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Internal capital market practices of multinational banks
Evidence from South Africa

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Abstract

This paper examines how internal capital flows inside multinational banks create global financial interconnections, relying on a novel database on foreign banks operating in South Africa. Using the event of the East Asian crisis, I find that foreign affiliates' balance sheet face "reversal of fortune" when other members of their banking group need large amounts of internal capital to cushion capital losses, leading to an abrupt reallocation of internal capital across countries. At the same time, an increase of the volume of internal funding received is shown to cause an expansion of credit to the local private sector.

JEL classification: E44, G21, G32

Keywords: Internal capital markets, multinational banks, crisis transmission, credit supply.

1. Introduction

It is well-documented that global banks contribute to international shock transmission via cross border lending (see for instance Acharya and Schnabl, 2010; Shin, 2012). But global banking has taken another form over the recent decades with the expansion of banks abroad via branches and subsidiaries, especially the expansion from and to developing and emerging economies, as countries have opened up their banking sector to foreign investors (Claessens and Van Horen, 2014). Multinational banks operate internal capital markets through which they (re-)allocate capital between their headquarters and their different foreign affiliates in response to financial or real economic shocks. As internal funding reallocation can alter the funding position of a bank's affiliate, this may in turn lead to adjustments in foreign affiliates' lending in their host market, thus creating another channel of international transmission of shocks.

This research examines how global financial interconnections arise through the flows of internal capital inside multinational banking groups by using a unique dataset containing information on internal capital transfers from and to subsidiaries. It analyzes the exchanges of internal capital between foreign affiliates of multinational banks located in an emerging economy, South Africa, and their headquarters. Focusing on the event of the 1997 Asian financial crisis I estimate a difference-in-difference model and find that South African affiliates belonging to banking groups with high exposure to East Asian crisis countries experienced a significant drop in their net internal funding position during the crisis, relative to South African affiliates of less exposed groups. This result suggests that the parent bank of more exposed groups reallocated capital away from South Africa to support their affiliates in East Asia. The analysis also shows that the effects of internal capital reallocation gradually dissipates over time: two years after the onset of the crisis, most of the effects had disappeared. The results are robust to collapsing the panel into one pre- and one post-shock periods to avoid serial correlation problems (see Bertrand, Duflo, and Mullainathan, 2004). Finally, I proceed to examine the link between the reception of internal funding and the expansion of local bank credit, using an instrumental variable technique. I find a positive impact of internal funding on bank credit expansion to the private sector, suggesting that foreign affiliates do not only use this capital to acquire government securities or to invest abroad, as it has often been reported in Africa (see Demetriades and Fielding, 2012; Andrianova et al., 2015; Beck, Maimbo, Faye and Triki, 2011), but also "pass it on" to the local economy by expanding their domestic lending.

The fact that multinational banks manage liquidity on a global scale has implications for policy-making as banking integration via the internal banking channel may make host countries either more resilient or more susceptible to financial shocks. For instance, Karam, Merrouche, Souissi and Turk (2014), using data from U.S. banking groups have

shown that the activation of internal liquidity support measures in reaction to a reduced access to external funding help mitigate the negative effect of a credit rating downgrade on lending. Cetorelli and Goldberg (2012) have also used data on U.S. banking groups to examine the international transmission of financial shocks at multinational banks through their internal capital markets. They find that affiliates in locations considered as important investment locations are relatively protected from internal capital reallocations while affiliates that are important funding locations are more extensively used to buffer shocks. The magnitude of these impacts can be large. For instance, Schnabl (2012) exploits the 1998 Russian default as a negative liquidity shock to international banks and analyze its impact on bank-to-bank lending to Peruvian banks and on bank lending to Peruvian firms. He found that among Peruvian banks that borrow internationally, the transmission of liquidity shocks by arm's length lenders is stronger than the transmission by owners (through internal capital markets). His analysis shows that domestically owned Peruvian banks with international bank-to-bank loans reduce lending by 8.2% relative to foreign-owned banks. Locally funded Peruvian banks are the least affected. Similar results were obtained by Chava and Purnanandam (2011) on the effect of the 1998 Russian crisis on the U.S. banking system, with rated bank-dependent firms experiencing larger cut in capital expenditures and valuation loss as compared to their counterparts who have access to the public debt markets. Similarly, Ongena, Peydró and Van Horen (2015) find that internationally-borrowing domestic and foreign-owned banks in Eastern Europe and Central Asia contracted their credit more during the global financial crisis than locally-funded domestic banks. As such, previous research has shown how the heterogeneity across the affiliates of a same group and their differential treatment during reallocations of internal capital affect the intensity of the transmission of shocks to host countries. In addition, the intensity of the international propagation of financial shocks through the banking channel depends on both the dependence of domestic banks on cross-border lending and the dependence of domestic firms on bank funding.

As direct empirical evidence on internal capital markets have so far been limited to groups from the same country of origin, this has precluded an analysis of the competitive advantage provided by internal capital flows to subsidiaries operating in a same host country but with different conditions in their home country and the other countries where their group are present. These new data allow me to examine how macroeconomic conditions in the countries where a group is operating affect the volume of internal capital received and transfered by the South African affiliates from and to their group.

South Africa as a host country is a particularly appropriate place to examine the issue of internal capital allocation for two main reasons. First, being an emerging economy its external capital markets are not as developed as those of developed economies, and as such internal capital might be an important source of funding for foreign banks. Second, a large variety of foreign banks operate in South Africa, both from developed and emerg-

ing countries, with important heterogeneity in terms of home countries' macroeconomic conditions and groups' international exposure. In particular, it is an interesting setting to examine how a banking crisis in a developing/emerging region (East Asia) impacts the funding position of foreign banks in another emerging economy (South Africa).

This paper makes three contributions. First, it contributes to the empirical literature on the benefits of internal capital markets for banking firms (De Haas and Van Lelyveld, 2010, Cetorelli and Goldberg, 2012, Cremers, Huang and Sautner, 2013; Karam, Merrouche, Souissi and Turk, 2014) by relying on direct internal transactions, instead of indirectly relying on an investment-cash flow sensitivity approach (e.g., Hoshi, Kayshap, and Scharfstein, 1991) or a comparative analysis of domestic and foreign multinational firms (De Haas and Van Lelyveld, 2010). Indeed, due to data constraints, much of the empirical evidence on the functioning of internal capital market has been indirect, based on comparisons between the investment behavior of conglomerates and that of standalone firms (Shin and Stulz, 1998; Rajan, Servaes and Zingales, 2000; Campello, 2002); or on the investment behavior of firms before and after being spun off from their parent firms (Gertner, Powers and Sharfstein, 2002). A small but growing empirical literature has emerged recently thanks to the availability of new databases providing direct evidence on internal capital market practices. For instance Cremers, Huang and Sautner (2013) have examined internal capital allocation in banking with data on a retail banking group in which bank members cannot access the external capital market. Most recently Almeida, Kim and Kim (2015) have examined capital reallocation among firms in Korean business groups (Chaebols) in the aftermath of the 1997 Asian financial crisis, and the consequences of this capital reallocation for the investment and performance of chaebol firms. This paper contributes to this new empirical literature by examining flows in both directions from parents to affiliates and vice versa. It shows that, as a consequence of the East Asian crisis, not only did parent banks highly exposed to East Asia cut their lending to South African affiliates but the South African affiliates also started to lend more to their parents.

Second, it examines internal lending in an international setting, focusing on affiliates of companies from different countries of origin, while the most recent empirical literature has examined internal capital markets inside groups from a single country of origin (for instance, Cetorelli and Goldberg, 2012, and Karam et al., 2014, examined U.S. banking groups, Frey and Kerl, 2015 examined German banking groups), or focused on a single multinational conglomerate (Glaser, Lopez-de-Silanes and Sautner, 2013), while this data set includes banking groups from continental Europe, the U.S. and emerging countries. In so doing, this research contributes to the international finance literature on global financial interconnectedness. In particular, it complements the research of Cetorelli and Goldberg (2012) on internal capital markets inside US multinational banks during the last financial crisis, by showing how financial crises abroad can impact differently foreign

affiliates of multinational groups located in the same host country and how internal capital might be a source of competitive advantage for foreign affiliates, over domestic banks or other foreign subsidiaries.

Third, it extends previous research on the internal fund channel for bank credit by using data on the volume of internal capital received by the affiliates, while previous research has relied on comparisons between credit growth of foreign affiliates of multinational banks and of domestic banks. (Houston and James, 1998; De Haas and Van Lelyveld, 2004, 2006, 2010, 2014; Popov and Udell, 2012; De Haas, Korniyenko, Pivovarsky, Tsankova, 2015). In that respect, it follows the work of Cetorelli and Goldberg (2012) which identifies a funding shock to branch parents and then examine the impact on the US branches' balance sheets, in particular in terms of their lending activity.

The remaining part of the paper is organized as follows. Section 2 develops the research hypotheses. Section 3 introduces the data and provides some descriptive statistics. Section 4 presents the empirical strategy. The results are presented in section 5 and section 6 discusses the results and concludes.

