The Effects of Exchange Rate Regimes on Real Exchange Rate Volatility. A Dynamic Panel Data Approach

The behavior of the real exchange rate (RER) volatility under different nominal exchange rate arrangements at national level and at different international monetary configurations continues to be one of the most controversial topics in international finance. The reason for this is because, up to now, it was difficult to establish not only a univocal consensus on this relationship, but also among the different exchange rate regimes and the macroeconomic variables.

Nonetheless the lack of consensus about the relationship between RER volatility and exchange rate regimes on economic policy ground, we can see strong efforts in order to reduce this volatility. Specifically this topic is one of the main points in the cost-benefits analysis of ER regimes.

Mussa (1986), Eichengreen (1988), Baxter and Stockman (1989) and Flood and Rose (1995) highlight a positive relation between the short-term volatility of the RER and the flexibility of the bilateral exchange rate regime. On the contrary, Grilly and Kaminsky (1991) criticize these regularities between RER volatility and exchange rate regime, and argue that RER volatility depends on a particular historical period of time, rather than upon the exchange rate regime.

In recent papers, Liang (1998) and Kent and Naja (1998) examine volatility using the effective RER. The former concludes that, in comparison, flexible exchange rate regimes have higher RER volatility than the fixed ones. Kent and Naja find that for pooled results across countries, effective RER is more volatile under floating regimes than under fixed regimes.

The aim of this paper is to set out the relative importance of these links, specifically by analyzing the exchange rate regime influence on the RER volatility using a dynamic panel data analysis. For this end a sample of 93 countries for the 1980-1999 period is considered. At the same time, it finds evidence on how other variables influence RER volatility and it also analyses the persistence of shocks in RER.

The paper is organized as follows: Section 1 reviews theoretical and empirical works on the subject and the motivations of the paper. Section 2 justifies the choice of econometric methodology. Section 3 presents the data set. Section 4 discusses the exchange classifications used in the paper. Section 5 shows the econometric results and, finally, Section 6 concludes.

1. Theoretical and empirical advances up to now

The currency crises in Europe, Asia and Latin America in the nineties, as well as the launching of the Euro, generated a renewed interest in the effects of the exchange rate regime on macroeconomic variables and especially over the RER volatility. Already when the Breton Woods system collapsed and was replaced with a more flexible system, an important interest about the effects of the new international system was expressed not only in theoretical terms but also in empirical investigation.

The post Bretton Woods models of the relationship between exchange rate regime and RER volatility recognized a sequence that starts in the seventies with the monetary approach where ER is mainly determined in asset markets. Then, the Mundell-Fleming-Dornbusch framework (MFD), that introduces in the short run price rigidity but in the long run the PPP holds, was converted into the main explanation. In the last decade there was an increasing importance of equilibrium models, where in the first papers, the series' properties are invariant in relation to the exchange rate regime, however, this strong result have been changing recently. Furthermore, all these approaches -that are usually named as the new open

macroeconomics (NOM)- emphasize the role of price adjustment and cost of arbitrage.

The traditional MDF approach with sticky prices supports the idea of greater nominal and real volatility under flexible regimes. This greater volatility could lead to a distributive inefficiency because if the nominal exchange rate (NER) changes, given the price rigidity, the RER is likely to change and, as a consequence, the allocation of factors in the production could be affected (Hallwood and McDonald, 1994).

By contrast, in a situation of disequilibrium, for example after a permanent real shock, floatation (or at least nominal corrections in the exchange rate parity) in a context of nominal inflexibility would contribute to reach an allocation closer to the socially efficient faster, by drawing the observed parity nearer to the new equilibrium. In this case, a fixed exchange rate regime, in a context of nominal rigidity of the prices, has efficiency costs in terms of greater unemployment of the factors while the transition takes place. That is to say, if the fixed exchange rate regimes were incapable of adjusting the shocks, as happened in the different exchange rate crises in Europe, Asia and Latin America in the nineties, it would be possible to observe collapses of the fixed regimes that create overshooting of the nominal parity and greater ex post RER volatility. It is important to remark that, in terms of causality, greater volatility could correspond to fixed regimes and not to the flexible or intermediate ones that might have replaced them.

In this way, good and bad volatility of the nominal and real exchange rate (Helpman y Razin, 1982; Neumeyer, 1998) could be distinguished. Taking extreme positions, good volatility is the one associated with adjustments to the NER, which contribute to drawing the country nearer to the equilibrium RER after a real shock. This volatility shows the inefficiencies generated as a result of being far away from the equilibrium and helps to correct them. Bad volatility is the one that, starting from a situation of equilibrium, takes place due to changes in the nominal parity (normally it is caused by a political shock).

