The impact of sudden stops on bank lending: Are there cross-sectional differences?

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Abstract:

Using annual financial statements of individual banks operating in East Asia and Latin America, we address the question whether banks are significantly affected by a sudden stop of capital inflows - an important source of vulnerability in recent years in these regions. In particular, it is tested for cross-sectional differences in the lending behavior of banks during a sudden stop.

In most cases, we find that a sudden stop leads to a reduction in the banks' sources of foreign funding. The subsequent effects range from increased credit default risk, increased costs of external funding to deposit withdrawals for a particular group of banks.

With regard to bank lending, we find evidence that well-capitalized banks with a liquid asset portfolio are better positioned during a sudden stop and play a stabilizing role on the domestic loan market.

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I Introduction

In a sudden stop episode, an economy that has been the recipient of large-scale capital inflows, stops receiving such inflows, and instead faces sudden demands for the repayment of outstanding foreign loans.

Most of the considered episodes in this paper exhibited elements of a self-fulfilling crisis, in which capital withdrawals by creditors resulted in a financial panic and an unnecessarily deep recession. The panic on its part may have been 'rational' from the perspective of individual creditors, since each of them was trying to flee ahead of the others, even though the collective result was in some cases disastrous and the panic unnecessary, in the sense that the countries' fundamentals could have supported a much more favorable outcome. The particular outcome of the reversal in capital flows can be manifold, ranging from outright default to a rescheduling of debt payments, or to a rescue by a lender who provides a new loan to finance the repayments of past loans that are falling due.

Goldfajn (2001) states with regard to sudden stops:

> 'I define a sudden stop as a very large change in the supply of capital. Of course, this sudden stop is always in the negative direction. There are also problems with big booms of capital inflows in the sense that you need to know what you are doing with the big influx. But the real problem is when you get billions of dollars less from one year to the other - on the order of 10 percent of gross domestic product (GDP) or so. And most of the countries that had crises faced this challenge: Mexico, Asia, Turkey, Brazil, all of them.'

The present paper investigates recent sudden stop episodes from the perspective of individual banks that operate in the involved economies. Using information on the balance sheet positions of banks, we address the question whether and in which way banks are affected. In particular, we explore a dataset comprising 945 banks in

11 Asian and Latin American countries during 1989-2004 and test for cross-sectional differences in the response of bank lending to a total of 16 sudden stop episodes. To distinguish between banks with different financial positions, we use measures for bank size, asset liquidity and capitalization. The following sort of prediction is tested: a sudden stop has a disproportionately large impact on the lending volume of small banks with 'weak' balance sheets. In addition, we investigate the overall impact of sudden stops on banks' securities holdings, deposits, non-deposit funding and equity.

Arena et al. (2006) address the question whether foreign banks that operate in emerging market economies have a lower sensitivity of loans and deposits to changes in monetary conditions, and whether these banks are better positioned during financial crises relative to their domestic competitors. The authors find weak evidence in favor of this view. In an earlier work, Bernanke et al. (1991) compare the loan growth of large and well-capitalized banks with that of small and poorly capitalized banks during the U.S. recession in 1990 and find weak evidence that poorly capitalized banks contracted lending by more than well-capitalized banks.

The present paper focuses on related issues, however, our specific contribution is that we focus on bank lending in the context of a sudden stop, one of the most important sources of instability in emerging market economies. In particular, we find that the loan growth of well-capitalized banks in the Latin American economies and that of banks with a liquid asset portfolio in the East Asian economies is less affected during sudden stops relative to the lending volume of small banks with weak balance sheets. This finding indicates that these banks were in a way more resistant to sudden stops.

In emerging market economies, bank loans play an important role for firms, because capital markets (i.e. stock and bond markets) are underdeveloped. For this reason, the banking sector plays a key role in determining the ability of an economy to attenuate the negative impact of large-scale capital withdrawals. The banking

sector can cushion the impact, when it is in the position to grant additional loans to those sectors that found their credits cut. Amongst other possibilities, banks can sell liquid assets, securitize and sell outstanding loans, attract new depositors, issue additional non-deposit funding (on the bond or interbank market, to the central bank), demand upstream financing from foreign mother companies, or do a recapitalization (i.e. issue additional stocks) in order to grant new loans.

During sudden stops, however, only a few possibilities are a feasible option, since in many cases banks have to deal with large amounts of non-performing loans, deposit withdrawals and tense situations on capital and interbank markets. In addition, those banks that relied on foreign funding have to meet the demand for the maturing liabilities of their foreign creditors. When the possibilities to obtain liquidity or additional funding are exploited or too costly, banks are even forced to liquidate outstanding loans and to cut down lending. With the underlying dataset, we can investigate many of these issues.

The remainder of the paper is organized as follows. In Section II, we present a structural description of the adjustment mechanism within the banking sector in response to a sudden stop. In Section III, we describe the underlying dataset and present the empirical results for the impact of sudden stops on the banking sector. The final section concludes.

