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EXCHANGE RATE REGIME
CHOICE AND CURRENCY CRISES

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Abstract

This paper aims to fill the gap between exchange rate regime choice and currency crises literatures. Through explicitly taking into account the exchange rate regime choice of countries in explaining the occurrence of currency crisis, it is tempting to think that sources of vulnerabilities, eventually leading countries to crises, might be different according to the exchange rate regime adopted by a country. This paper contributes to the empirical literature by assessing whether currency crises have regime-specific features. We propose a way to transform the variables exhibiting regime-specific features to solve the problems encountered in the empirical literature. Our regression results suggest that the odds of a crisis increase significantly in countries where chosen regimes are inconsistent with their features. In addition to standard macroeconomic indicators, countries' regime choice should also consider what is being imposed by the natural determinants of the regime choice. Our sample consists of 163 developed and developing countries and covers the period from 1990 to 2007.

1. Introduction

This paper intends to build the link between the literatures of exchange rate regime choice (ERRC) and currency crisis (CC). As revealed by studies in the ERRC literature, countries make their regime choice depending on many factors. The currency crisis, on the other hand, is taken by a majority of empirical studies as an issue independent of the regime choice made. The ever-growing literature on currency crisis has little to say on the regime-specific determinants of the crisis.

As Frankel (1999) put it; “the choice of exchange rate arrangement should depend on the particular circumstances facing the country in question”. What happens if the particular choice of regime does not match those particular circumstances? Is there a link between a country’s features, that govern its exchange rate regime choice, and the occurrence of a crisis? Are crises all similar, independent of the regime choice made? This study aims to answer such questions; it constitutes the first formal treatment of the regime-specific currency crisis. Following the literature review, we will mention theories on ERRC literature, namely Optimum Currency Area (OCA), political and financial views. After discussing the link between the ERRC and CC, a section is devoted to the methodology of the paper where we will present the analytical tools and proposals to modify the conventional empirical approach, and in the final section, we conclude.

2. Literature Review

Currency crises have long been a field of interest for scholars. The deepening of trade and financial interdependence among countries has caused the nature of crises to evolve.. Following the financial crises that have ravaged emerging economies throughout Latin America in the 1960s and 1970s, researchers started to focus on the fiscal and monetary causes of crises, leading to the development of the first-generation of crises models (see Krugman (1979) and Flood and Garber (1984)). The first generation of crises models is related to the work by Henderson and Salant (1978), which has analyzed the speculative attacks in the gold market. The EMS crisis of the early 1990s has given rise to the second-generation of models, which emphasized the effects of countercyclical policies in mature economies and on the self-fulfilling nature of crises (see Morris and Shin (1995), Obstfeld (1994 and 1996)). With the Asian crisis in 1997, a third-generation of models emerged focusing on imperfect information and moral hazard, which cause excessive booms and busts in international lending and asset price bubbles (see for example, Burnside, Eichenbaum and Rebelo (2004), Chang and Velasco (2001)).

The choice of regime to follow, or which regime is appropriate for a country, has been increasing in importance as globalization in the financial sector and in the goods and service sectors increases. The literature on ERRC was initiated by the seminal work by Mundell’s (1961) Optimum Currency Area (OCA) theory, which relates regime choice to a country’s features, including trade links, openness, size and characteristics of shocks the economy is subject to. Studies like Bayoumi and Eichengreen (1998), analyze the exchange rate volatility and intervention from the OCA theory point of view. In addition to OCA, we can consider the political and financial determinants of regime choice. For example, Stein and Frieden (2001) use political economy variables in explaining the regime choice of countries. Edwards (1996), Rizzo (1998), Juhn and Mauro (2002) have taken a broader perspective by embedding the different approaches mentioned above into their analysis, to find no conclusive empirical regularity. In a recent study by Levy-Yeyati et al. (2006), the authors build a comprehensive model encompassing the *OCA*, *political* and *financial* views, and find an overall empirical support for all three. They find that the link between regimes and their underlying fundamentals has been stable over years, and concluded that countries’ choice of

regime can be linked more easily to the evolution of their natural determinants, as opposed to the different policy prescriptions emerging from the exchange rate regime debate.

The exchange rate regime of the representative country plays a very important role in the theoretical models mentioned above. In the first-generation models, the representative country is assumed to pursue a fixed regime, and it is the inconsistency between the domestic monetary and fiscal policies and the fixed regime that has led countries into the crisis. Most of the studies in the empirical literature on currency crisis fail to take into account the ongoing exchange rate regime (be it *de jure* or *de facto*) of the countries as they lump together countries having a fixed regime with those having a flexible one. Frankel and Rose (1996) attempt to characterize currency crashes in 105 developing countries between 1971 and 1992, their definition of currency crash yields 117 cases. Once we check the exchange rate regime of the countries, we see that 80 of the cases have pursued a fixed regime and 28 a flexible regime a year before the crisis, with 9 cases having no information on exchange rate regime¹.

The implicit assumption that the exchange rate regime does not matter in explaining currency crises can be challenged on, at least, two fronts. First, lumping together cases with fixed and those with flexible regimes may reduce the explanatory power of the empirical models, the evolution of many variables exhibits an entirely different path under different regimes. Second, as the ERRC literature points, there is a strong link between regime choice and a country's structural, political and financial features. The "right" choice of regime that is consistent with an economy's unique features, then, becomes vital. The question to be asked is; what happens if a country's choice is *not consistent* with its circumstances? For example, what happens if a small economy with a high degree of trade openness chooses a flexible rather than a fixed regime as dictated by the OCA theory? Can it be that this "inconsistent" choice causes its (avoidable) vulnerability to shocks?

The contribution of this paper is twofold; we treat, separately, currency crises that have occurred with fixed and flexible regimes at work in different sub-samples. This separation would yield a clearer picture regarding the role of fundamentals. Furthermore, embedding regime choice models into the currency crisis model through transforming relevant variables as dictated by regime choice literature. We propose, in that regard, a way to transform these variables. These two innovations may help us reach a better understanding of factors underlying the occurrence of the currency crisis.

2.1. The Link Between Regime Choice and the Currency Crisis

A glance at country chronologies of exchange rate regime choice reveals the rarity of finding a country that sticks to a specific regime for too long. Transitions across different regimes are common and are caused by several factors. In line with present-day economic thinking, countries were advised to pursue pegged regimes, and later on, they were advised to adopt flexible regimes, all in the name of macroeconomic stability. The occurrence of currency crises and the vulnerability of some specific regimes to speculative attacks are the main factors leading to the transition to a new regime. There is, accordingly, a close link between the ERRC and CC literatures, one that has been neglected. The majority of empirical studies analyzing currency crises focus entirely on macroeconomic factors, disregarding the regime choice of countries. There are some studies that include variables representing determinants of regime choice into their analysis, but such representation remains either partial or inappropriate.

