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Are Financially Dollarized Countries More Prone to Costly Crises?

Carlos Ó. Arteta*

Abstract: In view of the role of liability dollarization in recent financial crises, whether or not the widespread presence of foreign-currency-denominated deposits and credits in developing-country banking systems leads to greater financial fragility is an open and pressing question. Using a comprehensive dataset on deposit and credit dollarization for a large number of developing and transition economies, I find little evidence that high dollarization heightens the probability of banking crises or currency crashes. Furthermore, while empirical results suggest that banking crises and currency crashes are contractionary, there is no robust evidence that they are more costly in highly dollarized countries than in countries where dollarization is low. This extensive empirical search highlights that macroeconomic and exchange rate policies are far more important than bank dollarization in determining crisis risks and costs.

Keywords: dollarization, banking crises, currency crashes, contractionary devaluations
JEL Classification Number: F33, G21

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1 Introduction and Motivation

The world has witnessed the onset of numerous banking and currency crises in developing countries during the past two decades, many of which were very costly. As a result, the study of their determinants has been an important priority in academic and policy settings. An issue that has generated considerable discussion is the widespread presence of foreign-currency-denominated (“dollar”) assets and liabilities on the balance sheets of banks and firms and their impact on the likelihood and severity of crises.¹ Indeed, it can be argued that the most dramatic crisis in recent memory, the ongoing Argentine disaster, was compounded by the presence of considerable dollarization of firms’, banks’, and households’ liabilities – in particular, dollar loans and deposits, which led authorities to pursue such actions as forced “pesification” and the infamous *corralito*. This paper asks whether or not countries that have high degrees of deposit and credit dollarization are more vulnerable to costly periods of banking and currency turmoil.

In the context of banks’ balance sheets, there are reasons to suspect that the extensive presence of dollar credits and deposits (“financial dollarization” or “bank dollarization”) heightens the probability of crises and their output costs. Consider the case of a large volume of dollar deposits. If deposit dollarization is high and dollar liquidity is low, banks may not be able to deal with a run on dollar deposits – again, see Argentina in late 2001. Since the authorities cannot print foreign currency, their lender-of-last-resort ability is limited. Furthermore, high deposit dollarization increases the substitutability of dollar-denominated and domestic-currency-denominated (“peso”) instruments and makes the exchange rate more sensitive to portfolio reallocations. Thus, deposit dollarization can increase the possibility of banking and currency crises. Moreover, it can make crises more costly once they strike: If banks’ liquid dollar liabilities (e.g. dollar deposits) greatly exceed their dollar assets, a currency crash – a large downward movement of the nominal exchange rate – may wreak havoc in their balance sheets.

¹ I follow the standard practice and refer to any foreign currency as “dollar” and to any domestic currency as “peso.”

In this scenario, credit dollarization may be a poor way for banks to hedge their existing dollar liabilities. After a currency crash, dollar loan default rates may soar, as borrowers find it more difficult to repay. Greater default in turn leads to a further deterioration of bank asset quality. As a result of increasing banking instability, banks' supply of credit may be contracted, reducing investment and making financial distress even more costly. In short, currency crashes in highly dollarized economies weaken both sides of banks' balance sheets and thus can be particularly contractionary. And the fact that banking and currency crises are entwined may make financial dollarization even riskier.

However, the important potential benefits of financial dollarization are usually neglected.² First, the presence of dollar deposits and loans in countries that suffered high nominal instability in the past has enhanced financial intermediation and helped avoid demonetization. If dollar accounts were not allowed in countries with a poor record of macroeconomic stability, depositors would not be as willing to hold their savings in the resident banking sector. If banks did not have the option of lending in dollars, their supply of credit would likely be lower. In this context, disruptions in deposit and credit supply during times of distress may be lessened by financial dollarization.

Second, financial dollarization may act as a buffer that alleviates the contractionary effects of crises on output. For instance, a currency crash hits depositors severely if most of their deposits are in pesos. On the contrary, if a significant share of deposits is denominated in dollars – and provided that bank runs and forced conversions do not take place – the crash will have a less adverse effect on household wealth and thus on consumption. Similarly, credit dollarization leads to a redistribution of currency risk that might be stabilizing. Dollar loans transfer currency risk from banks to firms, thus creating an incentive for the latter to improve their risk management skills and increase their hedging activities. And if banks concentrate most of their dollar lending to creditworthy firms whose income stream is mostly denominated in dollars, default risk will be contained.

² For a discussion of the risks and benefits of financial dollarization, see Baliño, Bennett, and Borensztein (1999).

Finally, financial dollarization may allow a greater integration with international capital markets and a richer menu of financial instruments, which may imply efficiency gains for financial intermediation. This greater capital market integration may also enhance banks' management skills, which can be crucial to alleviate disruptions in their operations during periods of financial distress.

Given the potential pros and cons of financial dollarization, and its widespread presence in the developing world, it is striking that there has been no systematic empirical research, to the best of my knowledge, on its effects on the likelihood and severity of crises. This is the first systematic study of these issues.

In this paper, I aim to present some stylized facts on the links between financial dollarization and crises, in order to answer two related questions: Does high dollarization of deposit and credits increase the likelihood of banking crises and currency crashes? And does it make banking crises and currency crashes more costly? To do so, I employ the first comprehensive database on financial dollarization for a large sample of developing and transition economies, previously used in Arteta (2002), as well as a variety of estimation methods and an extensive battery of sensitivity tests.

Extensive econometric analysis finds little evidence of any particular link between high bank dollarization and the likelihood of banking crises or currency crashes. In particular, the presumption that high dollarization heightens the probability of banking or currency turmoil does not receive empirical support. Furthermore, while empirical results show that banking crises and currency crashes are contractionary, there is no evidence that highly dollarized countries suffer more costly crises or crashes than countries where dollarization is low -- on the contrary, the results suggest that deposit dollarization may act as a buffer against the negative effects of these events. On the other hand, I find evidence that sharp devaluations have more severe contractionary effects than sharp depreciations: Large downward movements of the nominal exchange rate under managed regimes lead to more protracted output contractions than those under floating regimes. This extensive empirical search highlights that macroeconomic

and exchange rate policies are far more important than bank dollarization in determining crisis risks and costs.³

The remainder of this paper is organized as follows. Section 2 describes the methodology and data used. Section 3 reports the empirical evidence on the links between dollarization and the likelihood of crises. Section 4 presents the results on the links between dollarization and the costs of crises. Section 5 concludes.

2 Methodology and Data

2.1 Methodology

I divide the investigation into two clearly defined parts. The first part deals with the links between dollarization and the probability of banking crises and currency crashes. The second part focuses on the relations between dollarization and the costs of banking crises and currency crashes. To save space, I henceforth refer to banking crises and currency crashes simply as “crises.”

I start the analysis by conducting graphical event studies to assess the patterns of deposit and credit dollarization before and after crises. Then, I rely on the existing empirical literature on the determinants of crises and use probit regressions to estimate variants of the following equation:

$$(1) \quad Crisis_{it} = \alpha Dollarization_{it-1} + \gamma' Controls_{it-1} + \varepsilon_{it}$$

where *Crisis* is a binary variable taking the value of one if country *i* experiences the onset of a crisis at time *t*, and zero when the country is in a non-crisis year.⁴ *Dollarization* is a measure of deposit or credit dollarization. The term *Controls* stands for a set of other variables impacting crisis probability, to be detailed later, and ε_{it} is an error term. The

³ Before proceeding, it is important to reiterate what this paper aims and does not aim to do. This paper focuses on the impact of dollar deposits and loans on crisis risks and costs. It does *not* deal with the impact of the currency denomination of all assets and liabilities of banks (or those of firms and households). I return to this point in the concluding remarks.

⁴ For crisis spells that last more than one year, only the first year is considered as a crisis, and the subsequent years are excluded. This is a standard procedure in the empirical literature of the determinants of currency and banking crises; see Frankel and Rose (1996), among others.

coefficient of interest is α : For instance, a positive coefficient would be evidence that financially dollarized countries are more susceptible to suffer crises. To alleviate endogeneity and reverse causality concerns, all explanatory variables are lagged one year in the default regressions, unless otherwise noted.

After having attempted to establish whether there is a clear link between dollarization and crisis probability, I proceed to focus on the role of dollarization in compounding the contractionary effects of crises. Again, I do so in two ways. First, I divide the sample into two groups – crises in low-dollarization countries and in high-dollarization countries -- and pursue graphical event-study analysis of the behavior of several macroeconomic and financial variables (such as output growth, inflation, consumption growth, and investment growth, among others) before and after crises. The purpose of this approach is to see whether there are obvious differences in the post-crisis behavior of such variables, depending on whether crises occurred in a low or in a high dollarization country. For example, if output growth displays a sharp reduction after a crisis in a country with high dollarization but displays no major change after a crisis in a low-dollarization country, it would be evidence that dollarization does increase the output costs of crises.

Second, I use OLS, panel and instrumental-variable regression analyses to assess the effect of crises and dollarization on output growth. To that end, I estimate variants of the following equation:

$$(2) \quad Growth_{it} = \beta_1 Crisis_{it-1} + \beta_2 Dollarization_{it-1} + \beta_3 Crisis_{it-1} * Dollarization_{it-1} + \delta' Controls_{it-1} + v_{it}$$

where *Growth* stands for GDP growth (unless otherwise noted); *Crisis*, *Dollarization*, and *Controls* are self-explanatory; and v_{it} is an error term. The interpretation of these coefficients is straightforward. A negative value for β_1 indicates that crises are contractionary. More importantly, if β_3 is also negative, it would suggest that dollarization compounds the negative effect of crises on growth. Unless otherwise stated, all explanatory variables are lagged one year to minimize endogeneity and reverse causality.

Throughout all the empirical analyses in this paper, I make extensive use of one-year, two-sided exclusion windows around crisis onsets, in order to better capture the

different behavior of the relevant variables during crisis episodes vis-à-vis during “tranquil” (non-crisis) periods. Various robustness checks are also performed.

2.2 Crisis Data

To identify banking crises in developing and transition economies, I use the comprehensive list developed by Caprio and Klingebiel (2002). These authors use data on bank capital erosion, non-performing loans and similar qualitative information to make a judgment as to whether a particular episode of bank distress constitutes a banking crisis. The Caprio-Klingebiel list is one of the preferred sources of information used in the empirical banking crisis literature; for more details, see the comprehensive study in Eichengreen and Arteta (2002).⁵ I only use crisis onset dates for which dollarization data (detailed below) are available.⁶

To identify currency crashes, I follow Frankel and Rose (1996) and define a crash as an annual nominal depreciation of the currency of at least 25 percent which represented an increase in the rate of depreciation of at least 10 percent with respect to the previous year.⁷ Unless otherwise noted, I use the nominal exchange rate with respect to the US dollar. Again, I only use crash onset dates for which dollarization data are available.⁸

⁵ Caprio and Klingebiel sub-classify crisis events as systemic (if most or all of the banking system’s capital is eroded) or non-systemic (if a smaller subset of intermediaries are affected). Most of the Caprio-Klingebiel crises are systemic. In order to maximize the number of observations in this study, I do not make this further distinction in the results below, but I do undertake robustness checks (not reported) of this issue.

⁶ This explains why, for instance, Mexico’s 1994-5 crisis is not included in this study: Mexico’s dollarization data are available in my dataset only beginning in 1997.

⁷ According to this definition, a currency crash can occur under fixed or intermediate exchange rate regimes as well as under floating regimes. Note that this definition does not deal with changes in interest rates or reserves, which is consistent with the focus of this paper – namely, the output effects of large downward movements of the exchange rate in dollarized economies.

⁸ In order to follow the Frankel-Rose method as close as possible, I use annual nominal exchange rate data from the World Bank’s *World Development Indicators*. However, these data are constructed as the average of country-specific monthly averages, which might smooth out certain sharp movements that occurred towards the end of a year. This might explain why, for example, the crashes in Malaysia and Indonesia are recorded as taking place in 1998, not 1997. I took pains to account for these peculiar cases by doing extensive sensitivity analysis (such as using the year before a crash onset as the crash date). It turns out that the main results are largely robust to this issue.

Appendix Table A1 lists the occurrence of banking crises and currency crashes in the sample.⁹ These are the default dates, and sensitivity analysis regarding the dating strategy is also undertaken, as detailed below.

2.3 Dollarization Data

To measure bank dollarization, I rely on the first comprehensive databank on deposit and credit dollarization, previously used in Arteta (2002). The unbalanced panel data set employed in this paper consists of annual observations, mainly from the early 1990s to 1999 and, in some cases, 2000. Data on the aggregate volume of deposit money banks' foreign-currency-denominated ("dollar") deposits of residents are available for 92 developing and transition economies. Data on the aggregate volume of deposit money banks' foreign-currency-denominated ("dollar") credit to the resident private sector are available for 40 developing and transition economies, almost all of which also have dollar deposits data. The time span varies across countries, with some having data from as early as 1975 and some having data only from about 1995 onwards.¹⁰

Appendix A presents more detailed information on country sample, data definitions and sources. This sample covers all regions of the world. However, it is important to emphasize that all countries in the sample report having some degree of deposit and/or credit dollarization (which could be almost negligible, like Guatemala, or very large, like Bolivia).¹¹ By definition, I do not use countries that do not report

⁹ After implementing the one-year, two-sided exclusion window around crisis onsets, the Caprio-Klingebiel list yields 47 banking crisis observations and 734 non-crisis observations for which deposit dollarization data are available, as well as 22 banking crisis observations and 238 non-crisis observations for which credit dollarization data are available. Similarly, the Frankel-Rose method yields 59 currency crash observations and 823 non-crash observations for which deposit dollarization data are available, as well as 28 crash observations and 270 non-crash observations for which credit dollarization data are available. These numbers may be lower in some regressions below, due to missing values of some of the explanatory variables.

