Currency regimes: crises and growth

This paper tackles two established puzzles in international macroeconomics literature. The first is the lack of systematic difference in the macroeconomic performance across exchange rate regimes. The second is the absence of a clear empirical relationship between macroeconomic performance and capital-account liberalization. We suggest that both may appear because empirical methodologies fail to account for a latent economic "crisis state," influenced by exchange-rate and capital account regimes, and to allow the effects of a policy regime on growth to depend on whether the economy is in a crisis-prone latent state. In practice, we model and estimate the latent state of the economy as a crisis probability. In the framework we propose, exchange rate and capital-market liberalization regimes can have both a direct effect on short-term growth, and an indirect effect on growth that is channelled through their effects on the crisis probability.

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Evaluation of Currency Regimes: The Unique Role of Sudden Stops

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1. INTRODUCTION

International economics theory has long recognized that pegging exchange rates should improve macroeconomic performance. The idea is that by fixing their currencies to international moneys (the Dollar, the Euro, or the Yen), fiscally-disciplined emerging economies could rapidly accumulate exchange reserves through export growth, be able to maintain a high saving ratio, and provide certainty to business and profit margins to investors. Such a policy environment can lead to a low and stable domestic rate of interest, and thus enables the economy to retain the confidence of international investors. However, every major international economic crisis of the past 15 years (save Brazil in 2002) has been rooted in rigid exchange rate regimes. Thus, Stanley Fischer (2001) succinctly observed that: "Each of the major international capital market-related crises since 1994--Mexico, in 1994, Thailand, Indonesia and Korea in 1997, Russia and Brazil in 1998, and Argentina and Turkey in 2000--has in some way involved a fixed or pegged exchange rate regime. At the same time, countries that did not have pegged rates--among

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them South Africa, Israel in 1998, Mexico in 1998, and Turkey in 1998--avoided crises of the type that afflicted emerging market countries with pegged rates."

Indeed, there has been a long-standing view that an emerging economy under a peg, with government budget imbalances, trade deficits, and the presence of free-market policies that facilitate the outflow of capital, is likely to become vulnerable to sudden stops of capital inflows; hence, lead to a balance of payments crisis. A "sudden stops" crisis often entails a financial or currency crisis, accompanied by a sharp fall in output. Capital controls could reduce contagion effects, and thereby serve to lower the risk of financial crises.[2] A possible channel through which the probability of a crisis affects growth is as follows. If the domestic currency is pegged to a "world currency" it provides a less risky environment for investors and the country may be able to attract more external funds to complement more domestically funded investment. This could then increase growth. However, if foreign investors perceive that there is a sufficiently high probability that there will be a sudden stop of inflows that leads to a crisis, they may be less willing to invest. This could then decrease growth.[3] Similarly, benefits of capital market liberalization come typically from three factors. Revoking capital controls could lower the cost of capital and thereby promote investment. Capital-market liberalization could turn country-specific risks into diversifiable risks. Furthermore, the efficiency of allocation of domestic capital could also be enhanced. However, financial liberalization could also increase the risk of sudden stops to capital inflows, which could bring about defaults and recession. [4]

A related policy-regime evaluation issue is financial dollarisation, and its effect on the macroeconomic performance. The "original sin" concept, introduced by Barry Eichengreen and Ricardo Haussman (1999), explain the consequences for emerging markets of abrupt departures from an exchange rate peg regime due to sudden stops in capital inflows. The "original sin" concept underpins a crucial vulnerability of the economy under peg regimes. The phrase refers to the inability of a country to borrow abroad in its own currency, because no foreign creditor is willing to gamble on the potential exchange rate instability. A plausible explanation for the widespread use in dollarized debt is that countries are forced into this position because their monetary and fiscal policies lack credibility. If a country issued debt in domestic currency, it would

[2] For an early analytical approach to the problem of sudden stops, see Calvo (1998). Among recent papers on sudden-stops' vulnerability, and its relation to fixed exchange rate regimes, see also Calvo (2000), Calvo, Reinhart and Vegh (1995), Chang and Velasco (2000), Ghosh, Gulde and Wolf (2000), Obstfeld and Rogoff (1995) and Williamson (2000). Sharp current account reversals, which require a quick adjustment of the balance between domestic saving and investment (see Milesi Feretti and Razin (1996)), and the associated substantial depreciations, that trigger financial distress, tend to cause and to exacerbate recessions.

[3] In the empirical section we include the external debt as an exclusion restriction in the growth equation to identify the probability equation. In the data, the external debt is indeed strongly correlated with the crisis probability, but only weakly correlated with growth. The possible channel through which the probability of a crisis affects growth indicated in the text is not necessarily inconsistent with the empirical correlations to the extent that the funding of domestic investment is mostly from domestic saving when the crisis probability is low.

[4] For an historical perspective on capital controls see Voth (2004). See also Rodrik (2002) who cites Keynes: "I sympathize with those who would minimize, rather than… maximize economic entanglements between nations. Ideas, art, knowledge, hospitality and travel should be international. But let goods be homespun whenever reasonable and above all let finance be primarily national."

have an incentive to inflate its way out of debt. Investors, who expect that the government will succumb to such temptation, refuse to buy domestic currency-denominated debt papers.[5] In net terms, the foreign currency liabilities of residents of developing and transition countries usually exceed their assets in foreign currencies, implying that they are exposed to exchange rate risk on their balance sheets, as well as through trade. Issues of both sovereign and corporate bonds on international markets are overwhelmingly in foreign currencies, even in the case of an advanced economy such as Korea, or a country whose exchange rate is strongly pegged to the U.S. dollar, such as Argentina in the 1990s. [6]

Combining these insights, this paper aims at contributes to the resolution of long standing puzzles in the literature. The main idea of the paper is that a sudden stop crisis that could have happened but did not, affects growth in a negative way, for example inducing a liquidity shortage. If this is the case, the puzzling failure to establish empirically a relationship between the exchange rate regime and the growth rate is due to the exclusion of the projected crisis probability from the econometric analysis. Arguing that such a crisis probability should indeed be included for the purpose of evaluating policy-regime implications, we estimate a reduced form empirical model relating short-term (cyclically unadjusted) output growth rates to policy regimes in a panel of developing countries. This makes it possible to estimate the effects of policy regimes on macroeconomic outcomes, and their relationship to the "crisis state" of the economy as projected by the market participants.

The organization of the paper is as follows. In section 2, we briefly survey related empirical literature and discuss theoretical insights that serve as a background guide to the empirical analysis. In section 3, we describe the econometric methodology relevant for the evaluation of policy regimes in the presence of financial crises, and we introduce the data set. Section 4 presents the main empirical findings concerning the role of the crisis probability in the evaluation of policy regimes, and discusses their implications and robustness to different specifications, interpretations, and data sources. The concluding Section 5 summarized the results and reviews caveats and possible extensions.

2. RELATED LITERATURE

Strikingly, the empirical literature has not been able to identify clear-cut real effects of exchange-rate regimes on the open economy. Indeed, Marianne Baxter and Alan

[5] Indeed, 97 percent of all debt, placed in international markets between 1999 and 2001, was denominated in five currencies: the US Dollar, the Euro, the Yen, the Pound Sterling and the Swiss Franc. This feature of emerging markets' borrowing in the international market leads to balance-sheet type of currency crises, as formalized by Krugman (2000), and Schneider and Tornell (2000).

[6] Part of this exchange rate risk can be hedged, although only (in the aggregate for a given developing country) to the limited extent that non-residents are willing to hold local currency exposure. Large cross-holdings of foreign assets and liabilities means that the valuation channel of exchange rate adjustment has grown in importance, relative to the traditional trade balance channel. In this context, see also Lane and Milesi-Ferretti (2004), for an empirical analysis of the inter-connections between capital account openness and the exchange rate adjustment process.