¹ The lack of attention to existing exchange rate regimes of countries is also present in Kamisky's (2006) paper. In the paper, she identifies 94 currency crisis episodes, 55 of the cases had a fixed regime and 39 had a flexible regime a year before the crisis occurred.

Sources of vulnerability, eventually leading countries to crises, might be different from one country to the other depending on whether they are pursuing a fixed or a flexible regime. We can strongly assume that sources of vulnerability are independent of the existing exchange. For example, an “inappropriate” choice of regime, a main source of vulnerability, may be the driving force behind crises and signals received from early-warning indicators may represent the consequences of such a choice.

Levy-Yeyati et al. (2006) determined the factors effecting regime choice, we can, then, pin down the benchmark values for these variables based on countries that have never experienced currency crises (tranquil sample) throughout the sample period. After controlling for the conventional early-warning indicators, we can measure the effect of departures from the benchmark values to explain the occurrence of currency crises.

We start by discussing the factors affecting regime choice according to Levy-Yeyati et al. (2006). The authors test three hypotheses by calculating the *propensity to fix* in a pooled logit regression framework for 183 countries over the post-Bretton Woods period (1974-1999)².

Beginning with the OCA view; authors find that the propensity to peg increases as the *openness to trade* and *trade concentration* and decreases as *economic size* and the magnitude of *terms of trade shock*, all agreeing with what the theory suggests.

The authors then test the financial determinants of regime choice through employing variables like *capital account openness*, *financial sector development* and *liability dollarization* to represent currency mismatches. Here, the authors mention two competing arguments; the “impossible trinity” and the “currency mismatch”, and expected signs of the variables differ accordingly. The “Impossible trinity” argument suggests that, in an open economy monetary authorities cannot be aimed at both maintaining stable exchange rates and pursuing an independent monetary policy to smooth out cyclical output fluctuations. As financial integration deepens, monetary policy becomes increasingly contradicting to fixed exchange rates, therefore, the “impossible trinity” argument implies a negative relationship between *capital account openness* and *propensity to fix*. However, the existence of currency mismatches in financially dollarized economies is also a factor affecting the regime choice decision. Countries with significant foreign liabilities most likely choose fixed regimes due to the negative impact of sharp nominal depreciation of their currency on balance sheet solvency with currency mismatches. As financial openness induces large swings in capital flows, financially dollarized countries are expected to fix, rather than float, their currency for prudential reasons, indicating a positive correlation between the propensity to peg and capital account openness.

From a political point of view, exchange rate is a credibility-enhancing policy instrument. The authors present two competing arguments; “policy crutch” and “sustainability”. As far as the policy crutch argument goes; to tame inflationary expectations, countries with a poor institutional track record are more likely to choose a fixed exchange rate regime so as to solve the commitment problem. According to the “policy crutch” approach, weak governments, which are more vulnerable to expansionary pressures, would choose a fixed regime to avoid pressure from powerful interest groups. However, a negative correlation between political strength and the propensity to peg can be reversed once we recognize the fact that weak governments are often associated with large deficits making the peg difficult to sustain. Therefore, from the “sustainability” point of view, one can expect a positive correlation between political strength and the propensity to peg.

² The authors did not pay attention to currency crisis that have occurred in the countries included in the sample. It could have been better to exclude the crisis countries from the sample to get a clearer picture since the transition across different regimes often coincides with currency crisis.

Levy-Yeyati et al. (2006) results on ERRC provide us with benchmark values to stay at proximity with to prevent the occurrence of a currency crisis. That is, the values indicating the political, financial and economic features of fixed and flexible regimes show us the “value-regions” within which countries choose their regimes and, more importantly, sustain them without falling into a crisis. These “safe regions” can be determined for each variable through observing features of countries that have never experienced currency crises (tranquil countries). Once these regions are defined, we are able to measure the effect of a unit departure from these benchmark values.

The tables 1, 2 and 3 below summarize the discussion and present the expected signs of the variables mentioned.

The second column in table 1 above shows the relationship between variables and the propensity to peg, e.g. propensity to peg is increasing as openness. Regarding the currency crisis junction, one can argue that; in highly integrated countries, a flexible regime constitutes a source of vulnerability. In other words, high trade openness can be expected to increase the odds of a crisis in a flexible regime country. The third and the fourth columns present the expected signs of the variables in the occurrence of a currency crisis.

3. Data and Methodology

We first classify countries with respect to their regimes, and then construct an index to detect currency crisis episodes. Countries with no crisis episodes constitute the tranquil sample, regardless of their exchange rate regime. Countries that have experienced crisis form the crisis sample with fixed and flexible regimes at work.

In the regression analysis, we propose two different approaches, a multinomial logit regression and a binominal logit regression. In the multinomial regression analysis, we have three outcomes the first outcome is *crisis while fixed regime at work*, (Outcome 1), the second is *crisis while flexible regime at work* (Outcome 2) and thirdly the *tranquil* cases (Base Outcome) against which the first and second outcomes are measured.

The binominal regression framework is widely used in empirical crisis models; we try to justify the need to transform some variables exhibiting regime-specific distributions. After identifying such variables by employing non-parametric tests, such as Kolmogorov-Smirnov and Kruskal-Wallis, they are transformed, and a binominal logit regression is calculated, where the outcome explained becomes the *crisis* case (with fixed and flexible regime at work together) and the base outcome remains to be *tranquil*.

The data used in the analysis resides in the standard macroeconomic, financial and OCA indicators as retrieved from IFS, WDI and UNCTAD databases. Political variables are retrieved from *Polity IV* and *Database of Political Institutions (DPI)* databases. The study covers 163 developing and developed countries between 1990 and 2007.

3.1 Regime Classification

The choice of regime classification is an important issue, until 2002, the only classification available was the IMF’s *de jure* classification based on national authorities’ declarations. Following the influential study of Calvo and Reinhart (2002), the extent of the *de jure* classification credibility has become an area of question as to representing a country’s true regime. Several *de facto* classification proposals have been made, including Levy-Yeyati and Sturzeneger (2002), Reinhart and Rogoff (2004) and Bubula and Otker (2002).