II Sudden stops and the banking sector

An investigation aimed to describe a sudden stop and its impact on the affected economy should distinguish carefully between initial shocks, subsequent responses, and the involved sectors in the economy. There is no existent literature on the impact of a sudden stop on the banking sector and, here, we intend to contribute with a structural description of the involved adjustment. The presumptions rely in large parts on the empirical findings of the next section.

Initial shocks Foreign creditors reduce their exposure to investments in the whole economy. This translates for banks into a reduction in external finance, in particular, in foreign funds (bonds and loans).[2] At the same time, the deterioration in the economic conditions leads to an increased credit default risk from the part of the bank customers.

Subsequent effects The impact on an individual bank depends primarily on its initial portfolio structure as well as on its clientele. The restricted access to global capital markets is likely to cause an overall increase in the costs of external finance, since the affected banks and firms increase their demand for domestic funding. In addition, the risky environment causes on average a higher risk premium on external finance.

The increase in the costs of funding reduces a bank's equity via losses and profits. An increase in non-performing loans has the same effect. In particular cases, this can lead to a bank's insolvency (liabilities exceed assets).

The sudden demand for the repayment of the foreign liabilities that are falling due can result in serve liquidity problems, when too much assets are long-term and entail large costs in the case of liquidation (maturity mismatch).

A sudden stop also involves pressures on the exchange rate. In the case of a pronounced depreciation, the banks' liabilities can rise relative to assets (currency mismatch).

Foreign as well as domestic depositors may demand banks for the disbursement of their deposits. In particular cases, this may result in a bank run and lead to liquidity problems. Moreover, shifts of deposits within the banking sector can arise towards banks with a sounder financial structure or a better reputation (e.g. state- and foreign-owned banks).

Moreover, systemic banking crises can occur depending on the degree of foreign exposure of the banking sector and the maturity and currency composition of bank

[2]Not all banks are similarly affected, i.e. banks which relied on too much foreign short-term finance will be more affected.

debt. Domestic or even cross-border bank runs can occur depending on the depositors' confidence with respect to particular banks and to the banking sector as a whole.

Responses of affected banks Banks can sell liquid assets which is probably the cheapest alternative to meet the demand for the repayment of foreign funds and make up the potential increase in the cost of external finance. Likewise, banks can securitize and sell parts of their outstanding loans. Alternatively, banks can issue additional external funding (via deposits, the bond and interbank market, and the central bank). Here, the central bank plays an important role because it can demand bonds from the affected banks and reallocate resources within the banking system, e.g. provide banks in distress with liquidity support, while withdrawing funds from banks with excess liquidity. Foreign-owned banks can demand upstream financing from their mother company. Finally, banks can do a recapitalization (i.e. issue additional stocks).

Determinants of vulnerability The following factors play a key role in determining the subsequent adjustment in the bank sector: the country-specific bank regulation (reserve requirements, solvability and liquidity rules and deposit insurance); the central bank (can regulate domestic reserve and refinancing conditions, reallocate within the banking sector, and buy bonds issued from particular banks); and the banking sector's average portfolio structure (currency and maturity composition of banks' balance sheets, the degree of capitalization and the amount of liquid assets).

Sudden stops and the lending volume The lending volume of particular banks can be affected through several channels: an increase in the amount of non-performing loans reduces the lending volume; a reduction in a bank's equity may push the bank below the limit of its minimal capital requirement and reduce the bank's ability to grant new loans; adverse shocks to external finance and the cost of additional external finance reduce the ability of banks to grant new loans; and the

conditions for central bank and interbank finance play an important role.

Testable hypothesis The considerations above provide us several testable hypotheses which we will address in the following section. Unfortunately, we cannot address all questions because our database does not provide all necessary information, i.e. we do not have information on borrower and lender types, and the maturity and currency composition of assets and liabilities. The most important shortcoming is that we do not know which banks had a large exposure to foreign funding. For this reason, we investigate first the banking sector as a whole and then classify banks according to general characteristics such as bank size, the amount of liquid assets and a bank's capitalization.

Our testable hypothesis hereby is that large and well-capitalized banks with a liquid asset portfolio are better positioned during a sudden stop than banks with the opposed characteristics. There are several reasons for this presumption (see above): this group of banks are more reliable and may have a better reputation and, therewith, a stable deposit base; a binding capital constraint is less likely for well-capitalized banks; liquid banks can build on a larger, better accessible stock of assets; and this group of banks is more likely to have better access to external finance. In particular, we test on cross-sectional differences in the impact on the lending volume.

III Empirical results

Description of the database We use bank-level data from Bankscope and macroeconomic data from the International Financial Statistics (IFS). The unbalanced, annual dataset covers the period 1989-2004 and 11 countries from Latin America and East Asia.[3] Overall, we have information on annual financial statements of 945 individual banks that add up to about 5500 annual bank observations,

[3]The Latin American countries include Argentina, Bolivia, Chile, Mexico, Peru and Uruguay, while East Asian includes Indonesia, South Korea, Malaysia, Thailand and the Philippines.

distributed across time and countries as shown in Table 1. The particular countries were selected, because all of them experienced at least one sudden stop.