2. Research hypotheses

Following the approach of De Haas and Van Lelyveld (2010), I rely on the interstate banking model developed by Morgan, Rime and Strahan (2004) to examine internal capital allocation by multinational banks. Morgan et al. (2004) extend the Holmström and Tirole (1997) model to a two-state version where capital can flow between the two states. This model was initially developed by Morgan et al. (2004) to investigate how integration of bank ownership across states in the U.S. in the early 1980s affected economic volatility within states. The authors compare the impact of collateral and bank capital shocks under an *interstate* banking regime, where capital can flow freely across states, versus an *intrastate* regime, where capital flows across states are restricted. Building on Holmström and Tirole (1997), their basic model comprises risk neutral firms, banks and investors. Firms choose between a good project and two bad projects, with one bad project having higher private benefits to the firm than the other. Furthermore, the good project has a relatively higher likelihood of success than the two bad projects, and all the projects return R if they succeed, 0 otherwise. Through monitoring banks can prevent investments with large private benefits for the firm to occur, but not those with small private benefits. As such, banks incur monitoring costs and they must invest enough of their own capital in the project to be credible monitors. Firms borrow both *informed capital* from the bank and *uninformed* capital from investors. The authors show that in the interstate model, where informed capital can move freely to equalize the equilibrium rate of return in informed capital markets, bank capital shocks have a smaller impact on investment than in the intrastate model, while the impact of firm collateral shocks gets amplified (see appendix in Morgan et al. (2004) for proofs). This model can

easily be adapted to an inter-country setting to examine the international allocation of internal capital by multinational banks. In such a setting, multinational banks are capital constrained and risk neutral and they re-allocate liquidity (intrabank deposits and loans) between countries in reaction to financial or real-economic country-specific shocks to equalize the rate of return on (bank) capital across countries. The model generates two propositions.

The first proposition is that a collateral squeeze in country A will have a negative impact on bank lending in that state because the decrease in the rate of return on capital after the collateral squeeze will lead to a capital flight to the bank in country B[1]. The idea is that a weak demand in country A, due to declines in borrower wealth or collateral, will lead to an outflow of capital from country A to country B, where the rate of return on capital is higher (Morgan et al., 2004). A collateral squeeze could be related to real-economic shocks such as a sharp reduction in economic growth in the country of operation. The parent bank reallocates its capital where it is more profitable, from low-return to high-return countries: this is the "investment" motive or "substitution effect" (see De Haas and Van Lelyveld (2010)).

In this situation, the reallocation of internal capital by multinational banks may amplify business cycles, the group transferring more funds to foreign affiliates located in host countries with strong macro-economic environments and lending opportunities.

The second one is that multinational banks re-allocate capital between countries in reaction to financial shocks that reduce sharply a bank's capital or funding base to ensure that the return on capital remains equal in both countries. For instance, a parent bank may also provide intra-bank loans to its subsidiary if its capital base is squeezed during a systemic banking crisis in the host country. As a consequence of this extra capital inflow, bank lending in country A decreases by a lower amount than in the situation where there would not be extra capital available from another state[2]. The intuition is the following: a reduction in bank capital in country A, due to an exogenous shock, increases returns on bank capital in A, which attracts additional bank capital from country B and eventually equalizes rates of return on capital between the two countries (Morgan et al., 2004). This is the "support motive". Furthermore, and as an extension of this proposition, a capital squeeze faced by affiliates located in the other countries of operations of the banking group, such as may occur during systemic banking crises, should lead to a reallocation of internal group funding away from foreign affiliates in non-crisis countries to support for-

[1]Similarly to proposition 1, this reduction in informed capital available to firms is exacerbated by a reduction in uninformed capital, due to the reduction of pledgeable income that can be promised by firms to uninformed investors.

[2]The authors also show how this positive effect on lending is reinforced by the smaller reduction in pledgeable income that can be promised to uninformed investors by firms in country A, given that the amount lent by banks to firms in country A decreases less.

eign affiliates located in countries where the crisis is occurring. The existence of financial inter-linkages between entities of a same group leads to the following hypothesis:

Hypothesis 1 *The quantity of internal group funding to a foreign affiliate decreases when other group affiliates face a systemic banking crisis.*

Finally, the mechanism that underlies both the support and investment motives is the group's response to a variation in its foreign affiliates' investment prospects or solvency, *ceteris paribus*, through the channel of internal capital. In other words, foreign affiliates use internal capital to compensate for a reduction in their capital base, to profit from higher return on capital in their host country or, more generally, to compensate for the insufficiency of available external capital.

Hypothesis 2 *An increase in (net) internal funding to a foreign affiliate leads to an expansion of this affiliate's lending in its host country, ceteris paribus.*

In the next sections, I present the data and empirical strategy on which I rely to examine directly the functioning of internal capital market inside multinational banks.

3. Data and descriptive statistics

3.1. Data

In this paper, I use a novel database on banks operating in South Africa with detailed balance sheet data, including information on internal loans and deposits from and to the banking group. The data on internal funds come from the central bank of South Africa (Resbank). The Resbank requires all banks operating in South Africa to provide detailed balance sheet information on a monthly basis. The banks have to disclose information on group bank loans and deposits, under both assets and liabilities categories. This data, collected under the format Banks DI900 Returns is available from January 1993 to December 2007. After this date, the reporting format changes (BA900), with the categories "bank group funding" (funding received from the banking group of the foreign affiliate) and "interbank funding" (funding obtained through the interbank market) being merged into a single category, and it becomes impossible to isolate the stock of internal bank funding (see Table A.1 for an overview of a simplified DI900 reporting format of the Resbank). Therefore, I only use the files for the 1993-2007 period. The data is stored in separate excel spreadsheets for each month and each bank. I only compile the information for the end-of-quarter months of March, June, September and December, as the other data it is matched to is only available on a quarterly basis. This information is available to the public on the website of the Resbank (http://www.resbank.co.za) but to the best of my knowledge, this data on internal loans and deposits have never been explored for research on internal capital market.

This dataset is completed by financial and ownership information on banks from Bureau Van Dijk's BankScope database. Banks' ownership is defined as follow: I use the global ultimate owner indicator of BankScope database and update it using the same definition by looking on banks' websites when the information is missing in BankScope. A company is an Ultimate Owner (UO) if it controls at least 50.01% of the entity and has no identified shareholders or if its shareholder's percentages are not known. For banks which have a dispersed ownership and for which there is no ultimate owners controlling at least 50.01% of the company, I then determine the country of origin of the bank based on the country of the owner with the highest percentage of shares.

I obtain a panel of 28 foreign banks' affiliates. However, the panel is unbalanced and the sample size changes over time, with a minimum of 10 banks in 1994q1-1995q2 and a maximum of 23 between 2003q4-2004q4. In the empirical analysis (which focuses on the group of foreign banks) I use both the unbalanced panel and a balanced panel of firms that are present over the whole estimation period to test the robustness of the results to entry and exit of banks. Figure A.1 in the Appendix maps the geographic distribution of the country of origin of banks operating in South Africa. In the sample, 67% of the banks are global multinational banks from developed countries (henceforth, Global MNB) and 33% are multinational banks from emerging countries (henceforth, Emerging MNB). 81% of these banks are commercial banks or saving banks while the rest are either investment banks or securities firm. 67% of these foreign affiliates are organized as foreign branches, and 33% as subsidiaries. These banks have a unique bank identification number provided by the Resbank. The names of some of the banks in the sample have changed over time due to mergers, acquisitions or divestments at the group level (for instance ING Baring became ING in 2004), but the unique number ensures that we can follow the same bank over time. For mergers or acquisitions between banks in South Africa, the acquiring bank keeps its identification number, while the target bank ceases to report financial information. Mergers and acquisitions may overstate the role of internal capital market in the expansion of domestic lending; however, over the sample period mergers and acquisitions mainly concern domestic banks which are not the focus of the empirical analysis. The list of foreign banks' affiliates presented in Table A.3 in the Appendix shows that the sample includes some of the largest commercial banking groups from Anglo-Saxon countries, such as Barclays, HSBC, Standard Chartered and from Europe, such as ING and Societe Generale as well as important emerging banking groups, such as Bank of China and State Bank of India. As such, although this study focuses on one single emerging country, South Africa, the group of banks represented includes some of the largest banking groups in the world, therefore providing a relatively representative image of how large banking groups allocate internal funds to their affiliates in emerging countries.