In this study, we use the IMF’s *de facto* exchange rate regime classification. Bubula and Otker (2002) study provides a monthly *de facto* regime classification of all IMF members between 1990 and 2001. The classification data belonging to the 2002-2007 period was retrieved from the IMF’s “Annual Report on Exchange Arrangements and Exchange

Restrictions” (AREAER), collected using the same methodology³. In their paper, Bubula and Otker (2002) identified 13 different exchange rate regimes, under three coarse categories; hard pegs, intermediate and floating regimes (Table A.1 in the appendix). It is impossible to differentiate between hard and soft pegs, due to a small sample size, therefore, categories 1-11 are grouped under “fixed exchange rate regime”, and 12-13 under “flexible exchange rate regime”. Our rationale for lumping together hard pegs and intermediate regimes is the existence of an explicit, or implicit, commitment of national authorities to keep the exchange rate within certain limits, be it a horizontal or a crawling band. Such a commitment surely does not exist in the case of a managed float with no predetermined path (category 12) and an independent float (category 13).

Figure 1 below shows the monthly distribution of regimes across 184 IMF-member countries. Starting from January 1990, the proportion of countries pursuing any form of flexible regimes exhibits a steady increase to reach 46% in 2005 after which fixed regimes seem to have gained popularity.

3.2 Determining Currency Crisis Episodes

To detect currency crisis episodes, we employ the standard Exchange Market Pressure (EMP) Index which has two components; the percentage change in exchange rate and international reserves. We divide both components by their standard deviations to avoid any component dominating the other. We compute two indices, one for normal inflation episodes and another for hyperinflation episodes where annual inflation exceeds 150%, to avoid extreme devaluations dominating the index in the latter. Then, crisis episodes are marked by their means and standard deviations. Cases with index values exceeding their mean and 3 standard deviations, added, were marked as crisis cases. To avoid picking the same crisis, we excluded crisis spells occurring within the following 18 months, Currency Union member (CFA, Euro area etc.) countries were excluded, as well. As a result, our EMP indices detect 125 instances of currency crises, 93 of them occurred with a fixed regime at work and 32 with a flexible regime at work. There were 828 countries, having both fixed and flexible regimes, with no crisis episodes at all throughout the sample period, which constitute our tranquil sample. Country groups can be found in the Table A.2-4 in the appendix.

3.3 Some Methodological Issues

The link between exchange rate regime choice and a currency crisis requires some methodological modifications in empirical currency crisis models. Conventional empirical models use binominal regression tools like logit, probit etc.; with a binary dependent variable, (that is equal to 1 if the observation belongs to a crisis case and 0 otherwise) they treat all crises (occurring while a fixed or flexible regime is at work) within the same group. On the other hand, the ERRC literature clearly indicates that countries with different economical, geographical, political and structural features tend to choose different regimes. The implication of this finding on the currency crisis issue is clear; the factors leading countries to currency crisis might be different under different regimes and accordingly, conventional empirical models have to be modified.

In this paper, we propose two innovations to the methodology conventionally employed. The first one is to use a multinomial logit framework by employing a dependent variable, *crisismult* that equals to 0 if the observation belongs to the tranquil sample (the base outcome), *one* if the observation belongs to the fixed regime crisis sample, and *two* if the observation belongs to the flexible regime crisis sample. We have two different crisis samples, allowing different marginal effects of independent variables. Treating crisis cases

³ Since 1999 IMF’s AREAER reports *de facto* regimes, are not the one officially announced by national authorities.

with fixed and flexible regimes at work within different samples leads to a small sample size, and this is the only drawback of this proposal.

The second innovation we propose solves the small sample problem by treating all crisis cases within the same sample, an appropriate transformation of independent variables that exhibit statistically different distributions under fixed and flexible regimes. Analyzing factors leading countries to crisis by using the *raw form* of the variables proposed by ERRC literature would be inappropriate since high realization of one variable can pose a problem for countries having a fixed regime as opposed to those with a flexible regime. Take, for example, the *openness* variable; OCA theory suggests a positive link between openness and the propensity to fix. We expect countries with high (low) degree of trade openness to have fixed (flexible) regimes.

As seen on Figure 2, the distribution of the openness variable for tranquil fixed observations is to the right of those for tranquil flexible cases⁴. As expected, countries with a higher degree of trade openness are more likely to choose fixed regimes⁵.

Once we utilize this hypothesis, we can claim that, *ceteris paribus*; high realization of openness in a country having flexible regime may put the country at risk, since unstable exchange rates may prevent the country from fully deriving the gains from trade. Within the regression framework, we expect a unit increase in openness to reduce the odds of currency crisis for countries with a fixed regime while it increases the odds for countries having flexible regimes and *vice versa*. (Figure 3)

Figure 4 shows, parallel to our expectations, the distribution of the *openness* variable for flexible (fixed) cases having crisis to the right (left) of tranquil flexible (fixed) observations. It is clear that lumping together fixed and flexible cases is not appropriate. The regression analysis calculates the marginal effect of a unit increase of the openness variable over the dependent variable. Yet, an increase in openness seems to threaten the flexible regime sustainability, while acting in the opposite direction for the fixed regime. Lumping crisis observations together would possibly result in estimating an insignificant (or at least a biased) coefficient for these variables⁶.

Accordingly, variables related to ERRC literature should be transformed to reflect regime-specific features. Our proposal is as follows:

1. Divide the sample with respect to the regime followed by countries; fixed and flexible.
2. Determine tranquil benchmark values for independent variables by computing the variable mean and standard deviation for fixed and flexible countries having no crisis episodes⁷ (tranquil fixed and flexible sub-samples).
3. Run Kolmogorov-Smirnov (K-S) and Kruskal-Wallis (K-W) tests to test the equality of distributions of tranquil fixed and flexible sub-samples.
4. If the null hypothesis of equality of distributions is rejected, continue with the fifth step, if not; use the raw form of the independent variable.

⁴ Countries having no currency crisis episodes, depending on our crisis criterion, between 1990 and 2007 constitute the tranquil fixed and flexible observations.

⁵ The means are statistically different than each other at 1% significance level, and Kolmogorov-Smirnov and Kruskal – Wallis tests results strictly reject the null hypothesis of fixed and flexible observations are drawn from the same sample. See Table 4 for other variables' test results.

⁶ The observation is true for most of the variables pointed by the ERRC literature. Due to space constraints, I do not report the figures in the paper but they will be made available upon request.

⁷ Tranquil observations (belonging to fixed and flexible regimes) are expected to reflect the features ERRC literature points out, they can be taken as a benchmark.

5. Standardize the variable for the fixed and the flexible regimes separately, by using respective means and standard deviations, as shown below;
6. $dist_{x_i} = (x_i - \text{mean}(x_i)) / \text{standard deviation}(x_i)$, Where i = fixed sample, flexible sample observations
7. t = tranquil fixed, tranquil flexible observations
8. Identify *crisis-prone directions* based on the distribution of observations of the tranquil fixed and flexible sub-samples,
9. Multiply with -1 the $dist_{x_i}$ values of the sub-sample with a distribution lying to the right of the other sub-sample.
10. Lump together two $dist_{x_i}$ series.