To identify sudden stops, we follow Calvo et al. (2004) who identify a sudden stop episode by the following three criteria: (1) the episode includes at least one observation where the year-to-year fall in capital inflows lies at least two standard deviations below its sample mean; (2) the sudden stop episode begins (ends) when the year-to-year fall (rise) in capital inflows falls (rises above) one standard deviation below its sample mean; (3) there is an associated output contraction.

As can be seen in Table 1, sudden stops in the considered economies bunch together, especially, in the East Asian region during the year 1997. The majority of sudden stops in Latin America occurred thereafter, again, a sudden loss of confidence of foreign investors with respect to the region triggered large-scale capital withdrawals. In all, the dataset covers 16 episodes of sudden stops.

The macroeconomic time series from IFS include real GDP (series 99b divided by the GDP deflator, series 99BIP), money market rates (series 60b) and the financial accounts (series 78BJD).[4] The data from Bankscope includes for each bank 87 balance sheet (sub-) categories, however, in most cases only 38 categories are available. In addition, the database provides information on the bank history, bank specialization, holding country and revenues. In many cases, however, not all information is available.

Unfortunately, the database does not provide a breakdown of loan portfolios by borrower types and maturities as well as no information on the currency composition of loans, deposits and other external funding.[5] For our purpose, this information would be especially helpful to determine the potential sources of cross-sectional variations. The underlying database is, however, the best available for this sort

[4]For the countries Bolivia, Chile, Peru and Uruguay deposit rates were used instead, because of missing information on money market rates. The estimations were also done with real interest rates, in this case, we used the difference between money market rates and CPI inflation (growth rate of series 64ZF). The results of these estimations can be obtained from the author upon request.

[5]To be more precise, there are subcategories for loans and deposits by maturity, however, only available in very few cases.

of cross-national investigation, because the accounting information is in standardized form and adjusted for differences in accounting and reporting standards across countries.

In many cases, Bankscope reports consolidated and unconsolidated financial statements and we used unconsolidated figures to the extend possible to reduce variations arising from changes in subsidiaries' ownership and to work with comparable accounting data. In some cases, the financial statements were only available in US$ and we converted them to the domestic currency using the market exchange rate for each country (series rf from IFS). Moreover, the specific date of the financial year varies in some cases, i.e. for the majority of banks the financial year ends in December. We standardized these cases to December by calculating a weighted average of two subsequent financial statements, e.g. to construct a December 2000 observation, we used 1/2 times June 2001 and 1/2 times June 2000.

To remove nominal variations, the balance sheet positions of each bank were transformed either to ratios over the bank's total assets or expressed in real terms by dividing the balance sheet positions with the country-specific consumer price index from IFS (series 64ZF). We excluded central banks and observations for which the real growth rate of particular balance sheet positions (loans, securities, deposits, other funding, equity) exceeded 300% in absolute terms.

Average balance sheet positions Summary statistics for the average balance sheet positions as a ratio of total assets for the East Asian and Latin American economies are presented in Table 2. Latin American banks tend to have on average higher equity to asset ratios, moreover, these banks rely relatively more on money market funding (i.e. certificates of deposits and debt securities) than on other funding (convertible bonds and subordinated debt). On the asset side, East Asian banks tend to have larger fractions of problem loans and total other earning assets (i.e. bonds and deposits with banks). The first point may be explained by the fact that the five East Asian economies all went through deep recessions in 1997. In addition,

we calculated the average leverage ratio, defined as total liabilities over total equity, which is larger in East Asia amounting to 6.6 compared to 4.7 in Latin America.

Measures for the different bank types To distinguish between different types of banks, we use measures for the bank size, asset liquidity and capitalization. As a measure for the size of an individual bank in a given year and country, we use the ratio of a bank's total assets to the country average of total assets in a given year. Liquidity of each bank is defined by the ratio of its marketable securities, government securities (including treasury bills) and cash holdings to total assets. Capitalization of each bank is defined by the ratio of total equity over total assets.

One presumption hereby is that well-capitalized and larger banks and those with a higher fraction of liquid assets are likely to have better access to external finance (i.e. lower costs), and we call them financially-unconstrained banks. As mentioned in Section II, these characteristics may also reflect other important factors that influence the impact of sudden stops on this group of banks (reputation, deposit stability, minimal capital requirement and buffer stock of liquid assets considerations), so that cross-sectional differences in the response of the lending volume may arise also from these facts.

An investigation of this issue and a more detailed distinction between bank characteristics that may influence the results (e.g. state and foreign owned vs. private banks), we leave for future work. Moreover, we intent to augment the dataset with additional information about country-specific regulations in the banking sector, in particular, with information on reserve requirements (Arena et al. (2006)) and deposit insurance (Demirguc-Kunt et al. (2000)).

