Online Appendix to The Bank Lending Channel in a Partially Dollarized Economy

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This online appendix is divided into two parts. The first part presents the theoretical model. The second part presents additional data and results.

1 Theoretical Model

1.1 Household Portfolio Choice

The aim of this companion paper is to explain how a bank lending channel can form, which depends on the initial currency composition of a bank's deposits. Banks are constrained by regulation, geography, and technological differences in their ability to offset domestic currency deposits with foreign currency deposits. It follows that $\partial^2 D_{jt}/\partial(FXD)_{jt}\partial M_t < 0$, where D_{jt} is bank j's total deposits at time t, FXD_{jt} is the initial foreign exchange share of total deposits at bank j, and M_t is the monetary indicator such that higher values denote expansionary policy. This can be interpreted as saying that cross-sectional differences in the initial foreign currency deposit share of banks will determine the extent to which they respond to monetary policy shocks. To illustrate with a simple example, suppose that all Mexican banks are similar except that some have a much higher share of dollar deposits, say because of geographical proximity of their branches to the U.S. This implies that total deposits of the banks bordering the U.S. will be least sensitive to expansionary monetary policy, or that $\partial D_{jt}/\partial M_t$ decreases as FXD_{jt} increases. Nonetheless, this is only economically interesting if information frictions between banks and the providers of external funds make it difficult for banks to make up for a loss in domestic currency deposits with all other sources of external funds. This gives rise to the claim that $\partial^2 L_{jt}/\partial(FXD)_{jt}\partial M_t < 0$ (where L_{jt} is bank j's total loans), so that a higher foreign deposit share insulates a bank's loans. This will be explored further in the next section.

Assume an economy similar to the one modeled by Bernanke and Blinder (1988), which consists of households, banks and firms. The main difference is that it is an open economy where agents can

hold both domestic and foreign assets and liabilities. Households can hold their savings in the form of either money (consisting of domestic currency deposits or foreign currency deposits) or domestic bonds. Allowing households to hold foreign currency bonds does not change the results.[1] Indeed, it raises the question why households choose to hold foreign currency deposits if foreign currency bonds were indeed widely and easily available. The stylized fact based on the cross-country evidence is that households choose to hold a significant portion of their deposits in foreign currency (Baliño et al., 1999; De Nicolo et al., 2005).

I begin by assuming that banks are passive and cannot adjust their deposit portfolio. This will be relaxed later. First, I derive a household's demand for domestic and foreign deposits based on a theoretical model of a household's portfolio choice. A typical household will maximize its utility and solve for its optimal holdings of domestic bonds, domestic currency deposits and foreign currency deposits. I adopt the money-in-utility approach following Sidrauski (1967). The domestic currency bond earns interest but not domestic and foreign currency deposits (money). Deposits are therefore positively demanded because of money-in-utility preferences.

By applying the money in utility approach[2] (following Sidrauski (1967) and as presented in Obstfeld and Rogoff, 1996), I obtain a specific functional form for the demand for deposits by households. Households maximize utility with respect to $B_{t+1,}D_{H,t}$ and $D_{F,t}$ (where B are domestic bonds, D_H is domestic money (deposits), and D_F is foreign money (deposits)),

$$U = \sum_{s=t}^{\infty} \beta^{s-t} u(C_{s,} \frac{D_{H,s}}{Ps}, \frac{EsD_{F,s}}{Ps}) \tag{1}$$

and subject to their budget constraint,

$$B_{t+1} + \frac{D_{H,t}}{Pt} + \frac{E_t D_{F,t}}{Pt} = (1 + r_t)B_t + \frac{D_{H,t-1}}{P_t} + \frac{E_t D_{F,t-1}}{Pt} + Y_t - C_t \ , \tag{2}$$

where r is the real interest rate on bonds, P is the domestic price level, E is the exchange rate, Y is income and C is consumption. Combining the first-order conditions with respect to $B_{t+1,}D_{H,t}$ and $D_{F,t}$ respectively and taking utility to be of isoelastic form,
$U = \frac{\left[(\frac{D_H}{P})^{\rho_H}(\frac{ED_F}{P})^{\rho_F} C^{1-\rho_H-\rho_F}\right]^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}}$ implies:

$$\frac{D_H}{P} = \frac{\rho_H}{1-\rho_H-\rho_F} C(1 + \frac{1}{1+i_{t+1}}) \text{ and} \tag{3}$$

[1] Foreign currency bonds can easily be assumed in the background while allowing for uncovered interest rate parity to hold between domestic and foreign bonds.

