Effective Exchange Rate Classifications

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Abstract

This paper proposes a new method to classify exchange rate regimes. We innovate upon existing methods in two ways. First, we include characteristics of the country's effective exchange rate as a determinant of the exchange rate regime. For this purpose, we have constructed a new and extensive monthly dataset of effective exchange rates built from bilateral trade weights on goods and services for 180 countries from 1971 to 2002. Second, to obtain our classifications, we model the *de jure* classification as a choice problem conditional on a set of country characteristics. The choice probabilities, given by the multinomial logit specification, are estimated by maximum likelihood. Country-year observations are assigned to the exchange rate regime with the highest predictive probability. Employing our 'effective' exchange rate regime classifications in growth regressions we find that increasing exchange rate stability is associate with more rapid GDP growth.

Introduction

Accurate and meaningful classifications of a country's exchange rate regime are crucial elements in assessing the merits of fixed versus floating exchange rates. Until recently, empirical research employed the *de jure* classification, which largely reflects the self-reported regime submitted by a country's central bank to the International Monetary Fund. The *de jure* classification has been viewed as unsatisfactory because there are instances where countries that report themselves to be exchange rate fixers have allowed frequent changes in the peg while other countries that report themselves to be floaters have maintained relatively stable exchange rates. This dissatisfaction has motivated researchers to proposed alternative de facto exchange rate classifications. Two influential contributions to this literature are the pioneering work of Reinhart and Rogoff (2004) (hereafter RR) and Levy-Yeyati and Sturtzenegger (2002) (hereafter LYS). RR emphasize that a natural exchange rate regime classification should be based on the behavior of parallel market exchange rates on the grounds that they better reflect underlying market and monetary conditions than do the country's official exchange rate whereas LYS employ a k-means cluster analysis to sort countries among the various exchange rate regimes.

The central issues involved in devising a classification scheme are specifications of the country characteristics over which classifications are to be assigned and the criteria to be satisfied for assignment to a particular regime. In this paper, we propose an alternative classification system that innovates upon earlier classifications in two fundamental ways. First, we expand the set of country characteristics to include properties of the country's *effective* exchange rate as a determinant of the exchange rate regime. Existing strategies have focused on properties of the country's bilateral exchange rate in obtaining their classifications. To incorporate the effective exchange rate into our analysis, we have constructed an extensive new monthly data set of effective exchange rates built from bilateral trade weights on goods and services for 180 countries from 1971 to 2002. Two sets of nominal effective exchange rates are constructed using both official exchange rates from the IFS and parallel market exchange rates made available by RR.

The effective exchange rate conveys important and relevant information about underlying exchange rate exposure that a single bilateral exchange rate cannot. For a small open economy in a multilateral world, the behavior of a single bilateral exchange rate may have little relevance to the country's effective exposure to exchange rate fluctuations, which is more economically relevant concept. This is especially important for

small open economies set in a multilateral world, which comprise the bulk of our data set. The situation is straightforward for countries that choose a hard bilateral peg since unless the country trades exclusively with the anchor currency country (or within a bloc of countries that also peg to the same anchor), its effective exchange rate will exhibit some volatility even though its bilateral exchange rate may not. Argentina, for example, in its operation of its currency board made it a hard fixer to the US dollar. However, in 2000 its share of trade with the US was 16 percent and with 27 percent of it's trade with Brazil, 7 percent with Chile and 4 percent with Germany, its effective exchange rate during this time exhibited substantially more volatility than the peso-US dollar rate.[1]

Our second innovation lies in application of standard a econometric methodology to classify the exchange rate regime that parallels work done to estimate revealed preferences using household survey data. We model the *de jure* classification, reported by Ghosh et. al. (2002), as a choice problem conditional on a set of country characteristics which include properties of its effective exchange rate, a bilateral exchange rate and its international reserves. The choice probabilities are given by a multinomial logit specification which we estimate by maximum likelihood. The fitted logit provides a predicted probability that a country with a specified set of characteristics will adopt a particular exchange rate regime classification. We then assign country-year observations to the exchange rate regime with the highest predictive probability.

While we do not take the *de jure* classifications at face value, our approach does assume that they are thoughtful and reasoned responses of the monetary authorities that contain relevant information regarding exchange rate outcomes. Countries whose exchange rates behave differently from their stated regime description may not be answering the question posed by the IMF survey. Respondents to the IMF survey may have in mind a broader view of their exchange rate regime than information that is encapsulated in the behavior a single bilateral rate. We attempt to capture by conditioning on the effective exchange rate, is that the monetary authorities report a *de jure* classification that reflects overall exposure to exchange rate instability as opposed to the instability of an exchange rate for a single anchor currency.[2] We refer to our de facto

[1] Over our full sample (1971 to 2002), Argentina's effective exchange rate volatilty measured as the annualized standard deviation of monthly percent changes, was 25.9 percent whereas the volatility of the peso-dollar rate was 18.3 percent. While for hard fixers, the effective exchange rate is clearly more volatile than the bilateral exchange rate we find in general that there is no presumption regarding the volatility ranking between bilateral and effective exchange rates. We have about as many of our country-year observations exhibit effective exchange rate volatility that lies below bilateral exchange rate volatility as those that lie above.

[2] An alternative argument that the *de jure* classifications convey information is given in Genberg

classifications as the 'effective' exchange rate classification.

Our approach to regime measurement and classification contrasts sharply with RR. Their exhaustive classification methodology is heavily dependent on the classifier's judgement. This aspect poses challenge to future research if RR do not provide future updates of their classifications. In our approach, we reduce the role of the classifier's judgement to determining the set of variables to include in the regression which is the standard role in empirical economics. Updating and/or modifying the classifications by adjusting the relevant country characteristics becomes a straightforward undertaking. We also contrast our approach which is based on the likelihood principle, to LYS employ cluster analysis for which the optimality properties are not well understood.[3]

Comparisons of our effective exchange rate classifications generated from official (as opposed to parallel) exchange rates to alternative classifications, reveal that our regime classifications are most highly correlated with those of RR (0.53) whereas the correlation with LYS is 0.44. The correlation with the *de jure* classification, which is the dependent variables in the multinomial logit estimation, is 0.32.

Assessing the role of exchange rate regime classifications has received a substantial amount of attention.[4] Since it carries important policy implications, research needs to assess the robustness of particular conclusions across alternative regime classifications. To investigate whether our effective exchange rate classifications are economically significant, we re-examine the LYS analysis on the relation between GDP growth and the degree of exchange rate stability. They found that increasing bilateral exchange rate stability was associated with lower rates of GDP growth. We find that their result is not robust to our classification scheme. When the LYS exchange rate classification is replaced by our effective exchange rate classification, we find that countries with more

and Swoboda (2004), who suggest that the official choice of exchange rate regime is an avenue through which the monetary authorities communicate policy intentions to the public. The importance of such communications and how they have an effect on outcomes is emphasized in the literature on inflation targeting.

[3]Their method attempts to sort countries into exchange rate regimes by minimizing the unweighted average of within group sum of squared deviations from the group mean over each country characteristic.

[4]classifications have been used by Juhn and Mauro (2002), who explore the long-run determinants of exchange rate regimes, Bordo and Flandreau (2001), who examine the link between financial depth and exchange rate regimes, Frankel, Schmukler and Serven (2002) who use it to examine the link between regime choice and local interest rate sensitivity, Edwards and Levy-Yeyati (2003) and Broda (2004), who analyze the impact of terms of trade on economic performance under different regimes. Both the LYS and RR regime classifications are used by Alesina and Wagner (2003) to find the politico-economic institutional qualities of countries with different exchange rate regimes. RR is employed by Reinhart, Rogoff and Savastano (2003), who attempt to correlate the degree of exchange rate flexibility and degree and type of financial dollarization and Rogoff et.al (2004), who explore economic performance under alternative regimes.

stable exchange rates grow more rapidly than those with flexible exchange rates.

The plan of the paper is as follows. Section 1 presents an informal and descriptive comparison between the behavior of bilateral exchange rates and effective exchange rates. In Section 2, we describe the regime-choice model and discuss features of our effective exchange rate classifications. Section 3 revisits the LYS growth regressions which we re-estimate using our classification scheme and Section 4 concludes. A description of the data, variable construction and sources is contained in the Appendix.

1 Effective and Bilateral Exchange Rate Behavior

In this section, we undertake an informal comparison between the behavior of effective and bilateral nominal exchange rates. Even in this very casual analysis, we are able to identify several notable and substantive differences between the two measures.

To construct the effective exchange rates, we obtain for each of 180 countries. We construct trade weights from annual bilateral trade volume (imports plus exports) vis-a-vis each of the remaining 179 countries. Aggregated trade data were obtained from the United Nation's Comtrade database.[5]

We divide our discussion between an examination of the volatility of the alternative exchange rate measures and a comparison of their dynamics. We conduct two effective-bilateral comparisons—one using parallel market exchange rates and one using official exchange rates.

1.1 Volatility Comparisons

We measure volatility as the annual sample standard deviation of monthly percentage changes in the exchange rate. Scatter plots of effective and bilateral exchange rate volatility, computed from both official and parallel market exchange rates, are shown in Figure 1. The choice between the effective and the bilateral exchange rate would be irrelevant if the data points lie on the 45 degree line, which they evidently do not.

Full sample volatility calculations are reported in the appendix. Here, we give a brief summary of the numbers. Using official exchange rates, effective exchange rate

[5]These are imports and exports according to SITC rev.1 commodity classification or SITC rev.2 data when SITC rev.1 was not available for a particular country/year. For each reporting country $i = 1, \ldots, 180$ and year ($t = 1972, \ldots, 2002$), set of weights are formed by taking trade between country i and j as a fraction of country i's total trade for that year. These weights are used to construct the geometric average of respective bilateral nominal exchange rates and normalized such that their value in December 2000 is 100 to form the effective exchange rate.

volatility exceeds bilateral exchange rate volatility in 92 of the 172 countries for which we have data. Of these 92, 12 are OECD countries. Using parallel market exchange rates, the volatility of the effective exchange rate exceeds the volatility of the bilateral exchange rate for 59 of 105 countries for which the data exist. Of these 59 countries, 13 are OECD members and 42 of them also have official effective exchange rate volatility that lies above official bilateral exchange rate volatility.

The discrepancy between effective and bilateral exchange rate volatility is evident for countries that maintain a hard peg. Both effective and bilateral rates will exhibit the same degree of stability only if the country does all of its trade either with the country to which it fixes and with other countries that also fix to the same currency. Such may approximately be the situation for the Bahamas, which is a hard fixer to the US dollar and who in 2000 did 86 percent of its trade with the U.S., but this is an extreme case. We note that in 2000, Panama had trade shares of 40 percent with the U.S., 7 percent with Ecuador, 7 percent with Venezuela and 5 percent with Japan. Further down the line lies China, which in 2000 had trade shares of 19 percent with Japan, 17 percent with the U.S., 12 percent with Hong Kong, 8 percent with Korea and 5 percent with Germany.[6]

This source of discrepancy predicts that a scatter plot bilateral exchange rate volatility against effective exchange rate volatility should have data points on or below the 45 degree line. However, as can be seen from Figure 1 there appears to be no presumption in the data as to whether effective exchange rate volatility dominates bilateral exchange rate volatility since there are about as many data points that lie above the 45 degree line as there are that lie below.[7]

The descriptive statistics that we report combine experiences across regimes ranging from hyperinflation to currency board hard fixes. What these very aggregative summary statistics on volatility suggest, however, is that a very different picture about exchange

[6] In 2000, the US's major trading partners were Canada (21 percent) and Mexico (13 percent), Japan (11 percent) and China (6 percent).