The logic behind this is simple. Both the K-S and K-W test results indicate which variables carry regime-specific features. If a variable has a distribution that is significantly different under the fixed and the flexible regimes, we transform it as explained above; otherwise it is used in its original raw form. Note that, with such a transformation, one can measure the standardized distance of the individual observation from its tranquil mean separately for fixed and flexible cases⁸. Since both $dist_{x_i}$ series have zero mean and unit standard deviation, their lumping does not pose any problem. After the transformation, the value $dist_{x_i}$ takes increases, which is expected to increase the odds of a crisis, as it approaches to the tranquil mean of other sub-samples (tranquil fixed or flexible).

Figure 5 shows the distribution of a hypothetical variable x for the tranquil fixed and flexible regime observations. The three zones marked on the figure show the crisis-prone and safe zones for each regime. Since tranquil fixed observations exhibit a distribution lying to the right of tranquil flexible observations, we can argue that ZONE I is a safe zone for the fixed regimes, and similarly, ZONE III for the flexible regimes. ZONE II, however, is a crisis-prone zone. Note that the odds of a crisis are increasing as the flexible regime observation takes a higher value, and as that of the fixed regime takes a smaller value. Since their directions are opposite, we argue that it may not be true to employ variables such as x in a binominal regression framework. After the transformation proposed above, the distribution of the $dist_x$ is as shown in table 6.

By using transformed variables ($dist_x$) rather than their raw form (x), it is possible to treat crisis cases within the same sample, hence, alleviate a small sample size. Yet, it comes at a cost; using transformed variables consequently changes and complicates the interpretation of the results as explained above.

K-S and K-W tests results strongly back the OCA view. All the variables listed in table 4 exhibit statistically different means and distributions under fixed and flexible regimes in countries with no crisis episodes throughout the sample period. Countries with a higher degree of trade openness and export concentration tend to choose fixed regimes, large economies, on the other hand, tend to choose flexible regimes. Surprisingly, countries exposed to real shocks are those that choose fixed regimes. In addition to different means, inequality of distributions justifies the need for a transformation of such variables as explained above.

As for political variables, variables measuring government strength (*herfindahl index* of government's seat share in the parliament and *liec*, the legislative index of electoral competitiveness) do not exhibit regime-specific features. Neither the mean nor the distribution is statistically different under the fixed and flexible regimes so, we do not need to transform these variables. *Democracy* is used as a proxy to reflect institutional quality; it

⁸ Note that standardizing variables based on their fixed and flexible sub-sample properties is still valid, even if these subsamples have exactly the same means and standard deviations.

however, exhibits regime-specific features. Countries with better-functioning institutions tend to choose flexible regimes, along with the policy crutch argument of Levy-Yeyati et al. (2006).

Regarding financial variables, following our expectations, countries with less capital account restrictions tend to choose flexible regimes. Two variables are used to capture financial sector development, namely *banks' liquid reserves to assets* ratio and *M3 to GDP* ratio. They both indicate that countries with relatively developed financial sectors tend to choose fixed regimes. In terms of distribution, we cannot reject the null hypothesis of equal distributions for the *M3 to GDP* ratio under the fixed and flexible regimes. *Foreign liabilities as a ratio of money*, used to capture the degree of dollarization in the domestic economy, shows that countries with a relatively high degree of dollarization tend to choose flexible regimes, but distribution wise, there is no statistically explained difference between the two regimes.

4. Regression Results

4.1 Binominal Logit Regression Results

The dependent variable, *crisisbin* is equal to one if the observation belongs to the crisis sample (under the fixed or the flexible regime), and to zero if it belongs to the tranquil sample, Table 5 presents the regression results. For comparison purposes, we run the same regression with raw and transformed variables separately. The first column shows the coefficient estimates of raw variables as employed in conventional empirical models, and the second column shows the results obtained with transformed ERRC variables⁹. Comparing regression results, we see that the overall predictive power of the model increases once we replace some of the raw ERRC variables with those transformed.

Beginning with macroeconomic variables, which are used in their raw form in both regressions, as expected, we see that inflation, output gap, domestic credit as a ratio of GDP increase the odds of a crisis independent of the regime choice made.

Once we use the raw forms of *openness* and *size*, the estimated coefficients are insignificant which is hardly surprising given the regime-specific nature of these variables. For example, from Figure 2, we observe that countries with a higher (lower) degree of trade openness tend to choose fixed (flexible) regimes. Following our hypothesis in this paper, an increase (decrease) in openness in a country pursuing flexible (fixed) regime is expected to increase the odds of a crisis. In column II, the estimated coefficient of transformed *openness* variable is significant and has a positive sign. This means that *ceteris paribus*, countries with a currency crisis are those that did not pursue the appropriate regime in terms of *openness* as imposed by the OCA hypothesis. From the OCA theory, we expect that bigger (smaller) economies tend to choose flexible (fixed) regimes. Utilizing this in our analysis, we expect crisis cases to be of smaller (bigger) economies pursuing flexible (fixed) regime, we expect a positive sign for the transformed *size* variable that is significant but taking an opposite sign. Countries adapting a fixed (flexible) regime, which were of small economic sizes, were those hit by a currency crisis. That leads us to conclude that the countries in our sample had chosen regimes in accordance with their economic size as imposed by the OCA hypothesis.

Political determinants of regime choice include *institutional quality* and *political strength* of the government. As the argument goes, countries where institutional quality is low, governments may adopt a peg as a policy crutch, to convince the public of their commitment to low inflation. Low institutional quality forces governments to use the peg as a second-best solution to the commitment problem. There is a link between government political strength and regime choice; politically weak governments are vulnerable to expansionary pressures

⁹ In Column 2, the transformed *size*, *openness* and *institutional quality* variables were used.

from powerful interest groups, and are more likely to adopt a peg to fend off such pressures. Thus, we expect countries with lower (higher) *institutional quality* and weaker (stronger) governments to choose fixed (flexible) regimes, and therefore, an increase (decrease) in *institutional quality* and an increase (decrease) in *political strength* are expected to increase the odds of crisis while fixed (flexible) regime is at work.

The estimate coefficient for the institutional quality variable is positive and significant indicating that the odds of a crisis in a fixed (flexible) regime country increase as its institutional quality. The legislative index of electoral competitiveness variable is used to measure political strength of a government, it has an index ranging from 1 (no legislature) to 7 (the largest party in congress holds less than 75% of seats); and is correlated with political weakness. Depending on the test's results, we use this variable in its raw form. The estimated coefficient is significant and negative, showing that the odds of a crisis decrease as governments become politically weaker. We can conclude from the political determinants of currency crisis that countries in our sample had chosen the appropriate regimes *Vis a Vis* their governments' strength but their choices were not compatible with the level of institutional quality.