3.2. Measuring internal group funding

I use two main variables to examine internal capital markets. The first variable, *internal funding* is a liability item reported on the balance sheet and indicates the funding that the bank owes to its group, either in the form of deposits or loans. In Table A.1 in the Appendix, internal funding corresponds to the sum of items [A], [B], [C] and [D]. Loans or deposits denominated in foreign currency are reported in South African Rands so there are no currency conversion issues. The reporting banks also make deposits and loans to the rest of the group, reported under item [E] in Table A.1. This corresponds to *internal lending* and it is reported as an asset item on the bank balance sheet. The difference between internal lending and internal funding indicates the net internal funding position of the affiliate in relation to its group. If the net position is positive, the affiliate is a net receiver of internal funds from its group. If it is negative, the affiliate is a net provider of internal funds to its group. I present below the calculation of these two variables:

$$\text{internal funding} = \text{internal loans} + \text{internal deposits} \tag{1}$$

$$\text{net due internal funding} = \text{internal funding (liabilities)} - \text{internal lending (assets)} \tag{2}$$

3.3. Descriptive statistics

In this section I examine the funding model of banks operating in South Africa to understand the role played by internal funding. Specifically, I evaluate the importance of the group as a source of funding, compared to wholesale funding and customer deposits. I also examine the net internal funding position of the banks in relation to their group. Table A.2 in the Appendix provides detailed definitions and sources of the variables used in the empirical analysis. Table 1 provides descriptive statistics on selected bank financials for the sample period 1993q1-2007q4. All nominal values are deflated by the consumer price index (CPI) of South Africa provided by the IMF. In addition, all the variables coming from the banks' financial statements are winsorized at the 1% level to control for extreme observations that could potentially be errors[3]. The first half of Table 1 groups banks in three different ownership categories: Domestic banks, Global MNB and Emerging MNB. Domestic banks are included in this table as a benchmark, but the following empirical analysis focuses on foreign banks. Domestic banks are the largest by assets, closely followed by Global MNB while Emerging MNB have a much smaller size. The table shows that the net internal funding position of the three categories of banks is

[3]The results are robust to different treatments regarding the extreme observations. The estimations using non-winsorized variable gives qualitatively similar results.

on average positive over the sample period, indicating that the banks are on average net receivers of internal funds. The second half of Table 1 groups foreign banks according to their organizational form: bank branches and bank subsidiaries. The statistics reveal a much more limited participation of foreign bank subsidiaries in the internal capital markets of their group compared to foreign bank branches, which is consistent with both the organizational set up and the legal commitments implied by each structure.

— Table 1 insert here —

Table 2 provides more detailed information on the funding model of the two different categories of foreign banks (Global MNB and Emerging MNB). It also includes domestic banks as a benchmark. It presents the different sources of funding of each bank in the sample, as a percentage of their liabilities for the period 1993q1-2007q4.

— Table 2 insert here —

The table shows that internal funding represented 6% of total liabilities for domestic banks, while it was 7% for Global MNB and 3% for Emerging MNB, over the sample period. While clearly not as important as customer deposits, this source is however non-negligible and often more significant, in terms of amount, than interbank funding. This suggests that the traditional interbank wholesale market is underdeveloped in South Africa in comparison to developed countries, and that internal funding might represent an alternative to interbank funding. On average for all banks, interbank liabilities represented 5% of total assets over the period studied.[4]

Finally the second half of Table 2 compares the funding model of foreign bank branches to that of foreign bank subsidiaries. The difference in organizational structure is translated into sharp differences in funding patterns. Indeed, the subsidiaries of foreign banks in the sample are heavily reliant on deposits from other parties (close to 90% of their liabilities), while interbank funding and internal funding are negligible sources of funding. On the contrary, the branches of foreign banks have a more balanced funding model, with internal funding representing around 8% of their liabilities over the sample period. This suggests that foreign bank subsidiaries are relatively insulated from internal capital reallocations by their parent bank, while branches are much more financially integrated to their group.

[4]As a comparison, in Europe, interbank liabilities stood at around 30% of total assets for banks in the Euro area pre-crisis (end of 2007 to third quarter of 2008) followed by a drop in the median values to around 22% in 2011 (European Central Bank, 2012:10).

4. Estimation strategy

4.1. Hypothesis 1

According to Hypothesis 1, when foreign affiliates experience a sharp decline in their capital and/or liquidity position during systemic banking crisis they should receive additional internal funds from their group to compensate for the capital crunch, leading to declines in the internal group funding position of other foreign affiliates. I test this hypothesis in the context of the East Asian crisis.

The East Asian crisis which started in summer 1997 offers a sort of quasi-natural experiment on the functioning of internal capital market. East Asian economies which had been attracting significant amounts of short term foreign capital in the early 1990s faced a large and sudden reversal of capital flows in the second half of 1997 (Radelet and Sachs, 1999). I conjecture that the sudden reversal of capital flows of short term foreign debt and the reluctance of foreign creditors to extend new loans and roll over existing loans, which led to a severe banking crisis and the sharp contraction of the economy, created a funding shock for the south East Asian foreign affiliates of banking groups present in the region. Cetorelli and Goldberg (2012) have shown how global banks respond to such shocks by activating internal capital markets to reallocate funds across locations in response to their relative needs, while also creating another channel of international transmission of financial crises (see also Peek and Rosengren (2000) on the role of global banks in international shock transmission, with the case of Japanese banks in the U.S.). This should lead to an increase in internal capital flows from foreign banks' affiliates located outside the crisis region to those operating in countries affected by the crisis in order to support the affiliates' solvency and more importantly their liquidity positions. Furthermore, even though the subsidiaries of foreign banks in East Asia may not have been as reliant as domestic intermediaries on short-term, unhedged, foreign currency denominated debt, they also faced higher funding constraints both on the domestic and international wholesale market as a result of the crisis. As such, following Hypothesis 1, I expect the net internal funding position of South African affiliates belonging to a group very exposed to East Asia to decline more during the crisis, relative to before, compared to affiliates of groups with little or no exposure to East Asia.

4.1.1. Preliminary graphical analysis

Figures 1 and 2 chart the evolution of the ratio of net internal funding to asset for two different levels of exposure to East Asian crisis countries: "High East Asian exposure" regroups foreign affiliates whose banking group has above average exposure to East Asian crisis countries (more than 2.5% of total assets of foreign subsidiaries ex. South Africa are in East Asia) and "Low East Asian exposure" regroups banks with below average exposures. Three observations from these graphs are worth mentioning. The first one is that until 2000q4, and with the exception of the period immediately after the start

of the East Asian crisis in 1997q4-1998q1, the net internal funding position of the "high exposure" group is always higher than that of the "low exposure" group (see Figure 1, which graphs the evolution of the ratio over the long period 1993q1-2007q4). This suggests that banks are not randomly assigned into these groups. The second one is that 1998q1 is the only quarter, with the exception of 2007q1, in which the net internal funding position of the "high exposure" group becomes negative (-3% of total assets on average), meaning that the South African affiliate of these exposed groups becomes a net provider of internal funding to its group shortly after the start of the East Asian crisis. The third one is that despite important and stable differences in the level of their net internal funding position, both groups follow relatively similar trends in their reception of internal funds prior to 1997q3 (see Figure 2), which is important given the common (or parallel) trend assumption underlying difference in difference estimations. In addition, Table 3 presents summary statistics for key variables for banks with "High East Asian exposure" and "Low East Asian exposure" prior to 1997q4 (the start of the East Asian banking crisis). Only the loan-to-deposit ratio is found to be significantly different between these two groups of banks, with banks with high East Asian exposure reporting a significantly higher ratio than the banks with low exposure. The classification into Low and High exposure to East Asia being arbitrary I use instead the continuous variable "Asian Exposure" as specified in the empirical strategy section.

— Figure 2 and Figure 3 insert here —

— Table 3 insert here —

4.1.2. Model

I estimate a difference-in-difference model on the period 1996q4-1998q3, with a continuous treatment variable which is the exposure of the parent to the Asian crisis that started in the third quarter of 1997. The variable *Asian Exposure* is calculated as the weighted number of subsidiaries of the same parent (or "General Ultimate Owner" following BankScope's terminology) that are located in Thailand, Indonesia, Malaysia, Philippines, Singapore, South Korea in 1996[5]. The weight is calculated as the assets of the subsidiaries in the above-mentioned Asian countries divided by the total assets of the foreign subsidiaries (excluding South Africa) of the parent. This number is thus bounded below by zero (the group does not have any subsidiary in these East Asian countries) and above by one (all the other foreign subsidiaries of the group are located in these East Asian countries). As there was no foreign affiliate in South Africa over the sample period that was part of a banking group originating from one of these six Asian countries,

[5]Although this variable has also been calculated for each year in the sample, the weight does not change for any of the banks over the sample estimation period.

excluding the assets of the parent bank from the variable of interest is not biasing the results through under-reporting of exposure to the crisis.

I consider that the East Asian crisis started in the third quarter of 1997, after the Thai Prime Minister said on the 30th of June 1997 that the Thai baht would not be devalued, despite the speculative attacks on the currency on the 14 and 15 of May 1997 (see Corsetti, Pesenti and Roubini (1999) and Radelet and Sachs (1998, 1999) for a more detailed macroeconomic analysis of the East Asian crisis). The fact that the crisis was largely unanticipated and that high levels of capital continued to flow into East Asia until the very brink of the crisis itself (Radelet and Sachs, 1998) helps the identification exercise by limiting the potential existence of a pre-crisis trend. I use the continuous variable "Asian Exposure", which is an indicator of the weight of East Asian countries (in terms of assets) in the total foreign exposure (ex. South Africa) of the banking groups. I estimate the following model:

$$\text{Net internal funding/assets}_{it} = \delta_t + \gamma_i + \lambda \text{Asian Exposure}_i.\text{Post}_t + \delta \text{Controls}_{it} + \varepsilon_{it} \quad (3)$$

For the following variables t is a time subscript (year-quarter) and i is a bank (foreign affiliate) subscript. The dummy *Post* is equal to one for the period 1997q4-1998q3, and zero for the period prior to 1997q4. The estimation period is 1996q4-1998q3, that is, on the four quarters leading up to the financial crisis and the four quarters after. The parameter of interest is λ, which measures the difference in the effect of the East Asian crisis on net internal funding for a one percentage point increase in *Asian Exposure*[6].