[2] Alternatively, one could have used the mean-variance portfolio approach to determine the ratio of foreign to domestic currency deposits (see Ize and Levy-Yeyati 1998).

$$\frac{E_t D_F}{D_H} = \frac{\rho_F}{\rho_H} \frac{1 - \frac{1}{1+i_{t+1}}}{1 - \frac{1}{1+i_{t+1}} \frac{E_{t+1}}{E_t}} \ , \tag{4}$$

where i is the nominal interest rate on bonds (such that $\frac{1+i_{t+1}}{P_{t+1}/P_t} = 1 + r_{t+1}$). Equations 3 and 4 capture explicitly the effects of a monetary policy shock on domestic and foreign currency deposit demand.

Contractionary monetary policy leads to less of a decline in foreign currency deposits than in domestic currency deposits for two reasons. First, when monetary policy is tightened, households have an incentive to shift out of money (deposits) and into bonds. But they are less likely to shift out of foreign currency deposits than out of domestic currency deposits because the former provide households with a hedge against exchange rate risk which cannot be done by holding domestic bonds (unless in the event of a forced conversion, so there is still country risk). This effect can be obtained from the Keynes-Hicks money demand schedules shown (e.g., equation 3 is similar to the Keynes-Hicks money demand schedule). If we assume that $\rho_F < \rho_H$, then foreign money demand is less responsive to the interest rate than domestic money demand. The effect can also be modeled explicitly using a mean-variance utility approach (Dornbusch, 1983; Ize and Levy-Yeyati, 2003).

The second reason that an unanticipated monetary contraction leads to a greater decline in domestic currency deposits is because of the implied exchange rate depreciation that causes households to increase the relative share of foreign currency deposits in their deposit holdings. An unanticipated monetary contraction leads to an increase in the domestic interest rate on bonds. This is accompanied with expectations of an exchange rate depreciation over a future horizon, because uncovered interest rate parity is assumed to hold between domestic and foreign bonds. However, because deposits earn zero or little interest compared with bonds, uncovered interest parity will not hold between domestic and foreign currency deposits. This means that a rational depositor will have the incentive to shift out of domestic currency deposits and into foreign currency deposits when there is a monetary tightening, as seen by the first order conditions in equation 4.[3] This leads to a smaller decline in foreign currency deposits than in domestic currency deposits.

How reasonable is it to assume that deposits earn little interest, and therefore that uncovered interest parity will not hold between domestic currency and foreign currency deposits? In the case of Mexico, term deposits in domestic and foreign currency earn some interest and figures are available from the Bank of Mexico starting in April 1996 for both series. But the compensation for holding

[3] It is important to note that the monetary policy shocks are unexpected, which is standard (Bernanke and Gertler, 1995). A rational depositor will shift to domestic currency deposits in advance of an expected monetary tightening. The depositor anticipates the initial appreciation corresponding to the tightening, and therefore, the revaluation in his domestic currency deposits compared with his foreign currency deposits. A second point is that while the unanticipated monetary contraction causes an immediate appreciation and thus an immediate fall in the valuation of foreign currency deposits, the active decision by households to increase their quantity of foreign currency deposits due the expected depreciation offsets this initial valuation effect (equation (4)).

domestic currency deposits relative to foreign currency deposits was less than that implied by the differential between the interbank rate and the US federal funds rate.[4] Moreover, the term deposit rate is an upper bound as sight (demand) deposits that offer greater liquidity services earn less or no interest, and this is true for many other partially dollarized economies. Therefore, the expected depreciation effect is likely to be empirically relevant.

1.2 Bank Portfolio Choice: The Funding Side

It is important to establish whether the differential sensitivity of domestic currency relative to foreign currency deposits derived in the previous section has an effect on bank lending. I have so far assumed that banks behave passively, and do not adjust their deposit portfolios in response to household preference shocks. This will automatically translate to a lending channel. However in reality, banks can adjust their liability portfolios and obtain other sources of funds, in order to offset the decline in deposits.

Financial market imperfections must, therefore, exist for there to be a lending channel, so that $\partial^2 L_{jt}/\partial(FXD)_{jt}\partial M_t < 0$.[5] First, and as emphasized by Bernanke and Blinder (1988, 1992) and Kashyap and Stein (2000), banks are not able to perfectly substitute between deposits and other sources of uninsured funds, due to the failure of the Modigliani-Miller theorem.[6] Second and in the context of dollarization, I argue that they cannot frictionlessly substitute between domestic currency deposits and foreign currency deposits.

