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Exchange Rate Regimes and Real Exchange Rate Volatility Revisited

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Exchange Rate Regimes and Real Exchange Rate Volatility Revisited [1]

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Resumen

En este trabajo se estudia la influencia de los regimenes cambiarios y los regimenes monetarios internacionales sobre la volatilidad de corto plazo del tipo de cambio real. Utilizando una base mensual para 62 países durante el período 1950-2001 hallamos que la volatilidad del tipo de cambio real se incrementa con la flexibilidad del tipo de cambio nominal, apoyando la visión de Mussa sobre precios no flexibles. También hallamos en este trabajo que la configuración del régimen monetario internacional repercute sobre la volatilidad del tipo de cambio real en las economías desarrolladas, pero no en los países en vías de desarrollo, generando un nuevo resultado diferente de lo esperado..Utilizando una clasificación del régimen del tipo de cambio que considera tanto los anuncios de los respectivos bancos centrales como así también el comportamiento real del tipo de cambio, concluimos que tal interacción es relevante para las economías en vías de desarrollo, pero no así para los países desarrollados. Es decir que la consistencia del régimen cambiario es relevante para los países que típicamente enfrentan problemas de credibilidad.

Abstract

We study the influence of exchange rate regimes and international monetary regimes on short-term real exchange rate volatility. Using a novel monthly dataset for 62 countries covering the period 1950-2001 we find that real exchange rate volatility is increasing in nominal exchange rate flexibilty, supporting Mussa's sitcky prices argument. We also find that the international monetary regime configuration influence the real exchange rate volatility in advanced economies but not in non-advanced countries, which is a new puzzeling result.Using an exchange rate regime classification that considers both central banks announcements and actual exchange rate behavior, we obtain that such interaction is relevant for non-advanced economies, but not for advanced countries.That is to say, exchange rate regime consistency is relevant for countries that typically face credibility problems.

JEL Classification: *C23, F31, F33, F41.*
Keywords: *Real Exchange Rate, Volatility, Exchange Rate Regime, International Monetary System*

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Introduction

The question of whether exchange rate regimes (ERRs) are neutral or not stands as perhaps the most contentious and relevant topics in International Macroeconomics. There seems to be a consensus in recent research that ERRs are non-neutral on different real and monetary macroeconomic variables including economic growth (Levy-Yeyati and Sturrzenegger 2003, Husain et al. 2005 and Aghion et al. 2006), fiscal performance (Aghevli et al. 1991, Tornell and Velasco 2000, Alberola 2005 and Vuletin 2007), trade (Rose 2000 and Klein and Shambaugh 2006), interest rates (Levy-Yeyati and Sturrzenegger 2001 and Shambaugh 2004), real exchange rate (Mussa 1986, Eichengreen 1988, Grilli and Kaminsky 1991, Flood and Rose 1995 and Carrera and Vuletin 2003) and inflation (Ghosh et al. 2002 and Alfaro 2005).

The selection of an ERR classification is crucial for any empirical study that aims to measure the influence of ERRs on other variables. Traditionally most papers used the IMF official ERR classification, which is based on the ERR announcement made by the central bank of each IMF country member. In the context of such classification the unidimensional debate was mainly about how to categorize different arrangements according to the degree of flexibility. Following early discussion of Ghosh et al. (1997) and Calvo and Reinhart (2000), and the seminal works of Reinhart and Rogoff (2004) and Levy-Yeyati and Sturrzenegger (2005) which develop ERR classifications based upon actual behavior, there has been a renaissance in the discussion of ERR classifications and their impact on different macroeconomic variables. The consensus is that the new so-called de facto classifications are superior to the older de jure classifications especially because as remarked by Reinhart and Rogoff (2004) the gap between de facto and de jure can be vast. Although most of the literature stress the de facto dimension and relegate de jure dimension arguing it is irrelevant at best and misleading at worst, few studies analyze whether the de jure classification carries any information about exchange rate behavior over and above what is included in the de facto classification. These studies[3] argue that a full understanding of exchange rate arrangements, particularly in the post-Bretton Woods era, requires paying attention to both de jure and de facto ERR classifications because of credibility and consistency issues.
While the election of the ERR is under normal circumstances a government decision, the impact of such regime will also depend upon the rules of the game for each international monetary regime (McKinnon 1996). The discussion of the influence of ERRs on macroeconomic variables in the context of different international monetary regimes results interesting not only from a historical point of view due to the alleged different fixed and floating based international monetary regimes, but also in the light of the huge current global imbalances and recent exchange rate movements under the so-called Bretton Woods II.[4] It is also interesting to examine the impact of different ERRs conditional on the international monetary regime because of important institutional differences regarding the rules that govern the relationship between countries. For example, while the Gold Standard and Bretton Woods there were an explicit multilateral agreement, no true explicit system evolved to take the place of Bretton Woods. Instead, most developed countries float against one another (with the major exception of the European Union since 1999) while most emerging markets and developing nations are mostly pegged, often to the dollar.