[7] Using official exchange rates, countries whose effective exchange rate volatility exceeded bilateral exchange rate volatility by 50 percent (excluding those who maintained a hard fix throughout the sample) include Angola, Armenia, Austria, Azerbaijan, Bahrain, Belg.Lux, Belize, Cambodia, Chad, Comoros, Congo, Cyprus, Czecho, Estonia, Finland, Georgia, Germany, Guinea Bis, Haiti, Kuwait, Lao, Latvia, Libya, Lithuania, Maldives, Mauritania, Neth.Ant.A, Netherland, Oman, Qatar, Saudi Arab, Singapore, Slovakia, Somalia, Suriname, Switzerland, UAE and USA. Countries whose bilateral exchange rate volatility exceeded effective exchange rate volatility by 50 percent or more include Australia, Bangladesh, Benin, Bolivia, Botswana, Burkina Faso, Cent.Af.Rep.,China, Macao, Cote d'Ivorie, El Salvador, Ethiopia, Gambia, Guatemala, Guinea, Iceland, India, Ireland, Jordan, Kazakhstan, Kiribati, Kyrgyzstan, Lesotho, Mali, Mongolia, Namibia, New Zealand, Niger, Poland, Portugal, Rwanda, SaoTomePri, Senegal, Seychelles, Swaziland, Syria, Tonga, TrinTobago, Tunisia, Uganda and Ukraine.

volatility exposure emerges when viewed through the lens of effective rather than bilateral exchange rates.

1.2 Dynamic Comparisons

Here, we examine the co-movements between the alternative exchange rate measures by regressing a country's effective exchange rate on its bilateral exchange rate. Figure 2 plots the slope coefficients from regressing the percent change in a country's effective exchange rate on the percent change in its bilateral exchange rate at monthly and annual horizons. Figure 3 shows analogous plots for regressions at the four-year horizon and for levels of the data.

Whether these exchange rates are measured by parallel market rates or official rates, at the monthly horizon most of the point estimates are positive but very small in magnitude. However, there are many countries for which monthly changes in bilateral and effective exchange rates are negatively correlated throughout the available sample. At the monthly horizon using official exchange rates we obtain negative point estimates for 21 out of 157 countries. The discordance between the dynamics of effective and bilateral measures of the exchange rate tends to increase with the time horizon. Slope coefficient estimates are negative for 16 (of 152 available) countries for annual percent changes, 21 (of 138 available) countries at the 4-year horizon, and for 49 (of 157 available) countries when the regressions are performed on exchange rate levels. Using parallel market rates, we obtain negative point estimates for 9 out of 101 countries at the monthly horizon, 11 of 98 countries for annual changes, 10 of 87 countries for 4-year changes and 38 of 101 countries for levels.

In some cases, examination that looks only at the correlation between changes in the effective and bilateral exchange rates masks an underlying divergence in trends. Figure 4 shows plots of the monthly percent change, 4-year percent change and the levels of effective and bilateral exchange rates for Denmark using official rates. While Denmark has experienced an effective appreciation of the krone over the sample period and a bilateral depreciation with respect to the deutschemark, percent changes in the two exchange rate measures are positively correlated.[8] The exchange rates for many

[8]Two trend-stationary series $\{x_t\}$ and $\{y_t\}$ can trend in opposite directions and have positively correlated changes if the times when both series increase x_t experiences large changes and y_t experiences small changes and vice-versa when both series decrease. Suppose that $y_t = \alpha(1-\rho) + \rho y_{t-1} + \varepsilon_t$, $x_t = \beta(1-\gamma) + \gamma x_{t-1} + v_t$, $(\varepsilon_t, v_t)' \overset{iid}{\sim} (0, \Sigma)$, $\Sigma_{11} = \Sigma_{22} = 1, \Sigma_{12} > 0$, $0 < \rho, \gamma < 1$. Let $\alpha < 0$ and $\beta > 0$ so that they trend in opposite directions. Denoting the deviation from the mean with a '~', it follows

European countries and for Canada exhibit similar patterns. Dissimilar behavior is exhibited both in long-term trends and short-horizon movements for many countries.

2 Effective exchange rate regime classifications

Our source for the IMF's *de jure* classification is Ghosh et. al. (2002). Arranged in order of increasing stability, the categories are described as

1. Independently floating
2. Managed floating
3. Adjusted according to a set of indicators
4. Cooperative arrangements
5. Limited flexibility
6. Currency peg

The discrete choice model for the *de jure* classifications is presented in section 2.1. Section 2.2 discusses general features of our effective exchange rate classifications with comparisons to alternative classifications. In section 2.3, we present a comparison of our effective classifications to alternative classifications for a set of six countries–Argentina, Korea, Mexico, Peru, France, and the U.S.

2.1 Modeling regime choice probabilities

We begin with a latent variable model of the determination of the *de jure* classifications. This approach is commonly employed to model household revealed preferences from survey responses. Let R^*_{ijt} be the 'true' exchange rate regime perceived by the country's monetary authorities. These unobserved perceptions are given by

$$R^*_{ijt} = x'_{it}\beta_j + \epsilon_{ijt}$$

where x_{it} is a vector of the country's characteristics and ϵ_{ijt} has an extreme value distribution. Let the *de jure* or observed regime classifications be R_{ijt}. Then p_{ijt}, the

that the covariance between changes in x_t and y_t is $E\left(\Delta\widetilde{y}_t\Delta\widetilde{x}_t\right) = (1-\gamma\rho)^{-1}\Sigma_{12}\left(2-\gamma-\rho\right) > 0$.

probability that country $i = 1, ...N$ chooses to report regime its exchange rate regime to be $j = 1, ...6$ in year t are the conditional multinomial choice probabilities

$$p_{ijt} = \frac{\exp\left(x'_{it}\beta_j\right)}{\sum_{k=1}^{6} \exp\left(x'_{it}\beta_k\right)}$$

where β_j is a vector of coefficients associated with regime j. We estimate this model by the random effect panel maximum likelihood.[9] The regime categories are unordered in the multinomial logit specification. An important advantage of this approach over an ordered response model is that we can allow for coefficient heterogeneity across regimes. This allows the impact of country i's $k-$th characteristic on the choice probability to differ across regimes whereas an ordered response model imposes homogeneity restrictions on the coefficients across regimes. Given our emphasis on measurement as opposed to inference, we choose to adopt the less restrictive approach.

The set of country i characteristics in year t that we consider include,

1. EV_{it}–Effective exchange rate volatility,
2. EMC_{it}–Effective exchange rate mean absolute change,
3. $\text{BV}i_{it}$–Bilateral exchange rate volatility,
4. BMC_{it}–Bilateral exchange rate mean absolute change,
5. RV_{it}–Reserve volatility of country i's international reserves,

where volatility is measured as the annual sample standard deviation of the monthly percentage change in the respective variables. The mean absolute change for year t is similarly computed from the annual average of monthly percentage changes. We follow LYS by including reserve volatility. The idea is that high reserve volatility suggests active exchange rate management. Reserve volatility is thus predicted to be directly related to the 'fixity' in the exchange rate regime.

Using the estimated parameters $\beta_j, j = 1...6$, we obtain for year t a prediction of the probability that a country with the set of characteristics x_{it} will choose any particular regime. We then assign the regime with the highest predictive probability to the country-year observation.

[9] In estimation, a normalization with respect to one of the regimes is required for identification. Our estimates are obtained using regime 5 as the normalization.

2.2 Effective regime classifications

The distribution of country-year observations across alternative exchange rate regime classifications for alternative specifications of the country characteristics is displayed in Table 1. We begin with classifications generated from properties of official exchange rates, which offer substantially broader coverage than parallel market rates. Our preferred classification employs both measures of effective exchange rate flexibility, the mean absolute change in the bilateral exchange rate and international reserve volatility (variables 1,2,4 and 5 above).[10] Most of the country-year observations are classified into categories 4 (cooperative) and 5 (limited flexibility) which lie towards the stable exchange rate region of the spectrum. Only 64 observations were classified as hard fixers when using official rates. The next largest category is category 1 (independently floating), which form 17% of the observations. The column labeled 'effective' shows classifications generated using both measures of effective exchange rate volatility and reserve volatility (variables 1,2 and 5) but omitting properties of the bilateral exchange rate. This result shows nearly the same number of free-floaters, but many more fixers (categories 5 and 6). The tendency to classify country-year observations as fixers is even more pronounced when we use both measures of bilateral exchange rate volatility and reserve volatility (variables 3,4 and 5). These classifications are shown under the column labeled 'bilateral.'

It is noteworthy that the predictive probabilities do not simply replicate the *de jure* regime choices. *de jure* classifications that appear to be inconsistent with the stability of a country's bilateral exchange rate may be consistent with the degree of stability in its effective exchange rate. To the extent that those *de jure* classifications that are at odds with overall exchange rate stability are unsystematic, they are properly handled in the error term of the logit regression.

The bottom half of the table shows the distribution of the effective classification generated using parallel market exchange rates in place of official exchange rates. It can be seen that the classifications generated using parallel rates are more evenly distributed across the alternative regimes with relatively more observations in the intermediate categories than those obtained using official rates. Dropping bilateral exchange rate behavior tilts the classifications towards increasing exchange rate stability (variables

[10] The individual coefficient estimates from the multinomial logit do not have natural interpretations in this context and are not reported. We originally performed estimation using all five variables but because bilateral exchange rate volatility and mean absolute change measures are highly correlated (0.94) we dropped the volatility measure. Very similar results are obtained by keeping bilateral volatility and dropping the bilateral mean absolute change.

1,2, and 5), whereas omitting the properties of the effective exchange rate does not give any country-year classifications as pure independent floaters or as hard pegs.

In Figure 5, we compare the evolution of our official-effective classifications with alternative classifications.[11] In the *de jure* classifications, the sample begins with nearly all countries reporting to be fixers (categories 5 and 6). This proportion declines steadily over time. An increasing number of countries have moved towards reporting flexible exchange rates (categories 1 and 2). Note also the decline in the number of countries in intermediate regimes. This 'hollowing out' of the middle is seen only in the *de jure* classification.

The distribution of pure effective floaters is similar to *de jure* floaters but this is where the similarity ends. Not unexpectedly, we find very few country-year observations to be hard effective fixers. Most country-year observations are placed in categories 1, 4, and 5 with a relatively large proportion of category 5 regimes (limited flexibility). There is a trend towards away from fixing but it is less pronounced. Interestingly, even when using official exchange rates, our preferred classification exhibits a higher correspondence to RR's 'natural classification' than to either LYS or the *de jure* classifications. This is seen by comparing effective categories 5 and 6 to RR's category 5 and effective categories 1 and 2 to RR's categories 1 and 2. The distribution over time of the RR classification is relatively stable with many more intermediate regimes than our effective classification. Possibly, one reason for this stability is that RR employ a 5-year window for computing exchange rate variability whereas we (and LYS) employed a one-year window. The LYS classification rather consistently places country-year observations into the fixed category. In 1974, mor than 70 percent of LYS observations are classified as fixers. In 2000, approximately 55 percent were classified as fixers.

Table 2 shows the correlation matrix for our preferred official classifications, alternative classifications, and the country characteristics that we used to produce the effective classification. Among alternative classifications, our effective classifications are most highly correlated with RR (0.53) and, interestingly, are least correlated with the IMF *de jure* classifications (0.32) even though the latter are used as the quantal response variable in estimation. As expected, the effective regime classification is negatively cor-

[11] Our effective classifications are not directly comparable to RR nor LYS since they do not provide a 6-way classification. For RR, we examine their 5-way classification broken down as 1) Freely falling, 2) Freely floating, 3) Managed floating, 4)Limited flexibility, 5) Peg. For LYS, we examine their 4-way classification broken down as 1) Flexible, 2) Dirty Float, 3) Crawling Peg, and 4) Fixed. Both RR and LYS have a category for observations that are deemed 'inconclusive,' which we omitted in drawing the figures.

related with both measures of effective exchange rate variability but interestingly, so is the RR's classification. Neither LYS nor the *de jure* classifications show a systematic relationship with effective exchange rate variability.

None of the four classifications are highly correlated with reserve volatility. The correlation is slightly positive for the effective, *de jure* and LYS and slightly negative for RR. Increasing flexibility in the effective and RR classifications are associated with higher bilateral exchange rate variability and higher effective parallel market exchange rate variability. The correlations between these variables and the *de jure* and the LYS classifications are relatively small.

