-0.100*** (0.013)	-0.031 (0.039)	-0.030 (0.040)	-0.019 (0.049)	-0.023 (0.048)	-0.025 (0.049)	-0.019 (0.054)	-0.003 (0.054)
Short Maturity Claims	219.811 (391.996)	-4.451 (416.927)	162.986 (181.186)	135.043 (398.335)	178.198 (397.398)	-4432.751 (4208.620)	-3835.876 (4118.459)	-3626.104 (4156.146)	-4337.496 (4428.978)	-4360.780 (4383.039)
Total Asset	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.002 (0.002)	0.002 (0.001)	0.002 (0.002)	0.000 (0.002)	-0.000 (0.002)
Solvency	1907.975 (11620.485)	-1.07E+04 (19113.895)	-4126.742 (6747.808)	15932.751 (10474.825)	15720.188 (10525.913)	-4.62e+05* (242000.000)	-5.62e+05** (240000.000)	-7.72e+05*** (279000.000)	-1.43E+05 (254000.000)	-9.36E+04 (248000.000)
Liquidity	-5461.277 (5656.248)	1072.135 (5960.800)	396.545 (2736.892)	-2562.858 (5593.153)	-2145.354 (5595.733)	-9966.811 (84413.795)	30588.867 (81613.491)	18039.009 (82411.048)	33178.639 (89383.409)	2382.045 (90817.849)
Herfindahl	658.892* (396.359)	637.929 (503.269)	3.230 (191.492)	136.444 (336.108)	137.495 (334.962)	6746.539 (6895.380)	12964.406* (7256.949)	12595.381* (7557.139)	-4225.345 (6762.280)	-4833.492 (6660.790)
Constant	2067.021 (3732.787)	2312.506*** (576.614)	1493.855*** (123.095)	-893.192 (3737.473)	-1463.656 (3622.858)	59446.142 (148000.000)	75903.213 (146000.000)	1.03E+05 (148000.000)	42857.907 (168000.000)	67885.61 (168000.000)
R-squared	0.03	0.06	0.04	0.02	0.02	0.07	0.10	0.08	0.02	0.04
Observations	485	456	448	466	466	247	247	247	235	235
No. of groups	29	26	26	28	28	17	17	17	17	17

such as KCFSI (Kansas City Financial Stress Index) and Tightening Lending Standard,[18] which are frequently used as indicators of U.S. financial market conditions. These continuous shock variables allow us to account for the impact in 2008Q4, when the funding pressure caused by a liquidity squeeze reached its peak and credit declined most dramatically. Overall, our results remain the same and are robust to the different specifications of the shock variables.

Our results can be interpreted as showing that internal capital movements are more driven by the changes occurring in the host country rather than by parent banks' funding problems in the systemic crisis, when the shocks are highly correlated among countries. Thus, comparing *Global Crisis* with *Local Crisis* helps mitigate the potential concern that the observed reallocation of funds away from foreign affiliates during the global crisis was not just driven by global banks' liquidity demands.[19] To sweep out these potential demand factors, we repeat our analysis by using indicators defining local, idiosyncratic shocks, namely *EMPI* (*Exchange Rate Market Pressure Index*) and the reduction in foreign exchange reserves, and the *Local Crisis Dummy*. We find no significant effects for the interactions between *Shock* and *Group HL* (columns (4) and (5)), indicating that internal capital outflows do not occur during local crises in host countries. Consequently, although it is difficult to defend the presumption of the exogeneity of the global crisis, most of what is observed in times of global crisis arises due to global banks' liquidity problems rather than concomitant deteriorations in local fundamentals. This is also supported by the evidence that supply factors such as liquidity shortages in global banks were the

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18) By using these indicators, we can overcome the limitations of a dummy variable that acts as if the shocks to liquidity were the same in all quarters. See <Table A2> in the Appendix for details.

19) Since the Lehman event spilled over to developed and emerging countries, it is hard to satisfy the exogenous shock as a prerequisite to analyze internal capital markets (Cetorelli and Goldberg, 2012). Therefore, this test is essential in order to verify the exogeneity of the global crisis.

main drivers in the decline in cross-border bank lending, whereas the effect of demand factors such as host country CDS spread is much weaker (Herrmann and Mihaljek, 2010; Avdjiev, McCauley, and McGuire, 2012).