The aim of this paper is to analyze the influence of ERRs on real exchange rate (RER) volatility in the

[3]See for example Carrera and Vuletin (2003), Bastourre and Carrera (2004), Vuletin (2004) and Alberola et al. (2005), Genberg and Swoboda (2005), Alesina and Warner (2006).
[4]Michael Dooley, et al. (2003, 2004a,b,c), in a series of influential papers, have argued that many emerging markets have constituted since 2001 a new implicit Bretton Woods system of fixed and heavily managed exchange rates.

context of the above mentioned discussion on ERRs and international monetary regimes. The study of this question is very important for several reasons. Firstly, RER volatility has key implications on different crucial macroeconomic variables including consumption, investment, economic growth and trade flows (Frankel and Rose 1995 and 2002, Razin and Rubinstein 2004, Clark et al. 2004, Broda and Romalis 2003). The widespread consensus is that ceteris paribus, higher RER volatility reduce welfare. Secondly, there is no consensus in the empirical literature to whether the apparent higher RER volatility observed under flexible exchange rate regimes/international monetary regimes is due to relative sluggishness in price adjustment (Mussa 1986) or mainly because of an increase in the incidence of real and nominal shocks or other institutional changes under more flexible arrangements (Stockman 1983, Grilli and Kaminsky 1991, Clarida and Gali 1994, Rogers 1999). Lastly, because we believe that the failure of the empirical literature in obtaining more homogeneous results is partially attributed to the deficiency and discrepancy in identifying ERRs and the role played by international monetary regimes. A first group of papers relies on comparisons of different international monetary regimes in order to delineate fixed and flexible nominal ERRs. For example, Mussa (1986), Baxter and Stockman (1989) and Liang (1998) use Bretton Woods and post-Bretton Woods as a benchmark for fixed and flexible arrangements and Grilli and Kaminsky (1991) and Hasan and Wallace (1996) expand their analysis backwards to include also the Gold Standard. A more recent group of papers (e.g. Kent and Naja 1998 and Carrera and Vuletin 2003) analyze the impact of different ERRs only for the post-Bretton Woods era.

Using a novel monthly dataset of RER for 62 countries (19 advanced and 43 non-advanced) covering the period 1950-2001 we are able to answer many important unresolved questions regarding the influence of ERRs on short-term RER volatility. Firstly, we disentangle the influence of ERRs from the international monetary regimes, adding clarity to the current empirical literature. Secondly, we analyze whether the influence of ERRs depends upon the prevailing international monetary regime. This type of discussion is relevant to analyze the importance of ERR coordination upon the rules of the game under each international monetary system (McKinnon 1996). Moreover, we are able to analyze the role played by more formal, explicit and coordinated agreements like Bretton Woods as opposed from less explicit systems like post-Bretton Woods. Thirdly, we study if there is a difference in RER volatility behavior between core and periphery countries. Hausmann et al. (2006) find robust evidence suggesting a puzzling large cross-country differences in RER volatility between developing and industrial countries, even after controlling for the fact that developing countries face larger real and nominal shocks, recurrent currency crises or by different elasticities to these shocks. Lastly, for the post-Bretton Woods period we use an ERR classification that identifies both announcements (de jure) and actual behavior (de facto) in order to study the impact of credibility and consistency issues.

We can summarize our main results as follows:

- The results support Mussa's argument that RER volatility is increasing in nominal exchange rate flexibility.
- The international monetary regime per se and its interaction with ERRs matters only for advanced economies, but not for non-advanced economies. In particular we find that in advanced economies: i) fixed ERRs seem to be more effective reducing RER volatility when most countries also pursue fixed arrangements (i.e., during Bretton Woods), and ii) flexible ERRs are less effective in reducing RER volatility when most countries tend to have more flexible arrangements (i.e., during post-Bretton Woods). This asymmetric performance of ERRs across international monetary regimes is a new puzzling result.
- The interaction of both ERR announcement (de jure) and actual behavior (de facto) on RER volatility is relevant for non-advanced countries but not for advanced economies. This asymmetric impact is consistent with the idea that ERR consistency, defined in terms of the difference

between announcement and actual behavior, is only important for countries that typically face credibility problems.

The rest of the paper is structured as follows. In section 2 we present the theoretical and empirical state of the art, in section 3 we show the empirical results and in section 4 we make some final remarks.

Theoretical and Empirical Background

When the Bretton Woods system was abandoned in the early 1970s, a reduction of short-term volatility in nominal and real exchange rate was expected as smoothly adjusting nominal exchange rates were supposed to replace the purported occasional but actually quite frequent large and disruptive exchange rate movements of Bretton Woods. The actual high volatility observed in post-Bretton Woods motivate numerous researchers to study how different ERRs influence RER volatility (e.g. Dornbush 1980 and Stockman 1983). In his seminal work Mussa (1986) argues that:

For pairs of countries with similar and moderate inflation rates, it is shown that there are substantial and systematic differences in the behavior of real exchange rates under these two different exchange rate regimes. Under a floating exchange rate regime, real exchange rates typically show much greater short term variability than under a fixed exchange rate regime. The increased variability of real exchange rates under floating exchange rate regimes is largely accounted for by the increased variability of nominal exchange rates, with little contribution from changes in the variability of ratios of national price levels or in the covariances between movements in nominal exchange rates and movements in the ratio of national price levels [...]. These *substantial and systematic differences [...] are consistent with models that assume sluggishness of adjustment of national price levels.*