Controls. I include *Size*, calculated as the log of total book assets deflated by the CPI index as it may affect the degree of integration of the foreign affiliate with its banking group and drive internal funding and lending. For instance, Gopalan, Nanda and Seru (2007) show that larger firms are more likely to be providers of funds to their group than receivers. The loan-to-deposit ratio is also included as a control, as this variable was found to be significantly different between both groups of banks prior to the onset of the East Asian crisis (see Table 3). In alternative specifications without bank fixed effects I include the dummy *Branch*, which takes the value of 1 if the foreign affiliate is a branch and 0 if it is a subsidiary, to take into account the fact that different organizational structures translate into varying degrees of centralization of decision-making and restrictions on internal transfer. As such, I expect this dummy to be positively associated with the reception of intragroup funding. I include a dummy *Commercial* which is equal to one if the main business line of the bank is retail and commercial banking, and 0 if it engages

[6]That is, a one percentage point increase in the total assets of the subsidiaries in East Asia of the group, relative to the total assets of all the foreign subsidiaries, ex-South Africa.

primarily in wholesale or investment banking. Investment banks may prefer to adopt a more centralized model to be flexible globally in their liquidity management and services to large corporate clients (Fiechter et al., 2011).

I include time fixed effects δ_t to control for variations in local market conditions. I also include bank fixed effects γ_i to control for any unobserved time-invariant differences between bank affiliates. Bank fixed effects also control for differences between foreign affiliates in the tax regimes of their home country, which could also influence internal capital allocation.[7] The standard errors reported are corrected for heteroskedasticity and clustered at the bank (foreign affiliate) level, that is at the (foreign) affiliate level.

4.2. Hypothesis 2

According to Hypothesis 2, an increase in (net) internal funding to a foreign affiliate should, *ceteris paribus*, lead to an increase in bank credit. I examine whether foreign banks' affiliates use these additional internal funds to increase their credit to domestic firms and individuals in South Africa using an instrumental variable technique.

I want to estimate β, the elasticity of credit to internal funding using the following empirical model[8]:

$$\text{Credit}_{it} = \beta \text{Internal funding}_{it} + \gamma \text{Controls}_{it} + \delta_t + \gamma_i + \varepsilon_{it} \tag{4}$$

However, identifying the causal effect of internal funds on banks' credit is problematic as it may be influenced by the same unobservable factors affecting bank credit and therefore be endogenous. Indeed, apart from internal group funding, banks' supply of credit is determined by the demand for credit, by domestic macroeconomic conditions but also by the availability of external bank funding (customers' deposit, interbank markets). The identification problem is that the availability of internal funding may be itself a function of local (i.e. host country) demand of credit and of local supply of external funding.

The identification strategy relies on the exploitation of an instrumental variable technique. Following the "support motive" the quantity of internal group funding from a parent bank to its foreign affiliate should decrease when its subsidiaries in other countries are faced with a systemic banking crisis in the host country. I use the variable *Asian Exposure* as an instrument for the volume of internal funding in the bank's balance sheet in

[7] Cerutti, Dell'Ariccia and Martínez Pería (2007) have found evidence of a positive and significant relationship between the top corporate tax rate in a host country and the decision of banks to incorporate their local businesses as branches, given that it would ease profit shifting across borders to avoid tax burden. Desai, Foley and Hines (2004) also found that internal borrowing is particularly sensitive to local taxes. Furthermore, different tax treatments by home regulatory authorities of repatriated profits from overseas could differ between branches and subsidiaries, which would not only influence the group's choice of organizational form abroad but also drive the observed variation in internal funding. One way to control for that is to include home country fixed effects. Given that we already include bank fixed effects we do not include additional home country fixed effects as these would be redundant.

[8] *Credit* and *Internal funding* are in log so that β is an elasticity.

the period following the onset of the East Asian crisis. The identification reposes on the assumption that a multinational bank's presence in East Asia is uncorrelated with any other determinant of the foreign affiliate's local supply of credit, especially uncorrelated with the local demand of credit, or more generally, with local macroeconomic conditions.

The dependent variable is the outstanding volume of loans to the private sector (deflated by the CPI). In DI900 reporting format, the category private sector loans and advances includes overdrafts and loans to companies, unincorporated businesses, individuals as well as non-profit institutions[9].

In terms of controls I include bank's size and bank's solvency. In addition, I also include time fixed effects δ_t to control for variations in local market conditions, such as variation in credit demand.

5. Estimation results

5.1. Internal capital in times of crisis - Hypothesis 1

5.1.1. Hypothesis 1 - Results

The tests of the first hypothesis, according to which the quantity of internal group funding to a foreign affiliate decreases when other group affiliates face a systematic banking crisis, are reported in Table 4 with three different dependent variables: the ratio of gross funding to assets, gross lending and the net ratio (funding minus lending). They indicate that banks belonging to groups more exposed to East Asian crisis countries show a significant drop in their net internal funding position. Affiliates of banking groups with higher exposure to East Asian crisis countries experienced a drop in their net internal funding position of 27.3 percentage points relative to other foreign affiliates (column 3). In columns (5)-(8) I exclude banks that entered or exited during the 1996q4-1998q3 period. I find that a one percentage point increase in *Asian Exposure* was associated with a decrease in the internal funding ratio of 14.4 percentage points in the *Post* period relative to the *Pre* period (column (5)), while it was associated with an increase in the internal lending ratio of 13.4 percentage points (column (5)), leading to an overall decline in net internal funding of 27.8 percentage points (column (6)). In other words, the South African foreign affiliates of highly exposed multinational banks both received less internal funding from their group during the East Asian crisis period than before, and lent more to their group, relative to the affiliates of less exposed groups. Consistent with Hypothesis 1, this suggests that the headquarters of groups highly exposed to the East Asian crisis countries altered their internal capital allocation, diverting their internal funds from South Africa to support their affiliates in East Asia. In columns (4) and (8) I estimate an alternative model with a lagged dependent variable (net due group funding to assets, one lag), to

[9]Due to the small number of observations, I have not disaggregated further the measures of credit.

control for the fact that there may have been differential trends for the growth of internal funding for banks with different levels of exposure to East Asian countries. These models with a lagged dependent variable do not include fixed effects as it would require stronger assumptions (Angrist and Pischke, 2009). The point estimates of the interaction term obtained in the two models with a lagged dependent variable (on the entire panel and on the balanced panel) are both significant at the 1% level and their magnitudes are similar to those obtained in the fixed effects models. This provides reassurance that the results are robust to alternative identifying assumptions. Finally, in column (9) I collapse time into into one pre- and one post-shock periods to avoid serial correlation problems (see Bertrand, Duflo, and Mullainathan, 2004, for the methodology) and I control for entry and exit. The results are robust and the point estimates do not change significantly between models 3-4, 7-8 and 9.

— Table 4 insert here —

5.1.2. Hypothesis 1 - Robustness tests

As a robustness test, I show that the results are not qualitatively affected by changes in the end date of the *Post* period. In Table 5 I investigate further the lasting effects of the East Asian crisis by extending successively by one quarter the end of the *Post* period. I control for entry and exit by only examining the banks that were present during the entire period 1996q4-2000q3. The signs of the interaction term *Asian Exposure*Post* are negative and significant until the third quarter of 1999, however the point estimates decrease progressively, from -0.278 for the period ending in 1998q3 to -0.070 for the period ending in 1999q3. The results indicate that the transmission of the shock was rapid and it was mostly felt during the first year after the start of the crisis. Two years after, most of the effects had disappeared. The coefficient on the interaction term turns positive (but non significant) in 2000q3, three years after the onset of the crisis.