Second, since LTD ratios may not allow us to fully assess liquidity constraints, we replace the LTD ratio with the S&P credit rating of the host countries. The rated countries are divided into two categories: investment grade (from AAA to BBB-) and non-investment grade (BB+ or lower). Strong liquidity is closely related to the high credit ratings given by global rating firms and thus it makes sense to assume that credit ratings also proxy host countries' liquidity constraints. Only in the case of High financial reform & Investment grade (column 1 of <Table 4>) is the estimated coefficient statistically significant and negative. We obtain similar results even when using the systemic banking crisis (Laeven and Valencia, 2012) instead of the credit rating to represent liquidity constraints. In other words, countries that are more financially liberalized and less liquidity constrained (unrelated to the systemic banking crisis) increase internal capital outflows during the global crisis. In addition, we employ more variables for liquidity constraints such as EMPI (exchange market pressure index) and sovereign CDS premiums. The negative coefficients of financially liberalized local funding locations with Low EMPI or Low CDS premiums also support the outcome presented above (results are available upon request). These results confirm the relevance of liquidity constraints for explaining capital outflows in the crisis period.

Third, instead of interacting *Local Funding* with *Global Crisis*, we limit our sample to countries where foreign affiliates rely more on local funding than parents' resources and then apply different country-level proxies for financial liberalization and liquidity constraints. <Table 5> shows that the coefficient on *Global Crisis* in column (2) is negative, suggesting that

<Table 4> Robustness 2: The Influence of Local Funding on Internal Capital Flows

This table summarizes the robustness check regressions for internal capital flows by employing alternative measures for liquidity constraints. In columns (1) to (4), we divide each sample of countries into four groups by using credit ratings rather than liquidity constraints. In columns (5) to (7), we divide each sample into four groups based on whether or not the host countries are in financial crises. Standard errors in parentheses are clustered at the host country level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	High financial reform & Investment grade	High financial reform & Non-investment grade	Low financial reform & Investment grade	Low financial reform & Non-investment grade	High financial reform & Local crisis period	High financial reform & Tranquil period	Low financial reform & Tranquil period
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Global crisis × Local funding	-4967.456***	-53.517	112.001	-2.064	-311.988	-3390.976**	61.392
	(1791.569)	[94.275]	(654.063)	(53.348)	(4211.560)	(1400.633)	[210.823]
Global crisis × Cross-border funding	-1300.285	-31.236	-140.772	44.340	105.708	-646.775	-85.507
	(1563.750)	[204.154]	[536.082]	(46.935)	(4053.687)	(1394.725)	[188.835]
Local funding	2044.517**	109.599	42.286	92.331***	-526.951	1669.560**	47.089
	(883.639)	(66.366)	(486.772)	(30.773)	(3833.617)	(756.472)	(128.424)
Kaopen	-56.908	-75.624	-187.129	-16.844		255.531	-94.817
	(1591.988)	[93.998]	(375.965)	(26.121)		(1204.298)	[111.661]
Exrate Regime	-658.150	84.268		8.025		-492.131	-26.760
	(1714.175)	[96.454]		(24.426)		(1315.476)	[118.879]
GDP	405.585	145.623	592.859	114.632	13168.367	481.223	418.337
	(3630.357)	(144.823)	(1210.556)	(103.606)	(18338.096)	(2368.426)	(400.886)
Interest rate_Diff	258.211	6.437	26.145	0.701	-1131.205	185.059	2.008
	[321.609]	[10.825]	(44.865)	(2.932)	(884.950)	[206.961]	[12.607]

<Table 4> Robustness 2: The Influence of Local Funding on Internal Capital Flows (Continued)