Test results do not suggest regime-specific features for financial depth and capital account openness variables. As in column I, both coefficients are significant and have a negative sign, indicating the importance of financial sector development, and the ineffectiveness of capital controls in the wake of crisis.

4.2 Multinomial Logit Regression Results

Table 6 shows the multinomial regression results¹⁰. Note that the base outcome is tranquil, indicating no crisis. For comparison, in column I, we present the binomial logit regression result in which *crisisbin* is the dependent variable. Column II shows the multinomial regression result, and for the sake of expositional tractability, was presented in two columns. Our dependent variable *crisismult* is equal to:

- 0 for tranquil observations (fixed and flexible regime countries having no crisis during the sample period),
- 1 for crisis cases while fixed regime at work, and,
- 2 for crisis cases while flexible regime at work.

The multinomial framework is superior to a binomial one; it has more explanatory power and is more evident when comparing results in Column I and II. In column I, we treat crisis cases independent of the regime within which they unfold. The increase in inflation, output gap and domestic credit increase the odds of a crisis, but once we analyze crisis cases while fixed and flexible regimes are at work separately, in column II, we see that the output gap plays no significant role in the making of a crisis while a flexible regime is at work. It is evident in the literature that the fixed regimes are most vulnerable to boom-bust cycles in the domestic economy. (See, for example, Gourinchas et al. 2001) As countries adopt a peg, the lowered uncertainty about the evolution of exchange rate triggers excessive capital-inflows, which cause overvaluation of the real exchange rate and an output boom fuelled by the credit channel. Flexible regimes, on the other hand, shield countries from this extreme volatility in the domestic economy.

Using a multilevel crisis indicator improves results regarding OCA variables. In column I, *openness* is negatively correlated, yet insignificant, with the occurrence of crisis in general. However, this is true only for fixed regime countries, for flexible regime countries, an

¹⁰ Note that due to the small sample size especially for crisis cases, while flexible regime is at work, the regressions presented are run by using some of the relevant variables mentioned in the text.

increase in *openness* increases the odds of a crisis, agreeing with our expectations, yet the coefficient is not significant. Economic *size* seems to play no role in developing a crisis, from the OCA viewpoint countries have chosen their most suitable regimes and managed to sustain them without falling into a currency crisis.

Financial depth and *capital account openness* are the two variables we use in the regressions. Deep financial markets and less-restricted capital accounts decrease the odds of a crisis, independent of the regime choice made. However, estimation results indicate that financial market depth is more important in a fixed regime adapting country than in a flexible regime one.

The effects of political variables on the occurrence of a crisis seem to differ under the fixed and flexible regimes. *Institutional quality*, which is insignificant once we treat crisis cases independent of the regime followed, becomes significant and positively correlated with the occurrence of crisis with a fixed regime at work. An increase in institutional quality decreases crisis probability with a flexible regime at work; however, the coefficient estimate is not statistically significant. As for *political weakness*, the binominal regression estimate indicates a negative correlation, that is; the weaker the government the lower the odds of a crisis, this is significant only for fixed regime crisis cases.

5. Conclusion

There is a strong causal relationship between the exchange rate regime at work and currency crises. Apart from early-warning indicators, the discrepancy between natural determinants of exchange rate regime choice and the regime actually chosen has a role in cultivating a currency crisis. Our regression results suggest that countries experiencing crisis are those that have chosen regimes inconsistent with their individual features.

OCA theory claims that countries with a higher degree of trade openness should pursue fixed exchange rate regimes, in order to enhance welfare gains through stable exchange rates. This claim implies that the odds of a crisis increase as openness in countries pursuing flexible regimes and decrease as openness in those pursuing fixed regimes; our statistical evidence backs such a claim. However, in terms of economic size, countries' choice of regimes is consistent.

Our test results suggest no statistical difference across different regimes for financial variables; financial depth and capital account openness both decrease the odds of a crisis for both fixed and flexible regime countries.

As for political variables, we expect countries with low institutional quality to pursue a fixed regime, an increase in institutional quality increases the odds of a crisis with a fixed regime at work, and vice versa. Binomial and multinomial regression results back our expectations.

However, there was no statistical evidence that the government's political strength would differ under each regime. Yet interestingly, as governments become politically weaker the odds of a crisis decrease; a finding which deserves a closer attention.

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Figure 1: The Distribution of Regimes across Countries: 1990m1-2007m4

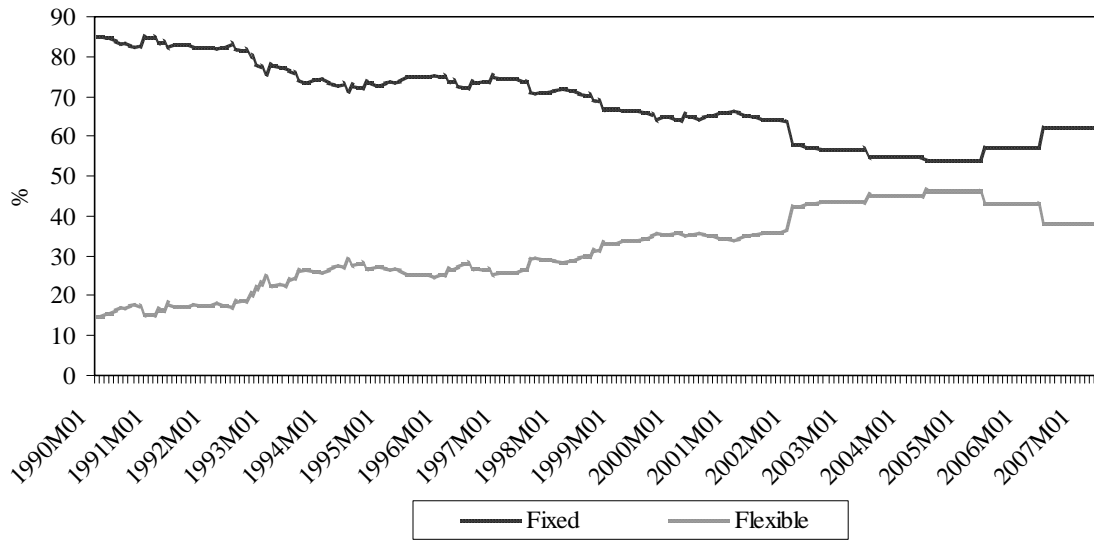


Figure 2. Kernel Density of *Openness* for Tranquil Observations: Fixed vs. Flexible

