



FESTSCHRIFT IN HONOR OF  
GUILLERMO A. CALVO  
APRIL 15-16, 2004

---

**GROWTH EFFECTS OF EXCHANGE RATE  
REGIMES AND CAPITAL ACCOUNT  
LIBERALIZATION IN THE PRESENCE OF  
CRISES: A NUANCED VIEW**

Assaf Razin  
Tel-Aviv University  
Cornell University

Yona Rubinstein  
Tel-Aviv University

# Growth Effects of Exchange Rate Regimes and Capital Account Liberalization in the Presence of Crises: A Nuanced View

Assaf Razin\* and Yona Rubinstein

April 7th, 2004, IN PROGRESS

## Abstract

Empirical growth equations are typically explained by (i) the history of the exchange rate regimes, (ii) capital market liberalization regimes, and (iii) actual balance of payments crises. The literature on the effects of policy switches on growth typically ignores the effect of policy on the likelihood of crises, and, in turn, the effect of crises on growth. It ignored a key explanatory variable, the probability of crisis, which is determined also by policy. Balance-of-payments policies affect growth both directly, and indirectly, through their effect on the probability of a crisis. The direct and indirect effects, however, typically work through the economic system in different directions. In this paper, therefore, we develop an econometric approach aimed at evaluating balance-of-payments policy by incorporating both the direct and indirect channels. Using sample of 100 countries over the period 1970 to 1998, we estimate the effects of balance-of-payments policy on growth.

We find that : (i) While policy switches do affect the crisis probability, policy levels do not; (ii) Ignoring country fixed effects we find, controlling for the likelihood of facing a crisis, that both policy switches as well as policy levels affect growth, however, conditioning out country-time-invariant heterogeneity we that only policy switches affect growth. As for the long run effects, it is hard to distinguish between what is known as country fixed effects, and permanent effects of exchange rate regime and capital controls on growth.

---

\*Mario Henrique Simonsen Professor of Public Economics, Tel-Aviv University and Friedman Professor of International Economics, Cornell University. E-mail address: razin@post.tau.ac.il.

# 1 Introduction

Stanley Fischer (2001) observes 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 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.” This observation conforms to 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, to balance of payments crises. This is the familiar and simple logic behind the first-generation currency crises models.

However, a more nuanced view of the peg will recognize that by fixing their currencies to international moneys (the Dollar or the Euro), emerging economies with fiscal discipline, that are rapidly accumulating exchange reserves through export growth, are also able to maintain a high saving ratio, provide certainty to business, and profit margins to investors, based on a low and stable country specific rate of interest. Consequently, in case that the economy retains the confidence of the international investors under a peg, its performance is good: output growth is high, while inflation is low.

Taking this nuanced view seriously, we can see why switching from a float to a peg presents the economy with a trade-off: on the one hand, the risk of a currency crisis is aggravated; but, on the other hand, if a currency crisis is avoided, the economy may actually perform better than what it would be under a float.

Trade-offs concerning the choice of exchange rate regimes are faced by policy makers when developing countries struggled with high inflations. A switch from float to peg served as an ingredient of the stabilization package. Examples are Israel (in 1985), and Argentina in (1991), underpinned the anti-inflation policy package by an exchange rate targeting. Argentina adopted a hard peg (a currency board), with a comprehensive capital market

liberalization package, while Israel adopted a soft peg (crawling peg), with only a phased out process towards capital market liberalization. As might have been expected, given the world economy recession after the after Israel's stabilization and the world economy boom that followed the Argentine's inflation stabilization, Argentina grew faster than Israel in the immediate aftermath of the float-peg policy switch. However, eventually Argentina underwent a catastrophic currency and liquidity crisis, whereas Israel avoided a major crisis. Ten years after the float-peg policy switch, the accumulated growth in Argentina was negative<sup>1</sup>, while accumulated growth trend in Israel was positive .

One would expect that a cross-country empirical analysis of float-peg policy switch could be conclusive; but this has not been the case at all. Indeed, it has been conspicuously difficult to identify clear-cut empirical real effect of exchange-rate regimes on the real side of the open economy. And, even in the Argentina-Israel comparison, it is by no means transparent what role the peg had been playing. This paper put forth the idea that by incorporating the *probability* of a crisis, which gauges the expectations of the state of the economy, into the empirical analysis we can disentangle the "good" and the "bad" effects of the peg. Similarly, we can identify "good" and the "bad" effects of capital account liberalization.

The theory, however, does not provide a clear guide as to the role of expectations in the multiple-equilibrium financial-market theory the *probability* of a crisis might could only weakly be related to fundamentals.<sup>2</sup> This feature of the theory runs counter to the intuition that bad fundamentals are more likely to trigger a currency crisis. Ultimately, the question is whether observed fundamentals, such as government deficits, are suffi-

---

<sup>1</sup>As Paul Krugman puts it, "Argentina, once a showpiece for the new world order, quickly became a byword for economic catastrophe" (The New York Times, January 6, 2004).