¹⁰ Frequent changes in the format of primary sources are a major reason for the diverse time coverage.

¹¹ There are a few instances in which values for dollar credit or deposits are equal to zero, principally when the data come from electronic sources. Unfortunately, it is not clear whether this means that the actual value was zero (e.g. values for dollar credit were zero because dollar credit was prohibited) or whether the data were missing. Therefore, I only work with strictly positive values of the relevant variables, and set any zero value to missing.

dollar deposits or credits.¹² Appendix Table A2 provides information on dollarization data availability.

As in Arteta (2002), I define credit and deposit dollarization in two ways. The default definition of credit dollarization is the ratio of dollar credit to the private sector over total credit to the private sector; the alternative definition is the ratio of dollar credit to the private sector over total bank assets. Similarly, the default definition of deposit dollarization is the ratio of dollar deposits over total deposits, while the alternative definition is the ratio of dollar deposits over total bank liabilities.¹³ Unless otherwise noted, I use the default definitions in the analysis below.¹⁴ Using the alternative definitions of dollarization instead of the default definitions yields essentially identical results.¹⁵

2.4 Other Controls

Drawing from the empirical literatures on the determinants and growth effects of banking and currency crises, I use various macroeconomic and financial variables, whose definitions and sources are detailed in Appendix A. For estimates of equation (1), the standard list of controls includes the following: Foreign direct investment relative to GDP, short-term debt relative to total debt, international reserves as a percentage of monthly imports, the current account balance relative to GDP, real exchange rate overvaluation, the rate of domestic credit growth, the rate of GDP growth, the ratio of M2 to reserves, the US interest rate, and the OECD growth rate. Permutations of this list of controls have been used by Eichengreen and Rose (2001), Eichengreen and Arteta (2002), and Frankel and Rose (1996), among others.

¹² The fact that a country does not report dollar loans or deposits does not mean that it does not have them. I return to this point in the conclusions.

¹³ The first definition focuses on portfolio allocation decisions, while the second focuses on the relative importance of the financial dollarization process.

¹⁴ The correlation between the default and alternative definitions of deposit dollarization is 0.913. The correlation between the default and alternative definitions of credit dollarization is 0.887.

¹⁵ There is a data limitation that needs to be noted. While this is the first and most comprehensive database to date (in terms of number of countries and years), credit dollarization data are available for 40 countries, not all of which suffered crises. Therefore, there are not many crisis observations in the credit dollarization regressions documented below.

For estimates of equation (2), I include the following: The current account balance relative to GDP, gross private capital flows relative to GDP, the ratio of trade (exports plus imports) to GDP, the US interest rate, and OECD growth. Some specifications also include lagged GDP growth. Permutations of this list of controls have been used by Ahmed et al. (2002), Eichengreen and Rose (2003), Gupta et al. (2001), Kamin and Klau (1998), and Milesi-Ferretti and Razin (1998), among others.

Following Arteta (2002), some empirical specifications include binary indicators of the regulatory framework of dollarization. In particular, I include dummy variables for whether a country allows dollar deposits or loans freely or with minor conditions, as opposed to severely restricting them, limiting them to certain residents (e.g. individuals or firms that earn foreign exchange), or prohibiting them.¹⁶

Two additional variables are included in estimates of equation (2): A dummy variable for whether a managed exchange rate regime is in place, and the interaction of the crisis indicator and the managed regime indicator.¹⁷ To determine whether a country operates under a managed regime, I use the standard classification based on the regime reported by monetary authorities to the IMF and published in the *IMF Annual Report on Exchange Arrangements and Exchange Restrictions*.¹⁸ To address inconsistencies between the reported regime and the regime actually followed by the authorities, I revised and corrected this classification to account for coding errors, and I reconciled this *de jure* information with a new *de facto* IMF classification (available only from 1999 onwards). The “managed regime” indicator used in this paper equals one if the

¹⁶ Arteta (2002) presents more discussion of these regulation indicators. While they are of paramount importance in explaining the *determinants* of dollarization (as emphasized in Arteta 2002), they can still contribute to the understanding of the *implications* of dollarization (as in this study).

¹⁷ This last variable is important when assessing the impact of large devaluations vis-à-vis large depreciations on growth. Insofar as the crash dummy represents a large downward movement of the exchange rate, the lagged interaction term “crash/managed regime” equals one if the crash leads to a significant readjustment of a rigid exchange rate – that is, to a large devaluation (as opposed to a large depreciation within a floating regime). Therefore, a negative value for the coefficient of this interaction terms suggests that crashes in managed regimes are more contractionary than crashes in floating regimes.

¹⁸ In general, this classification distinguishes regimes as fixed (single pegs or basket pegs), intermediate (limited flexibility, cooperative arrangements, crawling pegs or bands, or managed floats following a predetermined set of indicators), and floating (managed floats with no pre-announced path for the exchange rate or independent floats).

reported regime is either fixed or intermediate, and zero if the regime is reported as floating.

3 Evidence on the Likelihood of Crises

3.1 Event Study Analysis

I first conduct event-study analysis to characterize the behavior of deposit and credit dollarization before and after crises. Figure 1 compares the average values of the dollarization ratios around crisis onsets with the average values of the ratios during tranquil periods. Each panel in Figure 1 displays the movement of a particular dollarization ratio two years before the crisis and continuing through the crisis, marked by a vertical line, until two years afterward. Time is measured in the horizontal axis (from -2 to +2 years around crises). The horizontal line is the mean of the dollarization ratios for the non-crisis observations. The average values of the ratios for the crisis observations are surrounded by two-standard-error bands.

Figure 1 indicates that, while deposit dollarization is already slightly higher before the onset of banking crises and currency crashes, it goes up somewhat afterward (especially after currency crashes). This is true regardless of the definition of deposit dollarization used. On the other hand, credit dollarization does not seem to behave differently between crises and tranquil periods, or before and after crises. If anything, the ratio of dollar credit to total assets goes down after currency crashes (despite possible valuation effects due to exchange rate depreciation that would raise it), perhaps suggesting the presence of dollar credit rationing after such crashes.¹⁹

In sum, this graphical analysis does not indicate any particularly strong link between dollarization and the probability of banking crises or currency crashes.

¹⁹ Valuation effects may be present regardless of the currency used to express the values of the variables. In particular, any dollarization ratio will increase after depreciation by construction. If all volumes are expressed in their domestic currency (“peso”) value, the ratio’s numerator will increase, but only one part of its denominator (the dollar component) will. On the other hand, if all volumes are expressed in their dollar values, its numerator will stay constant, but its denominator will go down (as the dollar value of the denominator’s peso component decreases).

3.2 Multivariate Analysis

I now proceed with multivariate probit estimates of equation (1), computing standard errors that are robust to heteroskedasticity and to clustering by country-specific observations. I employ the default definition of deposit and credit dollarization, explained above (i.e. dollar deposit to total deposit and dollar credit to total credit ratios). I use a one-year, two-sided exclusion window around crises, to properly isolate crisis and tranquil periods, and I include the list of additional controls mentioned in Section 2.4. To further ameliorate endogeneity, I lag all regressors one year. In Tables 1 and 2, I report the effects of one-unit changes in the continuous right-hand-side variables on the probability of a crisis (in percentage points), as well as the discrete change in the probability for dummy variables. I also report the associated robust z-statistics to test the null hypothesis of no effect.

The explanatory power of the probit regressions used in this paper is not high, which is consistent with the performance of standard models of crises and the usual inability of leading-indicator exercises to properly predict events. Still, intriguing results appear. Table 1 indicates that there is no particular effect of deposit or credit dollarization on the probability of banking crises: None of the coefficient estimates of the dollarization ratios is statistically significant.²⁰

Similarly, Table 2 suggests no robust effect of dollarization on the probability of currency crashes. The relevant results are not only fragile but also economically insignificant. There is only weak evidence in column 5 that an increase in deposit dollarization of one percentage point raises the probability of a crash by a mere 0.004 percent, while a similar increase in credit dollarization reduces it by just 0.005 percent.²¹

These negative results are similar to the previously reported event study, and are clearly inconsistent with the presumption that bank dollarization heightens the risks of

²⁰ The only coefficient with some statistical significance is that of the binary for whether dollar loans are allowed, in column 4 of Table 1.

²¹ And it would appear that allowing dollar loans reduces the probability of a crash by 5.5 percent. However, all these results obtain in only one regression, where the sample size is small (132 observations).

banking or currency turmoil. In contrast, other macroeconomic and financial variables have an important impact on the probability of crises. Table 1 shows that a high ratio of reserves to monthly imports reduces bank crisis risks, while a high degree of real exchange rate overvaluation significantly increases it. Table 2 suggests that high FDI-to-GDP ratios and (to a lesser degree) current account surpluses lower the probability of currency crashes. There is also evidence that real overvaluation, high US interest rates, and high M2-to-reserves ratios render crashes more likely.²²

3.3 Robustness

The benchmark evidence above indicates that other macroeconomic conditions are far more important than bank dollarization in influencing the likelihood of banking crises and currency crashes. The lack of any particular association between deposit and credit dollarization and the probability of crises persists even after undertaking extensive sensitivity analysis.

Using lagged regressors in Tables 1 and 2 is analogous to undertaking a leading-indicator exercise. Since such exercises usually yield poor results, it is not clear whether the insignificant coefficients of the dollarization ratios mean that they actually do not impact crisis probability or, instead, that “predictive” probit models fit the data poorly. To check the sensitivity of the findings reported above, Table 3 uses the current value of the regressors instead of their lagged value. The benchmark results are immune to this test: Most of the coefficients of the dollarization ratios in Table 3 are still statistically and economically insignificant (with the exception of the credit dollarization ratio, which is marginally significant in column 2). More critically, other macroeconomic and financial variables display a much more important contemporaneous association with crisis probability, even more so than when using their lagged values. Reverse causality concerns notwithstanding, probit regressions *can* deliver relatively reasonable results.

²² There are two counterintuitive results in these tables. In Table 1, high monetary liabilities relative to reserves appear to reduce the likelihood of a banking crisis. In Table 2, positive OECD growth seems to increase the risk of a currency crash. However, these unexpected effects are not robust, and only appear when the sample size is small.

Table 4 tests the robustness of the results to weighting observations by GDP per capita (which has been done in previous studies on crises, such as Eichengreen and Rose 2002 and Eichengreen and Arteta 2002) as well as to using alternative dollarization ratios. The lack of any statistical (or economic) significance of the relevant coefficients again gives additional support to the benchmark results.

Additional robustness checks (not reported, to save space) included the following permutations:²³

- Using the year before the reported crisis date as the crisis onset.
- Using a two-year exclusion window instead of the one-year window around events, as well as not using any exclusion window at all.
- Including regional dummies for the transition economies, Latin America, and Asia.
- Excluding transition economies.
- Including year effects.
- Using non-robust standard errors.
- Including other controls, such as budget balance (as % of GDP) and inflation.
- Including exchange rate regime indicators.
- In deposit dollarization regressions, restricting the sample to the observations for which credit dollarization data are also available.
- Dropping observations where the annual inflation rate is greater than 1000 percent, as well as greater than 100 percent.
- When computing the currency crash indicator, using the nominal exchange rate with respect to the German Deutsche Mark for the transition economies (except Russia), instead of the US dollar.
- Computing additional probit regressions where the dependent binary variable is an indicator for “twin” crises – a currency crash that was preceded by a banking crisis spell sometime in the previous two years.
- Using panel data estimation methods (random-effect and population-average models).
- Using panel data estimation methods together with year effects.

²³ All unreported results in this paper are available upon request.

- Using instrumental-variable probit methods to account for potential reverse causality between dollarization and crises.

In all these additional tests, the same results obtain: There is no evidence of any particular relation between financial dollarization and the incidence of banking crises and currency crashes.

4 Evidence on the Costs of Crises

4.1 Event Study Analysis

I now turn to the question of whether dollarization makes crises more costly. As in Section 3.1 above, I begin by conducting graphical event-study analysis. Figures 2 to 5 assess the behavior of growth and other macroeconomic and financial variables two years before and after banking crises and currency crashes, depending upon the level of dollarization. To do so, I divide the sample into two groups – crises in low-dollarization countries and in high-dollarization countries – and compare the average behavior of a given variable during crises with the average behavior of the same variable for non-crisis, tranquil periods. In order to have a common point of comparison, the tranquil average is computed without distinguishing between low and high dollarization. For each of the eight variables considered, I display two panels – one for crises in low or moderate dollarization, one for crises in high dollarization -- thus presenting 16 panels per figure. The (admittedly arbitrary) threshold for classifying dollarization as low or high is 25 percent, which is about the median for the default definitions of deposit and credit dollarization: If dollarization is greater than or equal 25 percent the year before the crisis, then such crisis is considered to take place in a “high dollarization” environment.²⁴ I also used other thresholds – 20 percent and 30 percent – in unreported robustness checks, which did not change the results below.