I now introduce a bank's portfolio decision to determine a bank's optimal supply of domestic and foreign deposits, and domestic and foreign loans. The key ingredient for banks with an initially larger share of foreign deposits to be less affected by households' preference shock away from domestic deposits is that banks differ in their intermediation cost function of domestic compared with foreign deposits. Some banks are better able to intermediate in domestic currency, while others are better able to intermediate in foreign currency. I extend the bank optimization problem in an environment of perfect competition presented in Freixas and Rochet (1997, chapter 3, section 3.1.3) to two

[4] For example, the difference between the peso interbank rate and the U.S. federal funds rate averaged 16.1% over the sample from April 1996 – April 2002, compared with only 12.3% for the difference between term peso and foreign currency deposits. And in September 1998 when the expected peso depreciation reached 36.5%, the term deposit rate differential only adjusted to 23%.

[5] The sign on $\partial^2 L_{jt}/\partial(FXL)_{jt}\partial M_t$ where FXL denotes a bank's foreign currency *loan* share is ambiguous and will depend on the firm balance sheet channel. The next section presents the bank credit market in which bank loan supply is set equal to firm loan demand. The basic point is that it is ambiguous whether investment increases when monetary policy is "expansionary". This is in contrast to the one-currency Bernanke and Blinder (1988) model whereby the lending channel leads to an unambiguous positive shift in the IS curve on account of the decline in the lending interest rate. The ambiguity is mainly on account of the external finance premium that firms pay on credit. For example, expansionary monetary policy may also aggravate the dollar debt burden of firms thus decreasing their net worth. Therefore, no *a priori* prediction can be made regarding the reaction to monetary policy by banks that hold a larger share of foreign currency loans relative to other banks.

[6] In the setup below, they only hold deposits as liabilities. If banks were able to obtain other noninsured sources of funds, the external finance premium may be excessive, particularly for banks in an emerging market economy where shocks are more systemic in nature.

currencies. Banks face a convex intermediation cost function, which depends on their foreign and domestic currency deposits and loans.

Each bank j holds only deposits as liabilities (D_{Hj} and D_{Fj}). On the assets side, they hold loans (L_{Hj} and L_{Fj}) and have an interbank position $M_j = (D_{Hj} + D_{Fj}) - (L_{Hj} + L_{Fj})$[7]. Banks take the interbank rate (i), the interest rates on loans (i_{LF} and i_{LH}), and the interest rates on deposits (i_{DF} and i_{DH}) as given. For simplicity and comparability with the household's problem, assume that the deposit interest rates are equal to zero ($i_{DF} = i_{DH} = 0$). Let the intermediation cost function of bank j be $C_j(L_{Hj}, L_{Fj}, D_{Hj}, D_{Fj})$ which is convex. Bank j will therefore maximize its profits, choosing D_{Hj}, D_{Fj}, L_{Hj}, and L_{Fj}:

$$\Pi_j = (i_{LF} - i)L_{Fj} + (i_{LH} - i)L_{Hj} + iD_{Fj} + iD_{Hj} - C_j(L_{Hj}, L_{Fj}, D_{Hj}, D_{Fj}) \tag{5}$$

subject to the constraints:

$$D_{Hj} \leq D^h_{Hj}(i), \tag{6}$$

$$(D_{Hj} + D_{Fj}) - (L_{Fj} + L_{Hj}) \geq \underline{M}\ , \tag{7}$$

where D^h_{Hj} is the demand for domestic deposits at bank j by households derived earlier. If 6 is non-binding, then a bank can choose the amount of domestic deposits it wants to offer. Otherwise, the bank may be constrained by households' demand for deposits. This is imposed as a constraint because banks would like to have all their liabilities in the form of deposits, earning zero interest rate (or a very small rate). However because they are limited by depositors, they are forced to go on the interbank market to obtain other funds. I focus on the domestic deposit constraint because I am interested in this problem in studying demand shocks to domestic deposits and to what extent a bank can in response adjust its foreign currency deposits. The second constraint, equation 7, relates to limits on the (negative) position of a bank in the interbank market. In the extreme case, $\underline{M} = 0$, and no interbank borrowing is allowed. The reason for this constraint is so that a bank cannot perfectly make up a loss in deposits by borrowing on the interbank market. Therefore the bank's lending will be influenced by the extent to which it can make up the loss of domestic deposits with foreign deposits. Therefore the first-order conditions are:

[7] To keep the analysis simple, I ignore required reserves. Allowing for reserve requirements on domestic and foreign currency deposits does not affect the central result (extension available on author's website). As shown below, a bank will set its intermediation margin equal to its marginal management cost in an unconstrained equilibrium. Since the intermediation margin is decreasing in the reserve requirement, this leads to a lower equilibrium demand for deposits by a bank compared to when there are no reserve requirements. This means that the Central Bank will have additional policy instruments to achieve a desired objective. Essentially, the Central Bank can now use the reserve requirement to induce a lower (or higher) foreign deposit share, irrespective of banks' technological cost function. However, Mexico has no legal reserve requirement so the simplifying assumption that the difference between a bank's deposits and its loans is equal to its interbank position is close to reality. See Stein (1998) who points out that the bank lending channel is valid in an economy in which some bank liabilities are insured but are not subject to legal reserve requirements.

$$D_{Fj} \quad : \quad i - \frac{\partial C_j}{\partial D_{Fj}} + \nu_j \leq 0,\ D_{Fj} \geq 0 \tag{8}$$

$$D_{Hj} \quad : \quad i - \frac{\partial C_j}{\partial D_{Hj}} + \nu_j - \mu_j \leq 0,\ D_{Hj} \geq 0 \tag{9}$$

$$L_{Fj} \quad : \quad (i_{LF} - i) - \frac{\partial C_j}{\partial L_{Fj}} - \nu_j \leq 0,\ L_{Fj} \geq 0 \tag{10}$$

$$L_{Hj} \quad : \quad (i_{LH} - i) - \frac{\partial C_j}{\partial L_{Hj}} - \nu_j \leq 0,\ L_{Hj} \geq 0 \tag{11}$$

$$\mu_j \quad : \quad D^h_{Hj} - \ D_{Hj} \geq 0,\ \mu_j \geq 0 \tag{12}$$

$$\nu_j \quad : \quad (D_{Hj} + D_{Fj}) - (L_{Fj} + L_{Hj}) - \underline{M} \geq 0,\ \nu_j \geq 0 \tag{13}$$

First suppose the constraints are slack and therefore $\mu_j = 0$ and $\nu_j = 0$, then equations 9 and 8 bind and bank j will determine its optimal deposits freely. Then bank j will simply set $i = \frac{\partial C_j}{\partial D_{Hj}}$ (or $D_{Hj} = 0$ if $i < \frac{\partial Cj}{\partial D_{Hj}}$) and similarly $i = \frac{\partial C_j}{\partial D_{Fj}}$. Suppose we compare two banks such that bank 1 is better at intermediating domestic deposits than bank 2 ($\frac{\partial C_1}{\partial D_{H1}} < \frac{\partial C_2}{\partial D_{H2}}$) and the opposite for foreign deposits ($\frac{\partial C_1}{\partial D_{F1}} > \frac{\partial C_2}{\partial D_{F2}}$). This leads to the intuitive result that bank 1 will have a larger share of domestic deposits while bank 2 will have a larger share of foreign deposits in equilibrium.

Now consider a shock to the demand for domestic deposits by households such that constraint 6 binds (for example, i increases causing demand to decrease.) Assume that the decline in domestic deposits results in constraint 7 binding. Therefore $i + \nu_j - \mu_j = \frac{\partial C_j}{\partial D_{Hj}}$ and $i + \nu_j = \frac{\partial C_j}{\partial D_{Fj}}$ where μ_j and ν_j are positive. The decrease in unit demand for domestic deposits will cause domestic deposits at bank 1 to fall in the same proportion as at bank 2. Therefore bank 1 will experience a larger absolute decline in domestic deposits, since it has a larger share initially. Therefore in order for bank 1's total deposits not to be more affected than bank 2's, bank 1 will have to increase its foreign deposit holdings proportionally more than bank 2. However, because $\frac{\partial C_1}{\partial D_{F1}} > \frac{\partial C_2}{\partial D_{F2}}$, bank 1 will be limited to increasing its foreign deposit portfolio by its higher marginal costs of intermediating foreign deposits. This ensures that bank 1 will be more sensitive to demand shocks to domestic deposits.