<sup>2</sup>The 1992 EMS currency crisis inspired the second-generation models as in Obstfeld (1994). He explained crises as a consequence of a conflict between fixed exchange rate and the the central bank desire to pursue more expansionary monetary policy than what is consistent with the exchange rate and capital market regimes. The resulting pressure in the foreign exchange market can lead to multiple self-fulfilling expectations equilibria. The emerging market currency crises of 1997-8 inspired the third generation model of currency crises, generating a subtle mechanism with multiple self-fulfilling expectations equilibria.

cient to explain crisis outcomes; or whether there is a large unexplained component, that is attributed to self-fulfilling expectations. Indeed, later financial-crisis theory demonstrates that even a small amount of uncertainty with respect to the fundamentals, in the presence of asymmetric information, can transform the same analytical framework into fundamentals-driven models.<sup>3</sup> For example, Morris and Shin (2000) develop a model where the fundamentals and the crisis-driven outcomes are *correlated*. In this literature, self-fulfilling beliefs can be summarized by a unique probability of crisis. The probability is a function of observed fundamentals. Specifically, when the fundamentals are weak, the probability is large, and vice versa. The asymmetric-equilibrium setup implies that fundamentals-driven market expectations determines ultimately the observed performance of the economy. An implication is that output growth depends not only on the history of currency crises, capital liberalization, and monetary regimes, as in the traditional empirical work, but also on the *probability* of a crisis.

The paper develops an empirical approach in order to delineate the “good” and the “bad” effects on growth from a switch between a peg and a float, by incorporating the role of expectations. We also extend the analysis to accommodate a policy switch from capital controls to capital market liberalization, which is closely related to the exchange-rate regime nexus. Accordingly, we use the econometric framework to identify the effects of switching between a float and a peg, and discrete changes in capital-market liberalization regime, on growth. Our main objective is to explain empirically the effects of these policies in on output growth, for economies where balance-of-payments crises are likely. We define sharp depreciations in the real exchange rate, as the measure of a balance-of-payments “crisis”, rather than free falls in the nominal exchange rate, as has been the tradition in the balance-of-payments literature. In doing so we attempt to capture in the effects of crisis on the real side of the economy. Specifically, we think of a channel which emphasizes the role of companies’ balance-sheets in determining their ability to invest; and also the way these companies react to large and unexpected real depreciations. Evidently, unexpected fluctuations in the real exchange rate, rather than the fluctuations in the

---

<sup>3</sup>See, for example, Goldstein and Pauzner (1999).

nominal exchange rate, are likely to have such balance-sheet effects.<sup>4</sup>

## 2 Literature

Calvo and Reinhart (2000), and others, have emphasized that many countries that claim to have floating exchange rates do not effectively allow the exchange rate to float freely, but rather deploy interest rate and intervention policy to affect its behavior. From this valid point they appear to draw two conclusions: first, that the claim that countries are moving away from adjustable peg exchange rate systems is incorrect; and second, that countries for good reasons hanker after fixed exchange rates, which they can best obtain through hard pegs. It may have been a reason why the literature has had remarkable difficult empirical task to identify clear-cut empirical real effect of monetary regimes on the open economy. Indeed, Marianne Baxter and Alan Stockman (1989) and Robert P. Flood and Andy Rose (1995) find that there are no significant differences in business cycles across exchange rate regimes.<sup>5</sup>

No definitive view emerges as to the aggregate effects of capital account liberalizations. Eichengreen (2001) overviews the literature pointing to the lack of the profession's understanding of the policies. Rodrik (1998) finds no significant statistical association between capital account openness and growth. A more definite view concerning positives effect of capital account liberalization on output, which is advanced by Fischer (1998), is supported by evidence provided by Quinn (1997). The role of preexisting policies, and of trade-account-capital-account sequencing, in determining the effects of capital control liberalization on growth and investment, is examined by Arteta, Eichengreen and Wyplosz

---

<sup>4</sup>See Krugman (2000), and Allen, Rosenberg, Keller, Sester, and Roubini (2002).

<sup>5</sup>An exception is an Economic Policy paper by Andy Rose (Issue 30, 2000: pp. 7-45). In the paper Rose uses evidence from existing currency unions in the world economy, to estimate the effect of currency union on 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 analysis was challenged by Torsten Persson (Economic Policy, Volume 33). But he also find significant, albeit a more modest, effect of currency unions.

(2001) and Chinn and Ito (2002).

## 3 Data

### 3.1 Data set

Our original data set consists of 106 low-and middle-income countries (48 African countries, 26 Asian countries, 26 countries from Latin America and the Caribbean and 5 European countries). A subset of 100 countries, for which we have complete data, is listed in Table 1. The main source of data is the World Bank (World Development Indicators and Global Development Finance). The annual data ranges from 1971 to 1996. Data was assembled by Gian Maria Milesi-Ferretti and Assaf Razin (2000, in Krugman (ed.), *Currency Crises*, University of Chicago Press). Capital-controls data are a weighted average index of several categories restrictions on capital account transactions reported in the IMF's **Annual Report on Exchange Arrangements and Exchange Restrictions**.<sup>67</sup>

### 3.2 Definitions and description of data

We use binary variable to define policies and crisis state. Since we estimate the effect of policy change using changes over time within countries we distinguish between peg and float ignoring more refine classification. Similarly we use two way classification for capital controls policies. As for crisis: the balance of payments crisis is defined by sharp depreciations of the *real exchange rate*. We use the threshold of a 15 percent real depreciation per year.