Table 3 shows the average balance sheet positions for the two regions as a ratio of total assets grouped by the bank size category. In both regions, large banks tend to have lower equity-asset ratios and to rely relatively more on deposit funding as a share of total assets. That is, capitalization decreases with bank size. On the asset side, large banks tend to hold less loan loss reserves and to grant more loans as a

fraction of total assets than small banks. Smaller banks hold relatively more other earning assets (buffer stock).

Preliminary investigations Before testing the prediction with regard to the impact of sudden stops on the lending volume of banks, we first do some preliminary investigations. To be more precise, we estimate several period fixed effects regressions for the real growth rate of major balance sheet positions (i.e. (net) total loans, total other earning assets, total deposits, total non-deposit funding (net of equity), and total equity). As explanatory variables we use, in addition to the period dummies, two lags of the dependent variable, real GDP growth and the nominal money market rate. Table 4 shows the results.

The principal sudden stop periods (i.e. in East Asia 1996-97 and in Latin America 1994-95 and 1998-99) are, in most cases, accompanied by contractions in the real growth rate in deposit and non-deposit funding. An important exception and surprise are the coefficients for the year 1997 in the regressions for East Asia. Both coefficients are significantly positive, however, followed by a significant highly negative coefficient associated with non-deposit funding. A similar pattern can be observed for the real growth rate of total loans, equity and total other earning assets.

One part of the findings with regard to East Asia may be due to the fact that the major adjustment in the banking sectors was made in 1998. Another point is that large shifts in, amongst others, deposits within the banking sectors from private domestic banks to state and foreign owned banks have taken place, as emphasized by Radelet and Sachs (1998, page 63). The authors quote the following statement of the IMF with respect to the situation in Indonesia:

> 'Following the closure of 16 insolvent banks in November last year, customers concerned about the safety of private banks have been shifting sizeable amounts of deposits to state and foreign banks, while some have been withdrawing funds from the banking system entirely... By mid November, a large number of banks were facing growing liquidity

> shortages, and were unable to obtain sufficient funds in the interbank market to cover this gap, even after paying interest rates ranging up to 75 percent. At the same time, another smaller group of banks [that is state and foreign owned banks] were becoming increasingly liquid, and were trading among themselves at a relatively low JIBOR (Jakarta Interbank Offer Rate) of about 15 percent... the Bank Indonesia was compelled to act. It provided banks in distress with liquidity support, while withdrawing funds from banks with excess liquidity...'[6]

Radelet and Sachs argue that 'by January 1998, the banking systems of Indonesia, Korea, and Thailand had nearly ground to a halt. Foreign banks stopped accepting letters of credit written by banks in these countries, and firms had difficulty in finding new banks to services their needs...'.

In January 1998, the Prime Minister of Thailand noted 'the major problem we are facing with regard to exports is that of liquidity. The banks are charging high interest rates, and some banks do not have the funds to make loans...' Similar problems have occurred in Indonesia where, at the beginning of 1998, shoe manufacturers were unable to arrange for the working capital credits to import the inputs needed to produce the shoes for $1 billion of confirmed export orders. This point clearly needs more elaboration and with the underlying dataset, i.e. with information on the ownership and holding country, these issues can be examined. We leave this, however, to future work.

In the Latin American economies, the sudden stop episodes are accompanied in most cases with significant and pronounced declines in the real growth rate of total loans, total other earning assets, total deposits, total non-deposit funding and total equity even after controlling for monetary and economic conditions. We expected that the deposit run (Nov. 30, 2001) with the subsequent bank deposit freeze (Dec. 3, 2001) and banking holidays (Dec. 21-26, 2001; Jan. 6-10, 2002) in Argentina

[6]International Monetary Fund (1998, pages 4-5) and Radelet et al. (1998, page 63).

would show up in the coefficient on deposits in 2001.[7] This finding may indicate that parts of the deposit withdrawals from Argentina's banking sector were directed to other countries, i.e. to the Chilean and Mexican banking sector.[8] Another factor that has to be taken into account is the subsequent 'pesification' of dollar debts (1:1 parity) and deposits (1:1.4 parity).

In the next step, we test for capital market frictions faced by banks, and test whether these frictions are more pronounced for financially-constrained banks. We follow Jayaratne et al. (2000) and test whether bank lending depends significantly on deposits. In addition, we include into the regression the bank-specific variables and interact them with deposits. The regression is the following

$$L_{i,c,t} = \alpha_0 + \alpha_i + \alpha_t + \alpha_1 D_{i,c,t} + \alpha_1^* D_{i,c,t} z_{i,c,t-1} + \alpha_2 x_{c,t} + u_{i,c,t} \tag{1}$$

where $i = 1, ..., N$ refers to individual banks, $c = 1, ..., C$ to countries and $t = 1, ..., T_i$ to the time dimension (the sample is unbalanced, so T_i varies across banks). The variables $L_{i,c,t}$ and $D_{i,c,t}$ denote bank i's real growth rate of total loans and total deposits, α_0 a constant, α_i bank-level fixed effects and α_t period fixed effects. The vector of country-specific variables $x_{c,t}$ controls for changes in the demand for loans measured by real GDP growth and money market rates. The vector of bank-specific variables $z_{i,c,t-1}$ includes the measures for bank size, asset liquidity and capitalization.