The top panel of Table 3 reports the distribution of our effective country-year classification across industrialized and nonindustrialized countries. Most nonindustrialized countries are given effective country-year classifications in category 5, reflecting substantial exchange rate stability. Approximately 15 percent of the country-year classifications for industrialized countries are 'independently floating' whereas roughly 80 percent are grouped into categories 4 and 5–indicating the maintenance of relatively stable exchange rates. The bottom panel of the table shows the breakdown across countries that either did or did not experience a crisis during the sample year. A crisis is said to occur in year t if during the year the country experienced a month-to-month change in its effective exchange rate exceeding 25 percent. Of 5760 country-year observations, there were 434 crisis observations, 424 of which occurred in nonindustrialized countries (10 in industrialized countries). It is worth pointing out that a relatively large share of crisis country-year observations continue to be grouped in categories 4 and above (28 percent). That our classification methodology does not automatically consign all of the crisis observations to a free float classification is an attractive feature of the approach.

Table 4 shows the cross tabulation between our effective classification, the *de jure*, LYS and RR classifications. A perfect correspondence would show up with nonzero entries only on the diagonal. As can be seen, 265 out of 853 *de jure* floaters (categories 1-2), are effectively classified as fixers (categories 5 and 6). Fear of floating appears to be present for these country-year observations. On the other hand, only 74 out of 1035 *de jure* fixers (categories 5-6) are effectively classified as floaters whereas 868 are effectively classified as fixers. There are also some significant contrasts between our effective classifications and LYS. 63 LYS floaters are classified as effective fixers (categories 5 and 6) and 72 LYS fixers were classified as effective floaters (categories 1 and 2). We note also that the cross-tabulation with RR is relatively concentrated on and just below the diagonal. As we've seen before, the overall correlation between

the effective and RR classifications are relatively high which can be seen in the cross-tabulation table.

2.3 Classifications for selected countries

In this section, we take a look at the evolution of the alternative exchange rate classifications for a some selected countries in our data set. Figure 6 plots the evolution of exchange rate regime classifications for a set of emerging market economies–Argentina, Mexico, Peru, and Korea. For Argentina, there is some disagreement among the alternative classifications in the early 70s. In the 80s, Argentina is classified as a floater by RR and our effective classifications whereas it is a fixer according to LYS. In the 90s the country is generally classified as a fixer by each of the classification methods. In 1993, however, Argentina is classified as an effective floater whereas it is classified as a *de jure*, LYS, and RR fixer. Ostensibly, the reason is that Brazil, a large trading partner of Argentina's was heading into a period of high inflation and the real depreciated by 2000 percent against the dollar. This depreciation was reflected in instability of the effective exchange rate.[12]

Looking at the figure for Mexico, the effective classification is largely in agreement with RR until the mid 1990s. In the 1970s, LYS consistently classifies the peso to be more flexible than RR or the effective classification. Similarly, for Peru, our effective classification is largely consistent with RR. For Korea, we have fairly large agreement among our effective classification, RR and LYS. Korea appears to be a country that fears floating, especially after the crisis of 1997. Throughout the sample, these three classifications rather consistently view the won as more stable than the *de jure* classification.

Figure 7 plots alternative classifications for the US and France. Here, the effective classification rates the dollar in an intermediate regime, somewhat more stable currency RR or LYS. In the case of France, our effective classification corresponds closely to RR by assessing the franc to be a relatively stable currency whereas LYS often assesses the franc to be relatively flexible.

To summarize, our classification method incorporates important and relevant information about the effective exchange rate and employs an appropriate econometric method to estimate regime choice probabilities. A spot check of the regime classifications generated using official effective and bilateral exchange rates for selected countries

[12] We note that the 1993 predictive probability for floating is 0.39 which is not particularly high. The respective 1993 predictive probabilities are $p_1 = 0.39, p_2 = 0.23, p_3 = 0.04, p_4 = 0.00, p_5 = 0.20, p_6 = 0.14$.

look reasonable. Classifications generated from parallel market rates are qualitatively quite similar.

3 Growth and exchange rate classifications revisited

Although the main purpose of this paper concerns the measurement of exchange rate regimes and the classification of country-year observations into these regimes, it is useful to investigate whether our new classifications are economically significant in the sense that one might draw different conclusions when using them as opposed to others. To investigate this issue, we employ our effective exchange rate regime classifications to re-examine the evidence on the relation between GDP growth and the exchange rate regime.

On balance, the net effect of the exchange rate regime on economic performance is not clear cut. Frankel (2004) conveniently delineates four advantages of maintaining exchange rate stability. They are: 1) providing a nominal anchor for monetary policy, 2) promoting trade and investment, 3) precluding competitive depreciations, and 4) avoidance of speculative bubbles. Analogously, four advantages of promoting exchange rate flexibility are 1) allowing independence of monetary policy, 2) providing an avenue for trade shock adjustment 3) retention of seigniorage and allowing the central bank to be a lender of last resort and 4) avoidance of speculative attacks on the currency.

Empirical results on the effect of the exchange rate regime on GDP growth has been mixed. Ghosh et. al. (2002) collapse the *de jure* classifications into three categories (floating, intermediate, and fixed), and find in growth regressions that countries with the most stable exchange rates grew most rapidly, followed by floaters. Intermediate *de jure* regime countries grew least rapidly. In RR, if one excludes the pathological freely falling category (who experience an awful -2.5 percent growth), countries with relative stable exchange rates in the 'limited flexibility' category grew the most rapidly, followed by freely floating. Country-year observations in the intermediate regimes experienced the lowest GDP growth rates.

LYS run pooled growth regressions of GDP growth on their three-way classification along with a standard set of standard growth determinants. In contrast to Ghosh et. al. and RR, they find in their 'all countries' regression that floaters grow most rapidly, followed by fixers and then by intermediates. This result is driven in large part by nonindustrial countries. When countries are broken out by industrial development, non-industrial LYS floaters grew about 1.1 percent more rapidly than LYS intermediate and

fixers.

To conform to LYS's empirical analysis, we collapse our six-way effective exchange rate classification into a three regimes by combining categories 1-2, 3-4, and 5-6. Summary statistics for countries according to the LYS and effective three-way classification are shown in Table 5. For all countries, LYS floaters have the highest mean growth rate and lowest volatility whereas the mean growth rate is lowest for LYS intermediates. When we split between industrialized and nonindustrialized countries, we see that the industrialized LYS fixers have the highest mean growth rate but amongst nonindustrialized countries, LYS floaters have the highest growth rate. Growth rates among countries with LYS intermediate exchange rate flexibility are consistently the lowest. In sharp contrast, countries with the intermediate effective exchange rate classification experienced the highest growth rates regardless of industrial classification. Average growth rates were lowest for effective floaters.

Next, we conduct a re-examination of LYS regressions.[13] We estimate a random effects panel regression by generalized least squares of annual GDP growth on the same set of control variables considered by LYS and the LYS three-way classification. The control variables are a set of time-specific dummy variables, the investment to GDP ratio, the population growth rate, initial year GDP, secondary education attainment, the initial year population level, a political indicator of civil liberties, openness, the change in the terms of trade, and dummy variables for Latin America, Africa, and transition economies.

Results for the LYS regressions are shown in the top half of Table 6. To economize on space, we do not report coefficient estimates for the auxiliary control variables. We take category 1 to be the base, so exchange rate regime dummies capture growth effects relative to floaters. Using the LYS regimes in the all-countries regression, the intermediate regime is associated with lower growth than LYS floaters but the coefficient on the intermediate classification is not significant (p-value=0.10). The coefficient on LYS fixers is small in magnitude and insignificant. Similar results are obtained for industrialized countries. For nonindustrialized countries, stronger evidence that increasing exchange rate stability is associated with lower growth. The coefficient on the LYS intermediate regime is significantly negative. These countries experience growth rates 0.73 percent per year lower than LYS floaters. Growth rates for LYS fixers are 0.11

[13]There are some differences between our analyses. First, as we were unsuccessful in obtaining LYS's data, we constructed our own. Variables were constructed by conforming as close as possible to descriptions in LYS. Second, LYS do not exactly describe their econometric specification so there may be slight differences between our estimation methods.

percent below LYS floaters, but the coefficient is not significant. We are thus able to qualitatively replicate LYS's results that for industrialized countries fixers grow most rapidly, followed by floaters and intermediates whereas for nonindustrialized countries floaters grew most rapidly, followed by fixers and intermediates.

We now estimate the growth regressions using our effective exchange rate classifications.[14] Here, our general finding reinforces Ghosh et. al. and RR, that increasing exchange rate stability is associated with higher growth rates. In the all-countries regression, while the coefficient on the intermediate regime dummy is not significant. However, point estimates imply that effective fixers grow 1 percent faster than effective floaters and the coefficient on the fixer dummy is significant. For industrialized countries, coefficients on the classification dummies are not significant but both are positive suggesting that effective floaters grow less rapidly than effective intermediates and fixers. For nonindustrialized countries, effective fixers are estimated to grow 1.2 percent faster than effective floaters and the coefficient on this the effective fixer dummy is significant. The estimated coefficients on the exchange rate regime dummies lose their significance when a crisis dummy is added.

We can qualitatively replicate the LYS growth regressions and their conclusion that among nonindustrialized countries increasing exchange rate stability leads to lower GDP growth. Their conclusion is fragile, however. Figure 8 shows that in a three-way classification, LYS method places a larger proportion of country-year observations in the fixer category than does the effective exchange rate classification. When the growth regressions are run on a three-way effective exchange rate classification, growth in countries with the most stable exchange rates exceeds growth in countries with the most variable rates.

4 Conclusion

We have suggested an alternative exchange rate regime classification that conditions on properties of the country's effective exchange rate and are generated using standard econometric methods. This is an important measure of the overall exchange rate environment that existing classifications have not taken into account. Our preferred classification looks sensible, exhibits a relatively high correspondence to Reinhart and Rogoff's classification and relatively low correspondence to Levy-Yeyati and Sturtzenegger's classifications. Our regime classifications are economically significant in the sense

[14] These are our preferred classifications generated from properties of official exchange rates.

that Levy-Yeyati and Sturtzenegger's conclusions that increasing exchange rate stability hurts GDP growth is overturned when their classifications are replaced with our effective classifications.

While we have argued that our preferred classification is quite sensible, our general approach allows a particular classification scheme to be evaluated, criticized, updated, and reformulated in a straightforward fashion. Analyst judgement in building the classifications is exercised by varying the set of country characteristics upon which the classifications are determined.

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Table 1: Effective Exchange Rate Classifications

	Preferred		Effective		Bilateral	
Official	Freq.	%	Freq.	%	Freq.	%
1	532	16.8	525	16.6	280	6.4
2	116	3.7	60	1.9	0	0
3	34	1.1	0	0	0	0
4	811	25.7	60	1.9	233	5.3
5	1602	50.7	2445	77.4	3634	90.0
6	64	2.0	70	2.2	234	5.3
pseudo-R^2	0.119		0.046		0.100	
Nobs	3,159		3,160		4,381	

	Preferred		Effective		Bilateral	
Parallel	Freq.	%	Freq.	%	Freq.	%
1	323	16.93	180	9.41	0	0
2	106	5.56	137	7.17	227	9.60
3	198	10.38	126	6.59	205	8.67
4	747	39.15	976	51.05	1,209	51.14
5	523	27.41	489	25.58	723	30.58
6	11	0.58	4	0.21	0	0
pseudo-R^2	0.025		0.015		0.017	
Nobs	1908		1908		2364	

Table 2: Correlation Matrix

	EFF	IMF	RR	LYS	EV	EMC	RV	BV	BMC	EV^a
EFF	1.000									
IMF	0.315	1.000								
RR	0.527	0.184	1.000							
LYS	0.438	0.401	0.265	1.000						
EV	-0.356	0.008	-0.339	-0.085	1.000					
EMC	-0.447	-0.050	-0.441	-0.080	0.869	1.000				
RV	0.085	0.024	-0.050	0.014	0.056	0.050	1.000			
BV	-0.197	0.031	-0.215	-0.076	0.863	0.714	0.034	1.000		
BMC	-0.314	-0.032	-0.333	-0.118	0.847	0.849	0.039	0.941	1.000	
EV^a	-0.143	0.053	-0.256	-0.021	0.301	0.317	0.046	0.236	0.278	1.000
EMC^a	-0.248	0.059	-0.396	-0.021	0.447	0.566	0.062	0.357	0.471	0.921

Notes: $^{a/}$Parallel market rates. EFF is our preferred classification based on official exchange rates.