---

<sup>6</sup>These are rule-based, but not quantitative measures. See also Edison et al (2004).

<sup>7</sup>The IMF standard 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, was completely revamped by the pioneering work of Carmen Reinhart and Ken Rogoff (2004) They classify the regimes in a range from free falling to a hard peg like in the CFA franc zone in Africa. We look at episodes of a switch from broad categories of float (ranging from free falling, through freely floating, to managed floating) to broad categories of peg (ranging from limited flexibility to peg).

We intend to incorporate the new classification into our model in the near future.

Table 2 describes the frequency of crisis, switches between float and peg, and changes in capital account policy.

## 4 Econometric Framework

There are two main econometric issues in evaluating the effect of exchange rate regime switch and the liberalization of capital flows. First, both policies are not exogenous to the growth process nor to the likelihood of currency crises. Second, policies work through two channels, with potentially conflicting effect on growth. Therefore, evaluating the unconditional effect of a policy on growth generates a biased estimator of the conditional (*ceteris paribus*) effect of a policy on growth.

### 4.1 The statistical model

Let  $Y_{1,j,t}$  denote the growth rate of country  $j$  in time  $t$  as measured in terms of GDP per capita (growth rates).

Let  $Y_{2,j,t}^*$  denote a latent variable indicating a threshold state of the economy: If  $Y_{2,j,t}^* > 0$  a currency crises occurs; if  $Y_{2,j,t}^* \leq 0$  a currency crises does not occurs. That is:

$$Y_{2,j,t} = \begin{cases} 1 & \text{if } Y_{2,j,t}^* \geq 0 \\ 0 & \text{else} \end{cases}$$

whereas  $Y_{2,j,t}$  is a binary variable which equals 1 if currency crises occurs in country  $j$  at time  $t$ .

We assume that two policies: (i) a float-peg policy and (ii) a liberalization-controls policy. To simplify assume that policy decision is binary. Denote by  $D_1$  the float-peg policy and by  $D_2$  the liberalization-controls policy:

$$D_{1,j,t} = \begin{cases} 1 & \text{if peg} \\ 0 & \text{if float} \end{cases}$$

and:

$$D_{2,j,t} = \begin{cases} 1 & \text{if capital controls} \\ 0 & \text{if liberalization} \end{cases}$$

Therefore we could write the system as follows:

$$Y_{1,j,t} = \beta_1 X_{j,t} + \gamma_1 D_{1,j,t} + \delta_1 D_{1,j,t} + \phi_1 Y_{2,j,t} + \theta_1 Z_{1,j,t} + \varepsilon_{1,j,t}$$

•

$$Y_{2,j,t}^* = \beta_2 X_{j,t} + \gamma_2 D_{1,j,t} + \delta_2 D_{1,j,t} + \phi_2 Y_{1,j,t} + \theta_2 Z_{2,j,t} + \varepsilon_{2,j,t}$$

Whereas  $X_{j,t}$  is a vector of country specific exogenous variables and  $\varepsilon_{i,j,t}$  is a country specific *i.i.d.* random shock. We assume there are exogenous variables, such as  $Z_{1,j,t}$  and  $Z_{2,j,t}$  that affect  $Y_{1,j,t}$  and  $Y_{2,j,t}$ . (We introduce these variables for identification). Note that we assume that market participants know in real time the state of the economy.

Let  $P_{j,t}$  be the conditional probability that country  $j$  will face currency crisis in period  $t$ . Given our assumption,

$$P_{j,t} = \Pr(Y_{2,j,t} = 1 \mid \cdot) = \Phi(\beta_2 X_{j,t} + \gamma_2 D_{1,j,t} + \delta_2 D_{1,j,t} + \phi_2 Y_{1,j,t} + \theta_2 Z_{2,j,t} + \varepsilon_{2,j,t})$$

where  $\Phi$  is the cdf of the unit normal distribution (above).

Note that we can identify the parameters of the “crisis-selection” equation by estimating the following Probit equation:

$$Y_{2,j,t} = \Phi(\beta_2 X_{j,t} + \gamma_2 D_{1,j,t} + \delta_2 D_{1,j,t} + \phi_2 Y_{1,j,t} + \theta_2 Z_{2,j,t} + \varepsilon_{2,j,t}) \quad (1)$$

Where the projected likelihood for :

$$\hat{Y}_{2,j,t} = \Phi(\hat{\beta}_2 X_{j,t} + \hat{\gamma}_2 D_{1,j,t} + \hat{\delta}_2 D_{1,j,t} + \hat{\phi}_2 Y_{1,j,t} + \hat{\theta}_2 Z_{2,j,t}) \quad (2)$$

Typically policy action is endogenous. Thus obviously we cannot identify the parameters of interest using the OLS estimators for equations (1) and (2). Therefore, we use lag variables to instrument policy variables  $D_{1,j,t}$  and  $D_{2,j,t}$ .

## 4.2 Incorporating the likelihood of a currency crisis in policy evaluation

What is the effect of ignoring the likelihood of a currency crisis in evaluating the effect of peg-float or liberalization-controls policies on growth?