Stockman (1989) and Robert Flood and Andy Rose (1995) find that there are no significant differences in business cycles across exchange rate regimes. A recent study Frankel and Wei (2004) explores how output lost in crises is related to various controls, including the degree of exchange rate flexibility, currency mismatch, FDI, etc. The exchange rate flexibility variable is found as not statistically significant.[7]

Similarly, no definitive view emerges as to the aggregate effects of capital account liberalization. Indeed, Eichengreen (2001) who overviews the literature, points to ambiguities in the rather complex role played by capital account liberalization; and Rodrik (1998) finds no significant statistical association between capital account openness and growth. A recent study by Prasad et al (2005) finds that it is difficult to establish a robust causal relationship between the degree of financial integration and growth performance for developing countries. Kristin Forbes (2005) surveys the inconclusive macroeconomic evidence on capital controls like this: "…of the 14 recent papers they (that is, Prasad et al. (2005)) examine, three find a positive effect of financial integration on growth, four find no effect, and seven find mixed results".[8] Traditional explanations for the inconclusiveness focus on inaccurate measurement of capital account openness, [9] and on the possibly different effects of different types of capital flows and capital control.[10]

2.1. Theory as a guide to the empirical analysis

This paper provides a different explanation to the puzzle. Self-fulfilling expectations games played by market participants have elements of a "beauty contest". Market participants must care, not just about acting in the way that conforms with current fundamentals, but also about acting similarly to the way other do. Currency regimes determine the stochastic distribution of the fundamentals and the effect of the market

[7] See however a recent study by Levy-Yeyati and Sturzenneger (2003), who find real effects of exchange-rate regime in cross-country data. Another exception is Rose (2000). In the paper, Rose uses evidence from existing currency unions in the world economy, to estimate the effect of currency unions on international trade. Rose finds that a currency union (which is an extreme form of a peg) expands bilateral trade between two average member countries by a huge proportion (200%, and more). Rose's currency union effects were reduced substantially when fixed country effects were incorporated in the analysis. Persson (2001) challenged Rose's analysis, but also finds significant, albeit modest, effect of currency unions. Anderson and van Wincoop (2003) demonstrated the importance of including country fixed effects in gravity models. Although commonly estimated gravity equations generally have a very good fit to the data, they show that they are not theoretically grounded and prone to lead to biased estimation. They applied the method to solve the border puzzle. They find specifically that borders reduce bilateral national trade levels by plausible though substantial magnitudes.

[8] A more definite view concerning positive effects of capital account liberalization on output, which is advanced by Fischer (1998), is supported by some evidence, provided by Quinn (1997). The role of pre-existing policies, and of trade-account vs. capital-account sequencing, in determining the effects of capital control liberalization on growth and investment, is examined by Arteta, Eichengreen and Wyplosz (2001), Chinn and Ito (2002), and Tornell, Westermann, and Martinez (2004). A recent evaluation of this literature by Prasad *et al*. (2004) yields also inconclusive result. It shows no significant relationship between financial openness and growth in real per capita income across countries, even after controlling for a series of standard explanatory variables (initial income, initial schooling, investment-GDP ratio, political instability, and regional dummies. See also Ariyoshi et al (2000), Bhagwati (1998), Edwards (1999, 2000) and Kaplan and Rodrik (2000).

[9] Most of the studies use rough numerical indices of different policies and regulations. Other studies use *de facto* measures of integration (such as capital flows or foreign asset holdings) which are determined jointly with the macroeconomic performance they are supposed to explain.

[10] Recent work (see, for example, Razin (2004)) suggests that the growth effects of foreign direct investment may be greater than other capital flows.

fundamentals on the macroeconomic performance. This is because the credibility, and effectiveness, of macroeconomic policies must depend on the currency regimes themselves. Thus, a currency regime exerts not only a direct effect on growth, through its effect on the market fundamentals (as in the traditional macroeconomic literature) but it also have an indirect effect on growth, through its impact on the probability of financial crises, based on the endogenously determined expectations, and the way these expectations are coordinated.

In a stylised model of international capital flows associated with big fluctuations in the real exchange rate, Krugman (2000) identifies a general equilibrium link between real depreciations and macroeconomic performance in the presence of sudden stops. The driving mechanism in the model is the negative effect of real depreciations on the balance sheet of firms; hence on domestic investment spending. In that and other papers' common knowledge setting, all agents have the same knowledge about the fundamentals, and there exist multiple self-fulfilling equilibria. In recent literature, however, capital account reversals are triggered not only by fundamental shocks, but also by the degree to which market expectations about these fundamentals are coordinated (Morris and Shin, 2000). In the absence of common knowledge, an individual market participant receives only an independent and noisy signal about the fundamentals but also must have some uncertainty about the other market participants' expectations. Morris and Shin (2000) show how the market participants' knowledge about the statistical distributions of signals and market fundamentals (but not the actual realization of the fundamental and its idiosyncratic signals) helps to coordinate the behaviour of market participants.

The coordination of expectations induces a *unique* equilibrium in such a set up, in which there exists a *threshold* level of the fundamental. That is, withdrawals from the domestic capital market materialize if the realized level of the fundamental is below the threshold; injections of capital into the market occur if the realized level of the fundamental is above the threshold. As a consequence, the equilibrium macroeconomic performance can be specified as a one-to-one function of a fundamental ex-ante *probability* of the financial crisis, derived from the probability distribution of the fundamentals is correlated with the macroeconomic performance.[11] This gives a theoretical underpinning for the econometric model of the next section.

3. EMPIRICAL APPROACH

The empirical test for the effects of exchange rate regimes on the economy is rooted in the theory of sudden stops that we describe in the previous section. Theory suggests that coordination of expectations by market participants may trigger a financial crisis in a situation characterized by a latent threshold state of the economy, determined by key macro fundamentals. The equilibrium is unique: a financial crisis occurs if the latent

[11] Because the information is noisy, neither the market participants, who observe idiosyncratic signals, nor the econometrician, who observes only the equilibrium outcomes, could obtain precise information about the threshold level which triggers a crisis.

variable is below a certain threshold, and the economy's growth performance is weak. Above the threshold, financial crises are avoided and economic growth is strong. The estimated probability of sudden stops, which proxies the latent threshold state variable, is assumed to be negatively correlated with growth.

From the perspective of the theory of policy regimes, there are good reasons to expect that the crisis threshold is also directly affected by the policy regime itself. For example, a peg is expected to lower the crisis threshold, and thus increase the crisis probability, for any given combination of country specific and world economy shocks. Likewise, capital market liberalization tends to raise the crisis probability. In other words, the adoption of a peg is expected to have a direct positive effect on growth, through the trade adjustment channel, and an indirect negative effect, through a crisis-probability channel. Similarly, the adoption of capital account liberalization is expected to have a direct positive effect on growth, through capital market efficiency channels, and an indirect negative effect, through a crisis-probability channel.

The effect of the policy regime on growth is assumed to depend on the whether the economy is in a *latent* crisis state. The probability of the crisis state is obtained by fitting a Probit Model (or, alternatively, a Logit, or a Linear Probability Model) to the sample frequencies of observed crises, depending on the policy regime dummies and controls. Accordingly, a short term growth equation is fitted to the sample, depending on policy regimes, the estimated crisis probability, and standard controls. Policy-regime variables are modelled in level and change forms, capturing pre-existing policy-regimes and current changes in the regimes (whether a country switches from float to peg, or whether a country is imposing capital controls). The crisis probability itself depends on policy regime indicators, as well as on variable such as lagged sudden stops crises, government budget deficit, and initial GDP per capita.

In practice, we estimate a reduced form empirical model relating short-term (cyclically unadjusted) output growth rates in a panel of developing countries, to policy regimes. The dependent variable, as an indicator of macroeconomic performance, is the short term (cyclically unadjusted) GDP growth rate. We choose as a measure of "sudden stop" crisis realizations a large annual depreciation in the real exchange rate. We model its probability by fitting a probability model (Probit, Logit, or linear), noting that such empirical models may be derived from a latent-variable specification (see e.g. Wooldridge, 2003) that is consistent with the theoretical framework outlined above.