— Table 5 insert here —

One of the limits of this estimation is that Asian Exposure is not randomly assigned. In addition, and as mentioned before, one of the key identification assumptions of the difference-in-difference model is the so-called parallel-trend assumption according to which in the absence of the treatment, the unobserved differences between treatment and control groups are the same over time. I explore the possibility that a bank belonging to a group that was more significantly exposed to the East Asian crisis was on a different internal funding path than those that were less significantly exposed. If this was the case, my estimates could be capturing such pre-existing differences across the two groups of banks and not the effect of the East Asian crisis shock on internal funding. First I perform the following falsification placebo test: I estimate equation (1) over the pe-

riod 1995q3-1997q2, by lagging the internal funding measure by one year, as if the East Asian crisis had started in the third quarter of 1996 instead of the third quarter of 1997. The placebo test is estimated over the period $t = (\text{Pre-1}, \text{Pre})$ where *Pre* is the period 1996q3-1997q2, the same as in our baseline estimation, and *Pre-1* corresponds to the 4 previous quarters, 1995q3-1996q2. The results are presented in Table 6 in columns (1) and (2). The coefficient on the interaction terms of the placebo "post" dummies and Asian Exposure are not significantly different from zero at the 5% level. Furthermore, these different outcomes are driven by changes in the point estimates themselves. These results provide some additional reassurance on the validity of the exercise, indicating that banks that belonged to a group significantly exposed to the East Asian crisis did not face any differential supply of internal funding prior to the crisis period. I perform two additional placebo tests. The second placebo test is over the period 1994q3-1996q2, as if the East Asian crisis had started in the third quarter of 1995, instead of the third quarter of 1997. This is an additional test to check that there were no trends, up to two years before the crisis, that would explain the results. The coefficient on the interaction terms in columns (3) and (4) are positive and not significant at the 5% level, which further shows that there were no pre-existing trends in the supply of internal funding between the two groups prior to the start of the East Asian crisis. The last placebo test is over the period 1997q2-1999q3, as if the crisis had started a year later, in 1998q3. The coefficients on the interaction terms for both panels (columns (5) and (6)) are positive and significant. This shows that a year after the crisis, exposed banks had started to recover, with positively increasing net internal funding positions.

— Table 6 insert here —

5.2. From internal loans to domestic credit - Hypothesis 2

5.2.1. Instrumental variable and first stage

In this section I provide a test for Hypothesis 2, investigating the impact of the reception of internal funding on banks' credit. According to Hypothesis 2, an increase in (net) internal funding to a foreign affiliate should, *ceteris paribus*, lead to an increase in bank credit. I examine whether foreign banks' affiliates use these additional internal funds to increase their credit to domestic firms and individuals in South Africa using an instrumental variable technique. I have performed a preliminary Hausman test for endogeneity of the variable internal funding which rejected the null hypothesis of the exogeneity of this variable at the 5% confidence level. I use the bank's exposure to East Asia as an instrument (Asian Exposure). The results of the first stage are reported in Table 7. For the instrument to be valid it needs to be relevant and to satisfy the

exclusion restriction. The first stage shows that the coefficient on the variable *Asian Exposure* is negative and statistically significant at the 1% level. Models (1)-(5) cover different periods after the onset of the Asian crisis, from 1997q4 to 1999q3 (model 1), to 1999q4 (model 2), to 2000q1 (model 3), to 2000q2 (model 4) and to 2000q3, a three-year period (model 5). The coefficient on Asian Exposure is significant at the 1% level in all three models, but the F-stat varies depending on the period considered, decreasing from 21.28 to 3.75 as the negative effect of the East Asian crisis on the net internal funding position of exposed banks progressively diminishes.

— Table 7 insert here —

5.2.2. Hypothesis 2 - Results

The results of the Instrumental Variable (IV) estimations are reported in Table 8. The instrumented variable is the (gross) volume of internal funding in Panel A and the net amount of internal funding due to the group (Panel B).

— Table 8 insert here —

In Panel A, the IV estimates of the gross volume of internal funding imply that a 1% increase in the outstanding volume of internal funding results in a 1.5% increase to 2.7% increase in loans to the private sector, depending on the period considered. The effects progressively decrease as the period since the onset of the East Asian crisis is longer. The F-stat (Kleibergen and Paap (2006) Wald rk F statistic) also decreases as time passes since the beginning of the crisis. In panel B, the dependent variable is the net volume of internal funding due to the group. The coefficients are also positive and significant at the 1% level. In net terms, a 1% increase in internal funding leads to a 1.3% to 2.0% increase in loans to the private sector. To sum up, these results using instrumental variable technique provide evidence that an increase in the reception of internal capital has a positive impact on banks' lending to the private sector. In other words, when foreign affiliates receive more internal funds from their group they expand their loans to the private sector in South Africa. This confirms the second research hypothesis.

6. Discussion and Conclusion

Exploiting a novel dataset containing information on internal funding received and sent by banks located in South Africa to their parent group abroad, this research has provided evidence on the existence of support motives for internal funding as multinational banks reallocate capital away to support their subsidiaries facing financial specific-(host) country shocks. However, this also implies that foreign affiliates' balance sheet is not immune to "reversal of fortune" when other parts of their banking group need large amount of internal capital to cushion capital losses, as this reallocation of capital divert internal funding to other affiliates. I document this mechanism by examining the impact of the East Asian crisis, which resembles a "quasi-natural experiment", on internal allocation of

capital. The results show that South African foreign affiliates of banking groups highly exposed to East Asian economies experienced a significant drop in their net internal funding, as a percentage of their asset, during the crisis.

This research has also explored the link between internal capital and bank credit, using instrumental variable technique. It has shown that an increase in internal funding received by a bank affiliate has a positive impact on its supply of credit to the local private sector. The evidence provided in this paper suggests that foreign banks expand their loans to the local private sector when they receive higher volumes of internal funding.

The evidence of a support motive to internal funding is particularly important for developing economies where sources of wholesale funding are limited and capital markets are underdeveloped. Furthermore, these results are encouraging as foreign affiliates use this extra (internal) capital to expand local credit, whereas it has often been noted that banks in Africa are highly liquid but do not recycle deposits in the form of loans, preferring instead to buy government securities or invest abroad (Beck et al., 2011).

A first message of this research is that foreign affiliates have ambiguous effects for the financial stability of the host country. On the one hand, being part of a foreign group should reduce the risk of bankruptcy by allowing for the reception of internal capital from the group. On the other hand, internal capital markets may be a channel through which financial crises are transmitted from one country to another, when abrupt capital reallocations inside the group take place. However, the strength of this channel will partly depend on the legal structure of the foreign affiliate. Indeed, the organizational form of the foreign affiliate, either as a branch or as a subsidiary will have an impact on the stability of the banking sector and the local supply of credit through the internal capital market channel, as branches are more integrated to their group via this channel than subsidiaries. The choice of a legal structure by a multinational banking group is influenced by the regulations in the host country, which varies across countries, as well as by the development of local capital markets and macroeconomic and political risks in this particular country (Fiechter et al., 2011). A potential policy implication of this research for bank regulators may be that favoring organization of foreign affiliates as subsidiaries rather than branches, through specific banking regulations, may reduce the potential transmission of foreign crises via internal capital markets. One caveat, however, is that if a banking crisis occurs in the host country a parent is fully responsible for all losses incurred under a branch structure, while its obligations are only limited to the value of the invested equity under a subsidiary structure, which makes it more likely to walk away from the operation (Cerrutti et al., 2007; Fiechter et al., 2011). That said, if a foreign affiliate has systemic importance for the health of the banking group, its parent is more likely to support it through transfers of internal liquidity, regardless of its organizational form (Fiechter et al., 2011).

One of the limitations of this research is that, with the dataset at hand, we only

observe the internal funding position of one affiliate of a group, but we cannot capture the funding position of the other subsidiaries or branches belonging to this group. As such, one can only infer that capital was diverted from one country to another. This opens an avenue for future research, conditional on access to data, which would consist in examining internal transfers between the different affiliates of a group.

Table 1: **Summary of selected bank financials**
Source: ResBank. Own calculations.

Variable (Winsorized at 1%)	Obs.	Mean	Std. Dev.	Median	Min	Max
Domestic banks						
Total assets (in millions of Rands)	1633	12800	31800	946	25	168000
Total capital (in millions of Rands)	1633	1050	2370	153	1	13000
Solvency ratio	1633	19%	19%	11%	0%	100%
Global banks						
Internal funding/total assets	736	5%	14%	0%	0%	90%
Internal lending/total assets	736	2%	6%	0%	0%	78%
Net internal funding/total assets	736	3%	14%	0%	-36%	89%
Total assets (in millions of Rands)	736	12500	31900	2500	37	168000
Total capital (in millions of Rands)	736	915	2630	136	5	13000
Solvency ratio	736	8%	7%	6%	0%	91%
Emerging banks						
Internal funding/total assets	374	2%	11%	0%	0%	80%
Internal lending/total assets	374	0%	2%	0%	0%	33%
Net internal funding/total assets	374	2%	11%	0%	-25%	80%
Total assets (in millions of Rands)	374	240	178	189	31	1050
Total capital (in millions of Rands)	374	33	16	34	2	101
Solvency ratio	374	20%	16%	13%	4%	98%
Foreign bank branches						
Internal funding/total assets	750	6%	19%	0%	0%	370%
Internal lending/total assets	750	2%	7%	0%	0%	100%
Net internal funding/total assets	750	4%	19%	0%	-50%	370%
Total assets (in millions of Rands)	750	9750	26800	1150	25	168000
Total capital (in millions of Rands)	750	769	2000	126	1	13000
Solvency ratio	750	17%	18%	9%	0%	100%
Foreign bank subsidiaries						
Internal funding/total assets	360	0%	1%	0%	0%	19%
Internal lending/total assets	360	0%	1%	0%	0%	10%
Net internal funding/total assets	360	0%	2%	0%	-10%	19%
Total assets (in millions of Rands)	360	19400	44500	353	31	168000
Total capital (in millions of Rands)	360	1560	3650	35	7	13000
Solvency ratio	360	12%	9%	9%	1%	73%

Table 2: **Bank funding model (in % of total liabilities)**
Note: "Deposits from other domestic parties" include deposits from local governments, the public and private (financial and non financial) corporate sectors, Insurers, Pension funds, Households and Non-profit organisations.
Source: ResBank. Own calculations.