The estimated growth effect of  $D_1$  and  $D_2$  when the likelihood of a currency crisis is ignored are:

$$E(\hat{\gamma}_1^{IV}) = \frac{\partial E(Y_{1,j,t} | X_{j,t}, D_{1,j,t}^{IV}, D_{1,j,t}^{IV}, Z_{1,j,t})}{\partial D_{1,j,t}} = \gamma_1 + \phi_1 \frac{\partial \hat{Y}_{2,j,t}}{\partial D_{1,j,t}} \quad (3)$$

and:

$$E(\hat{\delta}_1^{IV}) = \frac{\partial E(Y_{1,j,t} | X_{j,t}, D_{1,j,t}^{IV}, D_{2,j,t}^{IV}, Z_{1,j,t})}{\partial D_{2,j,t}} = \delta_1 + \phi_1 \frac{\partial \hat{Y}_{2,j,t}}{\partial D_{2,j,t}} \quad (4)$$

where  $D_{1,j,t}^{IV}$ ,  $D_{2,j,t}^{IV}$  are the instrumented policy actions.

It is common wisdom that the likelihood of currency crisis has a negative effect on growth:

$$\phi_1 < 0$$

It is also common to assume that a peg exchange rate increases the likelihood of a currency crisis (all other things equal), and that capital controls reduce the probability of such a crisis:

$$\begin{aligned} \frac{\partial \hat{Y}_{2,j,t}}{\partial D_{1,j,t}} &> 0 \\ \frac{\partial \hat{Y}_{2,j,t}}{\partial D_{2,j,t}} &< 0 \end{aligned}$$

- Therefore:

$$E(\hat{\gamma}_1^{IV}) = \gamma_1 + \phi_1 \frac{\partial \hat{Y}_{2,j,t}}{\partial D_{1,j,t}} < \gamma_1 > 0 \quad (5)$$

and:

$$E(\hat{\delta}_1^{IV}) = \delta_1 + \phi_1 \frac{\partial \hat{Y}_{2,j,t}}{\partial D_{2,j,t}} > \delta_1 < 0 \quad (6)$$

Hence, by ignoring the likelihood of a currency crisis in evaluating the effect of peg-float or liberalization-controls policies on growth, one understates the effect of each one of these policies on growth, other things equal. Namely, the ceteris paribus positive effect of a peg policy on growth is biased downwardly to zero and the ceteris paribus negative effect of capital controls on growth is upwardly biased toward zero.

Why should a policy maker care about the ceteris paribus effect of a policy rather than the reduced form effect?

Our model makes clear that the overall effect of policy ( $D_1$  and  $D_2$ ) is intrinsically *non-linear*, via the *crisis-probability channel*. There is a range in which the effect of policy on the likelihood of a crisis is substantial, but there are others where it is not. The expected ceteris paribus effect of a policy switch varies with the probability of a currency crisis.

Exogenous shocks to the underlying economy may switch the desired policy. For instance, consider the episodes of inflation stabilization in Argentina and Israel in which policy switched from float to peg.

Argentina adopted a hard peg (currency board) while Israel adopted a more flexible peg policy. Consequently, the likelihood of currency crisis in Argentina was substantially higher than in Israel. As expected Argentina grew faster than Israel in the aftermath of the policy switch. However, consistent with the prediction of the model, Argentina eventually faced a severe currency crisis which Israel avoided. Ten years after the policy switch growth in Argentina was negative while growth in Israel was steadily positive.

## 5 Findings

We estimate both the short as well as the long run effects of exchange and capital controls regimes on growth, controlling for their effect on the likelihood of crisis. We report our findings in Table 3 and Table 4.

We start with the effects of exchange and capital controls switches (that is, the short-run effect). We do so with and without country fixed effects. To underscore the role of policy on growth via its effect (indirect) on crisis, we estimate each specification twice. First, we ignore the probability of having a crisis on growth; Second, we incorporate the effect of policies on the likelihood of facing a balance of payments crisis.

Two main facts emerge from Table 3: (i) Policy switches do affect the likelihood of a crisis: by switching from float to peg the probability of a crisis increases by approximately 30 percent; similarly by imposing capital controls the likelihood of a crisis declines by the same order of magnitude. (ii) Ignoring the crisis probability in the growth equation we

find negligible effects of policy switches; however, controlling for the crisis probability we find a substantial positive effect of a switch from float to peg and a negative effect, in a similar order of magnitude, of imposing capital controls.

Turning to the effects in the short and the long run (Table 4) we find: (i) While policy switches do affect the crisis probability, policy levels do not; (ii) Ignoring country fixed effects we find, controlling for the likelihood of facing a crisis, that both policy switches as well as policy levels affect growth, however, conditioning out country-time-invariant heterogeneity we find that only policy switches affect growth. These findings point out the role of policy switches. As for the long run effects, it is hard to distinguish between what is known as country fixed effects and the permanent effects of exchange rate regime and capital controls on growth.