The measure of large real depreciations captures the effects of international financial crises on the domestic financial side as well as the real side of the economy.[12] Typically,

[12] Typically in the currency crisis literature sudden stops are measured by free falls in the nominal exchange rate. However, this does not distinguish between domestic price crises and balance-of-payments crises. In our indicator, crisis episodes do not include, therefore, countries which suffer from bouts of high inflation and currency depreciation, but with stable real exchange rates, because they do not qualify to be classified as balanced-of-payments crises. Evidently, the real exchange rate measure for crisis is strongly correlated with sharp reversals in the current-account balance; see Milesi-Ferretti and Razin (2000). Calvo, Izquierdo and Majia (2004) find that real exchange rate fluctuations coming hand in hand with sudden stops are a unique phenomenon in emerging-market economies. They use a sample of 32 developing countries, to analyze the empirical characteristics of sudden stops in capital flows and their relations to balance sheet effects. See also Bacchetta, Aghion and Banerjee (2001), Krugman (2000), Allen, Rosenberg, Keller, Sester, and Roubini (2002), and Eichengreen and Hausmann (1999). See also Bacchetta, Aghion and Banerjee (2001), Krugman (2000), Allen, Rosenberg, Keller, Sester, and Roubini (2002), and Eichengreen and Hausmann (1999s.

unexpected depreciations of the real exchange rate (rather than the nominal exchange rate) are likely to have significant balance-sheet effects, leading to bankruptcies and unemployment.

The correlation between growth and currency regimes may of course reflect other underlying factors at play, not necessarily the true effect of the regime. For example, the cross-section correlation may be the outcome of time-invariant, unobserved, heterogeneity (across countries) rather than a causal effect of the regime on growth. Similarly, the time-series co-movements (within countries) may be the outcome of the effect of growth on the currency regime, rather than a causal effect of the regime on growth. To address the endogeneity issue we condition the time-invariant unobserved variation in the sample on country fixed-effects. We also instrument the variation over time in the sample (within a country) by using a measure of the past spell of the peg regime, which summarizes the history of the regime. The measure of the peg spell is defined as the number of years that a country had a pegged exchange rate up to that point of time, lagged by 6 years. Our identifying assumption is that the history of peg spell is not correlated with the error term (controlling for country fixed-effects). In addition, we also use lagged crisis (as a proxy for the crisis-related characteristics that are not captured by the country fixed effects or the peg spell measure), and lagged currency regime switches (as proxies for the current level or changes of the currency regime).

Self-selection may of course be a problem. For example, when the crisis probability is high, a successful switch to peg can only be implemented by countries for which governments have some strong belief about the health of domestic economic fundamentals (like the case of Hong Kong during the Asian crises). Thus, the conclusion that the adoption of the peg is good for growth in a state of high probability of crisis may not be valid. Because the policy switch may be based on a self-selection of countries, from a pool of countries. In other words, it may be that a country chooses to adopt a specific exchange rate regime because of its underlying economic fundamentals. It may be the case that the probability of a crisis is driven by these fundamentals rather than by the exchange rate regime itself. In such a case one cannot necessarily conclude that the exchange rate regime is responsible for the outcome. To address this issue we run an auxiliary regression of the peg on several instruments, and use the instrumented peg not the actual peg, in the growth equation. The instruments that we have available are: (1) the past spell of the exchange-rate peg regime, (2) time dummies, and (3) country fixed effects. These instruments are likely to capture important characteristics of the health of a country's domestic economic fundamentals, and various time dependent shocks to the world economy. The latter are presumably strongly correlated with the choice of the exchange rate regime and the country's growth rate.

In sum, our empirical methodology is capable of capturing the effects of policy regimes on macroeconomic outcomes, depending on a "Crisis State" of the economy, as projected by market participants.[13]

3.1. The data

We have assembled data consisting of 105 middle and low income countries in the period 1970 to 1997. [14] Because of lags in the estimation (up to six period lags), and non availability of some variables for some countries, we reduce the sample to 92 countries (see Table 1), with 985 annual observations.

We measure sudden stop crises by large fluctuations in the real exchange rate. In doing so, we attempt to capture the effects of the financial crisis on the real side of the economy through the balance sheet channel.[15] [16] Specifically, a sudden-stop crisis is defined by a sharp depreciation of the real exchange rate, with a 15 percent-per-year minimum threshold (a lower boundary of a one standard deviation band in our sample).

We implement a binary index based on multiple categories of the IMF- classification of exchange rate regimes. We also implement a binary index based on the different multiple categories of the Reinhart and Rogoff classification of exchange rate regimes, but only for a sub-sample of 58 countries of the 100 countries.[17] As a proxy for the exchange rate regime in the recent past we define the instrumental variable peg spell in period t for country j, as the number of the years from t-2 to t-6, in which the country has been on a peg.

Measuring the degree of openness of trade and capital accounts is always a heroic task. Since 1950, the IMF has issued an annual publication, which tries to describe the controls that its member countries have in place on various current account capital account transactions. We measure capital-account openness by a binary index based on a

[13] Nesting a probit estimate in a panel may raise in general issues in the statistical distribution of the error term. Often, a noisy explanatory variable may bias the standard errors in the second-stage growth regression. A bias in the standard errors exists when the latent variable, although being known to the economic agent, is, however unknown to the econometrician. This issue is mute in our case because the projected probability of the "Crisis-prone State" is the same for market participants and the econometrician. Hence, in our case the second-stage standard errors are not biased.

[14] We updated data set, originally assembled by Gian Maria Milesi-Ferretti and Assaf Razin (2000), to account for the Asian crisis in 1997.

[15] Typically in the currency crisis literature sudden stops are measured by free falls in the nominal exchange rate. However, this does not distinguish between domestic price crises and balance-of-payments crises. In our indicator, crisis episodes do not include, therefore, countries which suffer from bouts of high inflation and currency depreciation, but with stable real exchange rates, because they do not qualify to be classified as balanced-of-payments crises. Evidently, the real exchange rate measure for crisis is strongly correlated with sharp reversals in the current-account balance. See Milesi-Ferretti and Razin (2000). See also Calvo, Izquierdo and Majia (2004) on sudden stops and real-exchange-rate fluctuations.

[16] Calvo, Izquierdo, and Mejia (2004) find that real exchange rate fluctuations coming hand in hand with sudden stops are a unique phenomenon in emerging-market economies. They use a sample of 32 developing countries, to analyze the empirical characteristics of sudden stops in capital flows and their relations to balance sheet effects. See also Bacchetta, Aghion and Banerjee (2001), Krugman (2000), Allen, Rosenberg, Keller, Sester, and Roubini (2002), and Eichengreen and Hausmann (1999). See also Bacchetta, Aghion and Banerjee (2001), Krugman (2000), Allen, Rosenberg, Keller, Sester, and Roubini (2002), and Eichengreen and Hausmann (1999).

[17] Reinhart and Rogoff (2004) updated the IMF official classification of exchange rate regimes prior to 1997, as described in the various issues of the IMF's Annual Report on Exchange Rate Arrangements and Exchange Rate Restrictions. The IMF empirical definition of exchange rate regimes is based on formal government statements. The Reinhart-Rogoff classification is based on an empirical algorithm, factoring in ex-post behavior. The Reinhart-Rogoff classification applies to only a subset of the original sample of 100 countries.

list of various restrictions on capital account transactions, reported in the IMF Annual Report on Exchange Arrangements and Exchange Restrictions.[18]

Table 2 presents some stylized facts for growth, the frequency of crises, the frequency of the peg regime, the average spell of the peg regime, and the frequency of capital controls; all classified by years and by regions. We can see that growth is variable across time and region, crises are rare, the frequency of a peg is large, and the frequency of capital controls is very large. In Table 3 we present simple correlations between the growth, peg, peg spell, capital controls and crises. There is almost no correlation between the peg regime and growth, indicating that the first "puzzle" is present in the data. Capital controls are correlated negatively with growth, positively with exchange rate pegs, and negatively with the crisis indicator. The peg state and peg spell are highly correlated (but the peg spell and growth are only weakly correlated), indicating that the peg spell could indeed serve as a good instrument. In Table 4 we present similar correlations while controlling for country fixed effects. Among the highlights we find that the peg and the growth rate are only weakly correlated while capital controls and growth are negatively correlated. We find that the crisis and peg are no longer strongly correlated, and capital controls and peg spell are not significantly correlated either. The fact that peg and peg spell are significantly correlated, whereas peg and growth are not correlated, implies that the peg spell is a good instrument for the policy regime dummies.