Table 3: Effective Classifications across Subgroups

	EFF						
	1	2	3	4	5	6	Total
Non Indus.	431	99	18	500	1,361	63	2,472
percent	17	4	1	20	55	3	100
Indus.	101	17	16	311	241	1	687
percent	15	2	2	45	35	0	100
Non-crisis	392	60	31	785	1,561	52	2,881
percent	14	2	1	27	54	2	100
Crisis	140	56	3	26	41	12	278
percent	50	20	1	9	15	4	100

Table 4: Cross Tabulations

	EFF						
de jure	1	2	3	4	5	6	Total
1	168	29	7	116	109	1	430
2	100	36	10	122	149	6	423
3	48	15	12	106	134	1	316
4	47	8	3	277	147	4	486
5	48	9	0	76	587	22	742
6	12	5	0	17	231	28	293
Total	423	102	32	714	1,357	62	2,690

	EFF						
LYS	1	2	3	4	5	6	Total
1	205	44	21	230	58	5	563
2	62	10	3	70	53	4	202
3	76	27	1	56	121	1	282
4	62	12	1	112	903	49	1,139
Total	405	93	26	468	1,135	59	2,186

	EFF						
RR	1	2	3	4	5	6	Total
1	140	56	3	26	41	12	278
2	55	6	10	55	6	0	132
3	163	28	6	170	182	5	554
4	74	10	14	338	337	6	779
5	39	7	1	116	636	37	836
Total	471	107	34	705	1,202	60	2,579

Table 5: Summary Statistics for Growth Rates, Growth Volatility, and Exchange Rate Regimes

	All Countries		Industrialized		Non-Industrialized	
Classification	Growth	Volatility	Growth	Volatility	Growth	Volatility
LYS FLEX	1.811	2.857	1.953	1.878	1.743	3.369
LYS INTER	0.980	3.610	1.492	1.831	0.881	3.988
LYS Fix	1.134	4.538	2.408	1.653	0.992	4.840
EFF FLEX	0.845	3.596	2.048	1.911	0.570	3.988
EFF INTER	1.948	2.784	2.223	1.961	1.768	3.323
EFF FIX	1.687	3.692	2.144	1.640	1.603	4.092

Table 6: GDP Growth and Exchange Rate Regimes

LYS three-way classification					
	All	Indus	Non Indus	Indus	Non Indus
INT	**-0.506**	**-0.486**	**-0.728**	**-0.516**	-0.512
	(0.304)	(0.281)	(0.398)	(0.281)	(0.398)
FIX	0.097	0.194	-0.110	0.222	-0.297
	(0.276)	(0.273)	(0.364)	(0.273)	(0.363)
Crisis	–	–	–	**1.101**	**-1.777**
	(–)	(–)	(–)	(0.667)	(0.391)
R^2	0.210	0.411	0.212	0.416	0.224
Nobs	1768	386	1382	386	1382

Effective three-way classification					
	All	Indus	Non Indus	Indus	Non Indus
INT	0.349	0.288	0.318	0.349	-0.325
	(0.274)	(0.264)	(0.376)	(0.272)	(0.394)
FIX	**1.026**	0.217	**1.246**	0.266	0.540
	(0.254)	(0.300)	(0.322)	(0.305)	(0.350)
Crisis	–	–	–	0.691	**-2.034**
	(–)	(–)	(–)	(0.735)	(0.398)
R^2	0.284	0.400	0.305	0.403	0.320
Nobs	1762	510	1252	510	1252

Notes: Standard errors in parentheses. Bold face indicates significance at the 10 percent level.

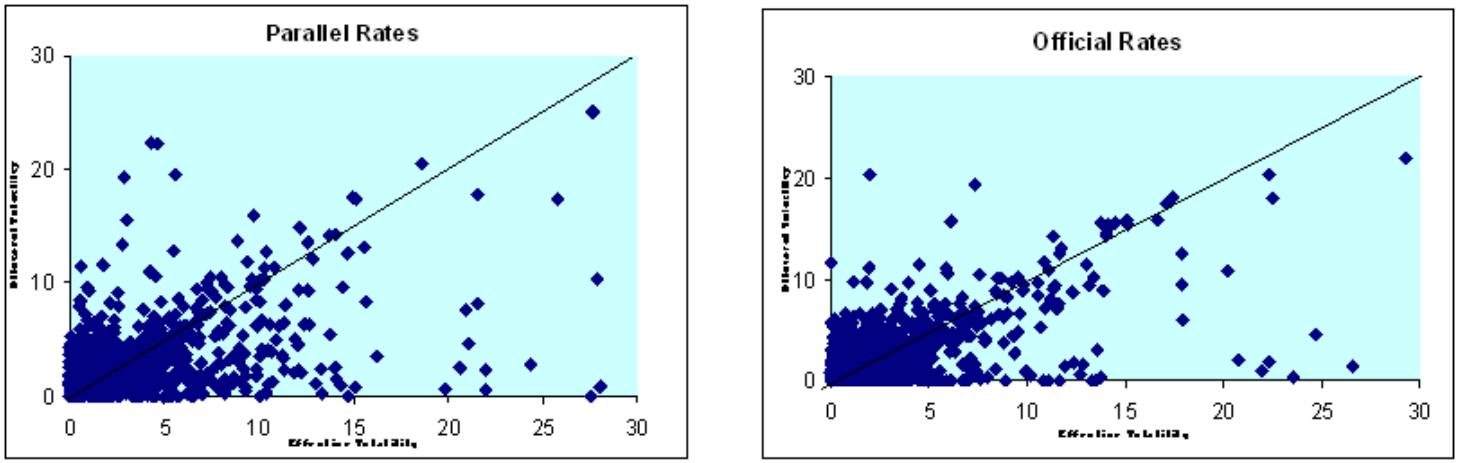

Figure 1: Scatter plots of bi-lateral exchange rate volatility against effective exchange rate volatility.

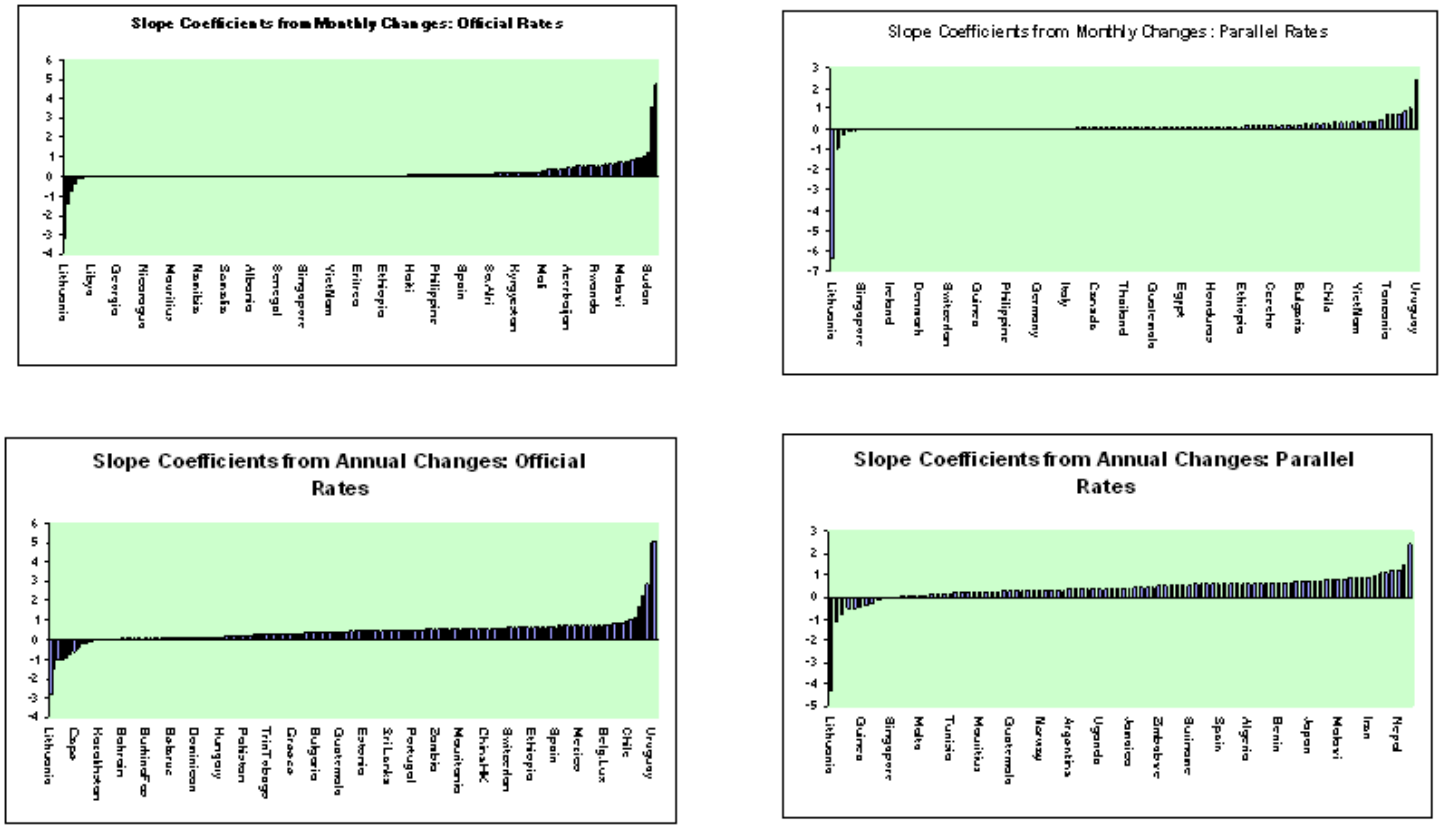

Figure 2: Slope coefficients from regression of percent change in effective exchange rate on percent change in bilateral exchange rate.