## 6 Concluding Remarks

1. Many developing countries, which switched from float to peg, did so as a means of stabilizing inflation.<sup>8</sup> Both Israel (in 1985) and Argentina in (1991) switched from float to peg to underpin their anti- inflation policy package. Policy-switch episodes of this type were common in Latin America throughout the 1990s. Potentially, such a switches may have two major effects on future output growth: The consequent low inflation-low rate of interest macroeconomic background is good for growth; but the possibility of a currency crisis, which is associated with the peg, is bad for output growth. The potential for a currency crisis, which existed both in the Israeli peg and the Argentina peg, is, however, unobserved. A significant currency crisis actually happened in Argentina, not in Israel, owing among other things, to a particular realization of domestic and external shocks. A regression that relates output growth to observed currency crises could not disentangle the good and the bad effects of the switch from float to peg. Because, in one case (Israel) the actual effect was positive, while in the other case (Argentina) the actual effect was negative.
2. Our model makes clear that the overall effect of balance-of-payments policy is intrinsically *non-linear*, via the *crisis-probability channel*. There is a range of the explanatory variables in which the effect of policy on the likelihood of a crisis is substantial, whereas there are other ranges where it is not. The expected ceteris paribus effect of a policy switch varies with the magnitude of the *crisis-probability*. Accordingly,

exogenous shocks to the underlying economy may switch the desired policies, exchange

---

<sup>8</sup>Kenneth S. Rogoff (2003), pp54-55) notes that “Global inflation has dropped from around 30 percent a year in the early 1990s to under 4 percent today.” Globalization, interacting with deregulation and privatization, has played a strong supporting role in disinflation episodes. We recall that the disinflation episodes were to a large part associated with a switch from float to peg. Globalization increases competition. It therefore drives down inflation both directly (that is, cutting monopolistic mark-ups), and indirectly (that is, it diminishes the temptation of central bankers to create inflation surprises; because unanticipated inflation is less potent in raising output).

rate regime and capital account liberalization. For instance, consider the episodes of inflation stabilization in Argentina and Israel in which policy switched from float to peg. Argentina adopted a hard peg (currency board) while Israel adopted a more flexible peg policy. Consequently, the *crisis-probability* in Argentina was substantially higher than in Israel. Argentina has not switched policies on time, and eventually faced a severe currency crisis; Israel switched capital-account policies when the *crisis-probability* became relatively low, and avoided severe financial crises. Ten years after the policy switch growth in Argentina was negative while Israel enjoyed steady growth trend.

1. An extension could address the related issue of dollarization. Conventional wisdom suggests that a switch from a float to a peg reinforces dollarization. Currency crises in dollarized economies are expected to be triggered by self-fulfilling expectations, and have adverse output effects through a balance-sheet-crisis mechanism (as in Paul Krugman (2000)). See Carmen Reinhart, Ken Rogoff and Miguel Savastano (2004), who find that, dollarization appear to increase exchange rate pass-through, which may reinforce the claim that “fear of floating” is a greater problem for highly dollarized developing economies.

2. TBA

## References

- [1] Allen, Mark, Christoph Rosenberg, Christian Keller, Brad Sester, and Nouriel Roubini, "A Balance Sheet Approach to Financial Crisis," IMF WP/02/210, International Monetary Fund.
- [2] Ariyoshi, Akira, Karl Habermeier, Bernard Laurens, Incintker-Robe, Jorge Ivan Canales-Kriljenko, and Andrei Kirilenko (2000). Capital Controls: Country Experiences with Their Use and Liberalization, IMF Occasional Paper 190.
- [3] Arteta, Carlos, Barry Eichengreen, and Charles Wyplosz, (2001). "When Does Capital Account Liberalization Help More Than It Hurts?" NBER Working Paper No. 8414.
- [4] Baxter, Marianne, and Alan Stockman (1989) "Business Cycle and Exchange Regime: Some International Evidence," *Journal of Monetary Economics* Vol. 23, 377-400
- [5] Bhagwati, Jagdish (1998). "The Capital Myth", *Foreign Affairs*, 77, 3 (May-June), 7-12.
- [6] Broda, Christian (2000). "Coping with Terms of Trade Shocks: Pegs vs. Floats", in Alberto Alesina and Robert Barro (editors), *Currency Unions*, forthcoming. Stanford: Hoover Institution Press.
- [7] Calvo, Guillermo A. (2000). "Capital Markets and the Exchange Rate, With Special Reference to the Dollarization Debate in Latin America", University of Maryland, (April).
- [8] ——— and Carmen M. Reinhart (2000). "Fear of Floating", NBER Working Paper 7993 (November).
- [9] ——— (2000). "Reflections on Dollarization", in Alberto Alesina and Robert Barro (editors), *Currency Unions*, forthcoming. Stanford: Hoover Institution Press.

- [10] ———, Carmen M. Reinhart, and Carlos A. Vegh (1995). "Targeting the Real Exchange Rate: Theory and Evidence", *Journal of Development Economics*, 47, 97-133.
- [11] ——— and Carlos Vegh (1999). "Inflation Stabilization and BOP Crises in Developing Countries", NBER Working Paper 6925.
- [12] Chang, Roberto and Andres Velasco (2000). "Exchange Rate Policy for Developing Countries", *American Economic Review, Papers and Proceedings*, 90, 2 (May), 71-75.
- [13] Chinn, Menzie D. and Hiro Ito (2002). "Capital Account Liberalization, Institutions and Financial Development: Cross Country Evidence," NBER Working Paper No. 8967.
- [14] Edison, Hali ; Klein, Michael ; Ricci, Luca A. ; Slok, Torsten M. (2004), "Capital Account Liberalization and Economic Performance: Survey and Synthesis," **IMF Staff Papers**, Vol 51
- [15] Edwards, Sebastian (1999). "How Effective are Capital Controls?", *Journal of Economic Perspectives*, 13, 4 (Fall), 65-84.
- (2000). "Exchange Rate Regimes, Capital Flows and Crisis Prevention", NBER (December).