4. ESTIMATION RESULTS

Table 5 presents the estimation of the base line econometric model. (A few outliers of exceptional negative growth are excluded.) The table consists of three panels. Panel A presents growth equations, with and without the probability of crisis as the explanatory variable. If the crisis probability is excluded, the coefficient of the instrumented peg is positive (2.8765) but not significant. The coefficient of capital controls is negative (-1.1670) and significant, while the coefficient of the switch to the peg is negative (-1.0252) but not significant. If the crisis probability is included, the coefficient of the instrumented peg is positive (5.2629) and significant. The coefficient of capital controls is negative (-1.5811) and significant, and the coefficient of the switch to the peg is negative (-2.8357) and significant. The direct effect of the policy regimes are uncovered if we control for the crisis probability in the growth equation. The crisis probability's coefficient is negative (-6.0377) and significant.

Panel B presents the crisis probability equation. Instrumented peg has a significant positive coefficient (2.6578), capital controls has a significant negative coefficient (-0.4594), and the switch to capital controls has a significant negative coefficient (-1.2737). The exclusion restriction variable, the external debt, has a significant positive coefficient (0.0125). Panel C presents the auxiliary peg equation. Lagged switch to peg, and peg spell, have positive and significant coefficients. This is a positive evidence for the role they play as instruments.

[18]The policy regime dummies can be interpreted as rule based. For alternative quantitative measures, see Edison et al (2004).

We can decompose the effect of policy regimes on growth into direct and indirect effects for the sample average as follows. The instrumented peg has a coefficient of 0.6 in the probit regression panel, whereas an increase in the crisis probability reduces growth by 6 percentage points (a lot!) per year, in the growth regression panel. Therefore, the indirect effect of the instrumented peg on growth is -3.6 percentage points, per year. The direct effect of the peg on growth is 5.2 percentage points, per year. The overall (marginal) effect is mildly positive, 1.6 percentage points, per year. But this is the magnitude of the effect for the sample average. Because the crisis probability equation is non linear, the composition and size of the effect would change with variations in the magnitude of the crisis probability.

4.1. Exploring nonlinear effects

One may wonder whether the non linear indirect effect, via the probability channel, shown in Table 5, masks another non linear direct effect of the regime on growth.

In Table 6 we specify, as an alternative hypothesis, a polynomial structure for the currency regime. The Table has three panels: polynomials of order one, two and three, for the currency regime variable, respectively. Columns (iii) may seem to imply that the effect of the peg is non-linear because the coefficient of the linear term is positive and the coefficient of the quadratic term is negative. Yet, once we introduce the crisis probability as an independent variable in column (iv) the direct non-linear effect disappears because the coefficient of the quadratic term is insignificant. The polynomial of order 2 in panel C of Table 6 has insignificant coefficients, because of severe multicollinearity among variables of the polynomial.

To investigate the phenomenon of non linearity further, we compare in Table 7 Probit, Logit and linear probability models. The coefficient of the instrumented peg is larger in the growth equation for all three probability models than in the growth equation where the crisis probability is excluded (see Panel A). Similarly, capital controls exert a stronger negative direct effect on growth if the crisis probability is included in the growth equation. The crisis probability has a significant negative coefficient in all three probability specifications. The effect is stronger in the Probit and Logit compared to the linear probability model.

In Panel B the qualitative effects of policy regimes on the crisis probability are similar across the three probability specifications.

We conclude that the main results are robust for the specification of the probability model. The Probit and Logit fit the data better than the linear probability.

4.2. The effects of currency regimes

The reduced-form marginal effect of a policy-regime switch from float to peg, which incorporates both a direct and an indirect effect (which is working through the crisis probability), is plotted in Figure 1 against the projected probability (estimated in the

Probit model). The U-shaped graph implies that in the extreme ranges, when the probability is relatively low and when the probability is relatively high, the marginal effect of the policy switch is positive. This is because in these ranges of the projected probability function the regime switch does not trigger a big change in the probability, and the direct effect on growth of the regime switch dominates the indirect effect. In the intermediate range for the probability function, the reduced-form marginal effect of a policy-regime switch from float to peg is negative. This because the policy-regime switch does generate a big marginal increase in the probability of crisis and the indirect effect of the regime switch dominates the direct effect. The linear probability model does not, however, produce a flat line. Indeed, a switch to peg does not have positive effects at ranges where the estimated probability of crisis is close to upper bound one.

Figure 1 also plots the frequency of crisis probability in the sample. Almost all the observations are concentrated in the low probability range. There almost no observations for crisis probabilities above 50 percent. Therefore the high probability estimate of the effect of the peg is not policy relevant. As the probability gets closer to the sample average the growth effect of the peg is small, consistently with the first "puzzle" of the traditional literature. Similarly, Figure 2 demonstrates how the reduced-form marginal effect of capital controls, which incorporates both the direct and the indirect effects, depends on the crisis probability. The reversed U-shaped diagram implies that the marginal effect of the policy switch is mostly negative. However, in the intermediate probability range, the marginal effect of the policy-regime is less negative. As one gets closer to the sample average, the second "puzzle" of the traditional literature is observed.

4.3. Different exchange- rate regime classifications

In this section we use the Reinhart-Rogoff classification for the exchange rate regime, as a robustness check to see if our results are sensitive to an alternative classification. The alternative classification applies to only a subset of the original sample of 100 countries.[19] Accordingly, we perform in this section a variety of robustness tests: sample-robustness and regression-specification. In addition to this we also address the difference between domestic price crises and sudden stops crises. [20]

[19] The frequency of currency and price crises in the sample are as follows. Sudden stop episodes appear in 65.5 percent of observations, and domestic-price-crisis episodes occur in 46.1 percent of the observations.

[20] We note that the literature has been dealing in the past extensively with the relation between inflation and growth. Bruno and Easterly (1998) propose a method, based on discrete high inflation crises, to look at the relationships between inflation and growth. They find that growth falls sharply during discrete high inflation crises; then growth recovers quickly after inflation falls below the threshold. Their approach, however, implies that growth is negatively affected by high inflation, above a certain threshold; but growth is not affected by inflation below the threshold. This discontinuity appears to be somewhat arbitrary. The Bruno-Easterly methodology is based on *actual* domestic price crises. Our methodology points out the role of a *latent* and *continuous* "crisis-prone state", estimated by a continuous crisis probability function. This means that even if the crisis does not materialize, the crisis probability could still be sufficiently big to affect the rate of growth. In this section we consider the effect of domestic price crises in addition to sudden stops' crises.

Table 8 describes the effect of the peg and capital controls on growth. Qualitatively, the findings in Table 8 (using the Reinhart-Rogoff classification in the sub sample) and Table 5 (using the IMF classification in the broad sample of 100 countries) are very similar: a switch to peg has positive coefficient, a switch to capital controls has a negative coefficient, and the crisis probability has a negative coefficient; all estimators are statistically significant. This can serve as evidence for the robustness of our methodological approach. In column (ii) of Table 8, the sudden stop probability includes the effect of the domestic price crisis. Notice that the effect of the crisis probability on growth is barely significant. In column (iii) we include two types of a projected probability of sudden stops: one which includes, and the other which excludes the effect of the price crisis. Observe that the coefficient of the latter type of projected probability is highly significant and negative. The estimated coefficient is larger in absolute value than the corresponding coefficient in column (i) of Table 8. The coefficient of projected probability of sudden stops which includes the effect of price crisis, in column (iii), is however not significant. We interpret this as evidence that domestic price crisis affect growth through the sudden-stops probability channel.

4.4. Currency regimes and debt dollarisation

We observe that different economies in our sample have also different levels of exposure to capital flow volatility that can trigger unanticipated fluctuations in the real exchange rate. [21] We use the ratio of the country's foreign currency liabilities to its money supply (FLM), as a proxy for the country's foreign currency exposure to fluctuations in the real exchange rate. We address the effect of a policy-regime switch on dollarisation, and the role of dollarisation in the macroeconomic process.[22]

Table 9 provides estimates of the influence of a policy-regime switch on dollarisation. Column (i) indicates that the policy regimes (a switch to peg, and the imposition of capital controls) do not have a direct effect on dollarisation. Column (ii) indicates a significant effect of the crisis probability, as a single explanatory variable, on dollarisation. Column (iii) indicates that policy regimes do not directly affect dollarisation, but only indirectly affect dollarisation through the crisis probability.

So, overall, the table shows that the exchange rate regime can affect the crisis probability, which in turn can affect dollarisation. In Table 6 we showed that a switch to a peg raises the probability of a crisis, therefore the switch to a peg lowers dollarisation through its effect on the crisis probability. The opposite happens when a country switches to capital controls.