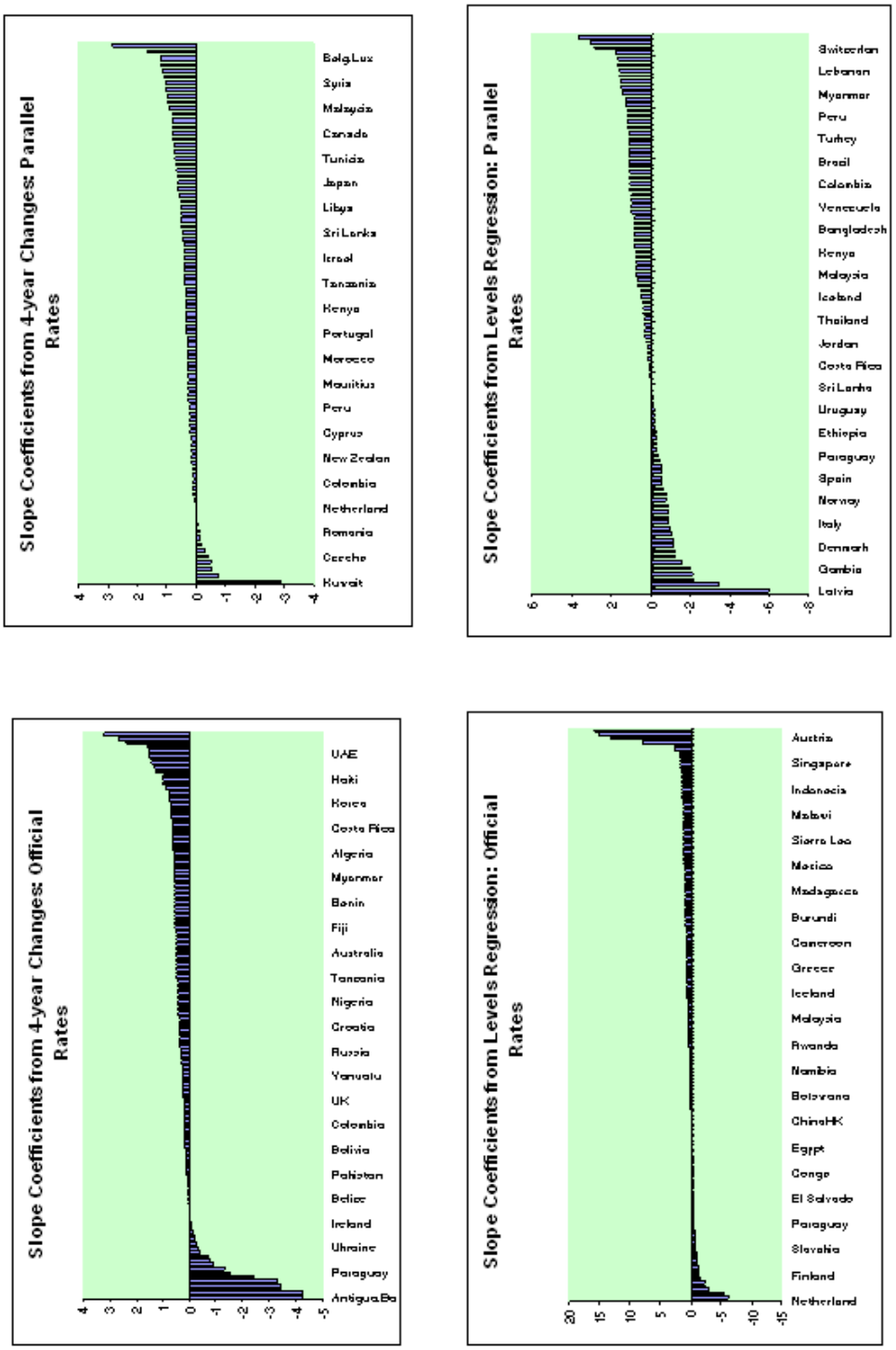

Figure 3: Slope coefficients from regressions of effective exchange rate on bilateral exchange rate.

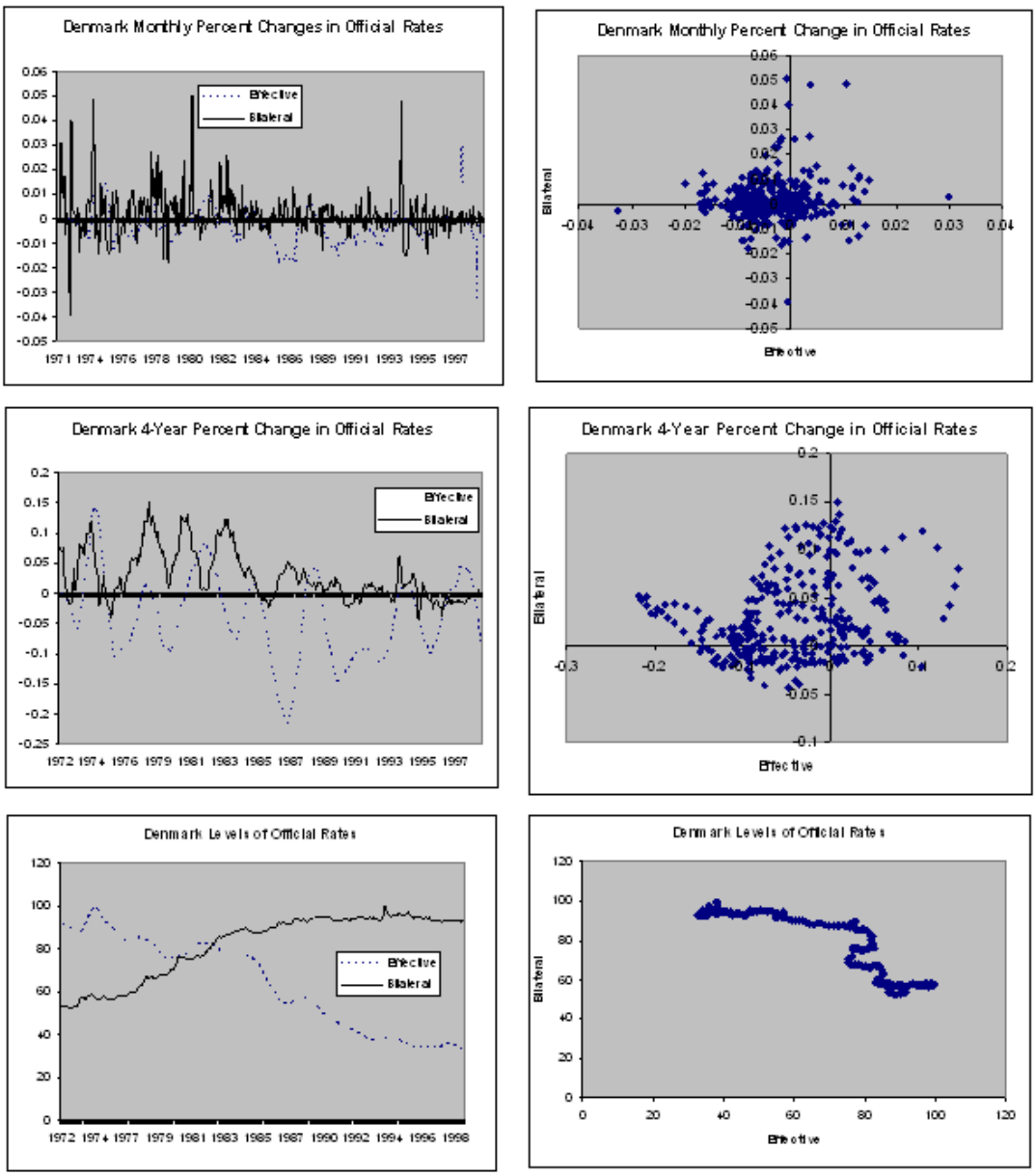

Figure 4: Effective and bilateral (krone-DM) exchange rates for Denmark.

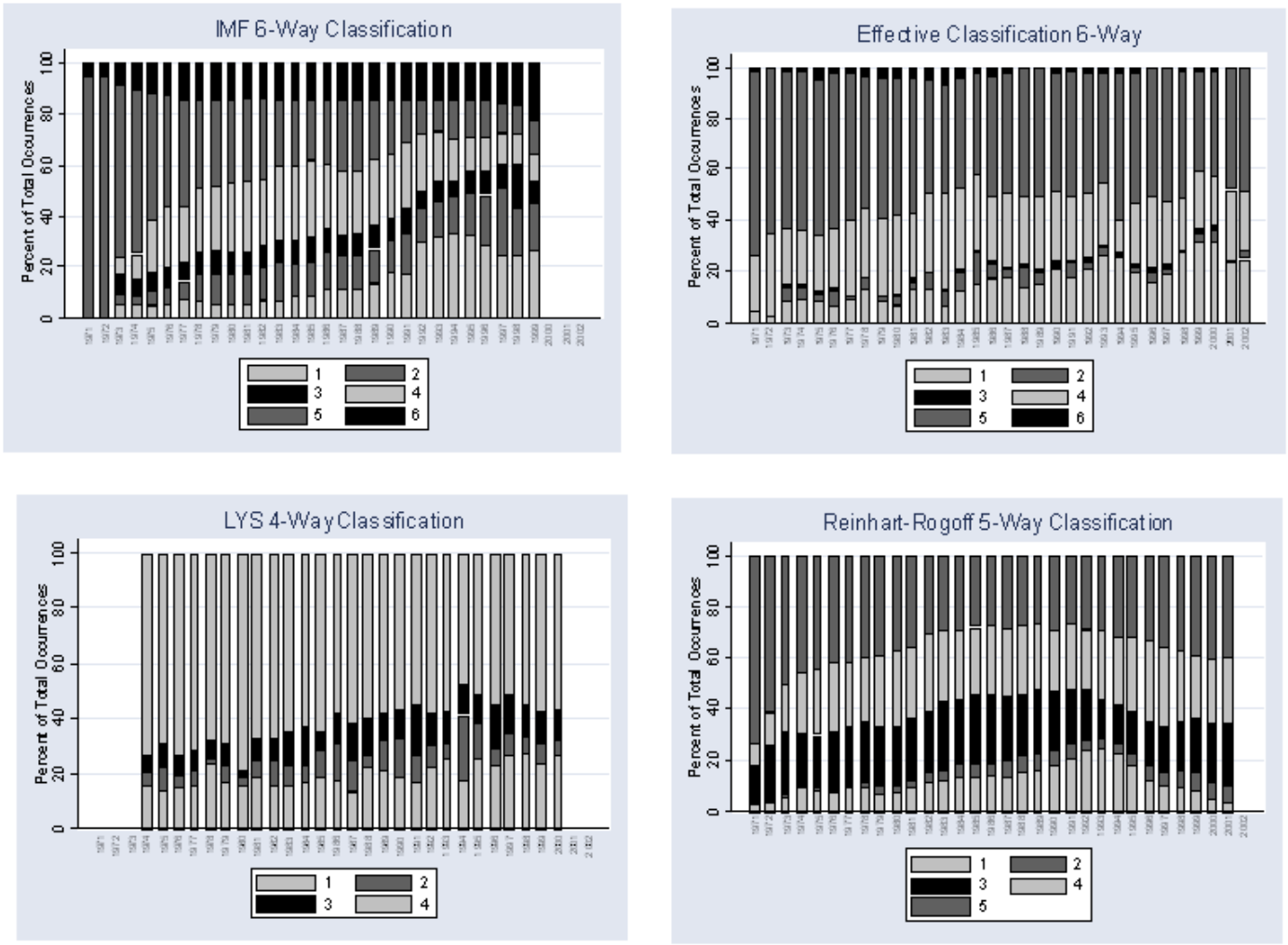

Figure 5: Evolution of distribution of country-year observations across exchange rate regimes for alternative classification methods.