## References

- [1] Eichengreen, Barry, (2001). "CapitalAccount Liberalization: What Cross-Country Studies Tel Us?" *World Bank Economic Review*,15: 341-365.
- [2] Eichengreen, Barry and Ricardo Hausmann (1999). "Exchange Rates and Financial Fragility", NBER Working Paper 7418 (November).
- , Paul Masson, Hugh Bredenkamp, Barry Johnston, Javier Haman, Esteban

## References

- [1] Jadresic, and Inci Mtker (1998). Exit Strategies: Policy Options for Countries Seeking Greater Exchange Rate Flexibility, IMF Occasional Paper 168.
- [2] Fischer, Stanley (1998). "Capital-Account Liberalization and the Role of the IMF", in *Should the IMF Pursue Capital-Account Convertibility? Princeton Essays in International Finance, 2007: 1-10*. Princeton University, International Finance Section,
- [3] ——— (2000). "Ecuador and the IMF", in Alberto Alesina and Robert Barro (editors), *Currency Unions*, forthcoming. Stanford: Stanley Fischer, (2001) "Exchange Rate Regimes: Is the Bipolar View Correct?", Delivered at the Meetings of the American Economic Association Hoover Institution Press.
- [4] Flood, Robert P. , and Andy Rose (1995), "Fixing Exchange Rates: A Virtual Quest for Fundamentals," *Journal of Monetary Economics*.
- [5] Frankel, Jeffrey A. (1999). No Single Currency Regime is Right for All Countries or At All Times, Princeton University, International Finance Section, *Essays in International Finance*, No. 215 (August).
- [6] Ghosh, Atish R., Anne-Marie Gulde, Jonathan D. Ostry, and Holger C. Wolf (1997). "Does the Nominal Exchange Rate Regime Matter?", NBER Working Paper 5874 (January).
- [7] Ghosh, Atish R., Anne-Marie Gulde, and Holger C. Wolf (2000). "Currency Boards: More than a Quick Fix?", *Economic Policy* 31 (October), 270-335.
- [8] Goodhart, Charles and Dirk Schoenmaker (1995). "Should the Functions of Monetary Policy and Bank Supervisor be Separated?", *Oxford Economic Papers*, 47, 539-560.
- [9] Goldstein, Itay and Ady Pauzner (1999), "Endogenous Probability of Bank Runs in a Rational Expectations Model," Tel Aviv University.

- [10] Hanke, Steve H. and Kurt Schuler (1994). *Currency Boards for Developing Countries*. International Center for Economic Growth. San Francisco: ICS Press.
- [11] Hausmann, Ricardo, Michael Gavin, Carmen Pages-Serra and Ernesto Stein, (1999). "Financial Turmoil and the Choice of Exchange Rate Regime", Inter-American Development Bank, Working Paper 400.
- [12] IMF, **Annual Report on Exchange Arrangements and Exchange Restrictions**, various years.
- [13] Isard, Peter and Hamid Faruquee, eds (1998). *Exchange Rate Assessment: Extensions of the Macroeconomic Balance Approach*, IMF Occasional Paper 167.
- [14] Kaplan, Ethan and Dani Rodrik (2000). "Did the Malaysian Capital Controls Work?", Kennedy School of Government (December).
- [15] Kenen, Peter (2000). "Currency Areas, Policy Domains, and the Institutionalization of Fixed Exchange Rates", Princeton University (April).
- [16] Krugman Paul (2000), "Balance Sheets, the Transfer Problem, and Financial Crises," in *International Finance and Financial Crises : Essays in Honor of Robert P. Flood, Jr*, edited by Peter Isard, Assaf Razin, and Andy Rose , Kluwer Academic Publishers.
- [17] McKinnon, Ronald and Huw Pill (1999) "Exchange Rate Regimes for Emerging Markets, Moral Hazard, and International Overborrowing," *Oxford Review of Economic Policy*.
- [18] Krugman, Paul (2000), "Balance Sheets, The Transfer Problem, and Financial Crises," in *International Finance and Financial Crises: Essays in Honor of Robert P. Flood, Jr*. Edited by Peter Isard, Assaf Razin, and Andrew K. Rose, Kluwer Academic Publishers, pp. 31-44.
- [19] Levy-Yeyati, Eduardo and Federico Sturzenegger (2000). "Exchange Rate Regimes and Economic Performance", paper presented at IMF First Annual Research Conference (November).