Up to date several empirical papers analyzed whether ERRs affect RER volatility. Such studies can be classify in two groups. A first group relies on comparisons of different international monetary regimes in order to delineate fixed and flexible nominal ERRs. For example, Mussa (1986) and Liang (1998) use the Bretton Woods and post-Bretton Woods as a benchmark for fixed and flexible arrangements and Grilli and Kaminsky (1991) and Hasan and Wallace (1996) expand their analysis backwards to include also the Gold Standard. A more recent group of papers (e.g. Kent and Naja 1998, Carrera and Vuletin 2003) analyze the impact of different ERRs only for the post-Bretton Woods era. What follows is a brief description of the above mentioned empirical studies:
Mussa (1986) analyze the bilateral RER volatility of thirteen industrial countries for the period 1957-1984 using quarterly data. He finds evidence confirming that RER volatility is significantly higher (eight to eighty times) during post-Bretton Woods than in Bretton Woods.
Grilli and Kaminsky (1991) use the bilateral RER between the U.S. dollar and the British pound for the period 1885-1986 using monthly data. Using a battery of statistical tests they find that RER volatility varies across exchange rate systems after, but not before World War II . Hence, they argue that RER behavior is likely to be dependent on the particular historical period rather than the exchange rate arrangement per se.
Hasan and Wallace (1996) use the bilateral RER volatility for four countries (UK, Canada, Japan and France) for the period 1870-1986 using yearly data. Unlike Grilli and Kaminsky (1991) they find higher volatility associated with more flexible exchange rates.
Liang (1998) use the bilateral RER volatility for two countries (UK and France) for the period 1870-1997 and for seven countries (Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands) for the period 1957-1997. In line with Hasan and Wallace (1996) he obtains evidence supporting that flexible exchange rate periods (World War I and First Interwar: 1914-1926, Second Interwar: 1932-1938, Post-Bretton Woods: 1972-1997) are associated with a higher RER volatility than fixed

exchange periods (Gold Standard: 1880-1913, Gold Exchange Standard: 1927-1931, Bretton Woods: 1946-1971).
Kent and Naja (1998) use the multilateral RER volatility for 90 countries for the period 1978-1994 using monthly data. Using the de jure IMF ERR classification they find that flexible ERRs have double RER volatility than fixed ERRs when pooling observation across countries; however, those differences tend to vanish when using a within country analysis.
Carrera and Vuletin (2003) use the multilateral RER for 93 countries for the period 1980-1999 using monthly data. Using the de jure IMF and the de facto Levy-Yeyati and Sturzenegger (2005) ERR classifications they find that countries for which its announcement and actual behavior coincides (i.e., are consistent and do not face credibility problems) have the lowest RER volatility compared with other non-consistent ERR. They also find that non-OECD countries have RER volatility five times higher than OECD countries.

In the next section we discuss some identification considerations regarding ERRs and international monetary systems and present the main empirical results.

Empirical Analysis

In this section we examine whether ERRs affect RER volatility. In particular we: i) disentangle the influence of ERRs from international monetary regimes, ii) analyze whether the influence of ERRs depends upon the prevailing international monetary regime, iii) for the post-Bretton Woods era we use an ERR classification that identifies both announcements (de jure) and actual behavior (de facto) in order to analyze the impact of credibility and consistency issues. Apart from analyzing the whole sample altogether, we also differentiate at each step of our study the behavior of core and periphery countries.

Based on the theoretical and empirical background presented in the previous section we find crucial to clarify two issues regarding the identification of ERRs. Firstly, the question originally developed in Mussa (1986) and in other early papers is whether RER volatility differ across ERRs or not; there were no theoretical arguments about the effect of different international monetary regimes. That is to say, Mussa's argument is that ceteris paribus the rest, more flexible nominal exchange rates induce higher RER volatility in the presence of sticky prices. Having said that, the international monetary configuration could affect the performance of RER volatility for other reasons related, for example, with the relevance of international monetary policy coordination or if international monetary regimes are good proxies for other sources of RER variability -like argued by Grilli and Kaminsky (1991). Of course, if countries had only fixed ERRs during Bretton Woods and flexible ERRs during post-Bretton Woods then identifying ERRs or international monetary regimes would be the same. However as Tables 1 and 2 show more than 20% of observations had flexible ERRs under Bretton Woods and, more importantly, more than 60% of countries fixed their exchange rate in post-Bretton Woods.
Secondly, the theoretical discussion categorizes a fixed (flexible) ERR as one in which the nominal exchange rate is stable (floating). In this sense, a de facto ERR classification is more appropriate to evaluate the actual behavior of the nominal exchange rate as opposed to a de jure ERR classification that captures the country's Central Bank claimed behavior. This difference is particularly relevant for the post-Bretton Woods period because countries announcements and actual behavior differ more than 60% of the time (see Tables 3 and 4). Having said that, we argue that paying attention to both de jure and de facto ERR classifications is important to estimate the impact of credibility and consistency issues on exchange rate and inflation expectations, as well as on the speed of price adjustment.

The rest of this section is organized as follows. First, we present the data used in our study. Second, we show our empirical results emphasising the importance of different ERRs, international monetary regimes and their interaction across different groups of countries.

Data
We use an annual panel data set which consists of 62 countries in the period 1950-2001. We include countries that have at least 10 years of RER data in both Bretton Woods and post-Bretton Woods, and monthly exchange rate and price indices information for at least 10 months per year. The RER data is quite balanced, covering more than 97% of the maximum dataset.