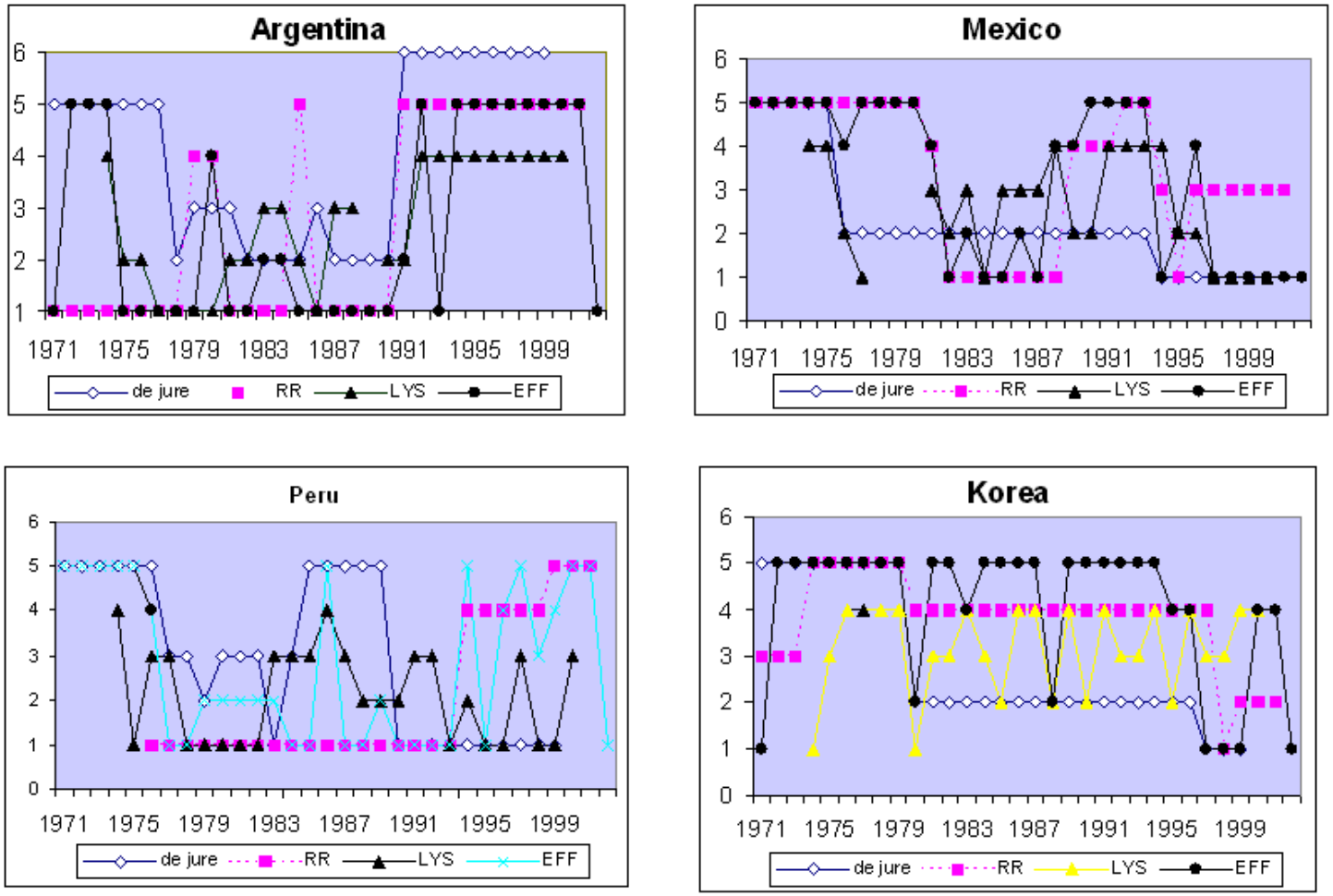

Figure 6: Evolution of alternative classifications for selected countries

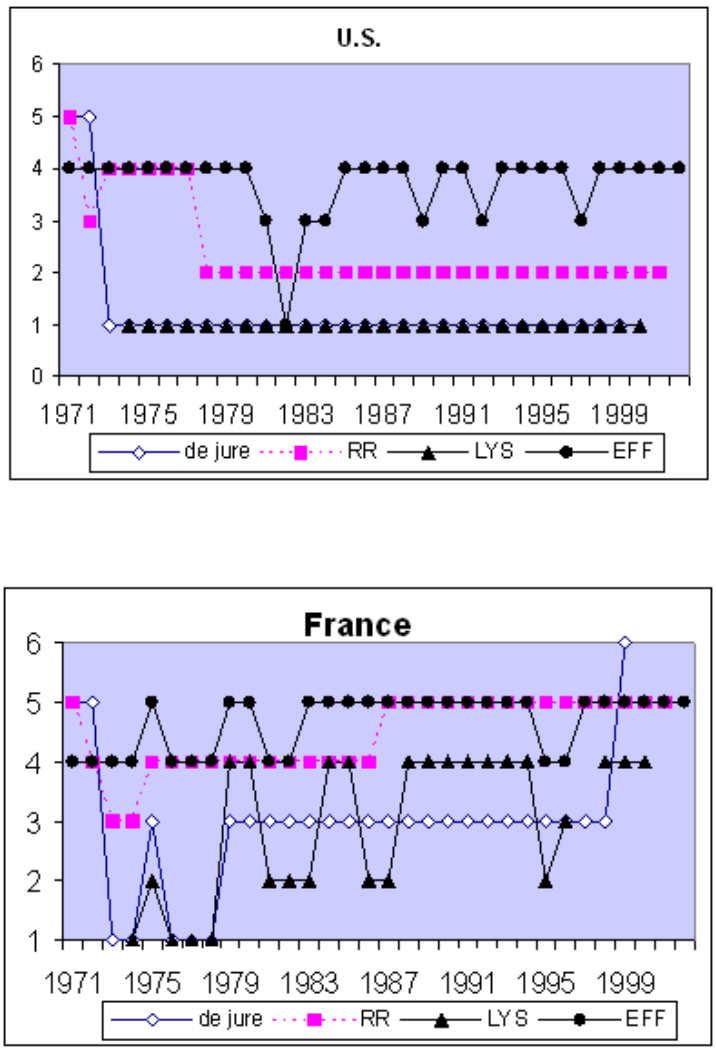

Figure 7: Evolution of alternative classifications for the U.S. and France.

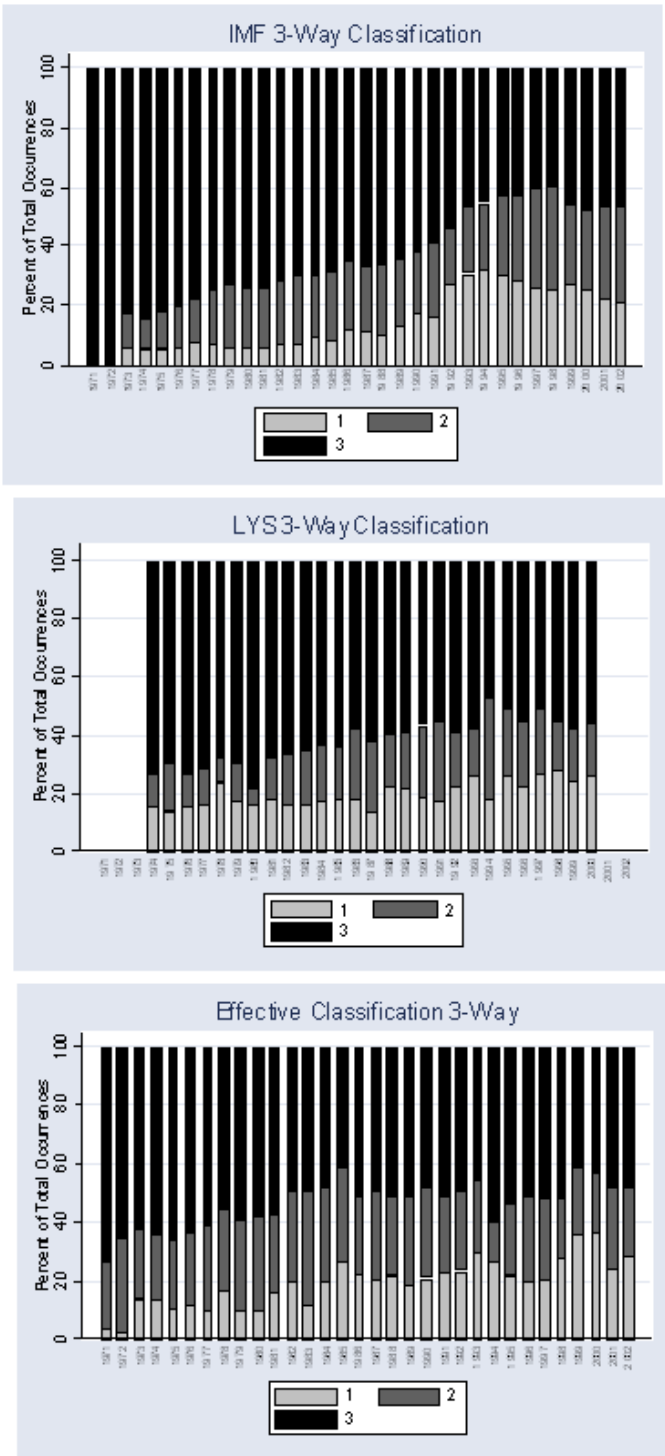

Figure 8: Evolution of three-way classifications.

5 Appendix

5.1 The Data

Our data set includes 180 countries, each with a unique country code (1-180). Country code 182 represents the world, country code 181 represents residuals, or countries not included in the 180.

Other notes: Fmr. Rep of Vietnam included as Vietnam in sample (cc 176), Fmr. Fed Rep of Germany (West Germany) included as Germany in sample (cc 66), Aruba, Netherlands Antilles defined together as Netherlands Antilles (cc 8) until 1987, separate thereafter, Fmr. Dem Yemen defined as Yemen in sample (cc 177), East and West Pakistan defined as Pakistan in sample (cc 124)

Data sources and construction of the effective exchange rate series was described in the text.

A monthly data set extending from 1960.01 to 2002.12 was used to construct annual volatility measures and other pieces of the annual data set. The monthly data set is comprised of the following.

Net Reserves (DLM): (in US$) (IFS line 1L.DZF) When this data was clearly reported on a quarterly basis (i.e., at least 2 consecutive periods), the data was interpolated to get monthly data points. A full list is available upon request. Some data anomalies were discovered in the raw data. Negative reserves were observed for several months for the Central African Republic, Chad, Gabon. Negative reserves in only one month were reported for Congo, Guinea-Bissau, and Ukraine. Except for the Ukraine, these are all Central Franc Zone countries.

We note that this is not the same definition of reserves as that reported by LYS. We attempted to re-create their reserve data. They describe it as the foreign assets less foreign liabilities and central government deposits (IFS: line 11, line 16c, line 16d). These data contained many anomalies—LYS reserves are negative for 30 percent of all observations and data are partially or entirely missing for many important countries (Australia, Belgium, Brazil, France, Greece, Japan, New Zealand, Norway, Switzerland, United Kingom). The reserve measure we utilize has approximately 10,000 more observations than LYS.

Nominal exchange rate: 2 bilateral (US$) measures as in annual data (nom_e_lc, nom_e_euro) (see below).

Parallel market exchange rates were used in Reinhart and Rogoff (2002), and obtained from Carmen Reinhart's web page.

Nominal effective exchange rates: Using trade weights from Comtrade data set, these were computed for both official rates and parallel market rates (neex and neex_bm). Additionally, to give these time series properties, they were smoothed using a 12 month moving average (5 lags, 6 leads, including observation) to create neex_sm and neex_ubm_sm.

Deposit Rate: IFS (60L..ZF)

Discount Rate: IFS (60..ZF)

Lending rate: IFS (60P..ZF)

CPI: IFS (line 64..ZF) No monthly data available for USSR, Czechoslovakia. Russian monthly CPI data derived from IFS data (CPI change over previous period, line 64XX..ZF), and inserted into database. In Australia, Belize, New Zealand, Papua New Guinea, Vanuatu, the CPI is reported quarterly. These quarterly data were interpolated to obtain monthly measures using Q1 as month 3, Q2 as month 6, Q3as month 9, Q4 as month 12.

Monetary base: Following LYS, these data are from IFS "reserve money", line 14, or if unavailable, line 14a. For euro countries, the observations were converted to imputed local currency units using the monthly euro exchange rate, taking into account the local currency parity at which these countries entered the euro. For Zambia (country code 179), the monthly data contains negative values for monetary base (1989.10-11, 1990.7-8, 1990.10-11). We replaced these observations using interpolations of the quarterly observations.

Investment derived by using GDP (current Local currency units (LCU)) minus external balance on goods and services minus final consumption expenditure [I=GDP-NX-C] (all from World Development Indicators).

Population, GDP, Exports, Imports, Terms of trade (Exports as a capacity to import), obtained from from WDI.

Secondary education: WDI. Data is generally reported every 5 years in the data source which was linearly interpolated to obtain annual observations.

Civil liberties: Following LYS, data was pulled from Freedom House country rankings.

5.2 Supplementary Tables

Table 7 shows the full sample volatility of each country's bilateral and effective exchange rate. Table 8 reports the slope coefficients from regressions of a country's bilateral exchange rate rates on its effective exchange rate. Regressions were run on percent changes and in levels.