What can justify the assumption that banks face differential costs in intermediating in domestic currency compared with foreign currency? Differences can be due to regulation, to technological differences, as well as to geography. The case of Mexico provides an exogenous geographic driver of differences across banks. Due to Mexico's geographic proximity to the United States, there is an exogenous rationale for the geographic distribution of dollar deposits. Therefore, the analysis is less prone to the issue that the dollar deposit shares may be endogenous – if for example a technological advantage in intermediating foreign currency is correlated with other characteristics

that make the bank less vulnerable to monetary policy shocks such as their capital and liquidity position. Restrictive legislation was passed in 1995 (see Bank of Mexico Circular 2019/95) in the aftermath of the 1994 crisis, limiting holders of dollar deposits to: (1) residents of the 20 kilometer strip along the northern border area of Mexico or living in Baja California or Baja California Sur, or (2) firms domiciled anywhere in Mexico. The first part of the legislation, which concerns residents, is a geographical restriction. Banks located in these regions (or with more branches in these regions) will be able to intermediate foreign currency deposits made by residents. And while the large banks in Mexico operate at the national level, the smaller banks can be geographically concentrated. For example, the six large banks have on average over 1200 branches distributed throughout the 32 Mexican states, with roughly a quarter of these branches in states along the US border. In contrast, there is much greater variation among the smaller banks. See the main paper for more empirical detail.

1.3 The Bank Credit Market

There is ambiguity in the bank credit market, where equilibrium is determined by setting bank lending supply equal to firms' demand for bank loans. In an open economy, monetary policy has offsetting effects on firms' demand for credit, so it is uncertain whether investment increases when monetary policy is loose. This translates on the individual bank level to the outcome that the loanable funds and lending by banks with a larger foreign deposit share are less affected by monetary policy. However, the lending by banks with a larger foreign *loan* share may not be less affected because of the different effects on their firms' demand for credit.

As in Bernanke and Blinder, allow banks to now hold bonds in addition to loans after setting aside the required reserves on their assets side (banks are required to hold a share α_H and α_F respectively of domestic and foreign currency deposits in the form of reserves.) Therefore, the overall bank balance sheet in a two-currency model will be, $R_H + R_F + B_H^b + B_F^b + L_H^b + L_F^b = D_H + D_F$ (where b denotes bank supply). Banks optimize their loan and bond supply schedules subject to real interest rates on bonds and loans, obtaining:

$$\begin{aligned}
L_H^b &= \mu_H(\underset{-}{r_B^H}, \underset{-}{r_B^F}, \underset{+}{r_L^H}, \underset{-}{r_L^F})\xi \\
L_F^b &= \mu_F(\underset{-}{r_B^H}, \underset{-}{r_B^F}, \underset{-}{r_L^H}, \underset{+}{r_L^F})\xi \\
B_H^b &= \upsilon_H(\underset{+}{r_B^H}, \underset{-}{r_B^F}, \underset{-}{r_L^H}, \underset{-}{r_L^F})\xi \\
B_F^b &= \upsilon_F(\underset{-}{r_B^H}, \underset{+}{r_B^F}, \underset{-}{r_L^H}, \underset{-}{r_L^F})\xi \ ,
\end{aligned}$$

where ξ is the loanable funds of a bank ($\xi = (1-\alpha_H)D_H + (1-\alpha_F)D_F$)and such that $\mu_H +$

$\mu_F + \upsilon_H + \upsilon_F = 1$. Note that under uncovered interest rate parity for bonds, then banks will be indifferent between holding domestic and foreign bonds. However, even if parity holds, banks face other constraints so far ignored. They may be subject to currency mismatch regulation (or choose to limit the mismatch of their own accord). In that case, it may be too simplistic to specify ξ as the potential loanable funds available, and may instead have loanable funds of $a\xi_H + (1-a)\xi_F$ for domestic bonds and loans, where $a > 1/2$ (in the extreme $a = 1$), and vice versa for foreign bonds and loans.