Real Exchange Rate Volatility
We construct a novel monthly dataset of bilateral RER using official exchange rates for 62 countries in the period 1950-2001. By considering a large set of countries for such a long period of time we are able to analize the influence and interaction of ERRs and international monetary regimes for a comprehensive group of developed and non-developed economies. We obtain monthly official exchange rates and price indices data from Global Financial Data. Using monthly RER data we construct the short-term RER volatility calculating the intra-annual standard deviation of the natural logarithm of the RER.

Exchange Rate Regime Classifications and International Monetary Regimes
We use the de facto Reinhart-Rogoff ERR classification which it is based upon the actual evolution of the exchange rate and the de jure IMF ERR classification which is based on the announcement made by the central bank of each IMF country member. In line with Mussa's statement we do not include observations classified as free falling by Reinhart-Rogoff ERR classification -which includes episodes with an annual inflation higher than 40%- since we want to measure the influence of ERRs under relatively moderate inflation rates. As described in Table 1, while just 4% of total sample observations correspond to this category during Bretton Woods, this percentage reaches 12% in post-Bretton Woods and, in particular, almost 20% for non-advanced countries.
For the period 1950-2007 we consider two international monetary regimes, Bretton Woods for the period 1950-1973 and post-Bretton Woods for the period 1974-2001.

Empirical Results
In this section we analyze the influence of ERRs and international monetary regimes on RER volatility using both pooled OLS and panel data with country fixed effects. In every section we analyze the impact for the whole sample and we also distinguish between advanced from non-advanced countries separately.

ERRs vs. International Monetary Regimes
In this subsection we analyze the impact of de facto ERRs and international monetary regimes. While Mussa's argument refers to the importance of ERR on RER volatility, Grilli and Kaminsky (1991) argues that ERRs are not that important and historical periods -as proxy for different real and nominal shocks as well as institutional factors- really matters. Table 5a shows for both OLS and FE regressions that there is more RER volatility in post-Bretton Woods for the overall sample. This seems to be driven by the influence of advanced economies (Table 5b), and not by non-advanced countries (Table 5c) where there seems to be no difference in RER volatility across international monetary regimes.
Tables 6a, 6b and 6c include not only a post-Bretton Woods dummy but also de facto ERR categories. The results confirm the asymmetric influence of international monetary regime across advanced and non-advanced countries. Our results also support Mussa's argument that RER volatility is increasing in nominal exchange rate flexibility for both advanced and non-advanced economies. In particular, the results show that flexible ERRs are more volatile than fixed ERR for both groups of countries, and limited flexibility ERR are less volatile than flexible ERR and more volatile than fixed ERR only for non-advanced economies.

ERRs and International Monetary Regimes

In this subsection we the study the influence of alternative de facto ERRs on RER volatility for different international monetary regimes. The idea of such test is to evaluate the relative importance of ERRs within and between each type of international monetary regime rather than test which dimension seems to dominate, like we did in last subsection. The results are shown in Table 7a, 7b and 7c. As usual the results for the overall sample represent an average of what happens for each group of countries. For advanced countries it seems that ERRs matter within each international monetary regime -especially for Bretton Woods- and also across international monetary regimes. For this group of countries we confirm again that RER volatility is increasing in nominal exchange rate flexibility. We also find robust evidence showing that fixed ERRs seem to be more effective in reducing RER volatility when most countries also pursue fixed arrangements; that is to say, fixed ERR induce lower RER volatility during Bretton Woods than during post-Bretton Woods. The results also support the idea that flexible ERRs seem to be less effective in reducing RER volatility when most countries have flexible arrangements. The results obtained for non-advanced economies indicate that ERRs matter only within each international monetary regime -that is to say, Mussa's argument is confirmed- but the influence of ERRs is similar across international monetary regimes. This asymmetric performance of ERRs across international monetary regimes is a new puzzling result.

Deeds and words

So far we used the de facto ERR classification in our empirical study because, as remarked before, this is the appropriate classification to evaluate the theoretical prediction of sticky prices models, as discussed in Mussa (1986). In this subsection we analyze the impact of both announcement (de jure) and actual behavior (de facto) of ERRs on RER volatility for the post-Bretton Woods era. This discussion is particularly relevant because of credibility and consistency issues. Based on the panel data with country fixed effects regressions we find that while such differentiation is relevant for non-advanced countries, it is not for advanced economies (see Table 8b and 8c). This asymmetric impact is consistent with the idea that ERR consistency, defined in terms of the difference between announcement and actual behavior, is only important for countries that typically face credibility problems.

The results obtained for non-advanced economies could be summarized in three parts. First, consistent flexible regimes (i.e., announcement and actual behavior indicate flexible ERR) induce higher RER volatility than consistent limited flexibility or consistent fixed regimes. This evidence supports Mussa's argument in the sense that within consistent regimes that do not seem to suffer credibility problems, RER volatility is increasing in nominal exchange rate flexibility. Second, having announced flexible regimes, RER volatility is increasing in nominal exchange rate flexibility. This is also consistent with Mussa's argument. Third, RER volatility is higher (at a significance level of 15%) for consistent flexible regimes than for de facto flexible and de jure fixed or limited flexibility. This outcome is consistent with the results obtained by some papers that analyze the price adjustment in the context of the purchasing power parity theory and find that the speed of adjustment of prices is faster for crises times. In a similar vein, it seems that when a country faces binding credibility problems the speed of adjustment might be faster and therefore the RER volatility could be lower.