[22] Savastano (2004) find that dollarisation appear to increase exchange rate pass-through. This mechanism may reinforce the claim that the "fear of floating" is a greater problem for developing economies, with highly dollarized debt. The role of balance sheet effects, the linkage between currency risk and country risk, and the impact of dollarisation on trade are analyzed in Levy Yeyati and Sturzenegger (2003). See also Calvo and Reinhart (2000).

We now turn to the analysis of how dollarisation influences growth. Columns (i) and (ii) of Table 10 indicate that FLM, the dollarisation measure, does not have any direct influence on growth, once we control for the actual realization of sudden stop crises. A crisis, as expected, reduces growth, and in a significant way. In column (iii) of Table 10 we introduce the *interaction* between dollarisation and the realized sudden stops. The coefficient of the interaction term is negative and highly significant. This means that although dollarisation does not have an independent influence on growth, the interaction between dollarisation and the *actual* crisis, tend to reduce the growth rate drastically.

This means that the following policy-regime induced mechanism may have been at work in the data: The imposition of capital controls tends to lower the *probability* of sudden stops and the decrease in the *probability* of sudden stops, in turn, tend to raise the level of dollarisation. If a crisis *actually* occurs, then the growth rate diminished. If, however the crisis does not materialize, then growth is to a large extent unaffected.

5. CONCLUSIONS, CAVEATS AND EXTENSIONS

The choice of macroeconomic policies has been cast traditionally in terms of the well-known policy tri-lemma. This is a way of describing succinctly a choice among three policy goals: pegging the exchange rate, keeping the capital markets open, or conducting a business-cycle stabilizing monetary policy. The tri-lemma arises because only two of these policy goals can be achieved at any point in time. Both foreign and domestic economic shocks (including policy mistakes) may move the equilibrium nominal exchange rate away from the pegged rate. If the official rate is overvalued, the defence typically requires higher interest rates and fiscal contraction to reduce the current account deficit. If the excess demand has become large, either because policy was slow to react or because the country has been hit by a strong and long-lasting shock, the required policy actions may not be viable; either for political-economic reasons or because of the damage they will inflict on the banking system or on aggregate demand. Under those circumstances an attack on the exchange rate is likely to succeed. Therefore, there is a fourth policy goal: keeping the economy out of sudden stops to international capital flows, or other violent types of financial crises. The literature, however, often ignores this aspect of the currency-regime choice problem. [23]

A recurrent problem with the fixed exchange rate regime is that it provides a one-way bet to speculators. Often the consequence is massive capital outflows which put upward pressures on interest rates. In Latin America and south-east Asia in the 1990s, abandoning a fixed exchange rate regime led to severe recessions. On the other hand, the benefits of freely floating exchange rate are not unlimited. Exchange rate risks impose huge costs on firms. It is costly for firms to divest themselves of this risk, especially in low income countries where the financial markets are under-developed. As a

[23] The tri-lemma, of a fixed exchange rate, capital mobility, and a monetary policy dedicated to domestic goals, is traditionally regarded as the main explanation of the non-viability of pegs.

consequence, currency regimes have conflicting effects on growth in a sample of emerging markets and low income countries. Therefore, it has been difficult to establish clear cut effects of currency regimes for these economies.

Indeed, a long standing puzzle in the literature is the failure to find any systematic difference in the macroeconomic process across exchange rate regimes. Another puzzle is the absence of a robust empirical relation between macroeconomic performance and capital-account liberalization. The main idea of the paper is that sudden stop crises which could have happened but did not, have affected cyclically unadjusted growth negatively. [24] We bring out theory to rationalize the inclusion of the crisis probability in the growth equation in order to evaluate currency regimes. The external debt serves as the exclusion restriction variable to identify the probability equation. We use several instruments to deal with the endogeneity of currency regimes, including the past spell of the pegged regime.

We find that the influence on the overall macroeconomic performance of currency regimes depends on the likelihood of sudden stops to capital flows. In various specifications, if the probability of sudden stops is excluded from the growth equation, we find that the instrumented peg and the financial liberalization regime indicators are insignificant in the growth equation; thereby tracing the literature "puzzles" in our sample. In various specifications, the instrumented peg has a positive and highly significant effect on growth after the inclusion of the crisis probability in the growth equations, and with the instrumented peg. The instruments that we use are: the past spell of the peg, country fixed effects, lagged crises, lagged policy regime switches, and time dummies. The external debt serves as the exclusion restriction variable.

In addition, capital controls (both in levels and changes) have a negative, and highly significant, effect on growth after the inclusion of the crisis probability in the growth equations The projected probability of an international financial crisis increases with the imposition of an exchange rate peg, and falls with the imposition of capital controls (both in level and change forms); The spell of the peg, country fixed effects, lagged crises, time dummies, as instruments, and the external debt serves as the exclusion restriction variable.

We also find that the projected crisis probability has significant effects on debt dollarisation, and, at the same time, currency regimes determine the degree of debt dollarisation through the crisis probability channel. It is the interaction term between the degree of dollarisation and realized crises which is significantly negative in the growth equation, whereas the coefficients of the currency regime dummies are not significant.

The estimations imply that the overall effect of currency regimes on macroeconomic performance work through the direct channel and the crisis probability channel. The latter is intrinsically non-linear at an intermediate range of the crisis probability. Thus countries with low crisis probability can benefit from an exchange-rate peg and capital market liberalization. Countries with an intermediate level of the crisis probability can

[24] Directly related is the "Peso problem" literature (e.g., Veronesi (2004)).

benefit from a more flexible exchange rate regime and some controls on capital flows. We do not have in our sample more than a few countries with an estimated crisis probability above 50 percent, however. Therefore we cannot draw any policy-relevant conclusion for the effect of policy regime on growth in the high crisis-probability range.

We list a few caveats. The data have little time variation concerning the country-specific fiscal and monetary shocks. Therefore we are unable to conduct a full-fledged dynamic analysis. Accordingly, the econometric methodology we employ is not able to analyze persistency of the effects of policy regime on long term growth. The background theory that we present in the paper posits that optimising agents will design their portfolio strategies based on expectations about policy rules. We have no good theory however of policy reaction functions in a financially unstable environment. To take seriously the issue of the endogeneity of the policy regimes one has to develop such theory and have access to high-frequency data, defined consistently across countries.

We also note that the indicators of capital controls used in the analysis do not distinguish controls on inflows and outflows. Controls on inflows may have quite different effects than controls on outflows. Therefore, they exert different influence on the probability of sudden stops. Cooper (1999, p. 111) notes that these descriptions are very imperfect measures of the extent of restrictions, particularly in the case of the capital account:

"… Restrictions on international capital transactions … come in infinite variety. Therefore an accurate portrayal requires knowledge not only of the laws and regulations in place, but also of how they are implemented—which often requires much official discretion—and of how easily they are circumvented, either legally or illegally. The IMF reports the presence of restrictions, but not their intensity or their impact."

The IMF empirical definition of exchange rate regimes is based on formal government statements. The Reinhart-Rogoff classification is based on an empirical algorithm, clustering ex-post behaviour. Both are not pure rule-based proxies, as our framework assumes.

Finally, we suggest two extensions. One extension of our analysis could consider regional spill-over effects. The crisis probability may affect one large country in the region, may have also negative effects on the growth of other countries in the region. Another extension concerns the choice between rules vs. discretion in monetary policy. Different monetary rules may systematically affect the probability of bank runs (as in Diamond and Dybvig (1983)), or stock market crashes. An econometric valuation of monetary rules can incorporate the effect of these rules on the probability of financial crises similarly to the evaluation of currency regimes in this paper.

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APPENDIX A. A stylised model of sudden stops

The model posits an exogenous stochastic process for the fundamentals (e.g., aggregate export volumes) that foreign creditors estimate based on public and private information. The extended model features a double guessing game by the foreign creditors, who receive noisy signals. First, each foreign creditor assesses the realized state of the domestic economy fundamentals; and, second, he/she guesses the likelihood of the credit extension-withdrawal action that all the other foreign creditors are going to take, given the signals they receive. The rational-expectations' equilibrium of such global game is the set of self fulfilling guesses so that the level of domestic investment implicit in the credit offers must match the actual level of investment that takes place given those offers.