- [20] Masson, Paul (2000). "Exchange Rate Regime Transitions", IMF Working Paper, WP/00/134 (July).
- [21] Mussa, Michael, Paul Masson, Alexander Swoboda, Esteban Jadresic, Paolo Mauro, and Andrew Berg (2000).
- [22] Exchange Rate Regimes in an Increasingly Integrated World Economy, IMF Occasional Paper 193.
- [23] Morris Stephen and Hyun Song Shin (2000), "Rethinking Multiple Equilibria in Macro Modeling," NBER Macroeconomic Annual 2000, pp. 139-161.
- [24] Obstfeld, Maurice (1994), "The logic of Currency Crises," *Cahiers Economique et Monetaires*, 43, 189-212.
- [25] Obstfeld, Maurice and Kenneth Rogoff (1995). "The Mirage of Fixed Exchange Rates", *Journal of Economic Perspectives*, 9, 4 (Fall), 73-96.
- [26] Quinn, Dennis, (1997), "The Correlates of Change in International Financial Regulation," *American Political Science Review*, Vol. 91, No. 3, (September), pp.531-51.
- [27] Reinhart, Carmen, and Ken Rogoff (2004), "The Modern History of Exchange Rate Arrangements: A Reinterpretation," *Quarterly Journal of Economics*, Vol. 119, Issue 1, February, pp. 1 - 48.
- [28] Reinhart, Carmen, Ken Rogoff and Miguel Savastano (2004), NBER Working Paper # 10015, forthcoming in the QJE.
- [29] Rogoff, Kenneth S. (2003), "Disinflation: An Unsung Benefit of Globalization," *Finance and Development*, December, pp54-55.
- [30] Rodrik, Dani, (1998), "Who needs Capital-Account Convertibility?" *Princeton Essays in International Finance*, 207: 55-65.
- [31] Summers, Lawrence H. (2000). "International Financial Crises: Causes, Prevention, and Cures", *American Economic Review, Papers and Proceedings*, 90, 2 (May), 1-16.

- [32] Velasco, Andres, (2003), Review of *Argentina and the Fund: From Triumph to Tragedy*, by Michael Mussa, *Journal of Economic Literature*, December, Vol. XLI, Number 4, pp.1291-1293.
- [33] Williamson, John (2000). Exchange Rate Regimes for Emerging Markets: Reviving the Intermediate Option. Washington, DC: Institute for International Economics (September).

Figure 1:

Figure 2:

Figure 3:

Figure 4:

**Table 1:**  
**The Frequency of Crises, Switches Between Float and Peg and**  
**Switches between Capital Controls and Liberalizations (%)**

---

---

<b>Variable</b>	<b>Frequency</b>
Crsises	22.61
Switches to peg	1.71
Switches to float	3.91
Switches to controls	1.03
Switches to liberalizations	0.9

---

**Table 2:**  
**List of Countries**

---

(1)	Algeria	(51)	Malawi
(2)	Argentina	(52)	Malaysia
(3)	Bangladesh	(53)	Maldives
(4)	Barbados	(54)	Mali
(5)	Belize	(55)	Malta
(6)	Benin	(56)	Mauritania
(7)	Bhutan	(57)	Mauritius
(8)	Bolivia	(58)	Mexico
(9)	Botswana	(59)	Morocco
(10)	Brazil	(60)	Myanmar
(11)	Burkina Faso	(61)	Nepal
(12)	Burundi	(62)	Nicaragua
(13)	Cameroon	(63)	Niger
(14)	Cape Verde	(64)	Nigeria
(15)	Central African	(65)	Oman
(16)	Chad	(66)	Pakistan
(17)	Chile	(67)	Panama
(18)	China	(68)	Papua New Guinea
(19)	Colombia	(69)	Paraguay
(20)	Comoros	(70)	Peru
(21)	Congo	(71)	Philippines
(22)	Cote d'Ivoire	(72)	Portugal
(23)	Dominican Rep.	(73)	Romania
(24)	Ecuador	(74)	Rwanda
(25)	Egypt, Arab Rep	(75)	Sao Tome and Pr
(26)	El Salvador	(76)	Senegal
(27)	Equatorial Guin	(77)	Seychelles
(28)	Ethiopia	(78)	Sierra Leone
(29)	Fiji	(79)	Solomon Islands
(30)	Gabon	(80)	Somalia
(31)	Gambia, The	(81)	South Africa
(32)	Ghana	(82)	Sri Lanka
(33)	Grenada	(83)	St. Vincent
(34)	Guatemala	(84)	Sudan
(35)	Guinea	(85)	Swaziland
(36)	Guinea-Bissau	(86)	Syrian Arab Rep
(37)	Guyana	(87)	Tanzania
(38)	Haiti	(88)	Thailand
(39)	Honduras	(89)	Togo
(40)	Hungary	(90)	Trinidad and To
(41)	India	(91)	Tunisia
(42)	Indonesia	(92)	Turkey
(43)	Iran, Islamic R	(93)	Uganda
(44)	Jamaica	(94)	Uruguay
(45)	Jordan	(95)	Vanuatu
(46)	Kenya	(96)	Venezuela
(47)	Lao PDR	(97)	Western Samoa
(48)	Lesotho	(98)	Zaire
(49)	Liberia	(99)	Zambia
(50)	Madagascar	(100)	Zimbabwe