Figure 2 shows the effects of banking crises under low vs. high deposit dollarization. Some patterns emerge. First, growth appears to decline more sharply

²⁴ I use the dollarization value the year before the crisis to ameliorate reverse causality.

during banking crises in high deposit dollarization contexts. However, growth recovery is achieved quickly: The rate of output growth in the second year after the crisis is roughly the same as in tranquil periods. The same is true for consumption growth. On the other hand, it seems as if inflation, depreciation, and interest rate spreads (lending rates minus LIBOR) are higher and more volatile during banking crises under high deposit dollarization. Other variables do not exhibit different behavior under low or high dollarization and under crises or tranquil periods.

Figure 3 shows the effects of banking crises under low and high credit dollarization.²⁵ Unlike the deposit dollarization case, there is no evidence that the growth of output or consumption is lower in high vis-à-vis low dollarization. Depreciation, inflation, and interest rate spreads again seem to be more volatile under high dollarization, but the evidence in this regard is weak.

Figure 4 focuses on the effects of currency crashes under low and high deposit dollarization. Now, output growth is slightly lower in low-dollarization than in high-dollarization countries during the year of the crash, although it shows no difference afterwards. Consumption growth falls slightly more sharply in highly dollarized countries during the year of the crash. Nonetheless, it falls more markedly in low-dollarization countries after one year of the crash; perhaps high deposit dollarization acts as a buffer that allows consumption growth to resume more quickly. On the other hand, investment growth falls more sharply during the crash year in highly dollarized economies. And, once again, inflation, depreciation, and interest rate spreads are higher and more volatile under high deposit dollarization.

Finally, Figure 5 displays the effects of currency crashes under low and high credit dollarization. The patterns are less clear: There is no particular difference in the behavior of output growth. If anything, there is some evidence that consumption falls in the crash year in low-dollarization countries; perhaps high loan dollarization helps avoid disintermediation and leads to fewer credit crunches, allowing greater consumption smoothing. However, there is no evidence that high credit dollarization exacerbates the negative impact of crashes on investment growth, despite strong priors

²⁵ Keep in mind, however, that the sample size is now smaller, since dollar credit data are scarcer than dollar deposit data.

that a currency crash increases the volume of non-performing dollar loans and thus leads to a fall in investment.

To summarize, this event-study analysis suggests that strong evidence on particular effects of crises on macroeconomic and financial variables is elusive.

4.2 Multivariate Analysis

I proceed with multivariate OLS estimates of equation (2), computing standard errors that are robust to heteroskedasticity and to clustering by country-specific observations. As in Section 3.2 above, I use the default definitions of deposit and credit dollarization and a one-year, two-sided exclusion window around crises. Unless otherwise stated, the dependent variable in all regressions below is the rate of output growth. As explanatory variables, I include indicators of banking crises or currency crashes, measures of bank dollarization, and relevant interaction terms, along with a comprehensive list of controls detailed in Section 2.4 above. I first use the current value of the right-hand-side variables to assess their contemporaneous links with growth; subsequently, I use their lagged values, in order to minimize reverse causality and thus focus on their impact on growth. In some regressions, I include a lagged dependent variable in the list of controls.

Table 5 presents various specifications about the impact of banking crises on output growth. Several points emerge. There is weak evidence of a negative contemporaneous link between banking crises and output growth. Deposit dollarization does not seem to strengthen or compound this link. On the other hand, there is evidence that a one-percentage-point increase in credit dollarization is associated with a modest (about 0.04 percent) increase in growth. However, credit dollarization does not influence the effects of banking crises. Regarding other explanatory variables, only lagged growth and OECD growth are significantly (and intuitively) associated with output growth.

Using lagged values of the regressors yields different results, as shown in Table 6. There is now evidence that banking crises are very contractionary – they lead to an average reduction of growth of about 6 percent after one year. More crucially, the

interaction between deposit dollarization and crises display a positive and significant coefficient (about 0.13), suggesting that countries with high dollarization suffer less contractionary crises. Furthermore, there is evidence that lagged growth and (to a lesser degree) trade openness enhance current growth, while high US interest rates depress it.

Table 7 focuses on the effects of currency crashes and bank dollarization on growth, using the current values of the right-hand-side variables. There is evidence in the first three columns that currency crashes are associated with a significant reduction in growth of about 11 percent.²⁶ But more importantly, the results again suggest that deposit dollarization serves as a buffer against periods of turmoil: The positive and significant coefficient of the deposit dollarization/crisis interaction term is evidence that countries with high deposit dollarization suffer less severe contractions during currency crashes.

What is the impact of crashes on output one year after? Using the lagged value of the regressors, Table 8 presents some evidence of a V-shaped recovery: Currency crashes are associated with a strong output rebound in the range of 3 to 5.5 percent. Furthermore, the level of bank dollarization does not influence growth, nor do the relevant interaction terms. However, there is strong evidence that output may not rise and might even fall a year after a crash if such an event took place under a managed exchange rate regime: The interaction term crash/managed regime suggests an offsetting decline of output in the range of 3.2 to 4.8 percent. Indeed, unreported F-tests fail to reject the null that this negative effect completely offsets the potential rebound in output a year after the crash.

These results suggest that, regardless of the level of bank dollarization, a currency crash leads to a considerable decline in economic activity, which is subsequently followed by an expansion a year later – unless the crash took place under a managed exchange rate system, in which case output growth one year after the crash may remain low or even be negative. In other words, there is evidence that the exchange rate regime shapes the growth effect of large downward movements of the exchange rate: Large depreciations (i.e. crashes in floating regimes) lead to V-shaped recoveries, while large

²⁶ This result does not obtain, though, when using the smaller sample of the credit dollarization regressions in columns 4-8.

devaluations (i.e. crashes in managed regimes) lead to U-shaped recoveries. And while the level of bank dollarization plays a decisively secondary role on the effects of banking and currency problems, there are reasons to believe that deposit dollarization may alleviate the negative output effects of these events.

4.3 Robustness

Of course, the question is whether the evidence survives further empirical scrutiny. Therefore, I conduct extensive robustness checks. To minimize reverse causality, I henceforth use the lagged values of all right-hand-side variables. Tables 9 and 10 present the results for a subset of this sensitivity analysis. In these tests, I include year or regional effects (for Latin America, Asia, and the transition economies), use the alternative definitions of dollarization, or weight observations by GDP per capita.

The negative effect of banking crises on output survives these tests. As Table 9 shows, a banking crisis leads to a subsequent reduction on growth of about 5 percent. Furthermore, the positive and significant coefficient for the interaction term deposit dollarization/banking crisis confirms the robustness of the benchmark result that deposit dollarization serves to ameliorate the negative growth effects of crises, regardless how it is measured.

Similarly, Table 10 documents the robustness of the benchmark results that growth quickly recovers after currency crashes unless they take place in managed regimes. The coefficient for the crash is positive (about 3.8 to 5 percent), while that of the interaction term crash/managed regime is negative (about -3.3 to -4.8 percent); they are statistically significant in general.

To further assess the robustness of the results to the estimation method and the potential presence of endogeneity, I also conduct panel data and instrumental variable regressions. Table 11 reports fixed- and random- effect estimates of the growth effect of crises. Columns 1-4 focus on banking crises, and columns 5-8 deal with currency crashes. Regardless of estimation procedure, the panel results give support to the evidence on the heavily contractionary effects of banking crises on output, and on the small but positive effect of deposit dollarization during such crises. Moreover, there is

further evidence that currency crashes are followed by output expansions except when they occur under managed regimes. In general, the panel evidence supports the OLS benchmark findings.²⁷

The results do not seem to be driven by the endogeneity of dollarization. Table 12 reports regressions where I instrument for the dollarization-related right-hand-side variables. I use the earliest available value of a given dollarization ratio per country to instrument for the current value of such a ratio. As instruments for interaction terms, I replace the current value of the relevant dollarization ratio with its earliest available value.²⁸ Insofar as the early values of the deposit and credit dollarization ratios are predetermined, this instrumentation strategy is plausible.²⁹ Moreover, the relevant first-stage regressions, not reported, generally suggest a good fit.³⁰

The results of the IV regressions in Table 12 are fairly similar to the benchmark findings. To facilitate comparison, I report the IV regressions along with accompanying OLS regressions that use exactly the same observations. The results again indicate that banking crises are followed by a heavy contraction on output growth after one year. Currency crashes are followed by a rebound of about 4.5 percent on average after one year -- except when they take place in managed regimes. And there is again evidence that deposit dollarization leads to less contractionary banking crises. However, the independent effect of deposit dollarization on output growth is negative in the banking crises regressions (columns 1 and 1'), regardless of the estimation method -- but this effect is not contingent on the occurrence of crises.

I conducted an additional battery of sensitivity tests, which I do not report to save space. They included:

- Using the year before the reported crisis date as the crisis onset.

²⁷ "Between" regressions (not reported) yielded similar results.

²⁸ For example, I use the interaction term "earliest dollarization value/crisis dummy" as instrument for "current dollarization value/crisis dummy".

²⁹ Of course, this instrumentation strategy assumes that the other components of the interaction terms -- the lagged dummies for crises -- are not endogenous to the growth rate, which is reasonable since it is unlikely that growth at time $t+1$ influences event probabilities at time t , as Tables 1 and 2 imply.

³⁰ The first-stage regressions consistently yield high R-squares and proper values for F-tests of the instruments.

- Using a two-year exclusion window instead of the one-year window around events, as well as not using any exclusion window at all.
- Excluding transition economies.
- Using non-robust standard errors.
- Including other controls, such as budget balance (as % of GDP) and inflation.
- In deposit dollarization regressions, restricting the sample to the observations for which credit dollarization data are also available.
- Dropping observations where the annual inflation rate is greater than 1000 percent as well as greater than 100 percent.
- Using the nominal exchange rate with respect to the German Deutsche Mark for the transition economies (except Russia), instead of the US dollar, when computing the currency crash indicator.
- Using a “twin” crisis indicator -- a currency crash that was preceded by a banking crisis spell sometime in the previous two years – instead of a bank crisis or currency crash indicators.
- Computing fixed- and random-effect regressions together with year effects.
- Computing fixed- and random-effect regressions allowing for autocorrelated disturbances.

In general, none of these additional tests suggested that deposit or credit dollarization leads to more costly banking crises or currency crashes.

One related issue remains: What components of aggregate demand are most affected by crises and bank dollarization? These questions deserve their own papers, and I do not attempt to provide answers to them here. Still, this analysis can provide some stylized facts about them. To that end, Table 13 presents the results of additional regressions that are similar to the benchmark estimates, except that the dependent variables are consumption growth (columns 1-4) or investment growth (columns 5-8), instead of output growth. These additional tests indicate that banking crises lead to a dramatic fall in investment in the range of 19.5 to 28.5 percent. This is evidence of the paramount importance of banks in developing-country financial intermediation and the disruption in productive investment brought about by episodes of bank turmoil. On the other hand, assessing the effects of currency crashes on consumption appears to depend

on the sample size – deposit dollarization regressions (which have more observations) do not yield statistically significant results, while credit dollarization regressions (where the sample is smaller) show that crashes are followed by a rebound in consumption. But more importantly, there is again some weak evidence that deposit dollarization alleviates the effects of crises: Column 5 suggests that while banking crises lead to investment collapses, dollar deposits alleviate these investment crunches. And column 4 indicates that crashes are particularly harmful to consumption under managed regimes. However, there is no evidence that currency crashes, by wreaking havoc in firm's balance sheets and leading to higher shares of non-performing loans, render loan dollarization dangerous for investment: While the coefficients of the interaction terms for currency crashes are always negative, they fall short of statistical significance.

5 Concluding Remarks

This paper aimed to assess whether the widespread dollarization of bank deposits and credits in developing countries render banking crises and currency crashes more likely or more costly. There appears to be no reason to believe that this is the case. The extensive empirical search does not provide any evidence that bank dollarization heightens the probability of banking crises or currency crashes or their output costs. On the contrary, there is some evidence that deposit dollarization may serve as a buffer and lead to less severe crises. By contrast, the empirical scrutiny presented in this paper highlights the importance of macroeconomic and exchange rate policies in determining crisis risks and costs. In particular, there is evidence suggesting that managed exchange rates may lengthen the negative growth effects of crises.

This analysis could be enriched in many ways, some of which are mentioned below and left for future research. First, I have attempted to establish a monotonic relation between dollarization and crisis risks and costs -- whether or not higher dollarization leads to a greater likelihood and costs of crises. This approach abstracts from the possibility of the existence of optimal degrees of dollarization. Perhaps crises are more likely and/or more costly only after a certain dollarization threshold.