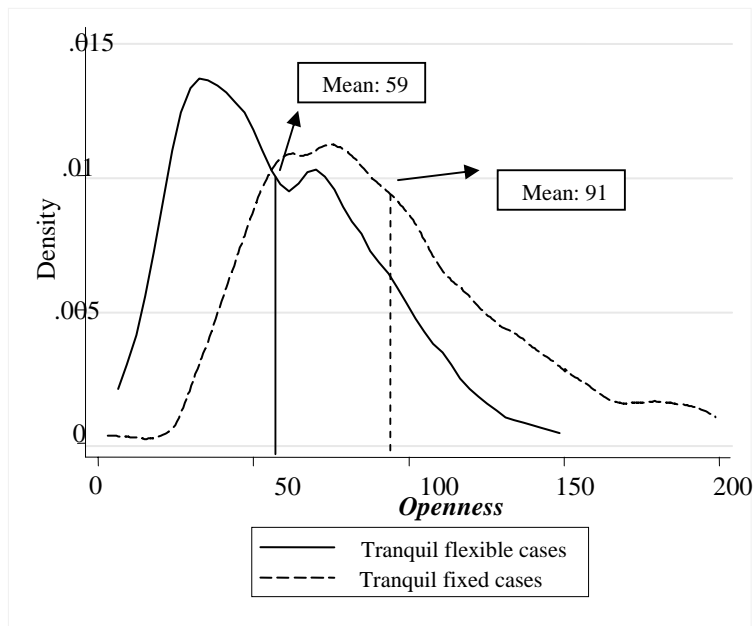


Figure 3: Kernel Density of *Openness* for Tranquil and Crisis Observations: Flexible Regime

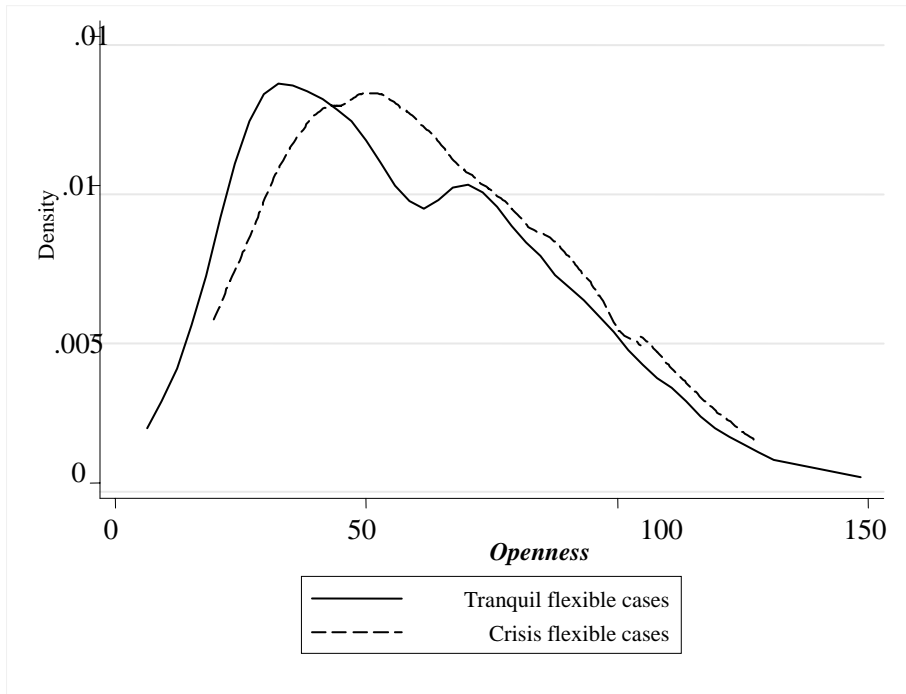


Figure 4: Kernel Density of *Openness* for Tranquil and Crisis Observations: Fixed Regime