Variable (Winsorized at 1%)	Obs.	Mean	Std. Dev.	Median	Min	Max
Domestic banks						
Deposits from other domestic parties	1,633	62%	29%	67%	0%	99%
Other liabilities	1,633	21%	25%	12%	0%	100%
Global banks						
Internal group funding	736	7%	20%	0%	0%	97%
Interbank funding	736	5%	7%	2%	0%	58%
Deposits from other domestic parties	736	55%	28%	64%	0%	99%
Other liabilities	736	28%	26%	18%	0%	100%
Emerging banks						
Internal group funding	374	3%	13%	0%	0%	92%
Interbank funding	374	6%	15%	0%	0%	58%
Deposits from other domestic parties	374	52%	37%	56%	0%	99%
Other liabilities	374	36%	37%	13%	0%	100%
Foreign bank branches						
Internal group funding	750	8%	22%	0%	0%	97%
Interbank funding	750	7%	12%	2%	0%	58%
Deposits from other domestic parties	750	39%	28%	37%	0%	99%
Other liabilities	750	41%	32%	36%	0%	100%
Foreign bank subsidiaries						
Internal group funding	360	0%	2%	0%	0%	23%
Interbank funding	360	1%	2%	0%	0%	21%
Deposits from other domestic parties	360	85%	8%	87%	62%	99%
Other liabilities	360	10%	6%	9%	0%	24%

Table 3: **Comparison of key variables for banks highly exposed to east Asia and banks with low exposure to east Asia, before 1997q4**
*, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.
Source: ResBank. Own calculations.

Variable	**Exposure less than 2.5%**		**Exposure over 2.5%**		**T-test**
	Obs.	**Mean**	**Obs.**	**Mean**	
Loans to private sector	187	1,180,145	14	332,428	1.050
Bank's size	187	13.568	14	14.045	-0.958
Internal group funding (% liab.)	186	0.031	14	0.070	-0.972
Interbank funding (% liab.)	186	0.031	14	0.026	0.401
Bank's solvency	187	0.113	14	0.108	0.115
Loan-to-deposit ratio	186	1.381	14	24.175	-4.465***
Total capital	187	369,691	14	95,060	-4.465
Net due group funding	187	7,588	14	83,458	-1.315

Table 4: **Impact of the East Asian financial crisis on South African affiliates' net internal funding**
This table presents difference-in-difference analysis of the ratio of gross internal funding to assets (columns (1) and (5)), gross internal lending to assets (columns (2) and (6)) and net internal funding to assets (columns (3)-(4) and (7)-(9)) over the period 1996q4-1998q3. The dummy Post is equal to 1 over the period 1997q4-1998q3. The dependent variables and the bank controls are Winsorized at 1%. Variable definitions are provided in Table A.2 in the Appendix. Standard errors are robust to heteroskedasticity with values in parenthesis reported beneath, and are adjusted for bank clustering in models (1) and (2).*, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Baseline				**Balanced panel (control entry/exit)**				**Collapsed panel**
	Gross fund.	*Gross lend.*	**Net**	**Net**	*Gross fund.*	*Gross lend.*	**Net**	**Net**	**Net**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asian Exposure * POST	-0.139**	0.134***	-0.273***	-0.285***	-0.144**	0.134***	-0.278***	-0.282***	-0.247***
	(0.056)	(0.001)	(0.056)	(0.029)	(0.062)	(0.001)	(0.062)	(0.030)	(0.026)
Bank's size	0.037	0.001	0.036	-0.001	0.053	-0.000	0.053	-0.003	-0.003
	(0.074)	(0.001)	(0.074)	(0.002)	(0.086)	(0.001)	(0.087)	(0.003)	(0.003)
Loan-to-deposit ratio	-0.000	0.000***	-0.000	-0.000*	-0.017	0.003	-0.020	-0.015	-0.016
	(0.000)	(0.000)	(0.000)	(0.000)	(0.015)	(0.002)	(0.015)	(0.009	(0.012)
POST				-0.022				-0.025	-0.021
				(0.018)				(0.018)	(0.023)
Asian Exposure				0.242***				0.234***	0.188***
				(0.045)				(0.049)	(0.043)
Net Due Group Funding to Assets (lag1)				-0.197				-0.202	
				(0.135)				(0.136)	
Commercial				0.023				0.024	0.025
				(0.022)				(0.025)	(0.026)
Branch				0.020				0.027	0.030
				(0.024)				(0.031)	(0.032)
Observations	124	124	124	124	112	112	112	112	28
R-squared	0.347	0.840	0.333	0.227	0.349	0.843	0.339	0.238	0.535
Time FE	✓	✓	✓		✓	✓	✓		
Firm FE	✓	✓	✓		✓	✓	✓		
Number of clusters	19	19	19	19	14	14	14	14	

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Table 5: **Testing for the duration of the East Asian crisis effect**
This table presents difference-in-difference analysis of the ratio of net internal funding to total assets. Constants and bank controls (bank's size) are included but not reported. The dependent variable and the bank controls are Winsorized at 1%. All the regressions include bank fixed effects and time fixed effects. Variable definitions are provided in Table A.2 in the Appendix. Standard errors are robust to heteroskedasticity and are adjusted for bank clustering with values in parenthesis reported beneath.*, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

From 1996q4 to	**1998q3**	**1998q4**	**1999q1**	**1999q2**	**1999q3**	**1999q4**	**2000q1**	**2000q2**	**2000q3**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asian Exposure * POST	-0.278***	-0.159***	-0.071**	-0.067**	-0.070**	-0.038	-0.018	-0.006	0.023
	(0.062)	(0.037)	(0.029)	(0.026)	(0.024)	(0.023)	(0.025)	(0.021)	(0.019)
Loan-to-deposit ratio	-0.020	-0.015	-0.012	-0.012	-0.011	-0.009	-0.008	-0.010	-0.012
	(0.015)	(0.015)	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)	(0.012)	(0.011)
Bank's size	0.053	0.006	-0.020	-0.019	-0.013	-0.006	0.001	0.010	0.017
	(0.087)	(0.040)	(0.023)	(0.020)	(0.016)	(0.017)	(0.024)	(0.029)	(0.031)
Observations	112	126	140	154	168	182	196	210	224
R-squared	0.339	0.295	0.301	0.309	0.318	0.339	0.358	0.356	0.340
Number of clusters	14	14	14	14	14	14	14	14	14

Table 6: **Placebo falsification test**
This table presents falsification tests of the difference-in-difference analysis of the ratio of net internal funding to total asset over three different periods 1995q3-1997q2, 1994q3-1996q2 and 1997q2-1999q3. The dummy Post Placebo 1 is equal to 1 over the period 1996q3-1997q2, the dummy Post Placebo 2 is equal to 1 over the period 1995q3-1996q2, and the dummy Post Placebo 3 is equal to 1 over the period 1998q4-1999q3. The dependent variable and controls are Winsorized at 1%. Variable definitions are provided in Table A.2 in the Appendix. Standard errors are robust to heteroskedasticity with values in parenthesis reported beneath,and are adjusted for bank clustering.

	1995q3-1997q2		**1994q3-1996q2**		**1997q2-1999q3**	
	All foreign affiliates	**Control for entry/exit**	**All foreign affiliates**	**Control for entry/exit**	**All foreign affiliates**	**Control for entry/exit**
	(1)	(2)	(3)	(4)	(5)	(6)
Asian Exposure * Post Placebo 1	0.336	-0.897				
	(0.897)	(0.482)				
Asian Exposure * Post Placebo 2			20.797	39.137		
			(21.234)	(23.189)		
Asian Exposure * Post Placebo 3					0.350***	0.352***
					(0.007)	(0.009)
Loan-to-deposit ratio	0.006		0.006		0.000	
	(0.005)		(0.006)		(0.000)	
Bank's size	0.078	0.114	0.099	0.138	-0.003	0.002
	(0.065)	(0.067)	(0.089)	(0.080)	(0.010)	(0.015)
Observations	112	105	88	81	142	112
R-squared	0.592	0.578	0.666	0.644	0.715	0.718
Time FE	✓	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
Adjusted R-squared	0.648	0.648	0.648	0.648	0.648	0.648
Number of clusters	15	14	15	14	15	14