Assume that there are N domestic entrepreneurs, who are single mindfully engaged in wealth accumulation (save only), and N foreign creditors, who supply the credit which domestic entrepreneurs demand in order to make investment. Let I_t^{α} denote investment in capacity by an individual entrepreneur, and let borrowing be specified as λ times the entrepreneur's net worth, W. Denote by y_t, F_{t-1} and p_t, the domestic output (produced by a standard Cobb-Douglas technology with a capital input output share α), the initial debt, indexed to foreign goods, and the *real exchange rate* (the relative price of foreign goods in terms of domestic goods), respectively. The entrepreneur's net worth is:

$$W_t = \alpha y_t - p_t F_{t-1} . \tag{A1}$$

A foreign lender imposes a credit limit, so that the investment, I_t^{α}, is constrained by the entrepreneur's net worth, W_t, and the leverage fraction, λ:

$$I_t^{\alpha} \leq (1+\lambda) W_t \tag{A2}$$

Market-clearing real exchange rate is specified as a function of *aggregate* investment and output:

$$p_t = \frac{[1 - 1(1-\alpha)(1-\upsilon)]Y_t - (1-\upsilon)I_t}{\widetilde{X}_t}, \tag{A3}$$

where, $I=NI^{\alpha}$, $Y=Ny$, denote the aggregate domestic investment and aggregate output, respectively. The coefficient υ denotes the marginal propensity to import, $\widetilde{X}_t$ denotes the stochastic volume of exports, expressed in terms of foreign goods. The cumulative distribution function of $\widetilde{X}_t$ is given by $G(\widetilde{X}_t)$.

An increase the aggregate investment I_t triggers real appreciation, a fall in p_t, through a standard "transfer problem" mechanism [see Krugman (2000)].

Rates of return differentials, which induce foreign creditors to extend loans to domestic entrepreneurs, are captured by a weak form of the interest parity condition:

$$(1+r_t)\frac{p_t}{p_{t+1}} \geq (1+r^*), \tag{A4}$$

where, r and r^* denote the marginal productivity of capital and the foreign interest rate, respectively. We start with the case of common knowledge, as in Krugman (2000). Figure A describes the multiplicity of equilibrium outcomes, depending on the realization of exports, $\widetilde{X}_t$. Because the entrepreneur is insolvent if exports are low and the real exchange rate is depreciated, the credit constraint is binding strongly. In this case there exists a unique equilibrium with zero investment. In an intermediate case there are multiple equilibrium-investment outcomes, due to the existence of expectations-coordination failure. Because the credit constraint is not binding if the real exchange rate is appreciated, there exists a unique equilibrium with investment determined by marginal productivity conditions, if export volumes are high.

Now turn to the case of noisy signals about exports. Assume that a foreign creditor i receive a private signal θ_i about $\widetilde{X}_t$ as follows.

$$\theta_i = \widetilde{X}_t + \varepsilon_{ti}. \tag{A5}$$

The error term ε_{ti} is assumed to be *i.i.d*.

An individual foreign creditor's decision whether or not to extend credit to the domestic entrepreneur crucially depends on her signal, a draw from a uniform distribution with a support [-ε, ε].

Applying the global-game methodology, there exists a cut-off signal, $\theta_i^* = \widetilde{X}_t^* + \varepsilon_{ti}^*$, so that

$$\underset{N\sim U[0,1]}{E}[(1+r_t)\frac{p(\widetilde{N}_t^*, \widetilde{X}_t^*)}{p_{t+1}}] - (1+r^*) = 0. \tag{A6}$$

The marginal individual creditor, who receives a threshold signal

$$\theta_i^* = \widetilde{X}_t^* + \varepsilon_{ti}^*, \tag{A7}$$

The creditor is indifferent between withholding, and extending the credit to the domestic entrepreneur counterpart.

Observe that the reduced-form function of equilibrium p_t is decreasing in $\widetilde{N}$, the number of foreign creditors, and decreasing in export volumes (the fundamental which drives the equilibrium outcome) $\widetilde{X}_t$.

The threshold level, $\widetilde{X}_t^*$, therefore determines a *unique* equilibrium outcome as a solution to the global game. Below the threshold $\widetilde{X}_t^*$ investment is equal to zero, because all foreign investors tend to withhold credit. Above the threshold, $\widetilde{X}_t^*$, domestic investment is driven by a *standard* rate-of-return consideration reaching a *unique* level of $\bar{I}_t$; because all foreign investors extend credit and strict interest parity prevails. This means that there is also a unique *probability* of a sudden stop in capital flow:

$$\text{Prob}\{I=0\}=G(\widetilde{X}_t^*). \tag{A8}$$

Furthermore, the associated (expected) level of aggregate investment is given by

$$(\bar{I}(1-G(\widetilde{X}_t^*)). \tag{A9}$$

Because of the uniqueness of equilibrium it can be summarized by a projected *crisis probability*, which is directly linked to the level of aggregate domestic investment and the real exchange rate. An essential feature of the equilibrium is the existence of a threshold in the value of some synthetic index of fundamentals (e.g., aggregate export volumes) that separate "crisis states" from "no crisis states". Building on such framework we can explain episodes of capital flow reversals. That is, how a state, in which foreign creditors decide not to keep lending to the country (be long on foreign currency), depends on an estimate that the fundamental is below an endogenous equilibrium threshold. The position of the threshold depends: (a) on the distribution of the fundamentals; (b) on the stochastic features of the process through which information reaches foreign creditors; as well as (c) on the policy regime. We also introduce the plausible assumption that the adoption of a peg has a direct positive effect on growth through traditional channels, and an indirect effect. The latter negative effect goes through a crisis-probability channel.

Figure A

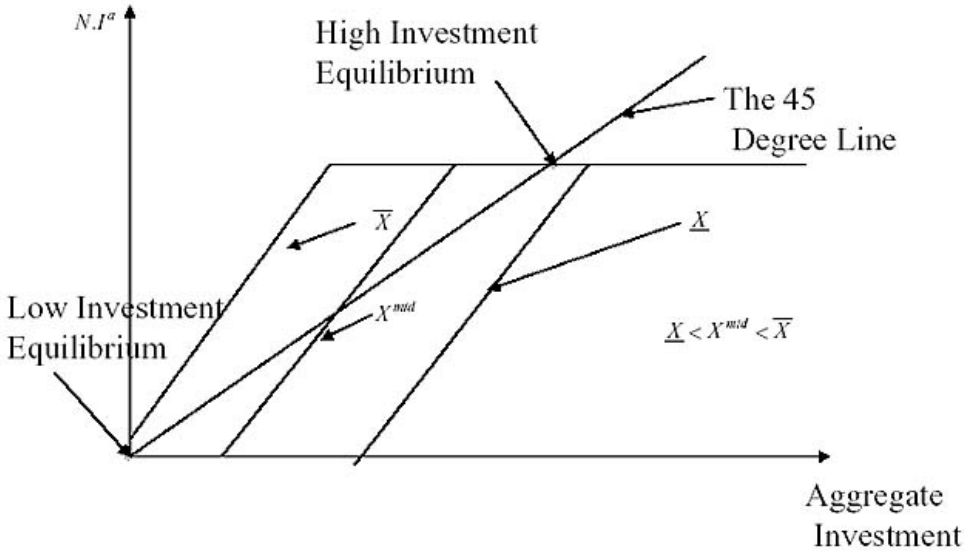
$N.I^a$
High Investment
Equilibrium
The 45
Degree Line
$\overline{X}$
$\underline{X}$
Low Investment
Equilibrium
X^{mid}
$\underline{X} < X^{mid} < \overline{X}$
Aggregate
Investment

Table 2:
Growth, Crises, Pegged Exchange Rate and Capital Controls: Sample Averages

	All	Decades			Region			
Variable		1970s	1980s	1990s	Africa	Latin	Asia	Europe
Growth	3.32	5.16	2.93	3.00	3.06	2.71	4.92	3.11
Crisis Years (fractions)	0.12	0.07	0.13	0.12	0.10	0.16	0.12	0.06
Peg Years (fractions)	0.63	0.79	0.66	0.51	0.73	0.57	0.55	0.48
Average years under peg (t-6 to t-2)	3.61	4.33	3.74	3.06	4.03	3.34	3.20	2.91
Capital Controls' Years (fractions)	0.88	0.82	0.90	0.88	0.97	0.75	0.84	1.00