	High financial reform & Investment grade	High financial reform & Non-investment grade	Low financial reform & Investment grade	Low financial reform & Non-investment grade	High financial reform & Local crisis period	High financial reform & Tranquil period	Low financial reform & Tranquil period
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Exchange rate	-1.12e+04*	-608.338	7743.455	191.130	-25100.000	-1.18e+04**	600.187
	(6405.888)	(495.270)	(5259.186)	(309.985)	(19030.925)	(5794.776)	(1363.414)
Total Local Liabilities	0.017	-0.056	0.013	-0.037	0.522**	0.017	0.020
	(0.025)	(0.043)	(0.036)	(0.028)	(0.230)	(0.023)	(0.018)
Short Maturity Claims	-3265.098	-277.947	-66.696	11.880	-18600.000	-2360.742	-102.103
	(2649.177)	(189.434)	(1057.054)	(96.819)	(15618.483)	(2206.117)	(367.463)
Total Asset	0.000	-0.000	-0.000*	-0.000	-0.004	0.000	-0.000**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.004)	(0.001)	(0.000)
Solvency	-5.63E+04	1047.755	7900.234	-101.288	-9.60e+05*	20413.872	-475.802
	(105000.000)	(7749.427)	(34990.803)	(3056.858)	(497000.000)	(95936.948)	(11912.821)
Liquidity	-5606.721	93.901	8148.154	-914.262	3.77E+05	-9174.461	3665.836
	(40789.472)	(2832.500)	(13445.061)	(1254.342)	(265000.000)	(33649.466)	(4841.205)
Herfindahl	4062.626	-53.583	1133.446	-17.183	-1.53E+04	2500.108	507.335
	(3125.010)	(218.320)	(1069.956)	(95.255)	(20931.484)	(2587.590)	(375.763)
Constant	7723.872	-734.235	-7653.419	-746.398	-9.59E+04	1875.692	-4245.778
	(38556.308)	(1436.425)	(11834.338)	(859.043)	(261000.000)	(24618.243)	(3582.541)
R-squared	0.02	0.05	0.08	0.04	0.36	0.02	0.03
Observations	848	211	216	366	60	999	606
No. of groups	28	7	7	12	14	35	20

the effect of a global crisis on internal capital outflows is pronounced in countries with high financial reforms and low liquidity constraints. Interestingly, capital outflows occur in financially liberalized countries regardless of the types of liquidity constraints (column (1) and (9)). The effect related to financial liberalization seems to be stronger than that related to liquidity constraints. However, the coefficient on *Global Crisis* in Group HL is far larger than that in Group HH, which is more likely to raise capital outflows at a higher rate than the other groups, supporting the importance of the liquidity channel.

Finally, Cetorelli and Goldberg (2012) divide the global crisis of 2007~2009 into the funding disruption of U.S. banks after August 2007 and the Lehman bankruptcy. To enable a comparison with their finding, we add the 2007 crisis into our regression (results are available upon request) and find that this variable is not significant. A possible explanation for this finding is that we use an eight-year panel analysis, which makes the conditions of international financial markets during 2007 feel less severe than those after the Lehman collapse. Another explanation is that our aggregate shocks, as measured by the dummy variables, affect all countries to the same extent during the crisis therefore, these systemic liquidity shocks may differ from the idiosyncratic liquidity shocks generated by individual bank's ABCP exposure. In addition, we use the cross-sectional variation and compute the dependent variable as the averages in the respective post-crisis periods (2007Q3 to 2007Q4) minus the averages in the pre-crisis periods (2006Q1 to 2007Q2) as in Cetorelli and Goldberg (2012). Consistent with the findings of Cetorelli and Goldberg (2012), we find that capital outflows after the 2007 crisis are only statistically significant because the change in capital flows in 2006~2007 is much larger than that in 2007~2008 (results are available upon request). However, the small number of observations makes