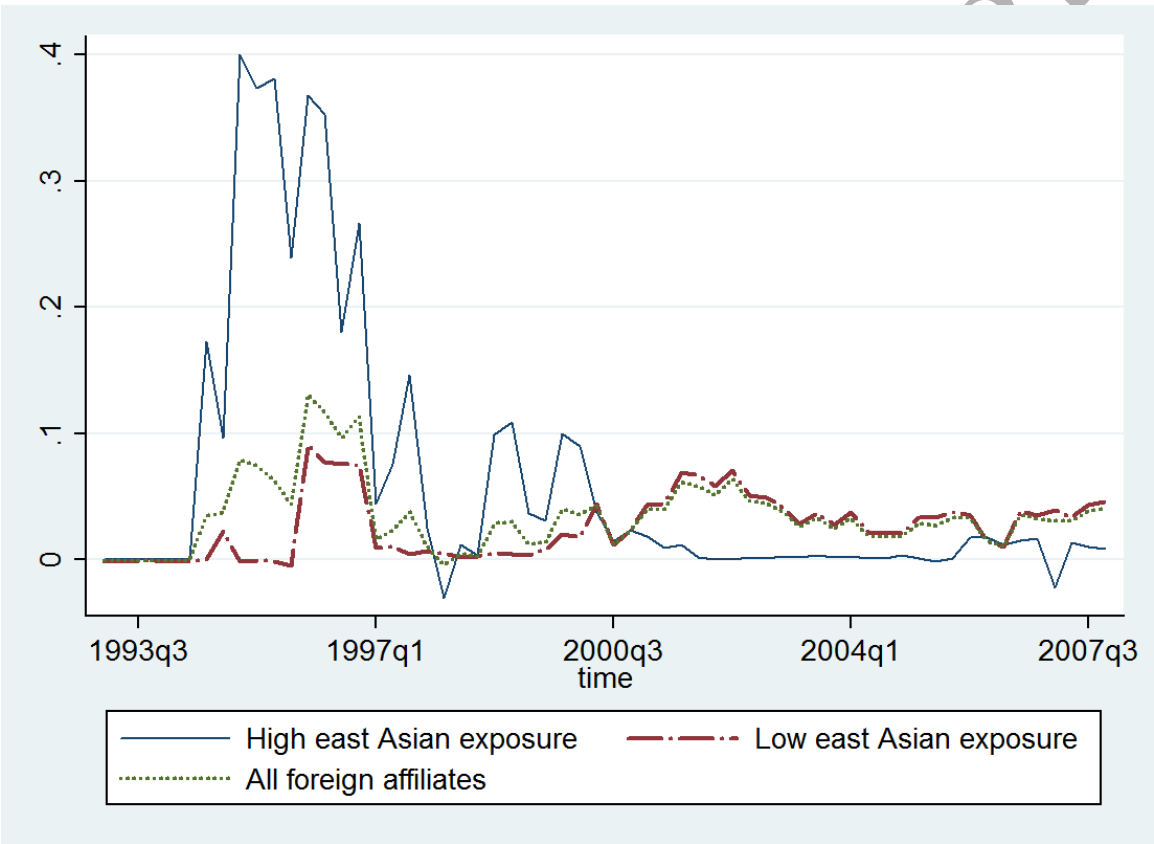
Table 7: **First stage regressions**
This table presents first stage regression analysis of net due internal funding, in log, deflated by the CPI index. Constants are included but not reported. Both regressions include time and bank fixed effects. The dependent variable and the bank controls are Winsorized at 1%. Variable definitions are provided in Table A.2 in the Appendix. Standard errors are robust to heteroskedasticity with values in parenthesis reported beneath.*, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

From 1997q4 to	1999q3	1999q4	2000q1	2000q2	2000q3
	(1)	(2)	(3)	(4)	(5)
Asian Exposure	-307.245**	-282.301***	-243.049***	-191.080***	-147.626**
	(75.093)	(51.257)	(62.853)	(54.447)	(54.838)
Bank's size	1.396*	1.378**	1.533***	1.460*	1.621**
	(0.598)	(0.410)	(0.437)	(0.651)	(0.563)
Bank's solvency	0.765	0.860	1.268	0.723	1.148
	(1.414)	(0.973)	(1.378)	(2.065)	(1.619)
Observations	35	42	48	56	62
Adjusted R-squared	0.755	0.755	0.755	0.755	0.755
Number of clusters	9	9	9	9	9
First stage F-stat	19.87	10.35	6.55	21.28	3.75

Table 8: **Elasticity of bank credit to internal funding**
This table presents the results of OLS and IV estimations of equation (2) over the 1997q4-2000q3 period for the sample of foreign banks' affiliates. The dependent variable is the volume of loans to the private sector, in log and deflated by the CPI index in both Panel A and Panel B. In the IV estimations, the log of internal funding (gross in Panel A and net in Panel B) is instrumented with the variable *Asian Exposure*. Constants are included but not reported. Variable definitions are provided in Table A.2 in the Appendix. All regressions include time fixed effects. The dependent variable and the bank controls are Winsorized at 1%. Standard errors are robust to heteroskedasticity, with values in parenthesis reported beneath.*, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The F-stat is the Kleibergen and Paap (2006) Wald rk F statistic provided by the Baum et al.'s (2002) ivreg2 Stata command.

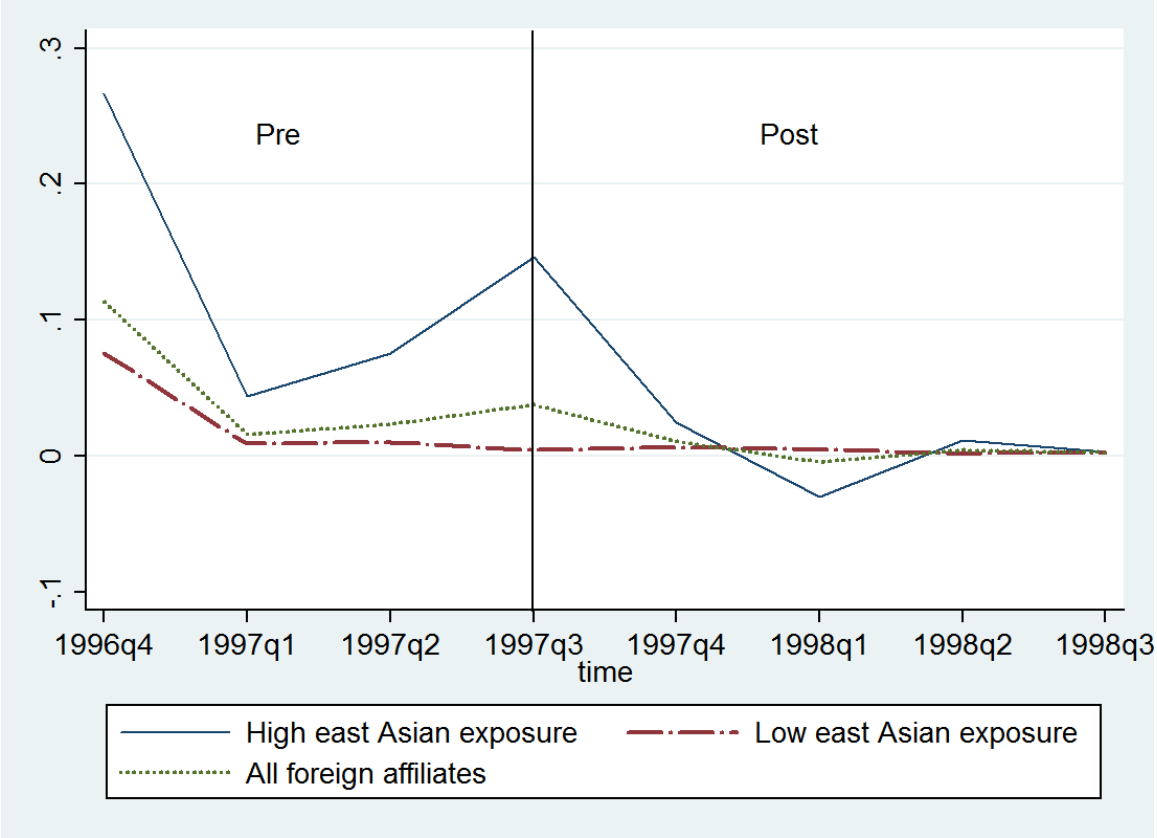
			Panel A		
From 1997q4 to	1999q3	1999q4	2000q1	2000q2	2000q3
	(1)	(2)	(3)	(4)	(5)
(Gross) Internal funding (real, in log)	2.713***	2.190***	1.700***	1.487***	1.560***
	(0.029)	(0.208)	(0.310)	(0.305)	(0.343)
Bank's size	-0.253***	-0.021	0.236	0.343**	0.282
	(0.024)	(0.116)	(0.159)	(0.157)	(0.177)
Bank's solvency	95.999***	70.881***	59.606***	53.785***	50.564***
	(1.800)	(7.710)	(10.323)	(10.011)	(10.023)
Observations	32	38	44	50	56
R-squared	0.336	0.429	0.452	0.507	0.416
Adjusted R-squared	0.216	0.216	0.216	0.216	0.216
Number of clusters	8	8	8	8	8
Time FE	✓	✓	✓	✓	✓
First stage F-stat	944.767	266.268	49.088	25.466	17.606
			Panel B		
Net due internal funding (real, in log)	2.015***	1.713***	1.381***	1.256***	1.337***
	(0.031)	(0.141)	(0.200)	(0.186)	(0.214)
Bank's size	0.711***	0.646***	0.756***	0.891***	0.782***
	(0.054)	(0.119)	(0.139)	(0.134)	(0.151)
Bank's solvency	94.920***	69.984***	61.173***	58.950***	58.526***
	(1.486)	(8.963)	(9.981)	(9.091)	(8.461)
Observations	28	34	39	45	50
R-squared	0.802	0.686	0.620	0.610	0.558
Adjusted R-squared	0.381	0.381	0.381	0.381	0.381
Number of clusters	7	7	7	7	7
Time FE	✓	✓	✓	✓	✓
First stage F-stat	176.651	169.128	59.281	30.102	17.520

Figure 1: **Ratio of net internal funding to asset, 1993q1-2007q4**



Source: Resbank, BankScope and own calculations. Quarterly averages for each of the following three groups of banks: "High East Asian exposure" regroups foreign affiliates which banking group has above average exposure to East Asian crisis countries (more than 2.5% of total assets of foreign subsidiaries ex. South Africa are in East Asia), "Low East Asian exposure" regroups banks with below average exposure, and all foreign affiliates.