**Table 3:**  
**Exchange Regime and Capital Controls: Short Run Effects**

<b><u>Panel A: Dependent Variable: Growth Rates</u></b>				
<b>Variables</b>	<b>OLS (i)</b>	<b>OLS (ii)</b>	<b>FE (iii)</b>	<b>FE (iv)</b>
Switching to peg between t-2 to t-1	<b>1.6423</b> (0.7503)*	<b>4.6209</b> (1.4795)**	<b>1.2041</b> (0.9958)	<b>5.0215</b> (1.7630)**
Switching to float between t-2 to t-1	0.1761 (0.6483)	0.6383 (0.6692)	-0.0539 (0.7039)	0.2005 (0.7401)
Switching to Capital Controls between t-2 to t-1	<b>-1.8832</b> (0.8616)*	<b>-4.7173</b> (1.5363)**	<b>-1.9592</b> (1.0495)	<b>-6.3843</b> (2.0713)**
The probability of having currency crisis this year ^		<b>-9.6164</b> (5.0663)		<b>-12.7791</b> (4.9934)*
<b><u>Controllers</u></b>				
1970 GDP per capita	<b>-0.0012</b> (0.0005)*	<b>-0.0011</b> (0.0005)*	--	--
Currency crisis at time t-1	0.5612 (0.5949)	2.7602 (1.2740)*	0.7579 (0.4506)	2.5482 (0.8331)**
Currency crisis at time t-2	-2.1345 (0.6375)**	-1.5347 (0.7221)*	-1.6442 (0.4525)**	-2.2155 (0.4852)**
Growth rate at time t-1	0.2540 (0.0464)**	0.2552 (0.0469)**	0.1802 (0.0275)**	0.2267 (0.0312)**
Growth rate at time t-2	0.1093 (0.0366)**	0.1048 (0.0372)**	0.0069 (0.0274)	-0.0224 (0.0313)
<b><u>Panel B: Dependent Variable: Currency Crisis (0,1). 1 if REE(t)-REE(t-1)&gt;15% - Probit (dF/dX) estimators</u></b>				
1970's GDP per capita		0.0000 (0.0000)		--
Switching to peg between t-2 to t-1		<b>0.3125</b> (0.0991)**		<b>0.2893</b> (0.1028)**
Switching to float t-2 to t-1		<b>0.0557</b> (0.0510)		0.0325 (0.0516)
Switching to Capital Controls between t-2 to t-1		<b>-0.2656</b> (0.0470)**		<b>-0.3313</b> (0.0524)**
Currency crisis at time t-1		0.2299 (0.0377)**		0.1314 (0.0349)**
Currency crisis at time t-2		0.0563 (0.0296)		-0.0307 (0.0256)
Government def t-1 ^^		0.0000 (0.0000)		0.0000 (0.0000)
Country fixed-effects		<b>No</b>		<b>Yes</b>

**Note:**

Data includes 106 countries in the years 1970 to 1997

^ Currency crisis =1 if the real exchange rate increased by 15% between t-1 to t (1 STD)

All specifications include linear time trend

( ) Standard errors in parenthesis

\* significant at 5%; \*\* significant at 1%

**Table 4:**  
**Exchange Regime and Capital Controls: Short Vs. Long Run Effects**

**Panel A: Dependent Variable: Growth Rates**

Variables	OLS (i)	FE (ii)
Peg at time t-1	-0.6088 (0.2899)*	-0.1813 (0.4787)
Switching to peg between t-2 to t-1	3.9786 (1.2935)**	4.9046 (1.4604)**
Switching to float between t-2 to t-1	0.4657 (0.7124)	0.8090 (0.8382)
Capital Controls at t-1	-1.2843 (0.4539)**	-1.1997 (0.9385)
Switching to Capital Controls between t-2 to t-1	-1.2843 (0.4539)**	-5.9101 (1.7511)**
The probability of having currency crisis this year ^	-7.9131 (6.0140)	-13.7764 (4.4409)**
<b><u>Controllers</u></b>		
1970 GDP per capita	-0.0013 (0.0006)*	--
Currency crisis at time t-1	2.3069 (1.4183)	2.6221 (0.7543)**
Currency crisis at time t-2	-1.7389 (0.7269)*	-2.3438 (0.4911)**
Growth rate at time t-1	0.2481 (0.0456)**	0.2247 (0.0312)**

**Panel B: Dependent Variable: Currency Crisis (0,1). 1 if REE(t)-REE(t-1)>15% - Probit (dF/dX) estimator**

1970's GDP per capita	0.0000 (0.0000)	--
Peg at time t-1	-0.0192 (0.0221)	0.0368 (0.0361)
Switching to peg between t-2 to t-1	0.2798 (0.1029)**	0.2106 (0.1070)*
Switching to float t-2 to t-1	0.0801 (0.0567)	0.1085 (0.0674)
Capital Controls at t-1	-0.0383 (0.0283)	-0.1021 (0.0639)
Switching to Capital Controls between t-2 to t-1	-0.2491 (0.0513)**	-0.2820 (0.0646)**
Currency crisis at time t-1	0.2264 (0.0373)**	0.1255 (0.0345)**
Country fixed-effects	<b>No</b>	<b>Yes</b>

**Note:**

Data includes 106 countries in the years 1970 to 1997

^ Currency crisis =1 if the real exchange rate increased by 15% between t-1 to t (1 STD)

All specifications include linear time trend

( ) Standard errors in parenthesis

\* significant at 5%; \*\* significant at 1%