Second, I have used a definition of currency crashes based on the behavior of the nominal exchange rate. Insofar as shifts in the prices of tradable vis-à-vis non-tradable goods also shape the effects of currency crashes on output, assessing the impact of large, discrete movements in the *real* exchange rate is important, as is analyzing the effects of the underlying continuous variables in addition to the discrete crash variable.

Third, the link between trade openness and dollarization and its impact on crisis costs should be researched further, since trade openness provides a measure of the availability of dollar earnings and subsequent containment of dollar loan default risks in an open economy.

Fourth, more structure and additional econometric techniques (for instance, selection or treatment methods) could be provided, to simultaneously compute the likelihood and output effects of crises, or the likelihood of countries allowing or exhibiting dollarization and the impact of dollarization on the growth effects of crises.³¹

Finally, continuing efforts in the collection of additional data are paramount. In particular, more data on credit dollarization are needed in order to more properly and clearly assess the effects of depreciations and devaluations on output and investment in countries with a high volume of dollar loans.

This paper has focused on deposit and credit dollarization. Therefore, it is important to emphasize that these findings should *not* be interpreted as if the currency denomination of assets and liabilities in developing and transition economies has no impact on crisis risks and crisis costs. After all, bank credit to the private sector and residents' deposits are only particular subsets of banks' assets and liabilities. A complete assessment of the role of asset and liability dollarization in developing countries – which has not been the topic of this paper – would require the collection of additional data on the currency denominations of all components of banks' balance

³¹ These additional exercises are difficult to implement in this database, though. I have collected data for as many countries as possible. However, the absence of a country in this database does not mean that such country does not have dollar deposits or loans – it only means that it does not regularly report them. Also, and as mentioned in a previous footnote, the presence of zeroes in the data does not mean that a given country did not have dollarization in a given year – it may be that the data were missing in electronic sources. In any event, the inclusion of the dummies for the regulatory framework of dollarization ameliorates these issues. Furthermore, whether additional econometric firepower will somehow reverse all the insignificant results reported in this paper – or whether it will simply be a refinement -- is not clear.

sheets. More critically, it would require information on the dollarization of the balance sheets of firms and households, as well as information on off-balance-sheet transactions in insurance markets for currency risk. These data are unfortunately scarce, and collecting them should be a high priority for researchers and policymakers.

To conclude, it is necessary to mention that the results of this paper do not mean that financial dollarization does not imply challenges for developing and transition economies. But what they do show is that the dollarization of deposits and loans are of second-order importance for countries aiming to achieve financial stability. Far more important are adequate macroeconomic, financial, and exchange rate policies. In that sense, these findings are a reminder that the Argentine case – where bank dollarization compounded the problems of the banking sector amid a collapse in economic activity – is not necessarily the rule for dollarized economies. Financial dollarization might be, if anything, more of an inconvenient (and perhaps irreversible) phenomenon, rather than a major source of financial fragility and costly crises. The key sources of financial problems seem to lie elsewhere. So do the key solutions.

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Data Appendix

Data Definitions and Sources

Abbreviations: AREAER: IMF *Annual Report on Exchange Arrangements and Exchange Restrictions* country pages (various issues). CB: Central Bank bulletins (various countries/issues). IFS: IMF *International Financial Statistics*. MBS: IMF Money and Banking Statistics data. WDI: World Bank *World Development Indicators*.

Dependent Variables

- Banking crisis: binary indicator based on the Caprio-Klingebiel systemic and non-systemic banking crisis dates. Source: Caprio and Klingebiel (2002).
- Currency crash: binary indicator that is equal to one if the annual rate of nominal exchange rate depreciation is at least 25 percent, and the current rate of depreciation is at least 10 percent higher than the rate of depreciation in the previous year. Depreciation is calculated as the first difference of the log of the nominal exchange rate * 100. Unless otherwise noted, the exchange rate used is expressed as local currency units per US dollar, period average. Source of raw data: WDI.
- GDP growth: annual growth rate of GDP based on constant 1995 U.S. dollars (percent). Source: WDI.

Dollarization Data

Raw Data:

- Total credit to the resident private sector issued by resident banks. Source: line 22d of IFS.
- Foreign-currency-denominated ("dollar") credit to the resident private sector issued by resident banks. Sources: CB and MBS.
- Total assets of resident banks. Sources: CB and MBS.
- Total deposits of residents held in resident banks. Source: lines 24 plus line 25 of IFS.
- Foreign-currency-denominated ("dollar") deposits of residents held in resident banks. Sources: CB, MBS, and lines 25.a and 25b of IFS.
- Total liabilities of resident banks. Sources: CB and MBS.

Definition of Dollarization Ratios:

- Credit dollarization (percent). Default definition: ratio of dollar credit to total credit. Alternative definition: ratio of dollar credit to total assets.
- Deposit dollarization (percent). Default definition: ratio of dollar deposits to total deposits. Alternative definition: ratio of dollar deposits to total liabilities.

Other Variables

- Foreign currency loans allowed: binary indicator for whether or not dollar loans are freely or almost freely allowed. Source: AREAER, other IMF publications.
- Foreign currency deposits allowed: binary indicator for whether or not dollar deposits are freely or almost freely allowed. Source: AREAER, other IMF publications.
- Managed exchange rate regime: binary indicator that is equal to one if a regime is reported to be fixed or intermediate, and zero if it is reported to be floating. Fixed: peg to another currency, a basket of currencies, or SDR. Intermediate: limited flexibility, cooperative arrangement, crawling peg or band, or managed float with a pre-announced path. Floating: managed float with no pre-announced path for the exchange rate or independent float. Source: AREAER. (Revised and corrected.)
- Foreign direct investment, net inflows/GDP (percent). Source: WDI.
- Short-term debt/total external debt (percent). Source: WDI.
- Gross International reserves/months of imports (percent). Source: WDI.
- Current account balance/GDP (percent). Source: WDI.
- Real exchange rate overvaluation: deviation from time-averaged country-specific real exchange rate [i.e. $\log(\text{price level})/(\text{U.S. price level} * \text{nominal exchange rate with US\$}) * 100$]. Source of raw data: WDI.
- Domestic credit growth (percent): first difference of the log of net domestic credit * 100. Source of raw data: WDI.
- Money and quasi-money/reserves (percent). Source: WDI.
- US interest rate. Source: line 60b of IFS for the United States.

- OECD GDP annual growth (percent). Source: WDI.
- Gross private capital flows (inflows plus outflows)/GDP (percent). Source WDI.
- Trade (percent): ratio of exports plus imports to GDP. Source: WDI.
- Inflation (percent): percentage change of CPI, as reported by source. If series is unavailable, percentage change of GDP deflator, as reported by source. Source: WDI.
- Budget balance/GDP (percent): budget balance divided by GDP (both in current local currency) * 100. Source: WDI.
- Per-capita GDP (percent). Source: WDI.
- Interest rate spreads (lending rate minus LIBOR). Source: WDI.
- Debt service/GDP (percent): total debt service divided by GDP (both in current US dollars) * 100. Source: WDI.
- Consumption growth: annual growth of household final consumption (percent). Source: WDI.
- Investment growth: annual growth of gross capital formation (percent). Source: WDI.

Appendix Table A1: Banking Crises and Currency Crashes Dates

Country	Bank Crisis	Currency Crash	Country	Bank Crisis	Currency Crash	Country	Bank Crisis	Currency Crash
Albania	--	1997	Haiti	--	--	Qatar	--	--
Angola	--	1999	Hong Kong, China	1998	--	Romania	1990	1990, 96, 99
Antigua and Barbuda	--	--	Hungary	1991	--	Russian Federation	1995, 98	1998
Argentina	1995	--	Indonesia	1994, 97	1998	Rwanda	--	1994
Armenia	1994	--	Israel	1977	1978, 80, 84	Sao Tome and Principe	--	1997
Bahamas, The	--	--	Jordan	--	--	Saudi Arabia	--	--
Bahrain	--	--	Kenya	--	--	Sierra Leone	--	1998
Bangladesh	1987, 99	--	Korea, Rep.	1997	1998	Slovak Republic	--	--
Barbados	--	--	Kuwait	1985	--	Slovenia	1992	--
Belarus	--	1997, 99	Kyrgyz Republic	--	1997, 99	South Africa	--	--
Belize	--	--	Lao PDR	1991	1997	St. Kitts and Nevis	--	--
Bhutan	--	--	Latvia	1995	--	St. Lucia	--	--
Bolivia	1986, 94	1982	Lithuania	1995	--	St. Vincent & Grenadines	--	--
Bulgaria	1995	1996	Malawi	--	1998	Sudan	--	1994
Cambodia	--	--	Malaysia	1997	1998	Suriname	--	--
Cape Verde	--	--	Maldives	--	1987	Syrian Arab Republic	--	1988
Chile	1976, 81	1982, 85	Malta	--	--	Tanzania	--	--
Colombia	--	--	Mauritius	1996	--	Thailand	1983, 97	--
Comoros	--	--	Mexico	--	--	Tonga	--	--
Congo, Dem. Rep.	1991, 94	1976,79,83,87,89,91,94	Moldova	--	1999	Trinidad and Tobago	--	--
Costa Rica	--	--	Mongolia	--	1997	Turkey	1994	1988, 91, 94, 96
Cyprus	--	--	Mozambique	--	1991	Turkmenistan	--	--
Czech Republic	--	--	Myanmar	1996	--	Uganda	1994	--
Dominica	--	--	Netherlands Antilles	--	--	Ukraine	1997	1998
Egypt, Arab Rep.	1982, 91	1990	Nicaragua	--	--	United Arab Emirates	--	--
El Salvador	1989	1986, 90	Nigeria	1997	1999	Uruguay	--	--
Estonia	1992, 98	--	Oman	--	--	Vanuatu	--	1981
Ethiopia	--	--	Papua New Guinea	1989	1998	Venezuela	--	1996
Georgia	--	1999	Paraguay	1995	1989	Vietnam	1997	--
Grenada	--	--	Peru	1983	1976, 78, 81, 85, 88	Yemen, Rep.	1996	1995
Guatemala	--	--	Philippines	1998	1983, 98	Zambia	--	1998
Guinea	1993	--	Poland	1991	1992	Zimbabwe	1995	1998

Appendix Table A2: Country Coverage and Dollarization Data Availability

Country	Deposits	Credit	Country	Deposits	Credit	Country	Deposits	Credit
Albania	1994-99	1994-99	Haiti	1997-99	1997-99	Qatar	1993-99	--
Angola	1995-99	--	Hong Kong, China	1990-99	--	Romania	1990-99	--
Antigua and Barbuda	1979-99	--	Hungary	1989-99	1989-99	Russian Federation	1993-99	1993-99
Argentina	1994-99	1994-99	Indonesia	1992-99	1992-99	Rwanda	1994-99	--
Armenia	1994-99	1994-99	Israel	1981-99	1975-99	Sao Tome and Principe	1995-99	1996-99
Bahamas, The	1975-99	1977-99	Jordan	1993-99	--	Saudi Arabia	1975-99	1992-99
Bahrain	1984-99	--	Kenya	1995-99	--	Sierra Leone	1996-99	--
Bangladesh	1987-99	--	Korea, Rep.	--	1975-99	Slovak Republic	1993-99	--
Barbados	1975-99	--	Kuwait	1981-99	--	Slovenia	1991-99	--
Belarus	1998-99	1996-99	Kyrgyz Republic	1995-99	1995-96	South Africa	--	1992-99
Belize	1976-99	--	Lao PDR	1987-99	1987-99	St. Kitts and Nevis	1979-99	--
Bhutan	1993-99	--	Latvia	1993-99	--	St. Lucia	1979-99	--
Bolivia	1975-99	1996-99	Lithuania	1993-99	1993-99	St. Vincent & Grenadines	1979-99	--
Bulgaria	1995-99	--	Malawi	1996-99	--	Sudan	1992-99	--
Cambodia	1993-99	1993-99	Malaysia	1996-99	1996-99	Suriname	1975-76	--
Cape Verde	1995-99	--	Maldives	1981-99	1985-99	Syrian Arab Republic	1975-99	--
Chile	1976-99	1976-99	Malta	1975-84	--	Tanzania	1993-99	--
Colombia	1990-99	1990-99	Mauritius	1992-99	--	Thailand	1982-99	--
Comoros	1998-99	--	Mexico	1997-99	1997-99	Tonga	1994-99	--
Congo, Dem. Rep.	1975-95	--	Moldova	1998-99	1998-99	Trinidad and Tobago	1996-99	--
Costa Rica	1997-99	1997-99	Mongolia	1993-99	1994-99	Turkey	1986-99	--
Cyprus	1991-99	--	Mozambique	1991-99	--	Turkmenistan	1998-99	1998-99
Czech Republic	1993-99	1997-99	Myanmar	1991-99	--	Uganda	1993-99	--
Dominica	1988-99	--	Netherlands Antilles	1975-99	--	Ukraine	1992-99	1998-99
Egypt, Arab Rep.	1980-99	1980-99	Nicaragua	1996-99	1996-99	United Arab Emirates	1981-99	--
El Salvador	1982-99	--	Nigeria	1994-99	--	Uruguay	1998-99	1998-99
Estonia	1991-99	1992-99	Oman	1975-99	--	Vanuatu	1981-99	--
Ethiopia	1998-99	--	Papua New Guinea	1976-81, 87-99	1979-99	Venezuela	1996-99	1996-99
Georgia	1995-99	1995-99	Paraguay	1988-99	1988-99	Vietnam	1992-99	1992-99
Grenada	1979-99	--	Peru	1975-99	1975-99	Yemen, Rep.	1990-99	--
Guatemala	1997-99	1997-99	Philippines	1982-99	--	Zambia	1998-99	--
Guinea	1989-99	--	Poland	1991-99	1996-99	Zimbabwe	1993-99	--

Appendix Table A3: Descriptive Statistics of Selected Variables

	Observations	Mean	Standard Deviation	Correlation with Deposit Dollarization	Correlation with Credit Dollarization
Deposit Dollarization	1017	21.665	22.105	1	0.749
Credit Dollarization	361	27.304	23.239	0.749	1
Banking Crises	815	0.059	0.236	0.084	0.004
Currency Crashes	920	0.068	0.253	0.068	-0.031
Output Growth	1007	1.850	5.801	-0.041	0.033

Statistics for banking crises, currency crashes, and output growth are restricted to observations where data on deposit or credit dollarization are also available.