Conclusions

In this paper we analyze the influence of ERRs on real exchange rate (RER) volatility. Using a novel monthly dataset of RER for 62 countries (19 advanced and 43 non-advanced) covering the period 1950-2001 we are able to answer many important unresolved questions regarding the influence of ERRs on short-term RER volatility.

Using Reinhart-Rogoff de facto ERR classification we find that RER volatility is increasing in nominal exchange rate flexibility; that is to say, our findings support Mussa's argument about the presence of sticky prices. We also find that the international monetary regime (Bretton Woods and post-Bretton Woods) per se and its interaction with ERRs matters only for advanced economies, but not for non-advanced economies. In particular we find that in advanced economies: i) fixed ERRs seem to be more effective reducing RER volatility when most countries also pursue fixed arrangements (i.e., during Bretton Woods), and ii) flexible ERRs are less effective in reducing RER volatility when most countries tend to have more flexible arrangements (i.e., during post-Bretton Woods). This asymmetric performance of ERRs across international monetary regimes is a new puzzling result. Using an ERR classification that considers both the ERR announcement (de jure) and the ERR actual behavior (de facto), we find that ERR consistency influence RER volatility for non-advanced countries but not for advanced economies. This asymmetric impact support the idea that ERR consistency, defined in terms of the difference between announcement and actual behavior, is only important for countries that typically face credibility problems.

References.

Aghevli, B., Khan, M., Montiel, P., 1991. Exchange rate policies in developing countries: some analytical issues. International Monetary Fund Occasional Paper, vol. 78.

Aghion, P., Bacchetta, P., Ranciere, R., Rogoff, K., 2006. Exchange rate volatility and productivity growth: the role of financial development. National Bureau of Economic Research Working Paper, vol. 12117.

Alberola, E., Molina, L., Navia, D., 2005. Say you fix, enjoy and relax: the deleterious effect of peg announcements on fiscal discipline. Bank of Spain Working Paper, vol. 0523.

Alesina, A., Wagner, A., 2006. Choosing (and reneging on) exchange rate regimes. Journal of the European Economic Association 4, 770-799.

Alfaro, L., 2005. Inflation, openness, and exchange-rate regimes: the quest for short-term commitment. Journal of Development Economics 77, 229-249.

Baxter, M., Stockman, A., 1989. Business cycles and the exchange-rate regime: some international evidence. Journal of Monetary Economics 23, 377-400.

Broda, C., Romalis, J., 2003. Identifying the relationship between exchange rate volatility and trade. Mimeo. University of Chicago.

Calvo, G., Reinhart, C., 2000. Fear of floating. National Bureau of Economic Research Working Paper, vol. 7993.

Carrera, J., Bastourre, D., 2004. Could the exchange rate regime reduce macroeconomic volatility? Brazilian Association of Graduate Programs in Economics Working Paper, vol. 67.

Carrera, J., Vuletin, G., 2003. The effects of exchange rate regimes on real exchange rate volatility. a dynamic panel data approach. Brazilian Association of Graduate Programs in Economics Working Paper, vol. c67.

Clarida, R., Gali, J., 1994. Sources of real exchange rate fluctuations: how important are nominal shocks? Centre for Economic Policy Research Discussion Paper, vol. 951.

Clark, P., Sadikov, A., Tamirisa, N., Wei, S.-J., Zeng, L., 2004. A new look at exchange rate volatility and trade flows. International Monetary Fund Occasional Paper, vol. 235.

Dooley, M., Folkerts-Landau, D., Garber, P., 2003. An essay on the revived Bretton Woods system. National Bureau of Economic Research Working Paper, vol. 9971.

Dooley, M., Folkerts-Landau, D., Garber, P., 2004a. The revived Bretton Woods system: the effects of periphery intervention and reserve management on interest rates & exchange rates in center countries. National Bureau of Economic Research Working Paper, vol. 10332.

Dooley, M., Folkerts-Landau, D., Garber, P., 2004b. Direct investment, rising real wages and the absorption of excess labor in the periphery. National Bureau of Economic Research Working Paper, vol. 10626.

Dooley, M., Folkerts-Landau, D., Garber, P., 2004c. The US current account deficit and economic development: collateral for a total return swap. National Bureau of Economic Research Working Paper, vol. 10727.

Dornbusch, R., 1980. Open economy macroeconomics. Basic Books, New York, New York.

Eichengreen, B., 1988. Real exchange rate behavior under alternative international monetary regimes: interwar evidence. European Economic Review 32, 363-371.

Engel, C., Rose, A., 2002. Currency unions and international integration. Journal of Money, Credit and Banking 34, 1067-1089.

Flood, R., Rose, A., 1995. Fixing exchange rates: a virtual quest for fundamentals. Journal of Monetary Economics 36, 3-37.

Frankel, J., Rose, A., 1995. Empirical research on nominal exchange rates, in: G. Grossman and K. Rogoff (Eds.), Handbook of International Economics, 3, North Holland, Amsterdam.

Frankel, J., Rose, A., 2002. An estimate of the effect of common currencies on trade and income. Quarterly Journal of Economics 117, 437-466.

Genberg, H., Swoboda, A., 2005. Exchange rate regimes: does what countries say matter? International Monetary Fund Staff Paper 52, 129-141.

Grilli, V., Kaminsky, G., 1991. Nominal exchange rate regimes and real exchange rate: evidence from the United States and Britain, 1885-1986. Journal of Monetary Economics 27, 191-212.