Due to potential endogeneity problems which would lead to inconsistent OLS estimates, these variables enter the regression with one lag. To be more precise, with regard to the size category there is a possible joint determination since a bank may become larger, precisely, because of a large loan growth. Similar problems arise

[7] The deposit run was caused by a collapse of confidence and resulted within one day in a decrease of \$1.8 billion (2.7%) of deposits. The deposit freeze (corralito) imposed restrictions on deposit withdrawals to \$1000 per month, although deposits could be used as a means of payment (electronic transfers, credit cards). However, cross-border transfers were highly restricted, see Standard and Poors (2002b).

[8] To examine this issue, we could include country dummy variables into the regressions.

with the two remaining bank-specific variables.

The key issue is interpreting the coefficient on real deposit growth, α_1, and those on the interaction terms, α_1^*. If capital market frictions in the market for non-deposit funding cause banks to depend on deposits, one should find $\alpha_1 > 0$, i.e. reductions in the growth of deposits force banks to slow their lending.

There are at least two possible reasons, however, why the coefficient may be positive even in the absence of capital market frictions. First, a positive shock to loan demand may cause that banks raise more deposits to fund the loans. The second reason why α_1 may be positive in the absence of frictions is that deposit growth may signal changes in loan demand. Therefore, if variables that affect both loan growth and deposit growth such as local economic conditions are omitted, the omitted-variable bias may generate a spurious positive correlation between loan and deposit growth. For both reasons, we include real GDP growth and money market rates. The coefficients α_1^* should be negative for the bank categories since the presumption is that banks with these characteristics face less frictions.

The results for Latin America and East Asia are shown in Table 5. In both regions, the estimated coefficient on deposit growth is significantly positive indicating that capital market frictions may be present in the considered economies. While in East Asia non of the coefficients associated with the interaction terms is significant, we find strong evidence that in Latin America the lending volume of well-capitalized banks depends less on deposits and weak evidence for the same conclusion regarding to banks with a liquid asset portfolio.

Sudden stops and the lending volume To test for cross-sectional differences in the impact of sudden stops on the lending volume, we estimate the following fixed effects regression

$$L_{i,c,t} = \alpha_i + \sum_{s=0}^{p} \beta_s x_{c,t-s} + \gamma z_{i,c,t-1} + \delta ss_{c,t} + \sum_{s=0}^{p} \beta_s^* x_{c,t-s} ss_{c,t} + \gamma^* z_{i,c,t-1} ss_{c,t} + u_{i,c,t} \quad (2)$$

where, as before, $i = 1, ..., N$ refers to individual banks, $c = 1, ..., C$ to countries and $t = 1, ..., T_i$ to the time dimension. The dependent variable $L_{i,c,t}$ denotes the banks' growth rate of real total loans and α_i bank-level fixed effects. The vector of country-specific variables $x_{c,t-s}$ controls for changes in the demand for loans caused by changes in economic conditions (real GDP growth) and monetary conditions (money market rates). The vector of bank-specific variables $z_{i,c,t-1}$ includes the measures for bank size, asset liquidity and capitalization. As before, due to potential endogeneity problems, these variables enter the regression with one lag.

To track the impact of sudden stops, we include a country-specific sudden stop dummy variable, $ss_{c,t}$, that equals to one during a sudden stop period (based on Table 1) and zero elsewhere. To test for cross-sectional differences among our bank categories each bank-specific variable is interacted with the sudden stop dummy. Moreover, to account for sudden stop induced changes in loan demand, we interact the control variables with the sudden stop dummy.

The key issue is interpreting the vector of coefficients, γ^*, associated with the interaction terms. In particular, our presumption is that the lending volume of financially-constrained banks declines more in response to a shortfall in deposits than that of the other type of banks. That is, we should find $\gamma^* > 0$. To account for differences in banking practices and regulations across the two regions, the regressions are estimated separately for the East Asian and Latin American economies. Table 6 shows the results for East Asia and Table 7 for the Latin America.

The coefficient on the sudden stop dummy for the Latin American economies is highly significant and negative, while that for the East Asian economies is insignificant. For Latin American banks there is strong evidence for cross-sectional differences in the response to sudden stops, i.e. well capitalized banks have a significantly higher (i.e. less negative) real growth rate of total loans relative to small banks with 'weak' balance sheets. For East Asian banks, we find evidence that banks with a higher fraction of liquid assets are better positioned during sudden

stops, in the sense, that these banks have a significantly higher real growth rate during sudden stops compared to small banks with 'weak' balance sheets.