All correlations reported are pair-wise, to maximize number of observations, and use the lagged value of deposit or credit dollarization with the current values of the other variables.

A one-year, two-sided exclusion window is used around the onset of banking crises and currency crashes.

Figures

Figure 1: Effects of Banking Crises and Currency Crashes on Financial Dollarization

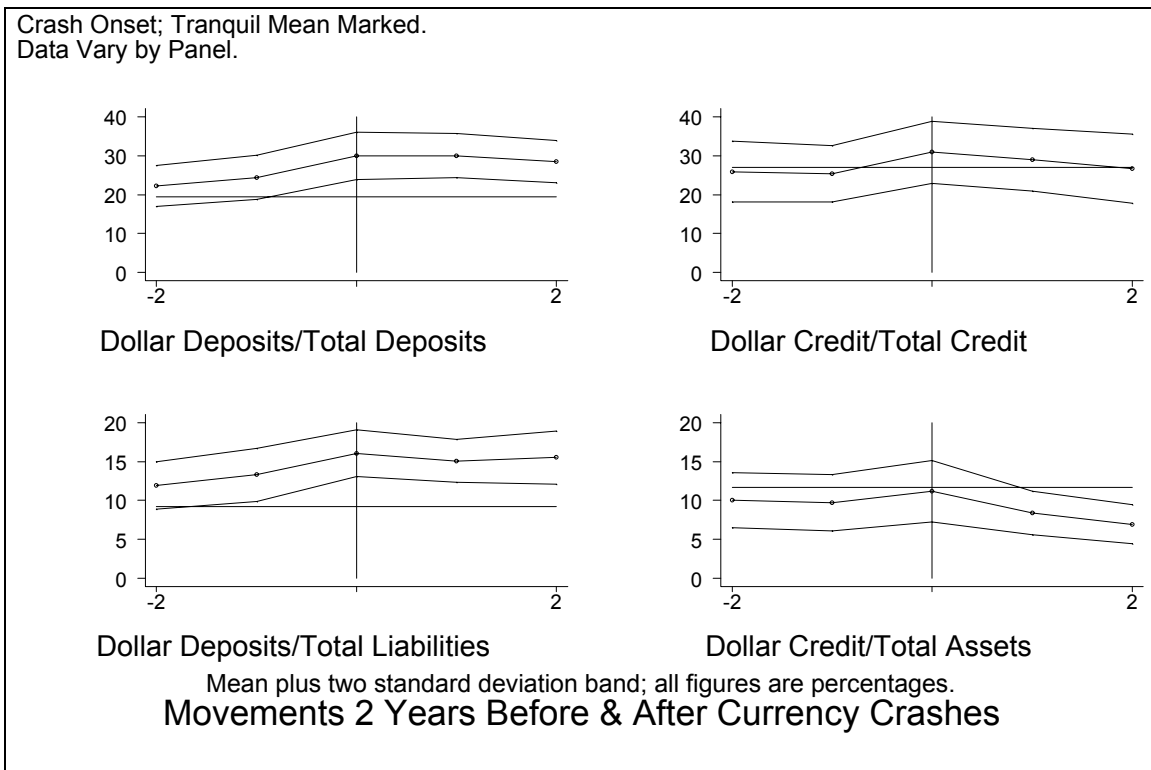
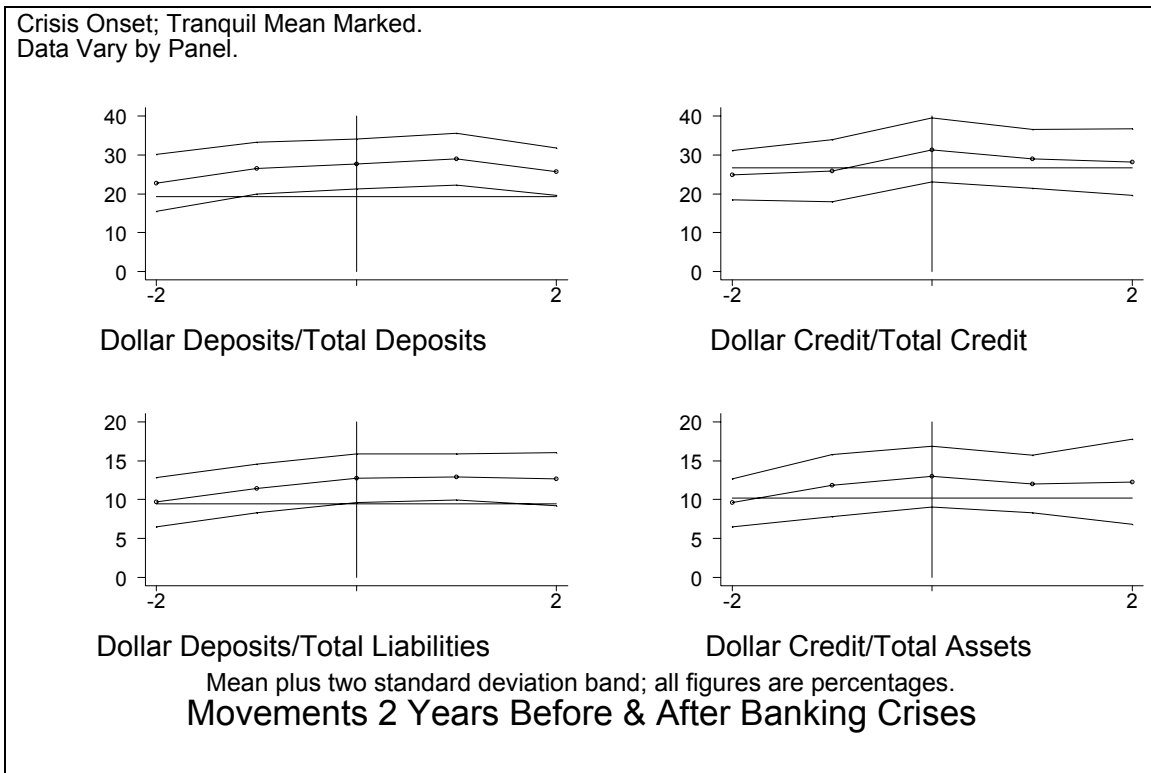
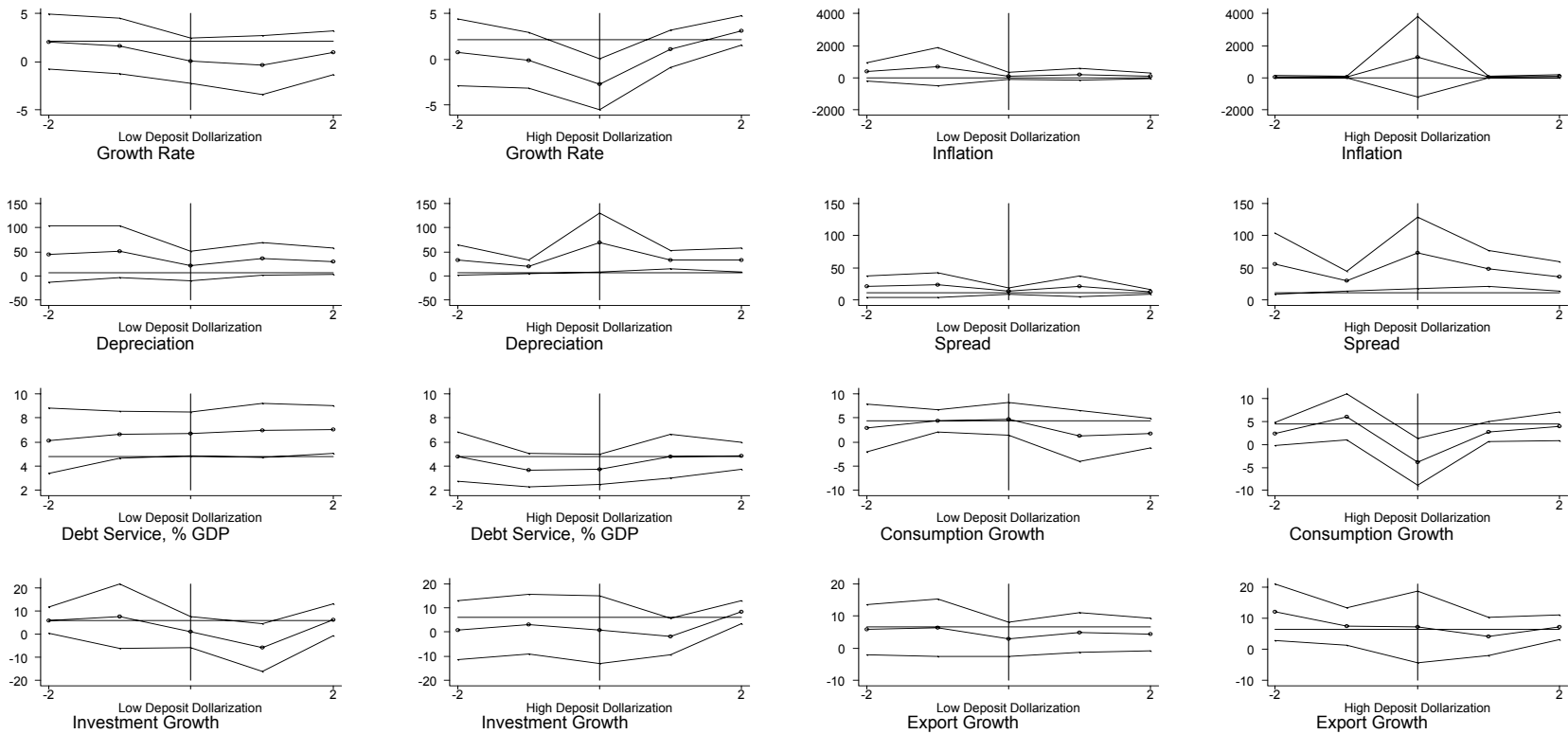


Figure 2: Effects of Banking Crises on Macroeconomic Variables, Low vs. High Deposit Dollarization

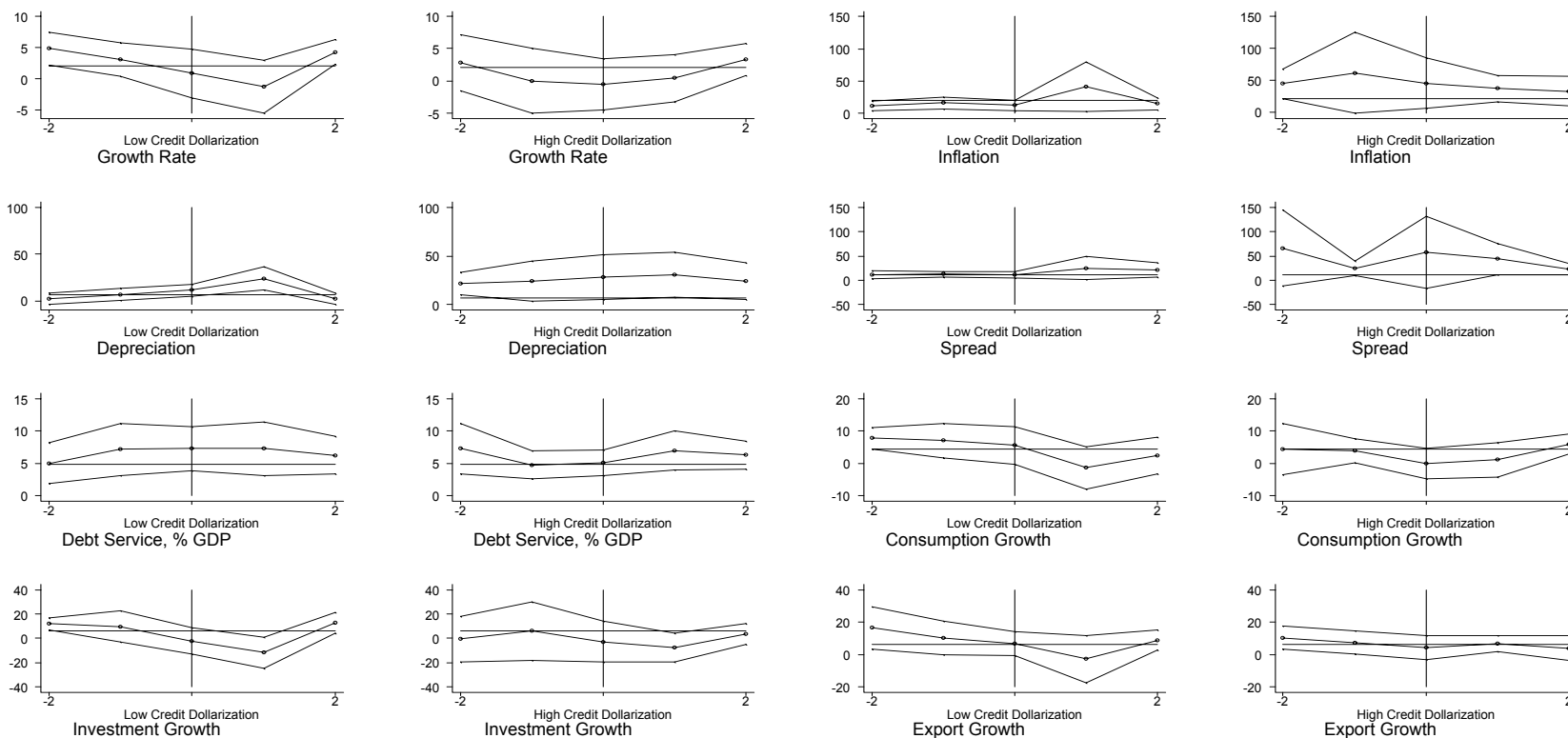
Crisis Onset; Tranquil Mean Marked.
Data Vary by Panel.