To obtain market equilibrium, it is necessary to specify loan and bond demand by firms. In the one-currency Bernanke and Blinder model, firms solved an optimization problem such that investment by firms, $I(\underset{-}{r_B}, \underset{-}{r_L}) = B^f(\underset{-}{r_B}, \underset{+}{r_L}) + L^f(\underset{+}{r_B}, \underset{-}{r_L})$. Then setting loan demand by firms equal to loan supply by banks resulted in $I(\underset{-}{r_B}, \underbrace{\underset{+}{r_L}(\underset{+}{r_B}, \underset{-}{R})}_{-})$. Therefore, expansionary monetary policy shifts not only the LM curve but the IS curve outwards as well. Unambiguously, the IS will shift outwards and output will increase. The end increase exceeds the increase predicted by the traditional interest-rate channel operating solely through the LM curve. In a two-currency economy, firm demand for loans and bonds is affected by not only the foreign currency interest rates but also the currency balance sheet channel. A firm's net worth and hence its external finance premium will be affected by changes in the exchange rate. The end effect is *not* unambiguously expansionary as in Bernanke and Blinder. As in Chang and Velasco (2001) and based on earlier work, (see Bernanke, Gertler and Gilchrist, 1996) suppose that the cost of investment at time 0 is $Q_0K_1 = R_0K_0 + E_0B^f_{1,F} + B^f_{1,H} - E_0B^f_{0,F} - B^f_{0,H}$, where R_0 is the gross return on the capital investment and B^f is the total debt of the firm (the sum of its bond and loan debt). Net worth is therefore equal to $R_0K_0 - E_0B^f_{0,F} - B^f_{0,H}$. Firms must pay a premium over the bond rate equal to $1 + \eta = \left(\frac{Q_0K_1}{R_0K_0 - E_0B^f_{0,F} - B^f_{0,H}}\right)^{\mu}$. Therefore in the event of a depreciation, net worth falls and firms experience a collateral squeeze, reducing credit demand and credit interest rates. However, the analysis has taken the return on the project, R_0, as given. This omits the effect of exchange rate movements on the return of investment. For example, in the event of a depreciation export firms will tend to benefit and the gross return may be $R(E)$, such that $R' > 0$. The net effect on net worth may then be positive and the premium will fall.

Therefore in a two-currency market equilibrium, domestic currency loan demand will equal domestic currency loan supply,

$$\underset{+}{L^f_H}(\underset{+}{r^H_B}, \underset{+}{r^F_B}, \underset{-}{r^H_L}, \underset{+}{r^F_L}, \underset{-}{\eta}) = \underset{-}{\mu_H}(\underset{-}{r^H_B}, \underset{-}{r^F_B}, \underset{+}{r^H_L}, \underset{-}{r^F_L})\xi.$$

Similar equilibrium conditions will hold for the other three variables.

Therefore $r_L^H = \phi(\underset{+}{r_B^H}, \underset{+}{r_B^F}, \underset{+}{r_L^F}, \underbrace{\underset{?}{\eta(R_H)}}_{-}, \underbrace{\underset{+}{\xi(R_H)}}_{-})$ and similarly for r_L^F. Substituting into the investment equation yields,

$$I = I(\underset{-}{r_B}, \underbrace{\underset{+}{r_L}(\underset{+}{r_B}, \underbrace{\underset{?}{\eta(R_H)}}_{-}, \underbrace{\underset{+}{\xi(R_H)}}_{-}), \underbrace{\underset{?}{\eta(R_H)}}_{-}}_{-}).$$

Clearly it is not obvious that investment increases in the event of "expansionary" monetary policy. The two ambiguities are on account of the premium. Suppose that the premium is decreasing with expansionary policy. This exerts positive pressure on the lending rates which dampens the direct positive effect on investment. It might even be possible, though of low likelihood, that loanable funds decrease in response to an expansionary policy and this pushes lending rates upwards, also decreasing investment. In short, the theory is more complex in an open economy with a partially dollarized banking system. No a priori prediction can be made regarding the reaction to monetary policy by banks that hold a larger share of foreign currency loans relative to other banks.

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2 Additional Data and Results