<Table 5> Robustness 3: The Influence of Local Funding on Internal Capital Flows

This table summarizes the robustness check regressions for internal capital flows by excluding the interaction terms. Instead, the sample is composed of countries with foreign affiliates that have high reliance on local liabilities (countries with an above median ratio for the local liabilities to total liabilities of foreign affiliates). We divide each sample of countries into four groups: 1) Group HH: more financially liberalized countries with liquidity–constrained foreign affiliates, 2) Group HL: more financially liberalized countries with liquidity–unconstrained foreign affiliates, 3) Group LH: less financially liberalized countries with liquidity–constrained foreign affiliates, and 4) Group LL: less financially liberalized countries with liquidity–unconstrained foreign affiliates. Standard errors in parentheses are clustered at the host country level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	All countries				Emerging countries				Developed countries	
	Group HH [1]	Group HL [2]	Group LH [3]	Group LL [4]	Group HH [5]	Group HL [6]	Group LH [7]	Group LL [8]	Group HH [9]	Group HL [10]
Global crisis	-1929.703* [1116.892]	-5114.836*** [1642.211]	2.099 [44.543]	-45.246 [63.127]	55.575 [147.590]	-727.299** [308.387]	-5.215 [54.076]	-35.868 [87.741]	-8276.992*** [2785.286]	-1.59e+04*** [4724.526]
Kaopen	467.308 [1293.187]	-115.151 [1686.428]	28.167 [68.865]	-5.866 [60.649]	-660.639** [276.749]	116.593 [239.915]	34.883 [74.594]	-15.144 [89.505]		-1429.219 [9787.299]
Exrate Regime	387.639 [869.134]	602.056 [1712.293]		7.076 [24.118]	244.788 [181.031]	-33.535 [161.817]		14.242 [41.015]		
GDP	1351.652 [3330.293]	-1653.409 [3596.680]	-48.569 [173.206]	77.813 [151.780]	1275.517* [635.909]	-392.623 [703.060]	-21.829 [216.142]	151.709 [221.445]	-2766.51 [21262.205]	1703.197 [16925.228]
Interest rate_Diff	211.22 [169.355]	240.339 [332.624]	0.057 [8.017]	-0.895 [3.571]	-10.591 [22.725]	33.214 [30.014]	0.865 [10.098]	-5.854 [9.248]	2591.548* [1355.045]	-146.36 [1815.842]
Exchange rate	-7453.644 [6783.126]	-2289.791 [8165.410]	-368.173 [713.555]	-948.076 [916.968]	213.991 [5994.846]	2236.514 [3805.069]	-279.637 [818.849]	-980.222 [1061.598]	-1019.593 [21161.963]	5045.753 [20518.117]
Total Local Liabilities	0.190 [0.044]	-0.052 [0.035]	-0.059 [0.046]	-0.044 [0.033]	0.068 [0.101]	0.054 [0.051]	-0.054 [0.051]	-0.062 [0.043]	0.290 [0.070]	-0.061** [0.028]
Short Maturity Claims	73.75 [2545.194]	-4376.818 [2929.283]	-15.724 [93.556]	-12.987 [129.880]	72.166 [352.602]	680.016 [814.574]	-90.486 [103.470]	-13.877 [156.969]	-1.02e+04* [5950.076]	-4100.511 [6489.155]
Total Asset	-0.001 [0.001]	0.000 [0.001]	0.000 [0.000]	-0.001 [0.000]	-0.000** [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	-0.005* [0.002]	0.002 [0.002]
Solvency	18449.872 [81339.442]	-1.68E+05 [120000.000]	-1004.016 [3143.706]	-2519.783 [3949.398]	-13400 [11516.310]	4247.582 [20986.313]	159.815 [3749.373]	-3349.867 [5178.342]	2.92E+05 [197000.000]	-4.87E+05 [388000.000]
Liquidity	-1.66E+04 [40076.540]	-2.55E+04 [46978.361]	428.424 [1673.538]	235.866 [1776.167]	-1039.941 [4765.433]	-12700 [9651.338]	551.376 [1897.082]	208.428 [2537.359]	-2.00E+05 [123000.000]	-4.52E+03 [127000.000]
Herfindahl	3238.877 [2808.634]	2679.523 [3643.687]	8.534 [108.027]	75.075 [140.138]	-91.299 [349.809]	1228.854* [678.053]	13.746 [139.960]	128.798 [187.111]	11189.077* [6140.563]	3227.123 [10570.536]
Constant	-8420.734 [32728.270]	41836.657 [37868.515]	520.046 [1511.174]	-448.964 [1262.378]	-7089.558 [5394.447]	4425.219 [6520.306]	162.316 [1904.438]	-1183.068 [1939.129]	91172.332 [233000.000]	2.03E+04 [192000.000]
R-squared	0.23	0.04	0.07	0.05	0.35	0.06	0.07	0.06	0.42	0.14
Observations	101	420	92	119	52	268	75	90	47	212
No. of groups	22	27	11	11	13	16	8	9	10	16

it difficult for such results to be considered to be acceptable.

4. Extensions: Volatility of Internal Capital Flows

While causality is difficult to ascertain in estimations owing to economic concerns, sudden capital outflows are likely to be associated with more volatile flows (IMF, 2012). To be specific, both capital flow volatility and capital outflows in an economy are affected by the loss of confidence in the global economy. Moreover, it is acknowledged that financial flow volatility and capital flight can be considered to be complementary indicators to the external vulnerability analysis. From this perspective, we investigate whether core funding location is also related to the high volatility of capital flows.