Mean plus two standard deviation band; all figures are percentages.
Movements 2 Years Before & After Banking Crises

Figure 3: Effects of Banking Crises on Macroeconomic Variables, Low vs. High Credit Dollarization

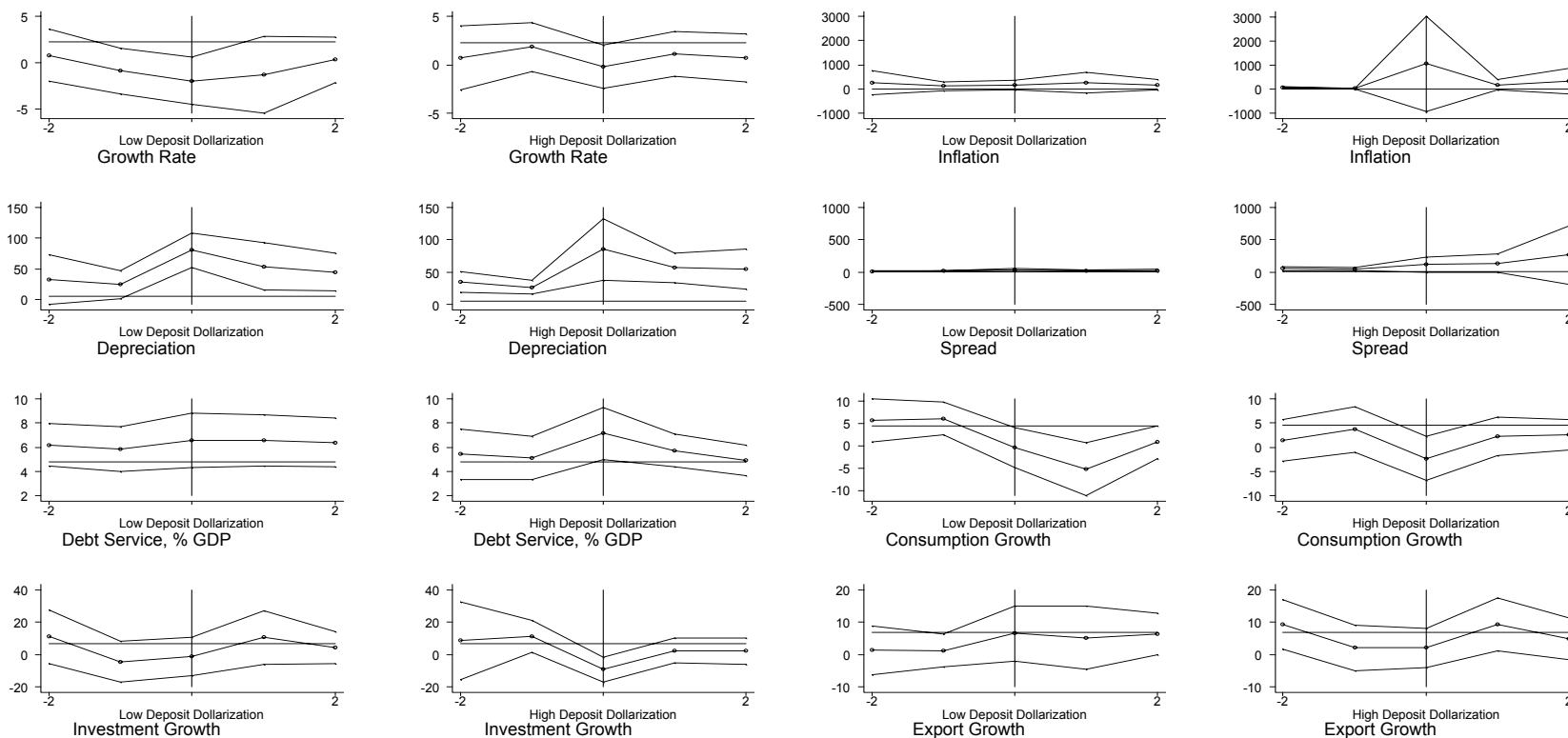
Crisis Onset; Tranquil Mean Marked.
Data Vary by Panel.



Mean plus two standard deviation band; all figures are percentages.
Movements 2 Years Before & After Banking Crises

Figure 4: Effects of Currency Crashes on Macroeconomic Variables, Low vs. High Deposit Dollarization

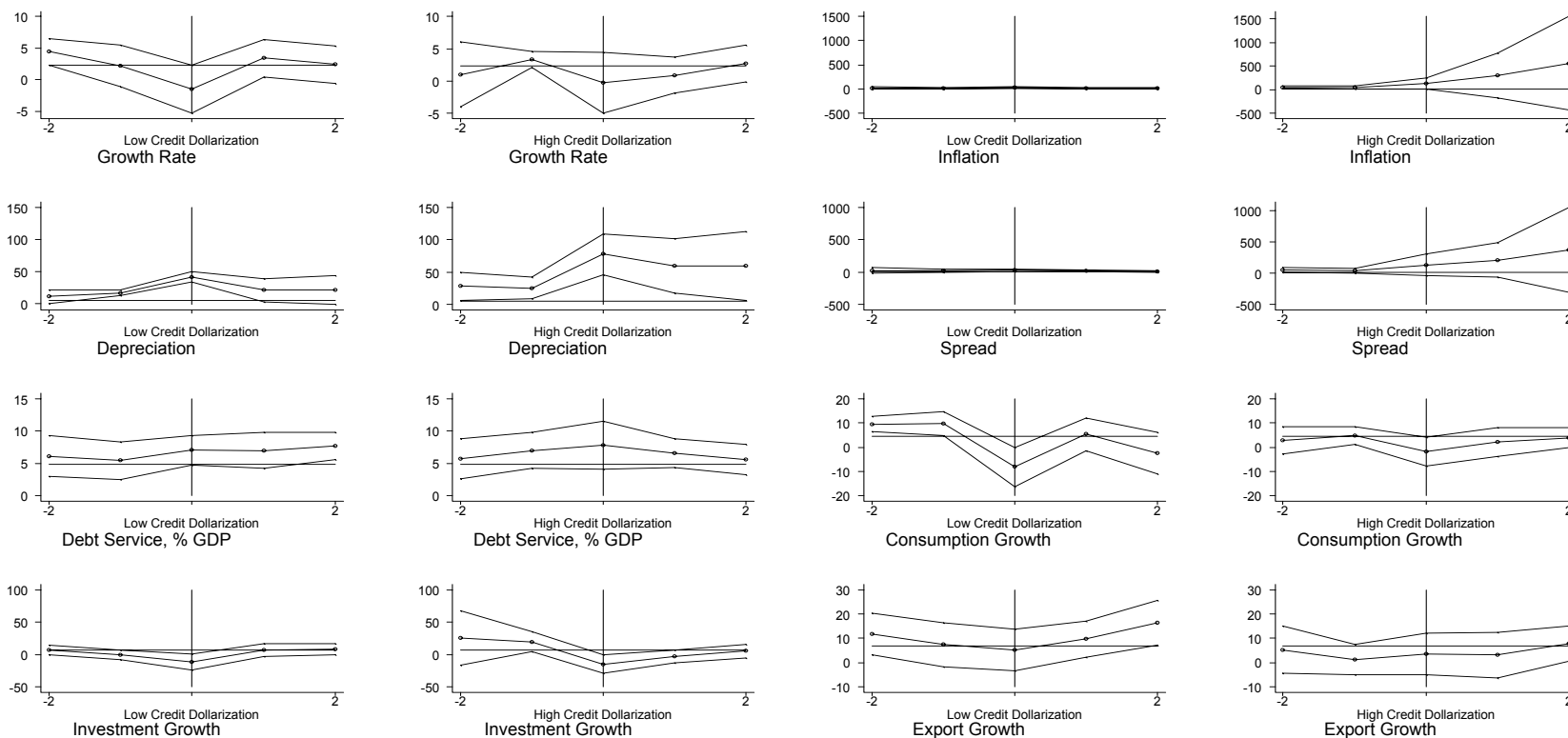
Crisis Onset; Tranquil Mean Marked.
Data Vary by Panel.



Mean plus two standard deviation band; all figures are percentages.
Movements 2 Years Before & After Currency Crashes

Figure 5: Effects of Currency Crashes on Macroeconomic Variables, Low vs. High Credit Dollarization

Crisis Onset; Tranquil Mean Marked.
Data Vary by Panel.



Mean plus two standard deviation band; all figures are percentages.
Movements 2 Years Before & After Currency Crashes

Tables

Note: In all tables below, a one-year, two sided exclusion window around banking crises and currency crashes onsets is used.

Table 1: Financial Dollarization and Banking Crises

Dependent variable: binary indicator for banking crisis onset. All regressors are lagged one year.

	(1)	(2)	(3)	(4)	(5)
Deposit	0.051		0.046		-0.007
Dollarization	(0.61)		(0.47)		(0.91)
Credit		0.042		-0.038	0.006
Dollarization		(0.79)		(0.57)	(0.73)
FC Deposits			0.501		-0.930
Allowed			(0.08)		(0.65)
FC Loans				2.936**	0.442
Allowed				(2.09)	(1.06)
FDI/GDP	-0.212	-0.268	-0.219	-0.095	-0.088
	(0.28)	(0.72)	(0.28)	(0.32)	(1.13)
Short-Term Debt/ Total Debt	0.207	0.138	0.209	0.101	0.019
	(0.94)	(1.11)	(0.92)	(0.85)	(0.58)
Reserves/Imports	-0.017**	-0.033***	-0.017**	-0.031***	-0.006***
	(2.08)	(4.89)	(2.11)	(4.95)	(3.46)
Current Account (%GDP)	0.224	0.046	0.220	-0.021	0.014
	(0.74)	(0.42)	(0.72)	(0.23)	(0.73)
Overvaluation	0.128**	0.162***	0.126**	0.184***	0.018**
	(2.16)	(4.36)	(2.04)	(4.61)	(2.23)
Credit Growth	0.061	-0.002	0.061	0.004	-0.004
	(1.46)	(0.12)	(1.46)	(0.30)	(0.38)
GDP Growth	0.023	0.276	0.027	0.295	0.094***
	(0.11)	(1.10)	(0.14)	(1.23)	(2.59)
M2 / Reserves	-0.095	-0.364**	-0.092	-0.439***	-0.049***
	(0.60)	(2.19)	(0.60)	(2.94)	(2.66)
US Interest Rate	-0.083	0.051	-0.083	0.099	0.063
	(0.12)	(0.20)	(0.12)	(0.48)	(1.44)
OECD Growth	-2.208	-1.503	-2.226	-1.298	-0.298
	(1.43)	(1.29)	(1.41)	(1.29)	(1.18)
Observations	238	112	238	112	82
Pseudo R ²	0.09	0.28	0.09	0.30	0.50

Probit regressions estimated with maximum likelihood. Derivatives (x100) reported for regressors. Constant included but not reported.

Robust z statistics in parentheses, based on standard errors robust to heteroskedasticity and to clustering by country-specific observations. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 2: Financial Dollarization and Currency CrashesDependent variable: binary indicator for currency crash. All regressors are **lagged** one year.