Table 3:
Correlations Between Growth, Peg, Peg Spell, Capital Controls and Crisis (without Country Fixed-Effects)

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	-0.0029	1			
Peg Spell	-0.0265	0.7431*	1		
Capital Controls	-0.0748*	0.1212*	0.0934*	1	
Crisis	-0.0404	-0.0599*	-0.0537*	-0.008	1

Africa

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	0.0244	1			
Peg Spell	0.008	0.7703*	1		
Capital Controls	-0.0561	-0.0093	-0.0015	1	
Crisis	-0.0353	-0.0249	-0.0034	0.0262	1

Latin

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	0.0024	1			
Peg Spell	-0.0475	0.6243*	1		
Capital Controls	-0.1032*	0.086	0.0049	1	
Crisis	-0.0213	-0.1465*	-0.1769*	0.046	1

Asia

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	-0.0139	1			
Peg Spell	-0.0071	0.8204*	1		
Capital Controls	-0.1278*	0.2207*	0.2118*	1	
Crisis	-0.0761	0.033	0.0563	-0.0366	1

Europe

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	-0.1034	1			
Peg Spell	-0.1281	0.7819*	1		
Capital Controls	.	.	.	.	
Crisis	-0.08	0.0619	0.1224	.	1

.

Table 4:
Correlations Between Growth, Peg, Peg Spell, Capital Controls and Crisis (Controling for Country Fixed-Effects)

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	0.0058	1			
Peg Spell	-0.0216	0.4262*	1		
Capital Controls	-0.0733*	0.0698*	-0.0163	1	
Crisis	-0.0033	-0.0152	0.0129	0.0145	1

Africa

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	0.019	1			
Peg Spell	0.0125	0.5031*	1		
Capital Controls	-0.0161	0.1474*	0.1832*	1	
Crisis	-0.0009	0.0419	0.0800*	-0.048	1

Latin

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	-0.0145	1			
Peg Spell	-0.0755	0.3788*	1		
Capital Controls	-0.1619*	0.0699	-0.0960*	1	
Crisis	0.0168	-0.0559	-0.0673	0.0423	1

Asia

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	0.0391	1			
Peg Spell	-0.0459	0.4468*	1		
Capital Controls	0.0358	-0.1195*	-0.0772	1	
Crisis	-0.0692	-0.0499	0.0277	0.0118	1

Europe

	Growth	Peg	Peg Spell	Capital Controls	Crisis
Growth	1				
Peg	-0.1345	1			
Peg Spell	0.0207	0.0513	1		
Capital Controls	0	0	0	1	
Crisis	0.0729	-0.0096	0.0192	0	1

.

Table 5: The Effect of Exchange Rate and Capital Account Regimes on Growth: Controling For The Crisis Probability

Panel A: Dependent Variable: Growth Rates

Variables	(i)	(ii)
Peg (instrumented)	**2.8765**	**5.2629**
	(2.2557)	**(2.5410)****
Capital Controls (t-1)	**-1.1760**	**-1.5811**
	(0.8093)*	**(0.8323)***
Switch to Capital Controls between t-2 to t-1	**-1.0252**	**-2.8357**
	(1.1191)	**(1.4304)****
Growth t-1	**0.2006**	**0.1986**
	(0.0315)***	**(0.0314)*****
Growth t-2	**-0.0713**	**-0.0737**
	(0.0303)**	**(0.0303)****
The Crisis Probability	**--**	**-6.0377**
		(2.9790)**
Adj R-Square	**0.062**	**0.066**
DW	**1.99**	**1.99**

Panel B: Dependent Variable: Currency Crisis (0,1). 1 if REE(t)-REE(t-1)>15%

	Coefficient (Probit)	dF/dX
Peg (instrumented)	**2.6578**	**0.6008**
	(0.8524)***	**(0.1920)*****
Capital Controls (t-1)	**-0.4594**	**-0.1217**
	(0.2686)*	**(0.0808)***
Switch to Capital Controls Between t-2 to t-1	**-1.2737**	**-0.2879**
	(0.4518)***	**(0.0988)*****
External Debt ($ Billions)	**0.0125**	**0.0028**
	(0.0049)**	**(0.0011)****
Pseudo R-Square	**0.2031**	**0.2031**
DW	**1.99**	**1.99**

Panel C: Dependent Variable: Peg (0,1).

Switch to peg between t-2 to t-1	**3.6315**
	(0.4065)***
Peg Spell	**0.6866**

	(0.0798)* **
Pseudo R-Square	**0.4498**

Note:
All specifications include country-fixed effects.
The specification in panel A includes also budget deficit (insignificant).
The specification in panel C includes also time fixed effects.
Standard errors in parenthesis
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6:
Non Linear Effects of Currency Regimes on Growth
Dependent variable: Growth Rates

	Panel A: linear		Panel B^: quadratic		Panel C^: ^2 and ^3	
Variables	**(i)**	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**
Peg (instrumented)	**2.8765**	**5.2629**	**8.6448**	**8.4918**	**9.6462**	**7.0377**
	(2.2557)	**(2.5410)****	(4.0144)**	(4.0091)**	(7.1621)	(7.2795)
Peg^2	**--**	**--**	**-16.2712**	**-9.2390**	**-22.6610**	**0.2035**
			(9.5537)*	(10.2252)	(39.0248)	(40.7507)
Peg^3	**--**	**--**	**--**	**--**	**7.3612**	**-10.6584**
					(43.5874)	(44.5246)
Capital Controls (t-1)	-1.1760	-1.5811	-1.3239	-1.7576	-1.3192	-1.7762
	(0.8093)*	(0.8323)*	(0.7821)	(0.8132)*	(0.7830)*	(0.8174)**
Switch to Capital Controls between t-2 to t-1	-1.0252	-2.8357	-0.9813	-2.7122	-0.9869	-2.7510
	(1.1191)	(1.4304)**	(1.0773)	(1.4066)*	(1.0784)	(1.4166)*
Growth t-1	0.2006	0.1986	0.1837	0.1824	0.1836	0.1826
	(0.0315)***	(0.0314)***	(0.0305)***	(0.0304)***	(0.0305)***	(0.0304)***
Growth t-2	-0.0713	-0.0737	-0.0725	-0.0743	-0.0725	-0.0743
	(0.0303)**	(0.0303)**	(0.0293)**	(0.0293)**	(0.0294)**	(0.0293)**
The Crisis Probability	--	**-6.0377**	--	**-5.8760**	--	**-6.0352**
		(2.9790)**		(3.0768)*		(3.1496)*
Adj R-Square	0.062	0.066	0.097	0.097	0.097	0.097
DW	1.99	1.99	1.99	1.99	1.99	1.99

Note:
All specifications include country-fixed effects.
The specification in panel A includes also budget deficit (insignificant).
The specification in panel C includes also time fixed effects.
Standard errors in parenthesis
^ Only in the growth equation.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: The Effect of Exchange Rate and Capital Account Regimes on Growth: Probit, Logit, and Linear Probability Models

Panel A: Dependent Variable: Growth Rates

Variables	(i)	(ii)	(iii)	(iv)
Peg (instrumented)^	**2.8765**	**5.2629**	**5.0509**	**4.8414**
	(2.2557)	(2.5410)**	(2.4859)**	(2.6585)*
Capital Controls (t-1)	-1.1760	-1.5811	-1.5271	-1.5313
	(0.8093)*	(0.8323)*	(0.8255)*	(0.8481)*
Switch to Capital Controls between t-2 to t-1	-1.0252	-2.8357	-2.7956	-2.7802
	(1.1191)	(1.4304)**	(1.4084)**	(1.6837)*
Growth t-1	0.2006	0.1986	0.1984	0.2000
	(0.0315)***	(0.0314)***	(0.0314)***	(0.0315)***
Growth t-2	-0.0713	-0.0737	-0.0740	-0.0726
	(0.0303)**	(0.0303)**	(0.0303)**	(0.0303)**
The Crisis Probability	--	**-6.0377**	**-5.5940**	**-5.0882**
		(2.9790)**	(2.7106)**	(3.6483)*
Adj R-Square	0.062	0.066	0.066	0.064
DW	1.99	1.99	1.99	1.99