Ghosh, A., Gulde, A., Wolf, H., 2002. Exchange rate regimes: choices and consequences. Massachusetts Institute of Technology Press, Cambridge, Massachusetts.

Ghosh, A., Gulde, A., Ostry, J., Wolf, H., 1997. Does the nominal exchange rate regime matter? National Bureau of Economic Research Working Paper, vol. 5874.

Hausmann, R., Panizza, U., Rigobon, R., 2006. The long-run volatility puzzle of the real exchange rate. Journal of International Money and Finance 25, 93-124.

Hasan, S., Wallace, M., 1996. Real exchange rate volatility and exchange rate regimes: evidence from long-term data. Economics Letters 52, 67-73.

Hussain, A. , Mody A., Rogoff, K. , 2005. Exchange rate durability and performance in developing versus advanced economies. Journal of Monetary Economics 52, 35-47.

Kent, C., Naja, R., 1998. Effective exchange rates and irrelevant nominal exchange-rates regimes. Reserve Bank of Australia Research Discussion Paper, vol. 9811.

Klein, M., Shambaugh, J., 2006. Fixed exchange rates and trade. Journal of International Economics 70, 359-383.

Liang, H., 1998. Real exchange rate volatility-does the nominal exchange rate regime matter? International Monetary Fund Working Paper, vol. 98147.

Levy-Yeyati, E., Sturzenegger, F., 2001. Exchange rate regimes and economic performance. Universidad Torcuato Di Tella Working Paper, vol. 2/01.

Levy-Yeyati, E., Sturzenegger, F., 2003. To float or to fix: evidence on the impact of exchange rate regimes on growth. American Economic Review 93, 1173-1193.

Levy-Yeyati, E., Sturzenegger, F., 2005. Classifying exchange rate regimes: deeds vs. words. European Economic Review 49, 1603-1635.

McKinnon, R, 1996. The rules of the game: international money and exchange rates. Massachusetts Institute of Technology Press, Cambridge, Massachusetts.

Mussa, M., 1986. Nominal exchange rate regimes and the behavior of real exchange rates: evidence and implications. Carnegie-Rochester Conference Series on Public Policy 25, 117-214.

Razin, A., Rubinstein, Y., 2004. Growth effects of the exchange-rate regime and the capital-account openness in a crisis-prone world market: a nuanced view. National Bureau of Economic Research Working Paper, vol. 10555.

Reinhart, C. Rogoff, K., 2004. The modern history of exchange rate arrangements: a reinterpretation. Quarterly Journal of Economics 119, 1-48.

Rogers, J., 1999. Monetary shocks and real exchange rates. Journal of International Economics 48, 269-288.

Shambaugh, J., 2004. The effects of fixed exchange rates on monetary policy. Quarterly Journal of Economics 119, 301-352.

Stockman, A., 1983. Real exchange rates under alternative nominal exchange-rate systems. Journal of International Money and Finance 2, 147-166.

Tornell, A., Velasco, A., 2000. Fixed versus flexible exchange rates: which provides more discipline? Journal of Monetary Economics 45, 399-436.

Vuletin, G., 2004. Exchange rate regimes and fiscal performance. Do fixed exchange rates generate more fiscal discipline than flexible ones? North American Winter Meeting of the Econometric Society Working Paper, vol. 474.

Vuletin, G., 2007. Exchange rate regimes and fiscal discipline: The role of capital controls. Mimeo. Colby College.

Tables

Table 1. Distribution of Reinhart-Rogoff ERRs across International Monetary Regimes (1950-2001).
Includes Reinhart-Rogoff free falling category.

Table1a

Bretton Woods	Fix	Lim. Flex.	Flex.	Free Falling	Total
All	816 *62%*	168 *13%*	271 *21%*	51 *4%*	1306 *100%*
Advanced	301 *70%*	65 *15%*	64 *15%*	1 *0%*	431 *100%*
Non-Advanced	515 *59%*	103 *12%*	207 *24%*	50 *6%*	875 *100%*

Table1b

Post-Bretton Woods	Fix	Lim. Flex.	Flex.	Free Falling	Total
All	358 *21%*	603 *35%*	534 *31%*	206 *12%*	1701 *100%*
Advanced	156 *29%*	209 *39%*	167 *31%*	 *0%*	532 *100%*
Non-Advanced	202 *17%*	394 *34%*	367 *31%*	206 *18%*	1169 *100%*

Table 2. Distribution of Reinhart-Rogoff ERRs across International Monetary Regimes (1950 2001). Excludes Reinhart-Rogoff free falling category.