	(1)	(2)	(3)	(4)	(5)
Deposit Dollarization	-0.001 (0.01)		-0.028 (0.47)		0.004* (1.70)
Credit Dollarization		-0.043 (0.91)		-0.014 (0.21)	-0.005** (2.46)
FC Deposits Allowed			2.488 (0.67)		-5.555** (1.99)
FC Loans Allowed				-2.595 (0.63)	0.028 (0.34)
FDI/GDP	-2.041** (1.99)	-1.086 (1.25)	-2.150** (1.97)	-1.116 (1.25)	-0.053** (2.11)
Short-Term Debt/ Total Debt	0.110 (0.92)	0.120 (1.32)	0.106 (0.90)	0.131 (1.39)	0.008 (1.54)
Reserves/Imports	-0.011 (1.27)	-0.003 (0.63)	-0.010 (1.23)	-0.003 (0.47)	-0.000 (1.26)
Current Account (%GDP)	-0.355** (2.17)	-0.160 (1.05)	-0.371** (2.33)	-0.124 (0.71)	-0.002 (0.46)
Overvaluation	0.083 (1.44)	0.074** (2.12)	0.078 (1.48)	0.054 (1.12)	0.004** (2.09)
Credit Growth	0.034 (1.32)	0.004 (0.31)	0.034 (1.34)	0.001 (0.11)	-0.000 (0.61)
GDP Growth	-0.259 (0.79)	-0.174 (1.17)	-0.215 (0.68)	-0.195 (1.27)	-0.007 (1.29)
M2 / Reserves	0.164* (1.89)	-0.009 (0.09)	0.202** (2.12)	0.036 (0.28)	-0.002 (0.60)
US Interest Rate	0.775** (2.20)	0.393 (1.62)	0.735** (2.11)	0.402 (1.52)	0.028*** (2.78)
OECD Growth	0.384 (0.42)	1.749*** (3.86)	0.377 (0.41)	1.740*** (3.73)	0.063*** (4.17)
Observations	310	165	310	165	132
Pseudo R ²	0.24	0.27	0.24	0.27	0.47

Probit regressions estimated with maximum likelihood. Derivatives (x100) reported for regressors. Constant included but not reported.

Robust z statistics in parentheses., based on standard errors robust to heteroskedasticity and to clustering by country-specific observations. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Financial Dollarization and Crises. Sensitivity Analysis I

Dependent variable: binary indicator for banking crises (columns 1-2) or currency crashes (column 3-4).

All regressors are **current**.

	(1) Banking Crises	(2) Banking Crises	(3) Currency Crashes	(4) Currency Crashes
Deposit Dollarization	0.093 (1.07)		0.028 (0.39)	
Credit Dollarization		0.123* (1.84)		-0.007 (1.17)
FDI/GDP	0.191 (0.28)	0.131 (0.24)	-1.293** (1.97)	-0.151*** (2.62)
Short-Term Debt/ Total Debt	0.213 (0.88)	0.173 (1.38)	-0.124 (0.75)	-0.007 (0.72)
Reserves/Imports	-0.011 (1.52)	-0.031*** (3.86)	-0.006 (0.83)	0.000 (0.63)
Current Account (%GDP)	0.314 (1.43)	0.344*** (4.15)	0.105 (0.31)	0.047** (2.20)
Overvaluation	0.141* (1.94)	0.139*** (3.31)	0.054 (1.00)	0.007*** (5.06)
Credit Growth	0.057 (1.64)	0.008 (0.17)	0.148*** (2.93)	0.007*** (3.34)
GDP Growth	-0.700*** (2.67)	-0.492** (2.37)	-1.039*** (3.91)	-0.061*** (4.86)
M2 / Reserves	-0.253 (1.57)	-0.371*** (2.86)	0.025 (0.15)	0.012 (1.11)
US Interest Rate	0.048 (0.09)	0.262 (0.85)	0.689 (1.54)	0.085** (2.27)
OECD Growth	-0.346 (0.23)	-1.004 (0.91)	1.553 (1.42)	0.020 (0.34)
Observations	257	125	308	162
Pseudo R ²	0.12	0.33	0.31	0.58

Probit regressions estimated with maximum likelihood. Derivatives (x100) reported for regressors.

Constant included but not reported.

Robust z statistics in parentheses, based on standard errors robust to heteroskedasticity and to clustering by country-specific observations. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Financial Dollarization and Crises. Sensitivity Analysis II

Dependent variable: binary indicator for banking crises (columns 1-4) or currency crashes (column 5-8).

All regressors are lagged.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Banking	Banking	Banking	Banking	Currency	Currency	Currency	Currency
	Crisis	Crisis	Crisis	Crisis	Crash	Crash	Crash	Crash
	Weighted by	Weighted by	Alternative	Alternative	Weighted by	Weighted by	Alternative	Alternative
	GDP p/c	GDP p/c	dollar ratio	dollar ratio	GDP p/c	GDP p/c	dollar ratio	dollar ratio
Deposit Dollarization	0.033 (0.49)				0.012 (0.30)			
Deposit Dollarization (II)			0.006 (0.04)				0.100 (1.16)	
Credit Dollarization		-0.033 (0.42)				-0.073 (1.12)		
Credit Dollarization (II)				0.098 (0.90)				-0.079 (0.66)
Observations	238	112	205	112	310	165	282	165
Pseudo R ²	0.11	0.26	0.14	0.28	0.25	0.25	0.26	0.27

Probit regressions estimated with maximum likelihood. Derivatives (x100) reported for regressors. Constant included but not reported.

Regressors included but not reported are lagged values of: FDI/GDP ratio, short-term debt/total debt ratio, reserves to months of imports ratio, current account (%GDP), overvaluation, domestic credit growth, GDP growth, M2/reserves ratio, US interest rate, and OECD growth.

Robust z statistics in parentheses, based on standard errors robust to heteroskedasticity and to clustering by country-specific observations.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Financial Dollarization, Banking Crises and Output GrowthDependent variable: GDP growth. All regressors are **current** unless otherwise noted.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Banking Crisis	-2.25 (1.43)	-2.25* (1.30)	-2.12 (1.28)	-3.58 (3.62)	-2.24 (3.12)	-1.95 (3.10)	-3.99 (2.81)
Deposit Dollarization	-0.01 (0.01)	-0.00 (0.01)	0.00 (0.01)				-0.04* (0.02)
Crisis x Deposit Dollarization	-0.02 (0.04)	-0.01 (0.04)	-0.01 (0.04)				0.07 (0.08)
Credit Dollarization				0.04** (0.02)	0.03** (0.01)	0.03* (0.01)	0.06*** (0.02)
Crisis x Credit Dollarization				0.01 (0.09)	0.01 (0.07)	0.01 (0.07)	-0.02 (0.07)
FC Deposits Allowed			-0.86 (0.64)				1.99 (1.35)
FC Loans Allowed						-0.86 (1.19)	-1.41 (1.12)
Lagged GDP Growth		0.29*** (0.08)	0.28*** (0.08)		0.43*** (0.07)	0.43*** (0.07)	0.39*** (0.07)
Current Account (%GDP)	-0.05 (0.04)	-0.02 (0.04)	-0.02 (0.04)	0.08 (0.08)	0.08 (0.06)	0.07 (0.06)	0.02 (0.07)
Gross Capital Flows / GDP	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.04 (0.06)	-0.04 (0.04)	-0.04 (0.04)	-0.07 (0.04)
Trade / GDP	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
US Interest Rate	-0.11 (0.10)	-0.06 (0.07)	-0.06 (0.07)	0.04 (0.13)	0.01 (0.10)	-0.02 (0.10)	-0.09 (0.13)
OECD Growth	0.78*** (0.29)	0.62** (0.28)	0.61** (0.28)	1.02** (0.43)	0.68* (0.38)	0.60* (0.34)	0.71 (0.44)
Managed Exchange Rate	0.52 (0.76)	0.18 (0.58)	0.10 (0.59)	2.43** (0.97)	1.28* (0.69)	1.41* (0.70)	0.98 (0.77)
Crisis x Managed Exchange Rate	-0.49 (1.87)	-0.08 (1.79)	-0.17 (1.78)	-0.55 (2.97)	-0.77 (2.83)	-1.18 (2.86)	0.59 (2.58)
Observations	583	578	576	225	224	212	178
R ²	0.06	0.16	0.16	0.16	0.32	0.30	0.28

OLS regressions (intercepts not reported).

Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Financial Dollarization, Banking Crises and Output Growth

Dependent variable: GDP growth. All regressors are lagged.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Banking Crisis	-6.19*** (2.12)	-5.76*** (2.14)	-5.61** (2.13)	-5.46* (3.16)	-4.36 (3.45)	-4.30 (3.47)	-8.12 (4.95)
Deposit Dollarization	-0.02* (0.01)	-0.02 (0.01)	-0.01 (0.01)				-0.04 (0.03)
Crisis x Deposit Dollarization	0.12*** (0.04)	0.13*** (0.04)	0.12*** (0.04)				0.21*** (0.08)
Credit Dollarization				0.03* (0.02)	0.02 (0.01)	0.01 (0.02)	0.04 (0.03)
Crisis x Credit Dollarization				0.07 (0.05)	0.07 (0.06)	0.07 (0.06)	-0.03 (0.04)
FC Deposits Allowed			-0.96* (0.57)				2.76*** (0.94)
FC Loans Allowed						0.14 (1.36)	-0.35 (1.44)
GDP Growth		0.19* (0.10)	0.17* (0.10)		0.31*** (0.07)	0.30*** (0.08)	0.23*** (0.08)
Current Account (%GDP)	-0.02 (0.03)	-0.00 (0.02)	-0.00 (0.02)	0.12 (0.07)	0.10 (0.06)	0.05 (0.08)	0.01 (0.07)
Gross Capital Flows / GDP	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.04 (0.04)	-0.03 (0.03)	-0.02 (0.03)	-0.02 (0.03)
Trade / GDP	0.02** (0.01)	0.01** (0.01)	0.01* (0.01)	0.01 (0.01)	0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)
US Interest Rate	-0.28*** (0.10)	-0.24** (0.09)	-0.24** (0.09)	-0.17 (0.12)	-0.18 (0.11)	-0.19 (0.13)	-0.33*** (0.12)
OECD Growth	0.47* (0.28)	0.34 (0.27)	0.32 (0.27)	0.65 (0.39)	0.34 (0.35)	0.16 (0.24)	0.55** (0.24)
Managed Exchange Rate	-0.45 (0.73)	-0.60 (0.63)	-0.69 (0.63)	2.03* (1.01)	1.28 (0.79)	1.03 (0.88)	0.28 (0.97)
Crisis x Managed Exchange Rate	1.71 (2.07)	1.85 (1.97)	1.75 (1.96)	-0.08 (3.15)	0.09 (3.14)	0.33 (3.29)	2.83 (3.80)
Observations	586	582	580	225	225	212	178
R ²	0.07	0.12	0.12	0.15	0.24	0.21	0.25

OLS regressions (intercepts not reported).

Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Financial Dollarization, Currency Crashes and Output GrowthDependent variable: GDP growth. All regressors are **current** unless otherwise noted.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Currency Crash	-10.88** (4.45)	-10.52** (4.00)	-10.31** (4.00)	-4.11 (3.47)	-3.87 (3.24)	-3.21 (3.32)	-10.77*** (3.12)
Deposit Dollarization	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)				-0.02 (0.02)
Crash x Deposit Dollarization	0.17** (0.08)	0.16** (0.07)	0.15** (0.07)				0.41*** (0.07)
Credit Dollarization				0.02 (0.02)	0.01 (0.01)	0.00 (0.01)	0.03 (0.02)
Crash x Credit Dollarization				0.05 (0.09)	0.04 (0.08)	0.03 (0.09)	-0.28*** (0.07)
FC Deposits Allowed			-0.86* (0.48)				2.19** (1.06)
FC Loans Allowed						0.46 (1.14)	-1.23 (0.97)
Lagged GDP Growth		0.34*** (0.05)	0.34*** (0.05)		0.45*** (0.05)	0.44*** (0.05)	0.40*** (0.04)
Current Account (%GDP)	-0.05 (0.04)	-0.01 (0.03)	-0.01 (0.03)	0.06 (0.08)	0.03 (0.05)	0.00 (0.05)	-0.03 (0.04)
Gross Capital Flows / GDP	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)	-0.01 (0.04)	-0.04 (0.03)	-0.03 (0.04)	-0.02 (0.03)
Trade / GDP	0.01* (0.01)	0.01* (0.01)	0.01* (0.01)	0.02* (0.01)	0.02** (0.01)	0.01 (0.01)	0.01 (0.01)
US Interest Rate	-0.16 (0.11)	-0.13* (0.07)	-0.13* (0.07)	0.02 (0.17)	-0.07 (0.13)	-0.08 (0.13)	-0.24* (0.14)
OECD Growth	0.63** (0.26)	0.49* (0.26)	0.47* (0.26)	0.72 (0.44)	0.41 (0.43)	0.37 (0.40)	-0.01 (0.44)
Managed Exchange Rate	0.27 (0.64)	-0.07 (0.46)	-0.12 (0.49)	1.59 (1.00)	0.76 (0.68)	0.88 (0.69)	0.77 (0.71)
Crash x Managed Exchange Rate	4.42 (3.14)	5.02* (2.87)	4.80* (2.86)	-2.94 (2.33)	-2.42 (2.31)	-2.37 (2.64)	3.90* (2.12)
Observations	687	684	673	261	260	250	212
R ²	0.10	0.24	0.24	0.12	0.30	0.29	0.39

OLS regressions (intercepts not reported).

Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Financial Dollarization, Currency Crashes and Output Growth

Dependent variable: GDP growth. All regressors are lagged.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Currency Crash	0.48 (3.46)	2.67 (3.60)	2.69 (3.58)	3.07** (1.45)	4.63*** (1.66)	5.40*** (1.48)	5.46*** (1.96)
Deposit Dollarization	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)				-0.01 (0.02)
Crash x Deposit Dollarization	-0.01 (0.06)	-0.05 (0.06)	-0.05 (0.06)				-0.05 (0.07)
Credit Dollarization				0.01 (0.02)	0.01 (0.01)	0.00 (0.01)	0.01 (0.02)
Crash x Credit Dollarization				-0.06 (0.04)	-0.07* (0.04)	-0.09** (0.04)	-0.04 (0.06)
FC Deposits Allowed			-0.97* (0.54)				1.17 (0.84)
FC Loans Allowed						-0.36 (1.35)	-1.07 (1.29)
GDP Growth		0.20** (0.09)	0.19** (0.09)		0.38*** (0.05)	0.36*** (0.07)	0.33*** (0.08)
Current Account (%GDP)	-0.02 (0.03)	-0.01 (0.03)	-0.01 (0.03)	0.10 (0.06)	0.07 (0.05)	0.04 (0.06)	-0.01 (0.05)
Gross Capital Flows / GDP	-0.00 (0.00)	-0.01* (0.00)	-0.00* (0.00)	0.02 (0.03)	0.02 (0.02)	0.03 (0.03)	0.02 (0.04)
Trade / GDP	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.02* (0.01)	0.01 (0.01)	0.00 (0.01)	0.01 (0.01)
US Interest Rate	-0.27** (0.11)	-0.23** (0.09)	-0.23** (0.09)	-0.08 (0.14)	-0.09 (0.11)	-0.12 (0.13)	-0.26* (0.15)
OECD Growth	0.21 (0.27)	0.09 (0.24)	0.07 (0.24)	0.14 (0.40)	-0.13 (0.29)	-0.33* (0.19)	-0.32 (0.29)
Managed Exchange Rate	0.02 (0.58)	-0.14 (0.48)	-0.24 (0.48)	1.47 (1.05)	0.84 (0.74)	0.84 (0.71)	0.51 (0.75)
Crash x Managed Exchange Rate	-3.85 (2.35)	-4.65* (2.58)	-4.78* (2.54)	-4.56*** (1.37)	-3.42** (1.35)	-3.82** (1.47)	-3.20** (1.52)
Observations	679	676	674	260	260	249	211
R ²	0.07	0.12	0.12	0.09	0.24	0.23	0.22

OLS regressions (intercepts not reported).

Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: Financial Dollarization, Banking Crises and Output Growth: Sensitivity Analysis

Dependent variable: GDP growth. All regressors are lagged.

	(1) Year effects	(2) Year effects	(3) Regional effects	(4) Regional effects	(5) Alternative dollar ratio	(6) Alternative dollar ratio	(7) Weighted by GDP p/c	(8) Weighted by GDP p/c
Banking Crisis	-5.76*** (2.03)	-4.53 (3.03)	-5.50** (2.18)	-4.33 (3.43)	-5.73*** (2.14)	-1.46 (3.22)	-4.17* (2.25)	-6.92* (3.69)
Deposit Dollarization	-0.02 (0.01)		-0.01 (0.01)				-0.03* (0.02)	
Crisis x Deposit Dollarization	0.12*** (0.04)		0.12*** (0.04)				0.13** (0.05)	
Deposit Dollarization (II)					-0.04** (0.02)			
Crisis x Deposit Dollarization (II)					0.26*** (0.07)			
Credit Dollarization		0.03* (0.02)		0.02 (0.01)				0.01 (0.03)
Crisis x Credit Dollarization		0.05 (0.06)		0.06 (0.06)				0.14* (0.08)
Credit Dollarization (II)						0.02 (0.03)		
Crisis x Credit Dollarization (II)						-0.05 (0.17)		
Crisis x Managed Exchange Rate	2.14 (1.84)	0.35 (3.06)	2.06 (1.85)	-0.13 (3.14)	2.08 (2.05)	0.02 (3.17)	0.45 (2.15)	-0.73 (2.90)
Observations	582	225	582	225	545	221	582	225
R ²	0.18	0.35	0.12	0.26	0.09	0.22	0.18	0.26

OLS regressions (intercepts not reported).

Unless otherwise notes, regressors included but not reported are lagged values of: GDP growth, current account (%GDP), gross capital flows/GDP, trade/GDP, US interest rate, OECD growth, and managed exchange rate dummy.

Columns 1 and 2 include year effects (and do not include US interest rates or OECD growth, since they are time-specific). Column 3 and 4 include dummies for Latin America, transition economies, and Asia. Columns 5 and 6 use alternative definitions of the dollarization ratios. Columns 7 and 8 weight observations by GDP per capita.

Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: Financial Dollarization, Currency Crashes and Output Growth: Sensitivity Analysis

Dependent variable: GDP growth. All regressors are lagged.

	(1) Year effects	(2) Year effects	(3) Regional effects	(4) Regional effects	(5) Alternative dollar ratio	(6) Alternative dollar ratio	(7) Weighted by GDP p/c	(8) Weighted by GDP p/c
Currency Crash	2.64 (3.63)	4.96** (2.11)	2.51 (3.68)	4.77*** (1.65)	1.56 (2.93)	3.79** (1.74)	0.37 (2.19)	4.48** (2.07)
Deposit Dollarization	-0.01 (0.01)		-0.01 (0.01)				-0.01 (0.01)	
Crash x Deposit Dollarization	-0.05 (0.06)		-0.04 (0.07)				0.00 (0.05)	
Deposit Dollarization (II)					-0.03** (0.01)			
Crash x Deposit Dollarization (II)					-0.05 (0.11)			
Credit Dollarization		0.01 (0.01)		0.01 (0.01)				0.01 (0.02)
Crash x Credit Dollarization		-0.08 (0.05)		-0.08** (0.04)				-0.07 (0.05)
Credit Dollarization (II)						-0.00 (0.02)		
Crash x Credit Dollarization (II)						-0.13 (0.08)		
Crash x Managed Exchange Rate	-4.78* (2.53)	-4.36** (1.87)	-4.72* (2.58)	-3.39** (1.28)	-3.38 (2.15)	-3.29** (1.56)	-0.40 (1.19)	-3.29* (1.78)
Observations	676	260	676	260	636	256	676	260
R ²	0.16	0.34	0.12	0.26	0.09	0.23	0.18	0.25

OLS regressions (intercepts not reported).

Regressors included but not reported are lagged values of: GDP growth, current account (%GDP), gross capital flows/GDP, trade/GDP, US interest rate, OECD growth, and managed exchange rate dummy.

Columns 1 and 2 include year effects. Column 3 and 4 include dummies for Latin America, transition economies, and Asia. Columns 5 and 6 use alternative definitions of the dollarization ratios. Columns 7 and 8 weight observations by GDP per capita.

Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11: Financial Dollarization, Output Growth, and Crises: Panel Regressions

Dependent variable: GDP growth. All regressors are lagged.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fixed	Random	Fixed	Random	Fixed	Random	Fixed	Random
	Effects	Effects	Effects	Effects	Effects	Effects	Effects	Effects
Deposit Dollarization	0.02 (0.03)	-0.02* (0.01)			0.02 (0.03)	-0.01 (0.01)		
Credit Dollarization			0.04 (0.03)	0.02 (0.01)			0.02 (0.02)	0.01 (0.01)
Banking Crisis	-5.65*** (2.00)	-5.76*** (1.71)	-4.53* (2.56)	-4.36* (2.29)				
Crisis x Deposit Dollarization	0.10** (0.04)	0.13*** (0.04)						
Crisis x Credit Dollarization			0.05 (0.06)	0.07 (0.05)				
Crisis x Managed Exchange Rate	3.24* (1.96)	1.85 (1.64)	1.07 (2.43)	0.09 (1.99)				
Currency Crash					2.07 (1.93)	2.67 (1.77)	4.97** (2.15)	4.49** (1.90)
Crash x Deposit Dollarization					-0.04 (0.04)	-0.05 (0.04)		
Crash x Credit Dollarization							-0.09* (0.05)	-0.07* (0.04)
Crash x Managed Exchange Rate					-5.46*** (1.87)	-4.65*** (1.64)	-4.62** (2.26)	-3.53** (1.77)
Observations	582	582	225	225	676	676	260	260
Countries	72	72	35	35	78	78	39	39
R ²	0.09		0.17		0.09		0.18	

Panel data regressions (intercepts not reported).

Regressors included but not reported are lagged values of: GDP growth, current account (%GDP), gross capital flows/GDP, trade/GDP, US interest rate, OECD growth, and managed exchange rate dummy.

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 12: Financial Dollarization, Output Growth, and Crises: Instrumental Variables Regressions

Dependent variable: GDP growth. All regressors are lagged.

	(1)	(1')	(2)	(2')	(3)	(3')	(4)	(4')
	IV	OLS	IV	OLS	IV	OLS	IV	OLS
Deposit Dollarization	-0.03** (0.01)	-0.02* (0.01)			-0.01 (0.01)	-0.01 (0.01)		
Credit Dollarization			0.02 (0.03)	0.02 (0.01)			0.01 (0.02)	0.01 (0.01)
Banking Crisis	-4.57** (2.13)	-5.75*** (2.14)	-5.31 (4.13)	-4.36 (3.45)				
Crisis x Deposit Dollarization	0.09** (0.04)	0.13*** (0.04)						
Crisis x Credit Dollarization			0.10 (0.10)	0.07 (0.06)				
Crisis x Managed Exchange Rate	1.45 (1.99)	1.83 (1.97)	0.16 (3.23)	0.09 (3.14)				
Currency Crash					4.60 (3.24)	2.66 (3.59)	4.56* (2.38)	4.63*** (1.66)
Crash x Deposit Dollarization					-0.10 (0.07)	-0.05 (0.06)		
Crash x Credit Dollarization							-0.07 (0.05)	-0.07* (0.04)
Crash x Managed Exchange Rate					-5.45** (2.46)	-4.59* (2.59)	-3.45** (1.44)	-3.42** (1.35)
Observations	580	580	225	225	675	675	260	260
R ²	0.11	0.12	0.24	0.24	0.11	0.12	0.24	0.24

2SLS regressions (intercepts not reported).

Regressors included but not reported are lagged values of: GDP growth, current account (%GDP), gross capital flows/GDP, trade/GDP, US interest rate, OECD growth, and managed exchange rate dummy.

Endogenous variables: deposit dollarization, credit dollarization, crisis x deposit dollarization, crisis x credit dollarization, crash x deposit dollarization, crash x credit dollarization.

Instruments are analogous variables, using the earliest available values of deposit and credit dollarization per country instead of the current value. Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 13: Bank Dollarization, Consumption and Investment Growth, and Crises

Dependent variable: consumption growth (columns 1-4), investment growth (columns 5-8). All regressors are lagged.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Consumption Growth	Consumption Growth	Consumption Growth	Consumption Growth	Investment Growth	Investment Growth	Investment Growth	Investment Growth
Deposit Dollarization	0.01 (0.02)		-0.00 (0.01)		-0.05 (0.04)		0.02 (0.03)	
Credit Dollarization		0.02 (0.02)		0.00 (0.02)		0.07 (0.05)		0.05 (0.03)
Banking Crisis	-4.11 (3.73)	-8.46* (4.41)			-19.49** (9.18)	-28.43** (10.54)		
Crisis x Deposit Dollarization	0.09 (0.07)				0.29* (0.16)			
Crisis x Credit Dollarization		0.10 (0.10)				0.27 (0.23)		
Crisis x Managed Exchange Rate	-2.34 (3.17)	-0.91 (4.29)			-0.16 (7.99)	6.94 (8.78)		
Currency Crash			-8.19 (7.08)	8.41*** (2.94)			10.36 (13.45)	8.59 (5.37)
Crash x Deposit Dollarization			0.12 (0.15)				-0.21 (0.25)	
Crash x Credit Dollarization				-0.16 (0.12)				-0.25 (0.16)
Crash x Managed Exchange Rate			-2.16 (4.62)	-9.20*** (3.13)			-10.42 (9.72)	-5.11 (5.44)
Observations	480	195	583	239	494	197	597	241
R ²	0.06	0.16	0.06	0.08	0.09	0.18	0.06	0.09

OLS regressions (intercepts not reported).

Regressors included but not reported are lagged values of: current account (%GDP), gross capital flows/GDP, trade/GDP, US interest rate, OECD growth, managed exchange rate dummy, consumption growth (columns 1-4), and investment growth (columns 5-8).

Robust standard errors (clustering by country-specific observations) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.