Panel B: Dependent Variable: Currency Crisis (0,1). 1 if REE(t)-REE(t-1)>15%

	Coefficient Probit	Coefficient Logit	Coefficient Linear
Peg (instrumented)^	**2.6578**	**4.5922**	**0.7708**
	(0.8524)***	(1.5553)***	(0.2386)***
Capital Controls (t-1)	**-0.4594**	**-0.8375**	**-0.1112**
	(0.2686)*	(0.4900)*	(0.0512)**
Switch to Capital Controls Between t-2 to t-1	**-1.2737**	**-2.3839**	**-0.3172**
	(0.4518)***	(0.7605)***	(0.0815)***
External Debt ($ Billions)	**0.0125**	**0.0236**	**0.0028**
	(0.0049)**	(0.0086)***	(0.0011)**
Pseudo R-Square	0.2031	0.2055	
Adj R-Square			0.2407
DW	1.99	1.99	1.99

Note:
All specifications include country-fixed effects.
The specification in panel A includes also budget deficit (insignificant).
The specification in panel C includes also time fixed effects.
^ Instrumented as in panel C of Table 5
( ) Standard errors in parenthesis
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8:
The Effect of Exchange Rate and Capital Controls Regimes:
The Reinhart-Rogoff (2002) Classification*,**

Dependent Variable: Growth Rates

Variables	(i)	(ii)	(iii)
Peg at time t-1	1.656	1.330	1.729
	(0.557)	(0.549)	(0.565)
Capital Controls at t-1	-0.439	-0.587	0.156
	(0.890)	(0.991)	(1.022)
Switching to Capital Controls between t-2 to t-1	-5.852	-3.374	-6.155
	(1.799)	(1.518)	(1.809)
The probability of having currency crisis this year^ excluding the effect of price crisis	-14.843		-22.359
	(4.937)		(7.996)
The probability of having currency crisis this year - real^^ including the effect of price crisis		-6.824	7.632
		(4.084)	(6.578)
Controllers			
Growth rate at time t-1	0.176	0.191	0.183
	(0.034)	(0.034)	(0.034)
Growth rate at time t-2	0.008	0.022	0.019
	(0.035)	(0.035)	(0.035)
Currency crisis at time t-1	2.812	0.917	3.340
	(0.978)	(0.629)	(1.069)
Currency crisis at time t-2	-1.904	-1.804	-1.831
	(0.479)	(0.483)	(0.481)
Price (CPI) crisis at time t-1	-0.100	1.078	-1.251
	(0.491)	(0.772)	(1.133)
Price (CPI) crisis at time t-2	0.385	0.374	0.468
	(0.488)	(0.491)	(0.490)

Notes:

* Reinhart and Rogoff (2002) classified into 5 categories: (i) peg, (ii) limited flexibility, (iii) managed floating , (iv) freely floating and (v) freely falling. We aggregate it into 2 main categories: (i) peg_rr, including the first 3 and (ii) float_rr, including the other two.

** Data includes 58 countries in the years 1970 to 1997

^ The estimated the likelihood for a currency crisis ignoring the effect of price crisis.

^^ The estimated probability for a currency crisis including the effect of past price crisis

All specifications include linear time trend

( ) Standard errors in parenthesis

Table 9:
The Effect of Sudden Stop Crisis and
Dollarization (Foreign Liabilities - Money Supply Ratio) on Growth

Variable	(i)	(ii)	(iii)
Foreign Liabilities - Money Suuply Ratio (FLM)	0.001 (0.042)	-0.001 (0.042)	0.000 (0.042)
Sudden Stop Crisis	-0.881 (0.384)	-0.781 (0.378)	-0.250 (0.431)
Growth at t-1		0.173 (0.021)	0.172 (0.021)
Interaction			
Sudden Stop Crisis * FLM			**-2.384** **(0.931)**
Country fixed effect	Yes	Yes	Yes
Observations	2228	2228	2228

Table 10:
The Effect of Sudden Stop Crisis on Dollarization (Foreign Liabilities - Money Supply Ratio)

Variable	(i)	(ii)	(iii)
Crisis at t-2	-0.034		-0.034
	(0.020)		(0.020)
Peg at time t-2	0.042		0.010
	(0.024)		(0.028)
Capital Controls at t-2	-0.013		-0.009
	(0.028)		(0.028)
The probability of having currency crisis this year^		-0.200	-0.176
		(0.070)	(0.083)
Country fixed effect	Yes	Yes	Yes
Observations	1176	1176	1176

Figure 1: The Marginal Effect Of The Peg And The Crisis Probability

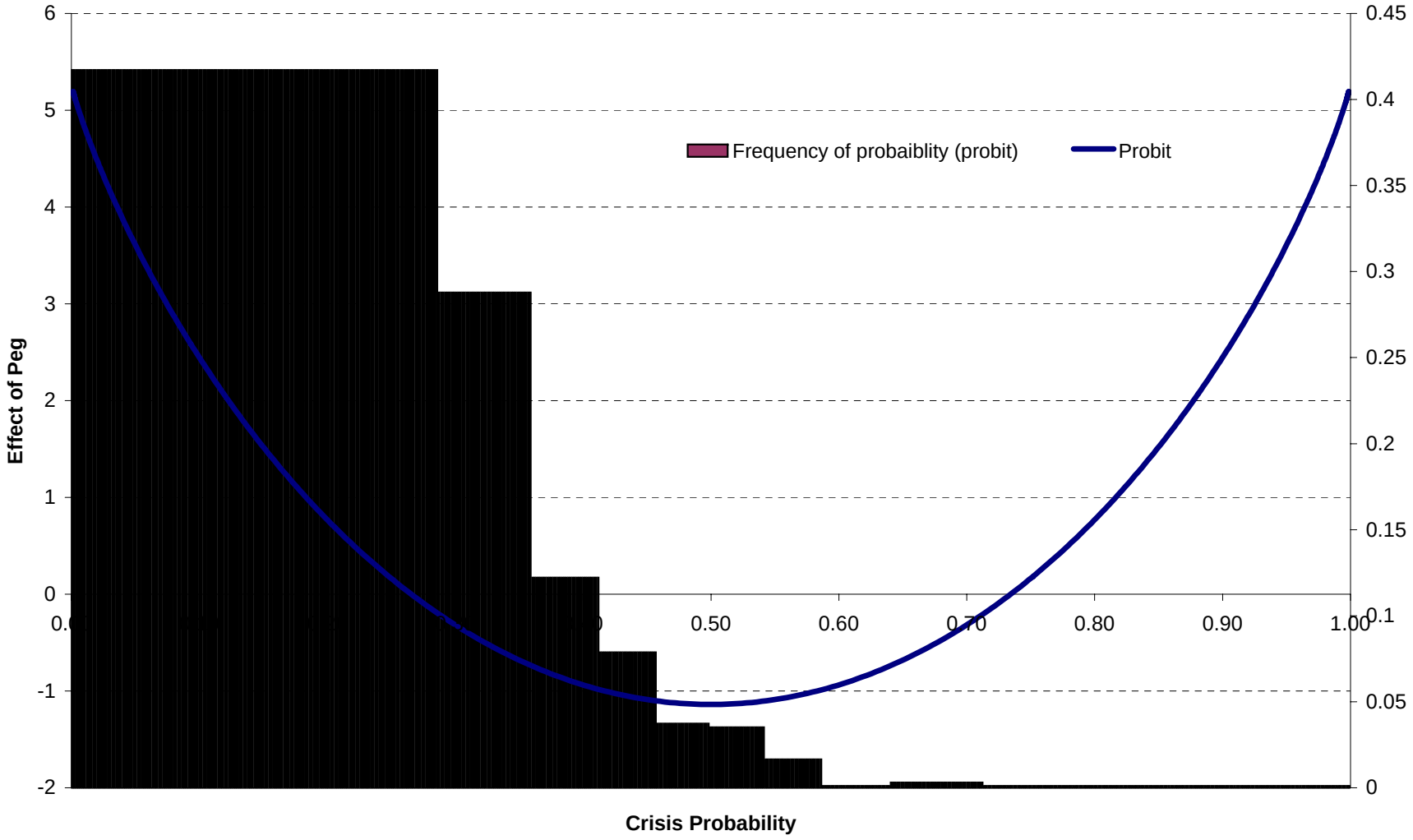

Figure 2: The Marginal Effect Of Capital Controls And The Crisis Probability