Challenging the MFD approach, the dynamic general equilibrium models (Helpman, 1981; Lucas, 1982) were based on price flexibility. Money is introduced because of cash in advance constraints and the RER only varies because of productivity or fiscal shocks. Monetary policy is neutral and the RER is a RW that exhibits a low prediction power. These models introduce important theoretical advances (as current account intertemporal aspects or optimizing behavior) but were incapable of explaining the magnitude of exchange rate variability. So advances in this strand of literature incorporate monetary non-neutralities. Two important modifications were, on one hand, the "liquidity approach" (Lucas 1990) that incorporates participation constrains in the financial sector and, on the other, the direct assumption of sticky prices in an intertemporal framework. This rigidity could be motivated by imperfect competition and segmented markets. Questions like menu cost, the pricing in domestic currency and the endogenous selection from the firms of a certain level of price rigidity are alternative features of these new models[1]. With these incorporations the models tend to produce RER volatility as observed in the data and high correlation among nominal and real exchange rate (Devereaux, 1997). However, even in recent developments (Devereaux and Engel, 2002) persistence is lower than in data.

As a general balance of recent literature, it is possible to conclude that there is not a clear consensus about the connection between exchange rate regimes and real exchange rate (RER) volatility. This question is especially important because the RER volatility is supposed to have a strong effect on several macroeconomic variables such as consumption, investment and trade flows[2] (Frankel and Rose, 1995)

[1] The study of Cuddintong and Liang (1998) divides tradeable goods into industrial goods and primary goods and find that a differential fixing of prices in international markets, may lead to a dependence of volatility in relation to the exchange rate regime and to changes of the allocation of factors that are socially inefficient.

[2] Gonzaga y Terra (1997) present an interesting model with exporters adverse to the risk, where greater volatility caeteris paribus reduces competitiveness and increases the average RER level required by an economy to be in equilibrium which, in return, affects inflation. Volatility, then, is an explanatory variable of the equilibrium RER. Some studies carried out by Cushman (1983, 1986, 1988), Akhtar and Hilton (1984), Kenen and Rodrik (1986), and Arize (1995, 1996) support the idea of a depressive effect of the RER volatility on trade. Others like Hooper and Kohlhagen (1978), Gotur (1985), and Asseery and Peel (1991) claim the opposite result. The evidence obtained,

and, eventually, on the long-term growth path (Rodrik, 2001). Even though the lack of precision about the main channels of transmission of its effects, there seems to be on economic policy grounds an extended agreement over the negative character of RER volatility in macro terms. In other words, between two countries with identical characteristics, ceteris paribus the one having greater volatility of the RER will be in worse conditions than the one having less. For all these reasons, the analysis of the impact of the exchange rate regime over the RER volatility may provide one of the main criteria for the election of a regime. The huge effort that governments make in order to reduce it, is important proof of this. The Smithsonian Agreement, the Plaza Accord or the progressive long term European exchange rate coordination are the main examples of these efforts.

1.1 Previous empirical findings

On the empirical side, there are many studies that analyze the impact of exchange rate regimes on different macroeconomic variables, such as inflation and its volatility, real interest rate, and growth and its volatility. However, the relationship between ER regime and RER volatility is an issue that has not been deeply analyzed[3].

Empirical evidence seems to show that after Breton Woods, nominal and real exchange rate volatility increased. Many studies, among which are those by Mussa (1986), Eichengreen (1988), Baxter and Stockman (1989) and Flood and Rose (1995), highlight a positive relation between the short-term volatility of the RER and the flexibility of the exchange rate regime. However, as in most of these studies, Mussa's is based on the analysis of the bilateral RER. He analyzes the behavior of 15 industrialized countries and finds that bilateral RER were, on average, almost 12 times higher under floating than under fixed exchange rate regimes.

Grilly and Kaminsky (1991) criticize the validity of the consensus about the empirical regularity between RER volatility and exchange rate regime (i.e. volatility is regime-dependent). They argue that RER volatility depends on the particular historical period rather than on the exchange rate regime. Through their work they examined monthly observations of the RER between the US Dollar and the British Pound between 1885-1986 and found that the distribution of the monthly rate of change of the RER is the same under fixed and floating regimes only for the pre-World War II data, and that when post-World War II data is included, different volatility behaviors across exchange rate regimes are found.

In a recent work, Liang (1998) criticizes the results obtained by Grilly and Kaminsky (1991) and performs an empirical analysis using annual data from 1880 to 1997, and monthly data from 1957 to 1997. He confirms the suspicion that flexible exchange rate periods have higher volatility of the effective RER than in fixed exchange rate periods. Kent and Naja (1998) analyze the relationship between the short-term volatility of the effective RER and the degree of flexibility of the exchange rate regime using non-parametric tests. Contrasting with Mussa's conclusions they find that, for pooled results across countries, effective RER is only twice –statistically significant- volatile under floating regimes than under fixed regimes. However, results within countries show that there was no significant increase in effective RER volatility when moving to more flexible exchange rate regimes and that, for some of them, volatility is lower under more flexible exchange rate regimes. If the behavior of the RER is influenced by country

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nevertheless, is not conclusive. Additionally, Goldberg and Kolstad (1995) find that RER volatility affects trade and the allocation of foreign investments of multinational companies when there is risk aversion and fixed productive factors.