<Table 6> presents the results for the volatility of internal capital flows and total liabilities, measured by the coefficient of variation over four-quarter rolling windows (the ratio of the standard deviation to the mean). Here, we estimate total liabilities volatility in order to gauge the applicability of our findings that internal capital outflows reflect the decreases in affiliates' local liabilities to the volatility measures. In other words, volatility trend of internal capital flows can be traced back to the volatility in foreign affiliates' liabilities in the host country.[20] In column (3), the results for the volatility of internal capital flows indicate that local funding affiliates with low liquidity constraints in financially liberalized countries exhibit high capital flow volatility. Consequently, local funding affiliates in core funding locations are expected to be vulnerable to a global crisis. In column (8), core funding location is also shown to have a positive

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20) To verify the robustness of these results, we limit our sample to countries where foreign affiliates rely more on local funding. The results also suggest that the effect of a global crisis on capital flow volatility may be pronounced in countries with high financial reforms and low liquidity constraints.

<Table 6> Extensions: The Influence of Local Funding on the Volatility of Internal Capital Flows and Total Liabilities

This table reports the fixed effects regressions of the volatility of internal capital flows (Panel A) and total liabilities (Panel B). We divide the sample of countries into four groups: 1) Group HH: more financially liberalized countries with liquidity–constrained foreign affiliates, 2) Group HL: more finan– cially liberalized countries with liquidity–unconstrained foreign affiliates, 3) Group LH: less financially liberalized countries with liquidity–constrained foreign affiliates, and 4) Group LL: less financially liberalized countries with liquidity–unconstrained foreign affiliates. Standard errors in parentheses are clustered at the host country level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variables	Panel A: Volatility of internal capital flows					Panel B: Volatility of foreign affiliates' total liabilities				
	Full sample	Group HH	Group HL	Group LH	Group LL	Full sample	Group HH	Group HL	Group LH	Group LL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Global crisis × Local funding	8.729***	9.506	10.364**	3.560	21.131	0.040**	0.003	0.046**	-0.007	-0.013
	[1.804]	[14.985]	[4.202]	[5.173]	[14.985]	[0.017]	[0.046]	[0.023]	[0.023]	[0.039]
Global crisis × Cross-border funding	12.103***	7.388	11.343	10.451	21.397	-0.008	-0.032	0.034	0.013	0.143
	[2.807]	[5.365]	[6.691]	[6.989]	[23.252]	[0.016]	[0.033]	[0.035]	[0.018]	[0.099]
Local funding	-0.216	-1.287	-4.325	-3.286	0.707	-0.017*	0.008	-0.023	-0.004	-0.091
	[1.922]	[3.935]	[4.329]	[4.260]	[16.628]	[0.010]	[0.026]	[0.016]	[0.015]	[0.075]
Kaopen	-1.702	-5.339	-2.570	2.575	-0.662	-0.043***	-0.127**	-0.002	-0.043***	-0.061
	[2.346]	[7.909]	[4.541]	[4.359]	[12.613]	[0.012]	[0.051]	[0.021]	[0.012]	[0.039]
ExrateRegime	-2.838	-8.222	4.243	-1.931	2.097	-0.026*	-0.217***	0.022	-0.035	0.000
	[1.935]	[9.094]	[3.231]	[12.331]	[4.603]	[0.014]	[0.078]	[0.023]	[0.029]	[0.008]
GDP	-8.505*	15.210	-8.366	-3.955	26.576	-0.032	-0.091	-0.073	-0.107**	-0.206*
	[4.946]	[12.874]	[10.410]	[12.120]	[33.527]	[0.025]	[0.081]	[0.049]	[0.048]	[0.114]
Interest rate_Diff	-0.211	-0.974	0.550	-0.546	1.554	-0.004**	-0.005	0.003	-0.003**	-0.003
	[0.284]	[0.952]	[1.059]	[0.468]	[1.359]	[0.002]	[0.006]	[0.004]	[0.001]	[0.002]
Exchange rate	-16.017	-65.771**	-89.487***	-57.107	-273.770	-0.149***	-0.131	0.049	-0.327**	-0.249
	[13.634]	[25.498]	[17.491]	[34.909]	[368.189]	[0.037]	[0.163]	[0.112]	[0.142]	[0.623]

<Table 6> Extensions: The Influence of Local Funding on the Volatility of Internal Capital Flows and Total Liabilities (Continued)