Figure 5: The Distribution of a hypothetical regime-specific Variable

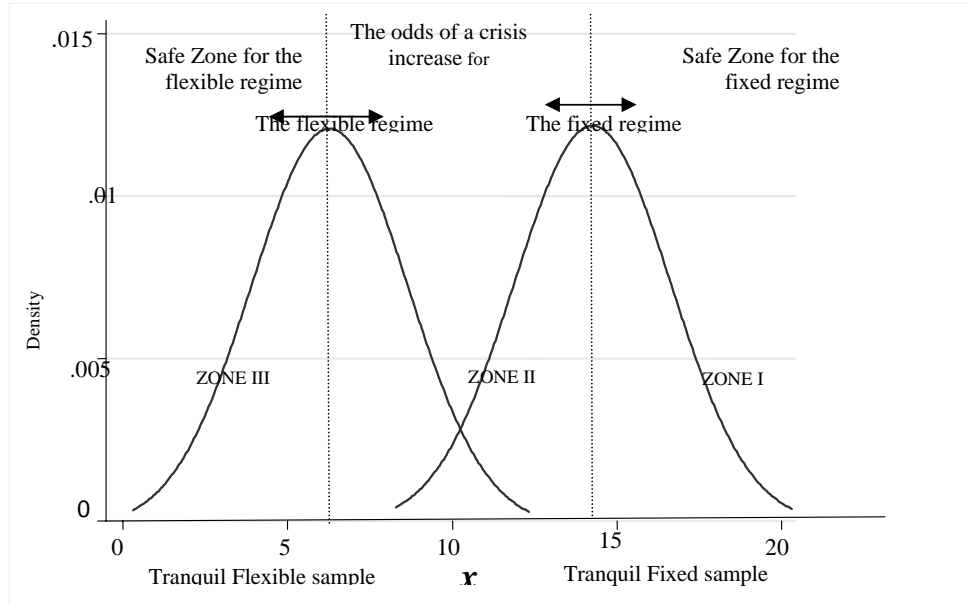


Figure 6: The distribution of variable x after the transformation

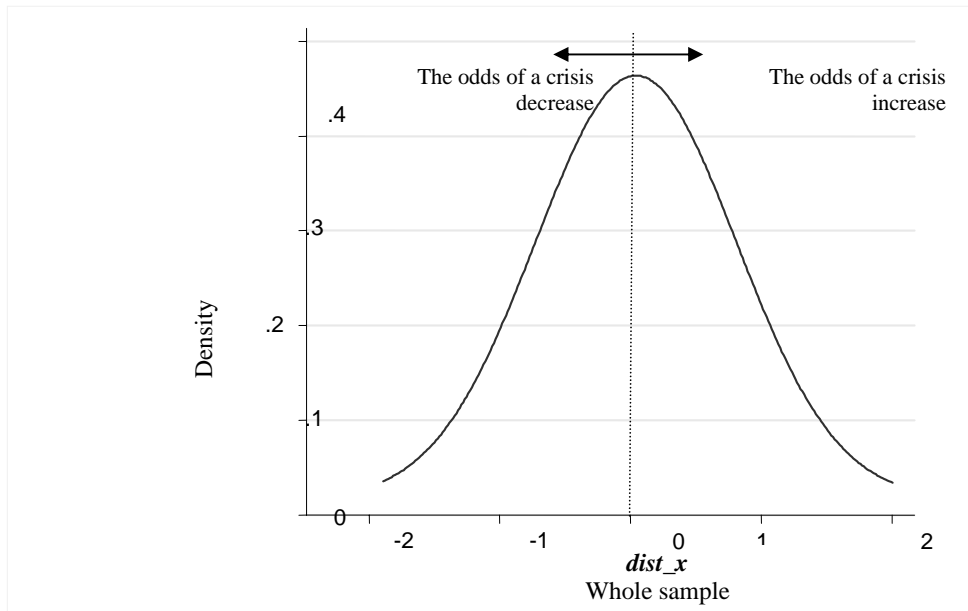


Table 1: Propensity to Peg and Odds of Crisis: OCA View

	Propensity to Peg	Odds of a Crisis while	
		Fixed regime at work	Flexible regime at work
Openness	+	-	+
Size	-	+	-
Trade Concentration	+	-	+

Source: Levy-Yeyati et al. (2006) and the author

Table 2: Propensity to Peg and Odds of Crisis: Political View

	Propensity to Peg		Odds of a Crisis while				
	Policy		Fixed regime at work		Flexible regime at work		
	Crutch	Sustainability	Policy	Crutch	Sustainability	Policy	Sustainability
Political Strength							
“Herfindahl Index”	-	?	+	?	-	?	
Political Weakness							
“Liec”	+	-	-	+	+	-	
Political Weakness							
“Veto Power”	+	-	-	+	+	-	
Institutional Quality							
“Democracy”	-	+	+	-	-	+	

Source: Levy-Yeyati et al. (2006) and the author. See Table A.5 in the appendix for variable descriptions.

Table 3: Propensity to Peg and Odds of Crisis: Financial View

	Propensity to Peg		Odds of a Crisis while			
	Impossible		Fixed regime at work		Flexible regime at work	
	Trinity	Currency Mismatch	Impossible	Currency Mismatch	Impossible	Currency Mismatch
Capital Account Openness	-	+	+	-	-	+
Financial Depth (M3 to GDP)	+	-	-	+	+	-
Foreign Liabilities to Money	?	+	?	-	?	+

Source: Levy-Yeyati et al. (2006) and the author.

Table 4: Descriptive Statistics: Tranquil Fixed vs. Flexible Sub-sample

OCA Variables	Mean Difference[♣]	K-S[♠]	K-W[♠]
Openness	24.5***	0	0
Size	-1.1***	0	0
TOT volatility	2.4***	0	0
TOT Shock	0.02***	0	0
Export Concentration	0.15***	0	0
Political Variables			
Political Strength (Herfindahl Index)	0.03	0.05	0.08
Political Weakness (Liec)	-0.17	0.83	0.3
Political Strength (Years in office)	3.04***	0	0.21
Institutional Quality (Democracy)	-1.7***	0	0
Financial Variables			
Capital Account Openness	-0.7***	0	0
Banks' Liquid Reserves to Assets	3***	0	0
Foreign Liabilities to Money	-0.25**	0.06	0.52
Financial Depth (M3 to GDP)	6.7***	0	0.42

♣ Tranquil fixed sub-sample mean minus tranquil flexible sub-sample mean

♠ p-values for rejecting the null hypothesis of equal distributions

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

Table 5 Binominal Logit Regression Results

Dependent Variable	I Crisisbin=1	II Crisisbin=1
Macroeconomic Variables		
Inflation	0.066*** [2.65]	0.076*** [3.08]
Output Gap	0.209*** [3.60]	0.226*** [3.61]
Overvaluation	0.08 [1.51]	0.086 [1.35]
Domestic Credit	0.020*** [2.81]	0.025*** [3.57]
OCA Variables		
Economic Size	-0.264 [1.63]	-0.619*** [2.69]
Openness	-0.011 [1.49]	0.801*** [3.73]
Financial Variables		
Financial Depth	-0.019*** [2.66]	-0.021** [2.25]
Capital Account Openness	-0.587*** [3.34]	-0.586*** [3.35]
Political Variables		
Institutional Quality	0.06 [0.96]	0.473* [1.80]
Political Weakness	-0.254* [1.72]	-0.268** [2.08]
Pseudo R-sqr	0.38	0.42
Observations	347	347

Robust z statistics in brackets

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

Constants not reported.

In Column 2, the transformed size, openness, institutional quality variables were used

Table 6: Multinomial Regression Results

Dependent Variable	I	II	
	Crisisbin= 1	Crisismult= 1	2
Macroeconomic Variables			
Inflation	0.051** [2.57]	0.042** [2.44]	0.055** [2.50]
Output Gap	0.216*** [3.88]	0.273*** [4.27]	0.064 [0.75]
Overvaluation	0.08 [1.53]	0.127 [1.53]	0.0001 [0.01]
Domestic Credit	0.017** [2.35]	0.019** [2.15]	0.016* [1.70]
OCA Variables			
Economic Size	-0.244 [1.52]	-0.19 [1.15]	-0.343 [1.03]
Openness	-0.012 [1.59]	-0.016** [2.19]	0.001 [0.09]
Financial Variables			
Financial Depth	-0.018** [2.49]	-0.024** [2.29]	-0.009 [1.60]
Capital Account Openness	-0.552*** [3.35]	-0.569*** [3.40]	-0.574* [1.78]
Political Variables			
Institutional Quality	0.057 [0.93]	0.125* [1.82]	-0.067 [0.47]
Political Weakness	-0.276* [1.88]	-0.332** [2.33]	-0.107 [0.33]
Pseudo R-sqr	0.35	0.37	
Observations	371	371	

Robust z statistics in brackets

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

Crisisbin=0 and Crisismult=0 are the base outcomes in Column I and II, respectively.

Appendix

Table A.1 IMF *de facto* Regime Classification

Coarse Classification	Finer Classification	Category
Hard Peg Regimes	Formal Dollarization	1
	Currency Union	2
	Currency Board Arrangement	3
	Conventional Fixed peg, single currency	4
	Conventional Fixed peg, basket	5
	Horizontal Bands	6
Intermediate Regimes	Crawling Peg, forward looking	7
	Crawling Peg, backward looking	8
	Crawling Band, forward looking	9
	Crawling Band, backward looking	10
	Tightly Managed Float	11
Floating Regimes	Managed Float with no predetermined path	12
	Independently Floating	13

Source: Bubula and Otker (2002), IMF AREAER 2002-2007.