Table A1. Descriptive Statistics: Bank Balance Sheets

Bank type		Small		Big	
Date		1995m1	2002m4	1995m1	2002m4
Number of banks		28	36	9	7
Mean assets (1995 peso millions)		12,211.8	11,220.2	113,305.6	189,194.1
Median assets (1995 peso millions)		2,736.1	3,795.6	76,273.8	135,733.3
Fraction of total system assets		0.25	0.23	0.75	0.77
Fraction of total assets in type category					
Total Assets, of which:	Peso	0.832	0.841	0.720	0.878
	FX	0.168	0.159	0.280	0.122
Cash	Peso	0.005	0.036	0.012	0.052
	FX	0.006	0.036	0.016	0.021
Securities	Peso	0.162	0.069	0.065	0.064
	FX	0.042	0.005	0.010	0.016
Total loans (current and past)	Peso	0.454	0.254	0.382	0.254
	FX	0.060	0.059	0.139	0.040
Current loans to private sector	Peso	0.435	0.112	0.340	0.081
	FX	0.101	0.029	0.152	0.022
Total liabilities, of which:	Peso	0.619	1.577	0.673	0.847
	FX	0.113	0.139	0.282	0.121
Total deposits	Peso	0.322	0.323	0.365	0.277
	FX	0.022	0.025	0.065	0.041
Interbank liabilities	Peso	0.147	0.708	0.095	0.060
	FX	0.085	0.018	0.119	0.016
Subordinated debt	Peso	0.007	0.000	0.010	0.003
	FX	0.000	0.000	0.002	0.001
Capital	Peso	0.266	-0.718	0.043	0.031
	FX	0.000	0.001	0.000	0.001

Source: Bank of Mexico. Notes: Big banks are banks above the 85 percentile of the fraction of total real assets of the banking system over 1995-2002. Current loans to private sector are the sum of commercial, consumer, housing, and other financial intermediary loans. The average capital position at small banks is driven by several banks under intervention of the Bank Savings Protection Institute (IPAB). The regressions in Tables 4-6 control for IPAB intervention and the results are robust to their exclusion.

Table A2. Summary Statistics of Main Shocks and Bank Characteristics

	Observations	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
VAR Orthogonalized Shocks						
Peso interest rate	4760	0.000	2.398	-1.496	-0.473	1.194
US interest rate	4760	0.000	0.135	-0.051	0.021	0.077
Brady bond spread	4760	0.000	0.801	-0.553	-0.058	0.426
Covariates						
Share of deposits in foreign currency	3979	0.158	0.202	0.003	0.103	0.207
if small bank sample only	3197	0.157	0.223	0.000	0.077	0.196
if big bank sample only	782	0.164	0.067	0.107	0.175	0.213
Share of deposits in foreign currency (cross-bank)	56	0.153	0.166	0.036	0.101	0.196
if small bank sample only	47	0.151	0.179	0.013	0.093	0.197
if big bank sample only	9	0.163	0.056	0.139	0.180	0.195
Share of loans in foreign currency	4221	0.297	0.237	0.040	0.287	0.469
if small bank sample only	3439	0.275	0.252	0.010	0.244	0.461
if big bank sample only	782	0.393	0.109	0.305	0.401	0.478
Share of loans in foreign currency (cross-bank)	56	0.286	0.204	0.129	0.269	0.448
if small bank sample only	47	0.266	0.214	0.064	0.245	0.445
if big bank sample only	9	0.393	0.066	0.383	0.399	0.451
Location of foreign currency deposits						
Number of branches, small banks	9	44.8	45.5	7.0	36.0	72.0
Number of branches, big banks	6	1216.8	467.4	978.0	1201.0	1564.0
Share of branches in border states, small banks	9	0.259	0.314	0.060	0.162	0.333
Share of branches in border states, big banks	6	0.255	0.031	0.226	0.261	0.272
Liquid assets to total asset ratio	4279	0.185	0.155	0.076	0.144	0.240
Capital equity to total asset ratio	4279	-0.089	0.615	0.021	0.044	0.092
Capital equity to total asset ratio (non-IPAB)	3160	0.114	0.162	0.037	0.058	0.134
Past due loans to total loan ratio	4232	0.160	0.260	0.000	0.036	0.150
IPAB Indicator	4928	0.227	0.419	0.000	0.000	0.000

Notes: Data for location of bank branches are from the Association of Mexican Banks "Directorio Nacional de Sucursales Bancarias", available at http://www.abm.org.mx, as of December 2007. For the other variables, see notes to Table A1 and to Figures 1-2.

Table A3. Robustness Check on Deposits: Controlling for Liquidity, Capital and Past Due Loans