Dependent variables	Panel A: Volatility of internal capital flows					Panel B: Volatility of foreign affiliates' total liabilities				
	Full sample	Group HH	Group HL	Group LH	Group LL	Full sample	Group HH	Group HL	Group LH	Group LL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total Local Liabilities	-0.000***	-0.000	-0.000	-0.000	-0.001	0.000	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Short Maturity Claims	2.460	-8.679	-10.528	12.032	-18.531	0.003	0.010	0.093**	-0.003	0.099
	(5.407)	(12.115)	(7.096)	(17.426)	(29.040)	(0.027)	(0.072)	(0.038)	(0.041)	(0.084)
Total Asset	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Solvency	1159.413**	528.207	1491.718***	726.446	1497.400	-0.991	2.021	1.104	-1.266	0.623
	(154.031)	(404.555)	(402.348)	(427.862)	(874.422)	(0.960)	(2.400)	(1.533)	(1.264)	(2.041)
Liquidity	414.967***	468.773***	530.648***	295.095*	583.500	0.064	-1.258	-0.026	-0.385	0.270
	(61.315)	(165.313)	(140.685)	(141.428)	(355.466)	(0.404)	(0.990)	(0.597)	(0.482)	(1.172)
Herfindahl	-45.067***	-40.865***	-40.679***	-31.073**	-43.612	0.016	-0.001	0.027	-0.011	0.150*
	(4.874)	(11.563)	(9.543)	(12.113)	(33.230)	(0.031)	(0.072)	(0.046)	(0.039)	(0.070)
Constant	68.846	-92.393	115.103	64.708	-175.192	0.784***	-0.581	0.981*	1.711***	1.786**
	(47.065)	(134.385)	(120.838)	(119.818)	(260.810)	(0.267)	(0.850)	(0.509)	(0.449)	(0.616)
R-squared	0.27	0.27	0.46	0.23	0.43	0.06	0.12	0.10	0.17	0.30
Observations	1925	506	570	467	150	1799	474	514	443	128
No. of groups	66	31	31	19	13	65	31	31	19	12

impact on total liabilities volatility. As we expected, the instability of foreign affiliates'total liabilities seems to be translated into more volatile internal capital flows during the financial crisis.

Recently, researchers have attempted to uncover the relationship between financial liberalization and the volatility of capital flows. By focusing on 13 developed economies from 1981 to 2000, Neumann and Penl (2008) find that financial liberalization increases capital volatility on average, whereas financial liberalization reduces capital volatility when it is at its low level, pointing to a threshold effect. Carp (2014) highlights that during the recent financial crisis, financial globalization raised capital flow volatility in Central and Eastern Europe. However, to our knowledge, no empirical evidence has been found to support that either local funding or liquidity constraints may affect capital flow volatility. Therefore, it can be concluded that our results stem from the close relationship between capital flow volatility and capital outflows. For example, Costa and Libanio (2009) prove that capital flight, as that which occurred in 2008, can be caused by high capital flow volatility, arguing that capital flow volatility shows the flows' behavior and capital flight captures the degree of outflows.

Ⅵ. Conclusions

In the context of internal capital markets for global banks, the findings presented in this paper provide evidence that capital outflows from a country during financial crises can in part be explained by foreign affiliates' liability structure. More specifically, lending to the parent bank of local funding-dependent affiliates can be a rather limiting factor for protecting host countries from outside economic shocks. We also show the difference

in a country's vulnerability to intrabank fund outflows for the local funding affiliates, depending on liquidity constraints and financial liberalization. A related implication is that the regulation and liquidity channels should be jointly considered when investigating why the impact varies significantly across local funding affiliates in the crisis period.

Our findings are interesting not only for policy makers and national authorities but also for market participants for the following three reasons. First, our findings shed new light on the discussion on the effects of proposed regulatory measures targeting an expansion of foreign affiliates' use of local deposits as a regulatory tool to limit their exposure to financial system liquidity shocks. Second, as a measure of restricting internal capital outflows, regulation authorities should generate incentives for foreign affiliates to invest their excess deposit volumes in local markets in the long run. Third, based on our findings, support from subsidiaries to the parent bank should be taken as granted and it may be desirable to impose the same weights on each direction. In particular, when assigning bank ratings, rating agencies need to assess not only whether parent support will be provided to a bank or not, but also whether the bank may have to support its parent bank, especially during a global financial crisis. Moreover, given the increased dependence of the financial system on credit ratings at times of crisis, the failure of rating agencies to evaluate potential risks may exacerbate financial distress.