Table 2a

Bretton Woods	Fix	Lim. Flex.	Flex.	Total
All	816 *65%*	168 *13%*	271 *22%*	1255 *100%*
Advanced	301 *70%*	65 *15%*	64 *15%*	430 *100%*
Non-Advanced	515 *62%*	103 *12%*	207 *25%*	825 *100%*

Table 2b

Post-Bretton Woods	Fix	Lim. Flex.	Flex.	Total
All	358 *24%*	603 *40%*	534 *36%*	1495 *100%*
Advanced	156 *29%*	209 *39%*	167 *31%*	532 *100%*
Non-Advanced	202 *21%*	394 *41%*	367 *38%*	963 *100%*

Table 3. Distribution of IMF ERRs across International Monetary Regimes (1974-2001). Excludes Reinhart-Rogoff free falling category

Post-Bretton Woods	Fix	Lim. Flex.	Flex.	Total
All	558 *38%*	154 *11%*	752 *51%*	1464 *100%*
Advanced	155 *29%*	148 *28%*	229 *43%*	532 *100%*
Non-Advanced	403 *43%*	6 *1%*	523 *56%*	932 *100%*

Table 4. De jure IMF and de facto Reinhart-Rogoff (RR) classification (1974-2001). Excludes Reinhart-Rogoff free falling category

All

RR \ IMF	Fix	Lim. Flex.	Flex.
Fix	218 15%		525 36%
Lim. Flex.		43 3%	
Flex.	374 26%		304 21%

Advanced

RR \ IMF	Fix	Lim. Flex.	Flex.
Fix	50 9%		215 40%
Lim. Flex.		38 7%	
Flex.	138 26%		91 17%

Non-Advanced

RR \ IMF	Fix	Lim. Flex.	Flex.
Fix	168 18%		310 33%
Lim. Flex.		5 1%	
Flex.	236 25%		213 23%

Table 5. Volatility of RER, Global Regime (1950-2001). Excludes Reinhart-Rogoff free falling category

Table 5a

All	OLS-Robust	FE-Robust
PBW	0.009***	0.009***
	[0.002]	[0.002]
Observations	2752	2752
R-squared	0.009	0.011
p-value: BW=PBW	0	0
Number countries	61	61

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 5b

Advanced	OLS-Robust	FE-Robust
PBW	0.021***	0.021***
	[0.002]	[0.002]
Observations	962	962
R-squared	0.137	0.143
p-value: BW=PBW	0	0
Number countries	19	19

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 5c

Non-Advanced	OLS-Robust	FE-Robust
PBW	0.002	0.003
	[0.002]	[0.002]
Observations	1788	1788
R-squared	0.001	0.001
p-value: BW=PBW	0.319	0.286
Number countries	43	43

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Volatility of RER, Global Regime "vs." de facto Reinhart-Rogoff (RR) classification (1950-2001)Excludes Reinhart-Rogoff free falling category

Table 6a

All		OLS-Robust	FE-Robust
PBW		0.004**	0.004**
		[0.002]	[0.002]
Fix (RR)		-0.020***	-0.021***
		[0.002]	[0.003]
Lim. Flex (RR)		-0.014***	-0.014***
		[0.003]	[0.003]
Observations		2752	2752
R-squared		0.043	0.038
p-value:	Fix=Flex	0	0
	Lim. Flex=Flex	0	0
	Fix=Lim. Flex	0	0
	BW=PBW	0.0413	0.0414
Number of countries		61	61

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 6b

Advanced		OLS-Robust	FE-Robust
PBW		0.018***	0.017***
		[0.003]	[0.003]
Fix (RR)		-0.007***	-0.010***
		[0.002]	[0.002]
Lim. Flex (RR)		0.001	0
		[0.003]	[0.003]
Observations		962	962
R-squared		0.153	0.165
p-value:	Fix=Flex	0.000122	0.0000294
	Lim. Flex=Flex	0.665	0.968
	Fix=Lim. Flex	0.0163	0.00616
	BW=PBW	0	1.06E-09
Number of countries		19	19

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 6c

Non-Advanced		OLS-Robust	FE-Robust
PBW		-0.003	-0.003
		[0.003]	[0.003]
Fix (RR)		-0.026***	-0.027***
		[0.003]	[0.004]
Lim. Flex (RR)		-0.020***	-0.021***
		[0.004]	[0.004]
Observations		1788	1788
R-squared		0.046	0.036
p-value:	Fix=Flex	0	0
	Lim. Flex=Flex	2.44E-08	0.000000416
	Fix=Lim. Flex	0.0241	0.0271
	BW=PBW	0.362	0.284
Number of countries		43	43

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Volatility of RER, Global Regime "and" de facto Reinhart-Rogoff (RR) classification (1950-2001)
Excludes Reinhart-Rogoff free falling category

Table 7.a

All	OLS-Robust	FE-Robust
BW-Fix (1)	-0.025***	-0.026***
	[0.003]	[0.003]
BW-Lim. Flex (2)	-0.012**	-0.011*
	[0.006]	[0.006]
BW- Flex (3)	0	0.001
	[0.005]	[0.004]
PBW-Fix (4)	-0.014***	-0.015***
	[0.003]	[0.003]
PBW-Lim. Flex (5)	-0.013***	-0.014***
	[0.003]	[0.003]
Observations	2752	2752
R-squared	0.046	0.042
p-values:		
1=6	0	0
2=6	0.0306	0.0555
3=6	0.99	0.849
4=6	0.0000021	0.00000219
5=6	0.00000634	0.00000276
1=2	0.0119	0.0046
1=3	3.94E-10	0
1=4	1.79E-10	3.60E-09
1=5	0	0
2=3	0.0503	0.0651
2=4	0.67	0.487
2=5	0.837	0.586
3=4	0.00039	0.000141
3=5	0.000877	0.000391
4=5	0.503	0.634
Number of countries	61	61

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Omitted category PBW-Flex (6)