During tranquil times, the estimated coefficients on liquidity and capitalization are significantly positive in both regions, i.e. their real growth rate of total loans is higher than that of small banks with weak balance sheets. The coefficients associated with the size category are in both cases significantly negative.

IV Conclusion

In the present paper, we test for cross-sectional differences in the response of bank lending to sudden stops of capital inflows. As motivated in Section II, the lending volume of large and well-capitalized banks with a liquid asset portfolio should be less affected by a sudden stop than that of banks with the opposite features.

Our empirical investigation reached a few results that are worth summarizing. For the banking sectors as a whole, we find evidence that sudden stops are in many cases accompanied by reductions in the banks' lending volume, security holdings, deposits, non-deposit funding and equity. We then categorize banks according to the its size, liquidity and capitalization and test whether the lending volume of these banks is less affected during sudden stops relative to small banks with weak balance sheets.

We find evidence that well-capitalized banks with a liquid asset portfolio increase (or decrease by less) their lending volume relative to small banks with weak balance sheets after controlling for changes in loan demand. There several possible explanations for this finding: (i) given the whole banking sector is subject to shortages in non-deposit funding and deposit withdrawals, liquid banks are more resistant and counteract the adverse shock by use of their 'buffer' stock of liquid assets, (ii) these bank characteristics reflect deposit stability, (iii) the other banks were unable to fulfill capital adequacy requirements, in the sense, that insufficient equity capital is

the restricting force behind the banks' lending activity, and (iv) other factors such as reputation effects (foreign- and state-owned vs. private banks) are the driving forces.

For the future research, it would be interesting to test for cross-sectional differences in the impact of a sudden stop on deposits (or the ratio of loans to deposits and non-deposit funding). Possible improvements could be: (i) adding to the dataset information on country specific reserve requirements and deposit insurance arrangements, (ii) constructing additional variables for particular bank characteristics (e.g. state-owned banks, foreign banks), (iii) including country dummies, and (iv) investigating the recovery of sudden stops.

V Appendix

Table 1: Overview of the dataset and sudden stop episodes per country [9]

Country	Bank year obs.	Number of banks	Average no. of obs. per bank	Sudden stops of capital inflows	Assoc. annual % change in capital inflows per GDP
Argentina	1080	161	7	1994, 1999, 2001	-3.8, -1.5, -8.0
Bolivia	200	19	11	2000	-5.1
Chile	452	50	9	1991, 1998	-6.9, -6.0
Mexico	530	75	7	1994	-4.2
Peru	270	32	8	1998	-6.4
Uruguay	188	38	5	2002	-14.2
Indonesia	860	120	7	1997	-5.1
Korea	482	76	6	1997	-6.2
Malaysia	747	98	8	1994, 1997	-14.9, -7.3
Philippines	468	62	8	1997	-5.8
Thailand	241	64	4	1996, 1997	-1.5, -17.5
Sum/average*	5518	945	7.3*	16	-6.3*

[9] The sample period is 1989 to 2004. Sudden stops of capital inflows are defined as in Calvo et al. (2004), see above.

Table 2: Average composition of the major bank balance sheet positions per total assets in the period from 1993 to 2003

		East Asia	Latin America
assets			
	Customer Loans	61.1	58.7
	Problem Loans (comprised)	10.3	8.1
	Loan Loss Reserves	5.3	5.2
	Net Loans	*56.9*	*55.6*
	Deposits with Banks	12.1	8.0
	Securities	14.7	17.1
	Equity Investments	3.4	2.0
	Total Other Earning Assets	*33.7*	*27.9*
	Total Non Earning Assets	8.5	12.6
	Fixed Assets	2.6	5.0
	Total Assets	*100.0*	*100.0*
liabilities			
	Total Deposits	68.2	66.9
	Money Market Funding	8.5	13.4
	Other Funding	9.1	3.5
	Other Liabilities	6.1	4.4
	Total Liabilities	*86.9*	*82.5*
	Total Equity	13.1	17.5
	Total Equity+Total liabilities	*100.0*	*100.0*
	No. of Observations	2676	2400
	No. of Banks	412	376

Asset side: **Customer Loans** include Private, Corporate, Government, Bank Loans, Mortgages and Leases; **Problem Loans** include Problem, Overdue, Restructured and Other Non-Performing Loans; **Securities** include Investment and Trading (Government) Securities; **Total Other Earning Assets** include Deposits with Banks, Securities, Equity Investments and Bonds; **Total Non Earning Assets** include Cash and Due from Banks, Intangible Assets and Deferred Tax Receivables; **Fixed Assets** include Land and Buildings and Other Tangible Assets.

Liability side: **Total Deposits** include Customer and Bank Deposits; **Money Market Funding** include Certificates of Deposits, Commercial Papers, Securities and Other Negotiable Instruments; **Other Funding** include Bonds, Subordinated Debt, Hybrid Capital and Other Funding; **Other Liabilities** include Loan Loss and Non Equity Reserves; and **Total Equity** include Retained Earnings, Other Equity Reserves, Preference and Common Shares.