Table 7: Effective and Bilateral Exchange Rate Volatility

	Parallel		Official	
Country	Effective	Bilateral	Effective	Bilateral
Afghanista	15.035*	0.08	14.339*	0
Albania	.	.	11.739*	8.726
Algeria	28.359	33.686	30.053*	28.208
Angola	.	.	26.686*	0
Antigua.Ba	.	.	23.652*	18.878
Argentina	27.618	39.69	25.871*	18.266
Armenia	.	.	15.142*	5.437
Aruba	.	.	10.194*	0
Australia	9.181	16.27	10.85	16.789
Austria	25.658*	1.971	27.042*	1.262
Azerbaijan	.	.	19.812*	7.139
Bahamas	.	.	27.818*	0
Bahrain	.	.	12.261*	4.409
Bangladesh	23.656*	22.183	9.091	17.28
Barbados	.	.	20.358*	19.076
Belarus	8.567	32.819	35.815*	35.197
Belg.Lux	20.066*	11.987	20.913*	11.949
Belize	.	.	22.888*	13.432
Benin	19.668	23.491	13.244	23.511
Bolivia	21.553	36.443	19.588	33.099
Bos.Herz	.	.	.	.
Botswana	.	.	1.202	7.413
Brazil	35.272*	31.653	25.482*	20.623
Brun.Darus	.	.	10.645	12.351
Bulgaria	38.851	38.867	29.655	34.437
BurkinaFas	.	.	12.445	23.275
Burundi	10.944	12.832	21.649	26.023
Cambodia	.	.	22.923*	1.357
Cameroon	.	.	18.1	22.264
Canada	11.753*	9.473	10.614	10.756

(Table 1 continued)

	Parallel		Official	
Country	Effective	Bilateral	Effective	Bilateral
Cape Verde	.	.	18.788	20.547
Cent.Af.Re	.	.	11.112	23.624
Chad	.	.	0.251*	0.058
Chile	22.808	35.578	23.564	28.183
China	21.047*	14.443	15.159	24.391
ChinaHK	11.819	11.89	12.173	12.774
ChinaMacao	.	.	8.218	15.196
Colombia	29.243*	25.572	26.937*	25.468
Comoros	.	.	2.78*	1.116
Congo	.	.	26.813*	15.474
Costa Rica	17.842	27.361	23.803	28.64
Cote d'Ivo	.	.	13.755	22.882
Croatia	.	.	14.639	16.351
Cyprus	25.797*	9.605	18.795*	12.491
Czecho	31.153*	15.977	11.486*	4.562
Dem.Rep.Co	29.084*	0	27.077*	0
Denmark	21.517*	15.95	20.471*	15.317
Djibouti	.	.	12.468*	0
Dominica	.	.	14.508*	0
Dominican	23.382	26.63	31.764*	26.269
EastGer	.	.	.	.
Ecuador	23.451*	20.426	27.65	29.694
Egypt	23.369	29.814	22.611	31.801
El Salvado	21.407	23.308	17.887	31.887
Equatorial	.	.	.	.
Eritrea	.	.	11.69	14.417
Estonia	11.502*	2.263	10.849*	1.323
Ethiopia	15.404	20.127	14.738	29.684
Fiji	.	.	15.181	18.895
Finland	28.652*	17.663	27.795*	17.426
France	26.351*	19.13	21.776*	18.885
Gabon	.	.	26.651*	22.175
Gambia	13.279*	4.174	3.005	4.994
Georgia	.	.	8.794 *	4.208
Germany	29.371*	13.237	28.523*	12.442
Ghana	31.494	31.896	29.349*	28.482
Greece	15.285	32.085	25.11	34.675
Grenada	.	.	15.354*	0
Guatemala	8.769	17.542	16.671	31.801
Guinea	8.168*	7.577	11.27	19.895
Guinea.Bis	.	.	37.292*	21.681
Guyana	5.294	7.222	46.347*	43.604

(Table 1 continued)

	Parallel		Official	
Country	Effective	Bilateral	Effective	Bilateral
Haiti	20.366*	18.275	23.164*	11.874
Honduras	20.445	25.781	23.367	29.702
Hungary	33.545*	22.367	28.129*	26.917
Iceland	23.97	37.39	23.962	36.54
India	14.852	24.57	12.018	28.531
Indonesia	.	.	28.941*	21.731
Iran	37.524*	30.35	20.034	24.213
Iraq	0.942*	0	0.232*	0
Ireland	10.965	24.121	8.814	25.897
Israel	38.929*	31.37	38.636*	32.66
Italy	25.81*	22.559	17.627	22.999
Jamaica	28.528	33.758	34.096*	31.891
Japan	29.907*	18.585	29.308*	20.799
Jordan	18.581	20.469	15.516	24.765
Kazakhstan	.	.	12.471	20.781
Kenya	18.366	23.128	22.281	30.728
Kiribati	.	.	7.334	13.735
Korea	20.666*	12.521	19.537*	16.024
Kuwait	20.599*	5.01	21.237*	4.913
Kyrgyzstan	.	.	15.339	30.11
Lao	26.89*	0.001	25.14*	1.557
Latvia	8.411*	0.492	19.256*	3.949
Lebanon	44.365*	28.732	41.43*	29.878
Lesotho	.	.	4.42	14.659
Liberia	.	.	9.905*	0
Libya	17.192*	13.256	9.928*	3.718
Lithuania	16.081*	1.152	11.403*	1.566
Madagascar	24.115	28.295	30.228	30.372
Malawi	20.758*	17.683	26.626*	23.201
Malaysia	16.427*	7.535	9.139	11.751
Maldives	.	.	8.829*	3.096
Mali	.	.	11.706	22.902
Malta	7.33 *	5.492	8.319	8.386
Mauritania	2.927*	0.98	22.206*	14.778
Mauritius	10.116	11.778	14.092	19.752
Mexico	28.323*	26.433	35.972*	34.844
Mongolia	.	.	8.911	17.656
Morocco	19.171*	17.468	15.363	18.302
Mozambique	.	.	.	.
Myanmar	18.993*	10.349	9.858*	9.356
N.Korea	.	.	.	.
Namibia	.	.	2.151	10.382

(Table 1 continued)

	Parallel		Official	
Country	Effective	Bilateral	Effective	Bilateral
Nepal	16.299	28.156	17.53	25.885
Neth.Ant.A	.	.	26.049*	0.99
Netherland	25.082*	3.681	23.105*	1.255
New Zealan	10.342	12.997	8.469	14.112
Nicaragua	39.975*	33.046	40.424*	33.65
Niger	.	.	12.348	23.318
Nigeria	37.819*	33.996	30.215*	25.263
Norway	16.975	18.342	16.085	18.426
Oman	.	.	10.349*	3.498
Pakistan	14.293	18.171	18.139	24.691
Panama	.	.	26.016*	0
PapuaNG	.	.	18.597*	12.866
Paraguay	24.06	28.943	24.1 *	20.036
Peru	39.612*	31.898	42.885*	36.749
Philippine	26.71*	21.776	26.367*	25.155
Poland	21.6	34.892	11.633	38.377
Portugal	15.346	33.889	16.79	33.306
Qatar	.	.	17.075*	3.792
Romania	27.566	27.694	30.182	33.046
Russia	7.332	23.031	28.895	34.809
Rwanda	.	.	6.499	13.983
Samoa	.	.	17.28*	13.82
SaoTomePri	.	.	4.054	8.998
Saudi Arab	17.68*	3.53	16.924*	3.325
Senegal	.	.	9.658	22.786
Seychelles	.	.	14.748	23.236
Sierra Leo	.	.	46.41*	42.909
Singapore	23.96*	12.903	21.934*	12.904
Slovakia	.	.	10.04*	4.969
Slovenia	.	.	10.736	14.96
So.Afri	27.706*	17.642	27.596*	23.845
Somalia	.	.	20.797*	0.147
Spain	25.533*	18.127	23.899*	20.133
Sri Lanka	11.236	19.48	20.445	24.606
St Kitts	.	.	6.586*	0
St Lucia	.	.	12.982*	0
StVincent	.	.	15.035*	0
Sudan	.	.	38.088*	38.004
Suriname	38.491*	31.854	26.408*	16.566
Swaziland	.	.	2.298	14.659
Sweden	19.286	20.767	14.562	21.531
Switzerlan	31.414*	9.66	27.986*	9.933

(Table 1 continued)

	Parallel		Official	
Country	Effective	Bilateral	Effective	Bilateral
Syria	21.919	31.82	20.926	32.266
Tajikistan	.	.	.	.
Tanzania	33.471	36.961	32.094*	30.901
Thailand	10.325*	9.142	9.876	12.667
Togo	.	.	15.853	22.583
Tonga	.	.	0.425	1.988
TrinTobago	.	.	13.458	23.49
Tunisia	14.471*	12.68	10.848	20.398
Turkey	20.466*	17.882	20.84	21.288
Turkmenist	.	.	8.077*	0
UAE	.	.	8.066*	1.455
Uganda	7.007	8.993	6.801	17.652
UK	21.553*	13.571	20.32*	14.255
Ukraine	14.831	16.751	8.956	28.836
Uruguay	18.229	29.025	17.857	19.021
USA	.	.	27.987*	15.137
Uzbekistan	.	.	.	.
Vanuatu	.	.	11.871	12.485
Venezuela	25.61	26.54	21.299*	19.814
VietNam	42.979*	42.369	3.273	7.167
Yemen	.	.	25.795*	25.284
Yugoslavia	22.693*	0	.	.
Zambia	28.171*	23.132	34.943*	26.503
Zimbabwe	17.767*	9.484	31.523	35.62

Table 8: Regressions of Effective Exchange Rates on Bilateral Exchange Rates

	Parallel				Official			
Country	Level	Monthly	Annually	4-years	Level	Monthly	Annually	4-years
Afghanista	69.335	0.026	-0.121	0.828	.	.	.	.
Albania	.	.	.	.	1.062	0.035	0.53	0.409
Algeria	0.798	0.033	0.59	0.426	1.038	0.223	0.734	0.608
Angola	.	.	.	.	.	.	.	.
Antigua.Ba	.	.	.	.	1.128	1.06	0.91	-4.291
Argentina	0.528	0.136	0.322	0.192	0.775	0.104	0.162	0.14
Armenia	.	.	.	.	-2.317	-1.447	-1.044	.
Aruba	.	.	.	.	.	.	.	.
Australia	0.294	0.009	0.317	0.258	0.498	0.056	0.429	0.493
Austria	3.674	0.029	0.233	-0.204	13.187	-0.081	-1.508	-3.302
Azerbaijan	.	.	.	.	-1.184	0.432	0.699	1.419
Bahamas	.	.	.	.	.	.	.	.
Bahrain	.	.	.	.	1.57	-0.05	0.009	0.174
Bangladesh	0.807	0.069	0.701	0.943	-0.099	0.038	0.17	0.161
Barbados	.	.	.	.	0.527	0.025	0.187	-0.434
Belarus	0.242	0.043	.	.	1.013	-0.001	0.095	.
Belg.Lux	-1.233	0.035	0.884	1.212	-1.476	0.152	0.738	0.774
Belize	.	.	.	.	0.862	0.045	0.144	0.041
Benin	0.65	0.046	0.667	0.671	0.496	0.05	0.612	0.543
Bolivia	0.039	0.154	0.31	0.281	-0.012	0.02	0.132	0.169
Bos.Herz	.	.	.	.	.	.	.	.
Botswana	.	.	.	.	0.125	0.019	.	.
Brazil	1.106	0.401	0.612	0.324	1.216	0.585	0.621	0.442
Brun.Darus	.	.	.	.	0.169	0.122	0.428	0.963
Bulgaria	0.954	0.197	0.358	.	0.797	0.132	0.373	0.107
BurkinaFas	.	.	.	.	0.427	0.057	0.06	0.247
Burundi	0.722	0.055	0.504	0.485	0.822	0.629	0.599	0.228
Cambodia	.	.	.	.	15.913	0.016	.	.
Cameroon	.	.	.	.	0.761	0.518	0.479	0.354
Canada	-0.352	0.052	0.563	0.811	-0.364	0.053	0.5	0.757

(Table 2 continued)