Table A.2 Crisis Cases While Fixed Regime is at Work

Country	Time	Country	Time		
Algeria	1991	January	Maldives	2001	July
Algeria	1994	April	Mauritania	1992	October
Armenia	1997	January	Mexico	1994	December
Austria	1991	March	Moldova	1998	November
Azerbaijan	1999	July	Nepal	1991	July
Bangladesh	1990	March	Nepal	1993	February
Bangladesh	2000	August	Netherlands	1991	March
Belarus	1998	December	Nigeria	1992	March
Belgium	1991	March	Nigeria	1999	January
Bhutan	1991	July	Norway	1991	March
Bhutan	1993	March	Norway	1992	November
			Papuan New		
Botswana	2005	May	Guinea	1994	September
Brazil	1990	February	Philippines	1997	December
Brazil	1999	January	Qatar	1998	June
Bulgaria	1994	March	Qatar	2000	January
Bulgaria	1996	May	Romania	1991	November
Burundi	1991	August	Romania	1997	February
Burundi	1997	November	Romania	1999	November
			Russian		
Cape Verde	1991	March	Federation	1998	September
Colombia	1995	August	Rwanda	1990	November
Congo Rep.	1994	January	Rwanda	1995	March
Cyprus	1991	March	Seychelles	2007	October
Ecuador	1999	February	Sierra Leone	1990	January
El Salvador	1990	May	Singapore	1998	January
Ethiopia	1992	October	Solomon Islands	1997	December
Fiji	1998	January	Solomon Islands	2002	March
Finland	1991	March	Spain	1992	October
Finland	1992	September	Sri Lanka	1998	July
Georgia	1998	November	Sudan	1992	February
Germany	1992	October	Suriname	1999	January
Haiti	1991	September	Suriname	2000	October
Honduras	1990	April	Sweden	1992	November
India	1991	July	Tanzania	1992	March
India	1993	March	Thailand	1997	July
			Trinidad and		
Indonesia	1998	January	Tobago	1993	April
Ireland	1991	March	Turkey	1994	April
Kazakhstan	1999	April	Turkey	2001	February
Kenya	1993	March	Ukraine	1998	September
Korea	1997	December	United Kingdom	1992	October
Lao PDR	1997	December	Uruguay	2002	July
Libya	1999	February	Venezuela	2002	February
Libya	2002	January	Venezuela	1994	May
Macedonia	1997	July	Venezuela	1996	April
Madagascar	1994	May	Vietnam	1998	August
Malawi	1992	March	Zimbabwe	1991	September
Malawi	1994	February	Zimbabwe	2000	August
Malaysia	1997	August			

Table A.3 Crisis Cases while Flexible Regime at work

Country	Time	Country	Time		
Angola	1996	March	Kenya	1997	August
Albania	1997	May	Krygyz Rep.	1996	November
Albania	1999	May	Krygyz Rep.	1998	November
Argentina	1990	February	Lao PDR	1998	June
Burundi	2000	July	Lebanon	1990	August
Burundi	2002	August	Mogolia	1997	March
Bangladesh	2006	March	Mozambique	1995	September
China	1992	July	Mauritius	1998	November
China	1994	January	Malawi	1998	August
Colombia	2007	August	Norway	1997	December
Ecuador	2000	January	Papua New Guinea	1998	July
Guyana	1999	March	Papua New Guinea	2000	January
Haiti	1994	August	Ukraine	1994	June
Haiti	2000	September	Congo Dem. Rep.	1993	January
Jamaica	1991	September	Zambia	1994	March
Kenya	1994	November	Zimbabwe	1998	August

Table A.4 Tranquil Sample Country List

Country (various years 1990-2007)			
Afghanistan	Dominican Republic	Jordan	Paraguay
Aruba	France	Kiribati	Peru
Australia	Gambia	Kuwait	Poland
Bahamas	Ghana	Liberia	Portugal
Bahrain	Greece	Luxemburg	Samoa
Barbados	Guatemala	Malta	Saudi Arabia
Belize	Guinea	Morocco	Somalia
Bolivia	Hong Kong	Myanmar	South Africa
Brunei	Hungary	Namibia	Switzerland
Canada	Iceland	Netherlands Antilles	Syria
Chile	Iran	New Zeland	Tonga
Comoros	Iraq	Nicaragua	Tunisia
Costa Rica	Israel	Oman	Uganda
Denmark	Italy	Pakistan	United Arab Emirates
Djibouti	Japan	Panama	Vanuatu

Table A.5 Variable Descriptions

Type	Variable Name	Explanation	Source	Frequency
Macroeconomic	Domestic Credit to Private Sector	as a % of GDP	WDI, FS.AST.PRVT.GD.ZS	Annual
Macroeconomic	Overvaluation	Deviation of RER from its H-P trend	IFS and author's calculation	Quarterly
Macroeconomic	Output Gap	Deviation of real GDP from its H-P trend	WDI, NY.GDP.MKTP.KN	Annual
Macroeconomic	Inflation		IFS line 64...XZF	Monthly
Financial	Capital Account Openness		Chinn, Ito (2007) dataset.	Annual
Financial	Foreign Liabilities to Money	Degree of Liability Dollarization	IFS line 26C/(line 14+line 24)	Annual
Financial	Financial Depth	M3 as a % of GDP	WDI, FS.LBL.LIQU.GD.ZS	Annual
OCA	Terms of Trade Shock	standard deviation of logarithm of terms of trade over the previous 5 years adjusted by average openness in the 5 previous years	WDI, NY.EXP.CAPM.KN	Annual
OCA	Terms of Trade Volatility	Standard deviation of TOT over 5 previous years	UNCTAD, IMF (2003) and Ghosh et al. (2003) datasets.	Annual
OCA	Concentration of Exports	Merchandise Export Concentration Index	UNCTAD Trade Statistics	Annual
OCA	Openness	Trade in GOODS and SERVICES (% of GDP)	WDI, NE.TRD.GNFS.ZS	Annual
OCA	Economic Size	Logarithm of real GDP	WDI, NY.GDP.MKTP.KN	Annual
Political	Political Weakness <i>"Liec"</i>	Legislative Index of Electoral Competitiveness	DPI 2006	Annual
Political	Political Strength <i>"Herfindahl Index"</i>	The sum of the squared seat shares of all parties in the government	DPI 2006	Annual
Political	Political Weakness <i>"Veto Power"</i>	Degree of Veto Power limiting executive's agenda	Polcon_2002 Database	Annual
Political	Institutional Quality <i>"Democracy"</i>	Democracy indicator	Polity IV database.	Annual