Table 3: Average composition of bank balance sheets per assets depending for the quantiles of bank size

	East Asia				Latin America			
Quantiles of Bank Size	0-25%	25-50%	50-75%	75-100%	0-25%	25-50%	50-75%	75-100%
Customer Loans	61.0	58.9	63.2	61.1	56.6	56.5	59.9	61.8
Problem Loans (comprised)	10.0	9.2	12.6	9.3	11.2	7.8	5.0	7.5
Loan Loss Reserves	10.4	4.1	3.3	3.6	6.7	6.2	4.3	3.6
Net Loans	51.4	55.7	60.9	59.2	51.3	51.6	58.1	61.3
Deposits with Banks	12.9	13.9	11.7	9.8	10.9	7.8	7.5	6.5
Securities	13.7	14.3	14.5	16.1	17.1	19.3	17.8	14.2
Equity Investments	5.1	5.5	2.4	1.7	1.8	2.8	1.8	1.6
Total Other Earning Assets	36.8	35.6	31.6	31.0	27.1	31.1	27.9	25.7
Total Non Earning Assets	10.8	8.7	6.8	7.8	16.5	13.6	10.3	10.1
Fixed Assets	3.4	2.5	2.2	2.2	7.9	5.0	3.9	3.2
Total Assets	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Deposits	64.4	66.5	69.5	72.4	54.9	68.2	70.4	73.8
Money Market Funding	9.3	9.0	10.0	6.4	11.6	14.9	18.3	9.2
Other Funding	5.4	11.3	10.5	9.1	1.0	1.6	3.7	7.0
Other Liabilities	6.4	5.9	5.3	6.9	5.1	5.0	3.8	3.5
Total Liabilities	78.3	86.2	91.1	91.8	66.3	84.2	89.3	90.4
Total Equity	21.7	13.8	8.9	8.2	33.7	15.8	10.7	9.6
Total Equity+Total Liabilities	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 4: Period fixed effects on the real growth rate of major balance sheet positions [10]

	East Asia					Latin America				
year	loans	securities	deposits	other funding	equity	loans	securities	deposits	other funding	equity
1993	0.37***	-1.48	-0.10**		-0.09***	0.02	-0.07	0.37***	0.21***	0.18***
1994	0.12***	-0.34***	0.12***		0.08***	0.01	-0.07	-0.19***	-0.03	-0.27***
1995	-0.11***	-0.38***	-0.11***	0.51***	0.001	-0.23***	-2.38***	-0.21	-0.39*	-0.33***
1996	-0.07***	-0.28***	-0.02	-0.17*	-0.09**	-0.15***	1.76***	-0.10**	0.18	0.13***
1997	0.09***	0.25***	0.07***	0.21**	-0.04	0.05	0.33***	0.06*	-0.20**	0.05***
1998	-0.17***	0.25**	0.01	-0.69***	-0.34***	-0.08**	-1.15***	-0.15***	-0.09*	-0.09***
1999	-0.10***	-0.38***	-0.04	0.09	0.12*	0.02	-0.84***	-0.05	-0.14	-0.15***
2000	-0.05	-0.31***	-0.17***	0.09	0.03	-0.1***	0.70***	-0.12***	-0.11***	0.03
2001	0.13***	-0.09	0.13***	-0.12	-0.18***	0.02	-1.33***	0.005	-0.37***	-0.11***
2002	-0.02	-0.15***	-0.08***	0.08***	0.06***	-0.02	-0.52*	0.03	0.26***	0.01
2003	-0.06***	-0.03	-0.02	0.09***	-0.05**	-0.12***	3.36***	-0.10*	-0.20***	0.03
2004	-0.05***	-0.06**	-0.06***	0.14***	0.05***	0.02	-0.34**	0.03	0.10***	0.14***
obs.	1230	1209	1224	462	1219	1254	1327	1257	345	1608

[10] In the period fixed effects regressions the following additional explanatory variables were included: a constant, two lags of the dependent variable, real GDP growth and the nominal money market rate. The estimation method is Panel Generalized Method of Moments. Significance tests are based on robust standard errors. The shaded area indicates major sudden stop periods in the respective region, and (***,**,*) significance at the 1%, 5% and 10% level. Securities are measured by total other earning assets, and other funding by the sum of money market and other funding.