Dependent variable: log change in total real deposits, monthly

	(1) All banks	(2) All banks	(3) All banks
Independent variables			
Peso interest rate (PESO)	-0.044*** (0.005)	-0.041*** (0.003)	-0.037** (0.017)
Share of foreign deposits, lag 1 (FXD_{t-1})	0.081 (0.110)	0.064 (0.197)	0.071 (0.137)
FXD_{t-1}*PESO	0.232*** (0.003)	0.212*** (0.007)	0.223*** (0.005)
US interest rate (US)	-0.086 (0.588)	-0.151 (0.405)	-0.117 (0.499)
Brady bond spread (RISK)	0.068** (0.048)	0.065* (0.053)	0.066* (0.051)
FXD_{t-1}*US	-0.247 (0.725)	-0.128 (0.855)	-0.196 (0.782)
FXD_{t-1}*RISK	-0.361*** (0.006)	-0.351*** (0.008)	-0.356*** (0.007)
Liquid assets to total assets, lag 1 (LQD_{t-1})	-0.041 (0.562)		
LQD_{t-1}*PESO	0.009 (0.880)		
Capital equity to total assets, lag1 (CAP_{t-1})		0.048 (0.266)	
CAP_{t-1}*PESO		0.048 (0.279)	
Past due loans to total loans, lag 1 (PDL_{t-1})			-0.113 (0.226)
PDL_{t-1}*PESO			-0.034 (0.442)
IPAB	-0.065*** (0.002)	-0.050** (0.017)	-0.023 (0.493)
R-sq	0.055	0.057	0.057
N	3479	3479	3479
Banks	56	56	56

Notes: This table presents results from estimating equation (1) for deposit growth. The reported figures associated with the shock variables are the sum of the estimated coefficients on the contemporaneous and six lags of the respective policy shock variable (or on the interaction of the bank characteristic in question with the policy shock variable and its lags). Reported in parentheses below estimates are the p-values from the test that the sum of the coefficients is significantly different from zero, where ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors computed are heteroscedasticity robust, clustered at the bank level. IPAB is dummy for government intervention in a bank after 1995 crisis. Also included in regression are lags of the dependent variable and a constant. Regressions use VAR orthogonalized shocks. Deposits are in real terms, and are also adjusted for spurious valuation effects from exchange rate changes.

Table A4. Robustness Check on Loans: Controlling for Liquidity, Capital and Past Due Loans

Dependent variable: log change in total real current loans, monthly

	(1) All banks	(2) All banks	(3) All banks
Independent variables			
Peso interest rate (PESO)	0.002	0.014	0.017
	(0.872)	(0.400)	(0.263)
US interest rate (US)	0.230	0.249	0.222
	(0.106)	(0.162)	(0.137)
Brady bond spread (RISK)	0.037**	0.035*	0.036*
	(0.043)	(0.056)	(0.054)
Share of foreign deposits, lag 1 (FXD_{t-1})	0.077*	0.080*	0.075
	(0.095)	(0.088)	(0.105)
FXD_{t-1}*PESO	0.119***	0.107***	0.105***
	(0.002)	(0.007)	(0.006)
FXD_{t-1}*US	-0.284	-0.298	-0.251
	(0.552)	(0.583)	(0.605)
FXD_{t-1}*RISK	-0.225***	-0.215***	-0.222***
	(0.001)	(0.002)	(0.002)
Share of foreign loans, lag 1 (FXL_{t-1})	-0.016	-0.026	-0.024
	(0.696)	(0.437)	(0.463)
FXL_{t-1}*PESO	-0.083	-0.069	-0.064
	(0.120)	(0.165)	(0.181)
Liquid assets to total assets, lag 1 (LQD_{t-1})	-0.065		
	(0.551)		
LQD_{t-1}*PESO	0.074		
	(0.387)		
Capital equity to total assets, lag1 (CAP_{t-1})		-0.010	
		(0.636)	
CAP_{t-1}*PESO		0.017	
		(0.337)	
Past due loans to total loans, lag 1 (PDL_{t-1})			-0.047**
			(0.043)
PDL_{t-1}*PESO			-0.037
			(0.103)
IPAB	-0.029**	-0.037***	-0.012
	(0.029)	(0.000)	(0.287)
R-sq	0.058	0.059	0.057
N	3506	3506	3506
Banks	56	56	56

Notes: This table presents results from estimating equation (2) for loan growth. The reported figures associated with the shock variables are the sum of the estimated coefficients on the contemporaneous and six lags of the respective policy shock variable (or on the interaction of the bank characteristic in question with the policy shock variable and its lags). Reported in parentheses below estimates are the p-values from the test that the sum of the coefficients is significantly different from zero, where ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors computed are heteroscedasticity robust, clustered at the bank level. IPAB is dummy for government intervention in a bank after 1995 crisis. Also included in regression are lags of the dependent variable and a constant. Regressions use VAR orthogonalized shocks. Deposits are in real terms, and are also adjusted for spurious valuation effects from exchange rate changes.