Finally, we leave for future research the examination of the driving forces behind a parent bank's repatriation from local funding affiliates, the stability of which was presumed in this study, using information on bank-level internal capital markets. Although data unavailability makes it difficult to compare our findings with those of Cetorelli and Goldberg (2012), we expand their study by demonstrating the two main factors that explain

how global banks' funding location works in addition to affiliates' local liabilities. Importantly, this country-level data allow us to examine the whole banking system in the host country and draw out the macroeconomic implications on the banking system's vulnerability. It is necessary to consider the behavior of the banking system as a whole since what may appear sound at the micro level may be quite fragile and flawed at the macro level (Hellwig, 1994).

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Appendix

\<Table A1\> Summary Statistics

This table displays the summary statistics of the main regression variables in each of the four subsamples, which is divided by two factors: financial reforms and liquidity constraints.

Group HH						
	obs.	Mean	Std.dev	Median	Min	Max
△NetDueTo	521	564.459	4957.923	23	-20862	48910
Local Funding	538	0.641	0.239	0.712	0.019	1
Kaopen	538	1.807	1.149	2.422	-1.875	2.422
ExrateRegime	538	2.240	1.034	3	1	4
GDP (logs)	538	11.529	1.450	11.510	7.814	14.236
Interest rate_Diff	522	1.652	2.627	0.948	-3.637	18.160
Exchange rate	538	0.643	0.546	0.379	0.002	1.581
TotalLocalLiabilities	538	17691	38907	1917	1	264038
ShortMaturityClaims	538	0.477	0.221	0.474	0	0.923
Financial Reform Index	538	19.377	1.293	19.500	17	21
Liquidity Constraints	538	2.491	3.782	1.428	1.085	50.900
EMPI	229	-0.132	0.980	-0.226	-3.937	3.687
Volatility of △NetDueTo	538	11.969	35.861	1.697	-82.041	105.713
Total Liabilities Volatility	486	0.181	0.194	0.117	0.017	1.778

Group HL						
	obs.	Mean	Std.dev	Median	Min	Max
△NetDueTo	648	-124.028	9105.962	-13	-113853	160253
Local Funding	669	0.914	0.129	0.996	0.285	1
Kaopen	669	1.691	1.266	2.422	-1.351	2.422
ExrateRegime	637	2.053	1.093	2	1	4
GDP (logs)	669	11.271	1.150	11.156	8.233	14.231
Interest rate_Diff	602	1.089	2.519	0.532	-5.025	13.900
Exchange rate	669	0.646	0.568	0.420	0.004	1.581
TotalLocalLiabilities	669	17980	27791	4853	1	247840
ShortMaturityClaims	669	0.476	0.206	0.456	0	1.482
Financial Reform Index	669	18.972	1.426	19	17	21
Liquidity Constraints	669	0.671	0.312	0.726	0	1.082
EMPI	366	-0.080	0.789	-0.121	-2.353	2.214
Volatility of △NetDueTo	669	10.920	34.936	1.048	-82.041	105.713
Total Liabilities Volatility	608	0.143	0.136	0.107	0.000	1.657

<Table A1> Summary Statistics (Continued)

Group LH						
	obs.	Mean	Std.dev	Median	Min	Max
△NetDueTo	630	75.154	892.990	7	-5284	8233
Local Funding	647	0.696	0.192	0.746	0.018	1
Kaopen	647	0.263	1.376	0.053	-1.875	2.422
ExrateRegime	647	2.063	0.759	2	1	4
GDP (logs)	647	10.325	1.867	9.916	6.273	14.690
Interest rate_Diff	479	5.923	4.533	4.875	-3.253	32.927
Exchange rate	647	0.156	0.267	0.022	0	1
TotalLocalLiabilities	647	5202	10468	726	2	51533
ShortMaturityClaims	647	0.397	0.181	0.398	0.004	0.876
Financial Reform Index	647	13.875	1.719	15	10.250	16.500
Liquidity Constraints	647	2.496	6.459	1.317	1.084	124
EMPI	644	-0.050	0.847	-0.093	-4.151	3.425
Volatility of △NetDueTo	647	10.891	35.269	1.745	-82.041	105.713
Total Liabilities Volatility	595	0.125	0.153	0.085	0.004	1.899