Figure 2: **Ratio of net internal funding to asset, pre and post East Asian crisis**



Source: Resbank, BankScope and own calculations. Quarterly averages for each of the following three groups of banks: "High East Asian exposure" regroups foreign affiliates which banking group has above average exposure to East Asian crisis countries (more than 2.5% of total assets of foreign subsidiaries ex. South Africa are in East Asia), "Low East Asian exposure" regroups banks with below average exposure, and all foreign affiliates.

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Appendix

Table A.1: **Simplified DI900 Reporting Format**

Assets at month-end	**Liabilities and Capital at month-end**
CENTRAL BANK MONEY AND GOLD	DEPOSITS:
Cash reserve deposits Interest bearing	**Deposits denominated in Rand**
Cash reserve deposits Non-interest bearing	Bank group funding:
Other deposits	*Bank group funding NCD's* [A]
DEPOSITS LOANS AND ADVANCES	*Bank group funding other deposits* [B]
Bank group funding incl Negotiable Certificate of Deposit (NCD)'s [E]	SA Inter-bank funding:
SA Inter-bank funding incl NCD's	*Inter-bank funding NCD's*
Deposits with and loans and advances to foreign banks, in rand	*Inter-bank funding other deposits*
Loans granted under resale agreements	Government deposits
Installment debtors suspensive sales and leases	Other domestic parties
Mortgage advances	**Deposits denominated in foreign currency**
Credit card debtors	Bank group deposits [C]
Acceptances, commercial paper bills, promissory notes	SA Interbank deposits
Liquid bills notes and acceptances discounted or purchased	Government deposits
Non-liquid acceptances,commercial paper bills notes	Other domestic parties
Foreign currency loans and advances	Companies and other
Redeemable preference shares	Non-residents Banks
Other overdrafts and loans public sector	Other
Other private sector loans and advances	LOANS AND ADVANCES:
Less Specific provisions i.r.o. loans and advances	**Bank group funding** [D]
INVESTMENTS incl trading portfolio assets	**SA Inter-bank funding**
NON-FINANCIAL ASSETS	**Loans received under repurchase agreements**
Premises of bank	**Foreign currency funding**
Other fixed property	**Other loans and advances denominated in Rand**
Computer equipment	Central and provincial government
Computer software	Reserve Bank and Corporation for Public Deposits
Other tangible assets	Other residents
Intangible assets incl purchased goodwill	Non-residents
OTHER ASSETS	OTHER LIABILITIES
TOTAL ASSETS	**TOTAL LIABILITIES**
	CAPITAL AND RESERVE FUNDS

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Table A.2: **Variable definitions**

Variable	Description	Source
	Dependent variables	
Internal funding/total assets	Ratio of internal funding to total assets.	Resbank
Internal lending/total assets	Ratio of internal lending to total assets.	Resbank
Net internal funding/total assets	Ratio of net internal funding to total assets.	Resbank
Private sector loans	Loans to the private sector (companies, individuals, non profit institutions), real values in log.	Resbank
	Independent variables	
Asian Exposure	Sum of weighted assets of other subsidiaries of the same GUO located in Thailand, Indonesia, Malaysia, Philippines, Singapore, South Korea for each year in the sample. The weight was calculated as the assets of the subsidiary in the above-mentioned Asian countries divided by the total assets of the foreign subsidiaries (excluding South Africa) of the GUO. This number is thus bounded below by zero % (the group does not have any subsidiary in these east Asian countries) and above by 100% (all the other foreign subsidiaries of the group are located in these east Asian countries).	BankScope and banks' websites.
(Gross) internal funding, real, log	Natural logarithm of gross internal funding, deflated by the CPI index.	Resbank
Net internal funding, real, log	Natural logarithm of net internal funding, deflated by the CPI index.	Resbank

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Table A.2 – continued from previous page

Variable	Description	Source
	Bank controls	
Global MNB	Dummy equals 1 if the bank' s largest shareholder is from a developed country.	BankScope, banks' websites
Emerging MNB	Dummy equals 1 if the bank's largest shareholder is from an emerging country outside Africa.	BankScope, banks' websites
Domestic bank	Dummy equals 1 if the bank is a domestic South African bank.	BankScope, banks' websites
Branch	Dummy equals 1 if the organizational form of the foreign bank's affiliate is a branch, and 0 if it is a subsidiary.	BankScope, bank's websites
Commercial	Dummy equals 1 if the foreign bank's affiliate is a commercial or a saving bank, 0 if it is an investment bank.	BankScope, bank's websites
Bank's size	Log of total book assets deflated by the CPI index.	Resbank
Solvency ratio	Ratio of equity to asset.	Resbank
Loan-to-deposit ratio	Bank's total loans divided by its total deposits	Resbank

Table A.3: **List of banks included in the sample**
Note: The maximum number of observations is 60 (60 year-quarters between 1993q1 and 2007q4). Apart from the dummies Branch and Commercial the variables are expressed in real terms, in R'000. They represent averages over the reporting period. Tot. assets are the total assets; tot. loans, total loans; NetInternalFund, the net internal funding received by the SA affiliate; NIF/Liab, Net internal funding/Total Liabilities.

Bank name	Obs.	Branch	Commercial	Tot. assets	Tot. loans	NetInternalFund	NIF/Liab.
Global Banks							
A B N AMRO BANK	49	1	1	3546626	728817	39501	0.46%
ABSA BANK LTD	60	0	1	114000000	70800000	-1821102	-2.00%
BARCLAYS BANK PLC	44	1	1	2225002	374269	75537	-1.06%
CALYON CORPORATE AND INVESTMENT BANK	60	1	0	5165428	451668	7339	0.10%
CITIBANK N.A	50	1	1	9591358	1861662	146600	3.62%
COMMERZBANK AKTIENGESELLSCHAFT	49	1	1	2812767	1229421	96111	4.39%
DEUTSCHE BANK AG	39	1	0	4925024	119294	-645503	-11.87%
FIDELITY BANK	48	1	1	3209367	2192284	-61601	3.56%
HSBC BANK	17	1	1	3014797	478428	-73104	-2.54%
IMPERIAL BANK LTD	49	1	1	4997162	1376459	3661198	51.74%
ING BANK	28	1	1	1208883	426724	152038	13.78%
JPMORGAN CHASE BANK	40	1	0	7326704	136429	-166	0.00%
BANK OF LISBON INTERNATIONAL LTD	12	1	1	536388	277385	0	0.00%
MERCANTILE BANK LTD	60	0	1	1509441	776593	-2234	-0.27%
MERRILL LYNCH CAPITAL MARKETS BANK	17	1	0	368545	0	12817	82.60%
NEDCOR BANK LTD	60	0	1	83800000	46100000	-2957600	-2.84%
SOCIETE GENERALE	60	1	0	1610069	157559	29855	4.44%
STANDARD CHARTERED BANK	17	1	1	1762653	769111	40074	2.38%
THE S A BANK OF ATHENS LTD	60	0	1	311982	209164	4530	1.64%
Emerging Banks							
ALBARAKA BANK LTD	60	0	1	305708	169631	46	0.01%
BANK OF BARODA	42	1	1	85637	20121	36	0.08%

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Table A.3 – continued from previous page

Bank name	Obs.	Branch	Commercial	Tot. assets	Tot. loans	NetInternalFund	NIF/Liab.
BANK OF CHINA	29	1	1	151116	35591	-903	-0.91%
BANK OF TAIWAN	60	1	1	345557	85745	33092	12.69%
BANK WINDHOEK SA LTD	4	1	1	44471	30241	0	0.00%
CHINA CONSTRUCTION BANK	28	1	1	516099	126602	3723	0.87%
HABIB OVERSEAS BANK LTD	60	0	1	104434	35818	177	0.38%
HBZ BANK LTD	49	0	1	242674	73680	0	0.00%
STATE BANK OF INDIA	42	1	1	237334	49495	401	0.21%

Figure A.1: **Country of origin of banks operating in South Africa, 2007q4 (35 banks)**