Table 7.b

Advanced	OLS-Robust	FE-Robust
BW-Fix (1)	-0.028***	-0.029***
	[0.002]	[0.002]
BW-Lim. Flex (2)	-0.006	-0.007
	[0.010]	[0.009]
BW- Flex (3)	-0.016***	-0.014***
	[0.003]	[0.003]
PBW-Fix (4)	-0.002	-0.004*
	[0.002]	[0.002]
PBW-Lim. Flex (5)	-0.001	-0.001
	[0.002]	[0.002]
Observations	962	962
R-squared	0.173	0.178
p-values:		
1=6	0	0
2=6	0.559	0.444
3=6	0.00000226	0.0000404
4=6	0.373	0.075
5=6	0.502	0.569
1=2	0.0265	0.0255
1=3	0.000186	0.0000168
1=4	0	0
1=5	0	0
2=3	0.318	0.432
2=4	0.686	0.783
2=5	0.655	0.552
3=4	0.000019	0.00437
3=5	0.0000116	0.000287
4=5	0.826	0.129
Number of countries	19	19

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Omitted category PBW-Flex (6)

Table 7.c

Non-Advanced	OLS-Robust	FE-Robust
BW-Fix (1)	-0.023***	-0.025***
	[0.004]	[0.004]
BW-Lim. Flex (2)	-0.015**	-0.012*
	[0.007]	[0.007]
BW- Flex (3)	0.005	0.008
	[0.006]	[0.006]
PBW-Fix (4)	-0.023***	-0.021***
	[0.004]	[0.004]
PBW-Lim. Flex (5)	-0.019***	-0.020***
	[0.004]	[0.004]
Observations	1788	1788
R-squared	0.046	0.038
p-values:		
1=6	2.56E-08	2.16E-08
2=6	0.0249	0.0897
3=6	0.424	0.195
4=6	0.000000249	9.58E-07
5=6	0.00000297	8.39E-07
1=2	0.137	0.056
1=3	0.000000139	4.32E-08
1=4	0.761	0.225
1=5	0.0562	0.0575
2=3	0.00721	0.0184
2=4	0.186	0.174
2=5	0.424	0.209
3=4	0.000000592	0.00000114
3=5	0.0000049	0.00000199
4=5	0.191	0.716
Number of countries	43	43

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Omitted category PBW-Flex (6)

Table 8. Volatility of RER, de jure IMF and de facto Reinhart-Rogoff (RR) classification (1974-2001). Excludes Reinhart-Rogoff free falling category

Table 8.a

All		OLS-Robust	FE-Robust
de jure Fix-de facto Fix (1)		-0.022***	-0.021***
		[0.005]	[0.006]
de jure Lim. Flex-de facto Lim. Flex (2)		-0.005	-0.01
		[0.005]	[0.007]
de facto flexibility higher than de jure flexibility (4)		-0.011**	-0.015
		[0.005]	[0.010]
de facto flexibility lower than de jure flexibility (5)		-0.017***	-0.016***
		[0.005]	[0.006]
Observations		1446	1446
R-squared		0.029	0.016
p-value:			
1=3		0.00000269	0.000465
	2=3	0.332	0.144
	4=3	0.0161	0.133
	5=3	0.000288	0.00779
	1=2	0.000000177	0.00207
	1=4	0.000000566	0.348
	1=5	0.00654	0.0618
	2=4	0.0578	0.307
	2=5	0.00021	0.0415
	4=5	0.00644	0.896
Number of countries		60	60

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Omitted category de jure Flex-de facto (3)

Table 8.b

Advanced		OLS-Robust	FE-Robust
de jure Fix-de facto Fix (1)		-0.002	0.004
		[0.003]	[0.004]
de jure Lim. Flex-de facto Lim. Flex (2)		0.005	0.010**
		[0.004]	[0.004]
de facto flexibility higher than de jure flexibility (4)		-0.004	0.004
		[0.003]	[0.004]
de facto flexibility lower than de jure flexibility (5)		-0.005**	0.004
		[0.003]	[0.003]
Observations		532	532
R-squared		0.024	0.012
p-value:			
1=3		0.631	0.253
	2=3	0.141	0.014
	4=3	0.173	0.314
	5=3	0.0443	0.292
	1=2	0.0613	0.106
	1=4	0.435	0.865
	1=5	0.166	0.777
	2=4	0.00567	0.11
	2=5	0.000867	0.042
	4=5	0.461	0.956
Number of countries		19	19

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Omitted category de jure Flex-de facto (3)

Table 8.c

Non-Advanced		OLS-Robust	FE-Robust
de jure Fix-de facto Fix (1)		-0.029***	-0.027***
		[0.006]	[0.007]
de jure Lim. Flex-de facto Lim. Flex (2)		-0.033***	-0.025**
		[0.007]	[0.012]
de facto flexibility higher than de jure flexibility (4)		-0.015**	-0.022
		[0.007]	[0.014]
de facto flexibility lower than de jure flexibility (5)		-0.023***	-0.024***
		[0.007]	[0.009]
Observations		932	932
R-squared		0.039	0.025
p-value:			
1=3		0.00000816	0.000176
	2=3	0.0000106	0.0375
	4=3	0.027	0.118
	5=3	0.000389	0.00568
	1=2	0.399	0.781
	1=4	0.000000377	0.503
	1=5	0.0217	0.311
	2=4	0.0000729	0.74
	2=5	0.0313	0.885
	4=5	0.00397	0.78
Number of countries		42	42

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Omitted category de jure Flex-de facto (3)