Group LL						
	obs.	Mean	Std.dev	Median	Min	Max
△NetDueTo	196	-8.327	358.119	0	-2409	1515
Local Funding	206	0.900	0.136	0.939	0.387	1
Kaopen	206	0.560	1.397	0.578	-1.175	2.422
ExrateRegime	206	2.189	0.893	2	1	5
GDP (logs)	206	9.943	1.492	9.669	6.417	14.462
Interest rate_Diff	150	4.606	4.642	4.500	-3.828	32.727
Exchange rate	206	0.141	0.232	0.048	0	1
TotalLocalLiabilities	206	2756	6202	1167	1	57513
ShortMaturityClaims	206	0.416	0.193	0.418	0	1
Financial Reform Index	206	14.573	1.389	15	10.250	16.500
Liquidity Constraints	206	0.874	0.233	0.956	0	1.084
EMPI	206	-0.194	0.976	-0.300	-4.322	3.232
Volatility of △NetDueTo	206	13.661	43.659	-1.161	-82.041	105.713
Total Liabilities Volatility	177	0.120	0.090	0.103	0.010	0.471

Parent Banks & Home Country						
	obs.	Mean	Std.dev	Median	Min	Max
TotalAsset	2976	8912514	1098371	9179861	6486714	10400000
Solvency	2976	0.106	0.006	0.110	0.091	0.113
Liquidity	2976	0.303	0.009	0.303	0.287	0.319
Herfindahl	3348	0.588	0.250	0.620	0.000	0.986
KCFSI	3162	0.312	1.422	-0.100	-0.970	5.350
Tightening Lending Standard	2883	0.071	0.270	-0.059	-0.218	0.836

<Table A2> Data Description and Sources

Variable name	Definition	Source
Dependent variables		
△NetDueTo	Quarterly change in net intra-bank funding positions of the foreign affiliates of all U.S. banks in the host country vis-à	FFIEC 009
Volatility of △NetDueTo	Standard deviation of △NetDueTo vis-à△NetDueTo vis-à	FFIEC 009
Total Liabilities Volatility	Standard deviation of total liabilities of each host country divided by the average total liabilities of that host, coefficient of variation over 4-quarter rolling windows	FFIEC 009
Independent variables		
Local Funding	Ratio of locally raised funds to total liabilities of affiliates of all U.S. banks in the host country	FFIEC 009
Kaopen	Chinn-Ito index value for financial openness	Chin and Ito (2013)
Exrate Regime	Classification of exchange rate regime as of end of 2008	Ilzetski et al. (2009, 2011)
GDP	The log of nominal GDP. in millions of US dollars	IMF International Financial Statistics
Interest rate_Diff	Money market interest rate differential between the United States and the host country	IMF International Financial Statistics
Exchange rate	US dollar per National Currency, period average	IMF International Financial Statistics
Total Local Liabilities	The sum of foreign affiliates' liabilities in non-local currency and in local currency	FFIEC 009
Short Maturity Claims	Foreign affiliates' claims of remaining maturity up to and including 1 year	FFIEC 009

<Table A2> Data Description and Sources (Continued)

Variable name	Definition	Source
Financial Reforms	Composed of seven categories (credit controls, interest rate controls, entry barriers, bank regulations, privatization, financial account, and securities market).	Abiad et al. (2010)
Liquidity Constraints	Ratio of local claims to local liabilities of foreign affiliates (Local claims refer to the claims of foreign affiliates - branches and subsidiaries- on the residents of the host country, including bank loans, lease financing, and other investments. Local liabilities refer to any external borrowing from local residents such as retail deposits on the balance sheet of the foreign affiliates)	FFIEC 009
KCFSI	is based on 11 variables (seven spreads between different bond classes by issuers, risk profiles and maturities, correlations between returns on stocks and Treasury bonds, expected volatility of overall stock prices, volatility of bank stock prices, and a cross-section dispersion of bank stock returns) aggregated by principal component analysis. The KCFSI is shown to perform well in identifying widely recognized episodes of global financial stress over the past 20 years.	Federal Reserve Bank of Kansas City
Tightening Lending Standard	captures changes in the lending cycle in the U.S. banking system. According to the senior loan officer opinion survey, it is defined as the percentage of senior loan officers who reported tightening in a given quarter, minus the percentage of officers who reported easing in credit standards to large and medium-sized firms in the United States.	FRB
EMPI	Captures the depreciation of the local currency with respect to US dollar and the reduction in foreign exchange reserves	IMF International Financial Statistics
Total Asset	Parent banks' total asset size	FFIEC 031
Solvency	Ratio of total equity to total assets of parent banks	FFIEC 031
Liquidity	Ratio of liquid assets to total assets of parent banks	FFIEC 031
Herfindahl	Measure of concentration of parent banks' foreign claims across countries	FFIEC 031