	Parallel				Official			
Country	Level	Monthly	Annually	4-years	Level	Monthly	Annually	4-years
Cape Verde	.	.	.	.	-0.723	-0.77	-0.614	-0.892
Cent.Af.Re	.	.	.	.	-0.184	0.044	0.521	0.185
Chad	.	.	.	.	-0.41	-0.098	.	.
Chile	-0.223	0.276	0.94	2.835	-0.32	0.176	0.964	2.672
China	1.128	0.227	0.836	1.196	0.461	0.066	0.675	0.732
ChinaHK	0.095	0.322	0.646	0.595	0.017	0.107	0.56	0.538
ChinaMacao	.	.	.	.	-0.258	0.001	0.21	0.2
Colombia	1.02	0.014	0.068	0.094	1.014	0.082	0.262	0.194
Comoros	.	.	.	.	-0.108	0.006	-0.013	0
Congo	.	.	.	.	-0.257	0.04	0.227	-3.439
Costa Rica	0.066	0.089	0.366	0.455	0.683	0.072	0.47	0.641
Cote d'Ivo	.	.	.	.	0.234	0.028	-0.041	-0.212
Croatia	.	.	.	.	0.588	0.38	0.463	0.379
Cyprus	-1.019	0.044	0.457	0.179	-0.934	0.043	0.283	0.207
Czecho	-1.615	0.154	-0.493	-0.402	0.629	0.017	0.154	0.064
Dem.Rep.Co	.	.	.	.	.	.	.	.
Denmark	-1.153	0.011	0.255	0.533	-1.187	0.024	0.165	0.153
Djibouti	.	.	.	.	.	.	.	.
Dominica	.	.	.	.	.	.	.	.
Dominican	0.71	0.402	0.765	0.24	1.132	0.121	0.145	0.057
EastGer	.	.	.	.	.	.	.	.
Ecuador	1.082	-0.106	0.318	0.202	0.927	0.19	0.583	0.621
Egypt	-0.247	0.08	0.691	0.971	-0.138	0.051	0.568	0.438
El Salvado	-0.533	0.052	0.422	0.084	-0.414	0.059	0.24	0.056
Equatorial	.	.	.	.	.	.	.	.
Eritrea	.	.	.	.	0.779	0.061	0.509	.
Estonia	3.042	0.041	0.506	.	0.699	0.005	0.429	0.887
Ethiopia	-0.324	0.12	0.589	0.142	0.178	0.072	0.629	0.496
Fiji	.	.	.	.	0.745	0.379	0.486	0.508
Finland	-1.049	0.059	0.321	0.125	-1.296	0.051	0.25	0.185
France	-0.93	0.037	0.574	1.051	-0.83	0.061	0.4	0.64
Gabon	.	.	.	.	-0.522	0.059	0.085	-4.276
Gambia	-2.002	0.052	-0.813	.	-0.115	0.083	0.309	0.279
Georgia	.	.	.	.	0.167	-0.024	0.39	.
Germany	1.623	0.041	0.248	0.161	1.696	0.045	0.283	0.314
Ghana	0.97	0.185	0.238	0.079	1.025	0.203	0.531	0.252
Greece	0.154	0.011	0.101	0.405	0.665	0.051	0.309	0.503
Grenada	.	.	.	.	.	.	.	.
Guatemala	-0.045	0.077	0.251	0.352	0.377	0.02	0.407	0.404
Guinea	-0.623	0.029	-0.428	.	0.55	0.024	0.375	0.538
Guinea.Bis	.	.	.	.	1.715	0.242	0.189	.
Guyana	-0.131	0.023	.	.	1.035	0.962	0.403	0.371

(Table 2 continued)

	Parallel				Official			
Country	Level	Monthly	Annually	4-years	Level	Monthly	Annually	4-years
Haiti	1.058	0.001	0.209	0.131	1.873	0.096	0.815	0.996
Honduras	0.771	0.096	0.53	0.407	0.63	0.128	0.466	0.447
Hungary	-1.115	0.05	0.677	0.789	-0.726	0.046	0.166	0.229
Iceland	0.508	0.04	0.588	0.754	0.552	0.187	0.649	0.561
India	-0.438	0.062	0.103	-0.496	-0.111	0.001	-0.239	-0.724
Indonesia	.	.	.	.	1.31	0.132	0.534	0.628
Iran	1.235	0.856	0.892	0.681	0.772	0.575	0.584	0.481
Iraq	.	.	.	.	.	.	.	.
Ireland	0.061	0.002	0.027	-0.128	0.049	-0.002	-0.006	-0.079
Israel	1.229	0.218	0.752	0.417	1.161	0.409	0.793	0.545
Italy	-0.953	0.045	0.601	0.6	-0.533	0.07	0.409	0.362
Jamaica	0.817	0.041	0.39	0.372	1.053	0.208	0.601	0.495
Japan	1.471	0.098	0.705	0.595	1.292	0.123	0.692	0.669
Jordan	0.175	0.173	0.844	0.525	-0.201	0.14	0.425	0.689
Kazakhstan	.	.	.	.	0.507	0.043	-0.021	.
Kenya	0.75	0.117	0.56	0.351	0.669	0.621	0.737	0.55
Kiribati	.	.	.	.	0.028	-0.022	0.147	0.047
Korea	1.489	0.078	0.577	0.998	1.098	0.088	0.552	0.725
Kuwait	-1.234	-0.965	-1.14	-2.905	-0.454	-0.032	-0.213	-3.45
Kyrgyzstan	.	.	.	.	0.409	0.199	0.004	.
Lao -13408.979	*		*					
Latvia	-5.938	0.275	1.458	.	-2.634	0.315	1.687	-0.271
Lebanon	1.543	0.262	0.266	0.283	1.368	0.355	0.352	0.216
Lesotho	.	.	.	.	0.284	0.024	0.103	.
Liberia	.	.	.	.	.	.	.	.
Libya	0.007	-0.254	0.051	0.516	-1.111	-0.062	-0.081	-0.182
Lithuania	-3.478	-6.312	-4.241	.	-6.228	-3.171	-2.828	-1.328
Madagascar	0.828	0.477	0.565	0.062	0.984	0.564	0.615	0.631
Malawi	1.134	0.318	0.769	0.814	1.133	0.744	0.734	0.67
Malaysia	0.696	0.096	0.784	0.926	0.466	0.098	0.453	0.63
Maldives	.	.	.	.	-1.084	0.113	0.88	1.545
Mali	.	.	.	.	0.095	0.294	0.314	0.253
Malta	-0.935	0.034	0.083	-0.517	-0.788	-0.003	0.048	0.177
Mauritania	-2.15	0.187	.	.	1.502	0.547	0.539	.
Mauritius	0.702	0.04	0.233	0.27	0.649	0.007	0.069	-0.107
Mexico	1.063	0.08	0.558	0.504	1.027	0.114	0.7	0.588
Mongolia	.	.	.	.	-0.428	0.047	0.057	-0.126
Morocco	-0.76	-0.054	-0.556	0.284	-0.532	0.026	0.165	0.493
Mozambique	.	.	.	.	.	.	.	.
Myanmar	1.426	0.708	0.762	0.243	0.23	0.031	0.308	0.565
N.Korea	.	.	.	.	.	.	.	.
Namibia	.	.	.	.	0.186	0.02	.	.

(Table 2 continued)

	Parallel				Official			
Country	Level	Monthly	Annually	4-years	Level	Monthly	Annually	4-years
Nepal	0.431	0.079	1.221	0.341	0.621	-0.029	0.054	0.186
Neth.Ant.A	.	.	.	.	7.993	0.174	2.866	1.591
Netherland	-0.349	0.003	0.07	0.025	-11.963	0.073	1.145	2.369
New Zealan	-0.167	0.062	0.345	0.135	0.22	0.084	0.386	0.432
Nicaragua	1.191	0.304	0.1	0.018	1.167	0	0.004	0
Niger	.	.	.	.	0.186	-0.015	0.02	0.547
Nigeria	1.11	0.752	0.667	0.367	1.175	0.157	0.549	0.425
Norway	-0.805	0.015	0.285	0.709	-0.76	0.017	0.12	0.135
Oman	.	.	.	.	1.472	0.24	2.28	3.206
Pakistan	0.685	0.01	0.687	1.144	0.717	0.105	0.228	0.116
Panama	.	.	.	.	.	.	.	.
PapuaNG	.	.	.	.	1.399	0.78	0.689	0.469
Paraguay	-0.394	-0.001	-0.39	-0.766	-0.567	-0.052	-0.806	-1.553
Peru	1.203	0.186	0.357	0.217	1.114	0.061	0.35	0.217
Philippine	1.143	0.037	0.325	0.017	1.015	0.113	0.492	0.477
Poland	-0.327	0.053	0.272	-0.026	0.018	0.09	0.092	0.009
Portugal	-0.094	0.023	0.245	0.339	-0.202	0.103	0.489	0.304
Qatar	.	.	.	.	2.643	-0.395	-1.042	-2.414
Romania	0.981	0.036	0.326	-0.088	0.91	0.007	0.025	-0.021
Russia	0.165	0.01	0.112	.	0.814	0.119	0.549	0.337
Rwanda	.	.	.	.	0.311	0.576	0.643	1.309
Samoa	.	.	.	.	1.057	0.888	0.712	0.523
SaoTomePri	.	.	.	.	-0.371	-0.029	-0.423	.
Saudi Arab	-2.24	0.052	1.202	1.657	-3.075	0.173	1.044	1.263
Senegal	.	.	.	.	-0.05	0.045	0.482	0.586
Seychelles	.	.	.	.	0.449	0.379	0.317	0.146
Sierra Leo	.	.	.	.	1.081	0.544	0.509	.
Singapore	1.616	-0.009	-0.007	-0.303	1.588	0.05	0.292	0.535
Slovakia	.	.	.	.	-0.865	-0.023	-0.017	1.429
Slovenia	.	.	.	.	-0.299	-0.073	-0.971	-0.676
So.Afri	1.523	0.087	0.455	0.819	1.106	0.166	0.645	1.001
Somalia	.	.	.	.	-5.333	0.025	0.463	0.383
Spain	-0.539	0.078	0.568	0.394	-0.513	0.125	0.669	0.567
Sri Lanka	-0.002	0.088	0.226	0.475	0.767	0.225	0.467	0.497
St Kitts	.	.	.	.	.	.	.	.
St Lucia	.	.	.	.	.	.	.	.
StVincent	.	.	.	.	.	.	.	.
Sudan	.	.	.	.	0.995	1.236	0.521	0.393
Suriname	1.187	1.035	0.541	0.421	1.516	0.001	0.48	0.547
Swaziland	.	.	.	.	0.146	0.014	0.069	.
Sweden	-0.833	0.04	0.39	0.321	-0.616	0.046	0.264	-0.008
Switzerlan	2.83	0.017	0.435	0.202	2.62	0.069	0.592	0.575

(Table 2 continued)

	Parallel				Official			
Country	Level	Monthly	Annually	4-years	Level	Monthly	Annually	4-years
Syria	0.249	0.284	1.081	1.01	-0.177	0.596	0.582	0.21
Tajikistan	.	.	.	.	.	.	.	.
Tanzania	0.783	0.701	1.111	0.385	0.996	0.749	0.638	0.456
Thailand	0.303	0.061	0.492	0.343	0.578	0.108	0.414	0.434
Togo	.	.	.	.	0.203	0.583	0.559	0.379
Tonga	.	.	.	.	0.09	0.001	.	.
TrinTobago	.	.	.	.	0.256	0.027	0.281	0.674
Tunisia	-0.542	-0.002	0.139	0.687	-0.194	-0.055	0.118	0.72
Turkey	1.138	0.126	0.741	0.505	0.974	0.175	0.665	0.459
Turkmenist	.	.	.	.	.	.	.	.
UAE	.	.	.	.	1.124	4.77	5.095	1.518
Uganda	0.387	0.142	0.356	.	0.325	0.069	0.494	0.528
UK	0.385	0.017	0.205	0.171	0.522	0.036	0.257	0.219
Ukraine	-0.534	-0.006	-0.051	.	0.148	0.033	0.086	-0.309
Uruguay	-0.155	2.448	2.442	0.116	-0.237	3.549	4.885	0.37
USA	.	.	.	.	-1.048	0.054	0.295	0.276
Uzbekistan	.	.	.	.	.	.	.	.
Vanuatu	.	.	.	.	0.743	0.438	0.434	0.258
Venezuela	0.96	0.081	0.348	0.341	1.067	0.066	0.565	0.577
VietNam	1.012	0.33	0.232	.	0.063	0.055	0.917	.
Yemen	.	.	.	.	0.977	0.021	0.549	0.337
Yugoslavia	.	.	.	.	.	.	.	.
Zambia	1.205	0.336	0.254	0.296	1.282	0.682	0.518	0.41
Zimbabwe	1.815	0.114	0.471	0.274	0.87	0.967	0.725	0.506