Table 5: Estimation results of equation (1) for East Asia and Latin America[11]

Dependent Variable: Growth rate of real total loans				
Method: Panel least squares				
Sample(adjusted): 1990 2004				
Cross-sections included: 372 for East Asia and 349 for Latin America				
Total panel (unbalanced) observations: 2189 for East Asia and 2204 for Latin America				
White cross-section standard errors & covariance (d.f. corrected)				
Cross-section fixed and period fixed (dummy variables) effects specification				
East Asia				
	Coefficient	Std. Error	t-Statistic	Prob.
C	0.12***	0.03	4.31	0.00
real GDP growth	0.94**	0.45	2.06	0.04
money market rate	-0.01***	0.00	-6.86	0.00
real deposit growth	0.39***	0.09	4.34	0.00
real deposit growth*liq(-1)	0.39	0.38	1.02	0.31
real deposit growth*cap(-1)	-0.17	0.22	-0.74	0.46
real deposit growth*size(-1)	-0.01	0.01	-0.74	0.46
	S.E. of regression	0.28	Sum squared resid	141.99
	Durbin-Watson stat	2.20	R-squared	0.52

Latin America				
	Coefficient	Std. Error	t-Statistic	Prob.
C	0.03	0.02	1.09	0.28
real GDP growth	0.32	0.33	0.99	0.32
money market rate	-0.001	0.001	-0.89	0.38
real deposit growth	0.73***	0.07	9.79	0.00
real deposit growth*liq(-1)	-0.19	0.15	-1.23	0.22
real deposit growth*cap(-1)	-0.51***	0.11	-4.45	0.00
real deposit growth*size(-1)	0.01	0.02	0.66	0.51
	S.E. of regression	0.34	Sum squared resid	212.92
	Durbin-Watson stat	2.23	R-squared	0.53

[11](***,**,*) indicate significance at the 1%, 5% and 10% level.

Table 6: Estimation results of equation (2) for East Asia[12]

Dependent Variable: Growth rate of real total loans				
Method: Panel least squares				
Sample(adjusted): 1991 2004				
Cross-sections included: 380				
Total panel (unbalanced) observations: 2121				
White cross-section standard errors & covariance (d.f. corrected)				
Cross-section fixed (dummy variables) effects specification				
	Coefficient	Std. Error	t-Statistic	Prob.
C	0.10**	0.05	2.12	0.03
real GDP growth	1.45***	0.30	4.90	0.00
money market rate	-0.01***	0.00	-4.67	0.00
real GDP growth(-1)	0.22	0.23	0.95	0.34
money market rate(-1)	0.003	0.00	-1.52	0.13
real GDP growth*SS	3.39*	1.92	1.76	0.08
money market rate*SS	0.004	0.01	-0.58	0.57
real GDP growth(-1)*SS	-1.31	1.80	-0.73	0.47
money market rate(-1)*SS	0.01	0.01	0.55	0.58
size(-1)	-0.07***	0.03	-2.65	0.01
capitalization(-1)	0.66***	0.18	3.60	0.00
liquidity(-1)	0.36***	0.13	2.72	0.01
size(-1)*SS	0.002	0.01	-0.36	0.72
capitalization(-1)*SS	-0.26	0.23	-1.13	0.26
liquidity(-1)*SS	0.36**	0.18	2.00	0.05
SS	0.005	0.09	0.06	0.95
S.E. of regression	0.32	Sum squared resid	177.54	
Durbin-Watson stat	2.04	R-squared	0.42	

[12]SS indicates the sudden stop dummy variable, and (***,**,*) indicate significance at the 1%, 5% and 10% level.

Table 7: Estimation results for equation (11) for Latin America[13]

Dependent Variable: Growth rate of real total loans				
Method: Panel least squares				
Sample(adjusted): 1992 2004				
Cross-sections included: 358				
Total panel (unbalanced) observations: 1948				
White cross-section standard errors & covariance (d.f. corrected)				
Cross-section fixed (dummy variables) effects specification				
	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.24***	0.05	-5.03	0.00
real GDP growth	2.37***	0.67	3.53	0.00
money market rate	0.006*	0.00	1.65	0.10
real GDP growth(-1)	0.36	0.44	0.81	0.42
money market rate(-1)	-0.003	0.00	-1.43	0.15
real GDP growth(-2)	1.14**	0.55	2.06	0.04
real GDP growth*SS	-8.95***	1.82	-4.91	0.00
money market rate*SS	-0.02***	0.01	-3.45	0.00
real GDP growth(-1)*SS	-0.54	1.10	-0.50	0.62
money market rate(-1)*SS	-0.05***	0.01	-5.56	0.00
real GDP growth(-2)*SS	-1.61***	0.65	-2.48	0.01
money market rate(-2)*SS	0.11***	0.02	5.05	0.00
size(-1)	-0.07***	0.01	-4.60	0.00
capitalization(-1)	0.71***	0.19	3.69	0.00
liquidity(-1)	0.63***	0.18	3.50	0.00
size(-1)*SS	0.01	0.01	0.62	0.53
capitalization(-1)*SS	0.70***	0.22	3.18	0.00
liquidity(-1)*SS	0.17	0.19	0.87	0.39
SS	-0.55***	0.21	-2.59	0.01
	S.E. of regression	0.43	Sum squared resid	295.65
	Durbin-Watson stat	2.06	R-squared	0.32

[13]SS indicates the sudden stop dummy variable, and (***,**,*) indicate significance at the 1%, 5% and 10% level.

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