[3] Though it is true that there are few papers that concentrate on testing the impact of the RER volatility over growth, there is much evidence concerning the effects of the regimes over issues like growth. While some papers find greater growth in the Breton Woods era, Ghosh (1997) does not find any relation between regime and growth. By means of a better classification than the simple *de jure* classification, Levy Yeyati and Stuzenegger (2000), observe that the flexible exchange regimes are associated with greater growth.

characteristics, then the results of the within analyses are more appropriate. This should necessarily be taken into account in the modelization of our problem.

The focus of our research

The study of all this previous empirical literature raises some unanswered questions:

- Are the exchange rate regimes neutral with respect to real variables like the RER volatility?
- Do fixed exchange rate regimes provide less RER volatility than flexible ones?
- How do other economic variables, like the openness or capital flows, affect RER volatility?
- How do policy variables affect the RER volatility?
- How persistent is volatility?
- Do consistent central bankers enjoy lower RER volatility?

The aim of this paper is to give an answer to these questions. In order to do that and taking into account previous papers, this empirical analysis is improved in the following aspects:

1. It is important to evaluate the behavior of exchange rate regimes taking into account the predominant rule of the game at international level. Any regime at domestic levels works very differently according to which at international level there is more or less coordination. For example, an extreme fixed exchange regime such as dollarization or a currency board, does not generate the same results under the gold standard or BW than under an international floating regime as the present one (Carrera, 2002). For this reason, this paper focuses exclusively on the period of the international flexible regime according to the classification of Eichengreen (1994). This makes it possible to evaluate the influence of the exchange rate regimes on the RER volatility without adding the effect of change on their properties caused by a different international monetary configuration.
2. It is necessary to make extensive use of available information on the classification of exchange rate regimes. Here the *de jure* classification is used compiled by the IMF and also new contributions are used that classify countries according to their observed behavior. However, both are incomplete in order to detect inconsistencies between the declared commitment of the central bank – specially in order to fix the parity or to leave it floating- and its true behavior.
3. Most of the papers analyze the relationship between exchange rate regimes and RER volatility using the bilateral RER. However, from a macroeconomic view point, the analysis of the effective RER seems to be more appropriate, especially for countries that are away from monetary centers and have a diversified trade. This is the case for countries like Argentina, Australia, Brazil, South Africa, Sweden, etc. Besides, the election of the period of the international flexible regime suggests that the measurement of the RER contemplates the changes generated by the floatation in the rest of the countries. The results obtained by regressing bilateral and effective RER are confronted.
4. It is important not only to have cross section information as an average of a long period but the dynamic of each country. In order to do that a cross country approach using dynamic panel estimations is followed. A dynamic methodology of estimation (Generalized Method of Moments) is used which considers endogeneity problems and unobserved specific effects. The employ of this dynamic methodology makes the analysis of the persistence of the shocks in the RER possible. As it is well known, this is a puzzling problem analyzed in recent international finance literature (Devereaux and Engel, 2002).
5. It is possible that other variables interfere in the relationship between exchange rate regime and RER volatility, then the regression is controlled by other variables that can affect this result.

2. Econometric Methodology

For the selection of the estimation method, three aspects were considered. Firstly, issues concerning the data should be considered: due to the availability of panel data -which makes it possible to retain all the information in relation to the use of annual averages- the presence of the country's unobservable factors must be taken into account. Secondly, it is interesting to analyze the persistence of the RER shocks, reasons for which the methodology must allow for an inertial behavior of the variable considered. Finally, an element -frequently ignored in empirical works, but which is very important- is the so- called "reverse causality". That is, as some of the explanatory variables are likely to be jointly determined with RER volatility, endogeneity of the explanatory variables must be controlled.

Considering these aspects, the appropriate methodology to use is the Generalized-Method-of-Moments (GMM) estimator for dynamic panel data models (Hansen, 1982). Here the version developed by Arellano and Bond (1991) is used. This estimator deals with country specific effects and potential endogeneity of the explanatory variables. The control for endogeneity is achieved by the use of "internal instruments", that is to say, instruments based on lagged values of the explanatory variables. It what follows the main benefits of using this methodology is discussed in comparison to other alternatives more frequently used.

The dynamic nature of RER volatility (R) must be represented through a model containing lagged dependent variables among the regressors. To simplify the analysis, a simple autoregressive model with one lag period of the dependent variable is considered:

$$R_{it} = \delta R_{i,\,t-1} + x_{it}^{'}\beta + \upsilon_{it} \qquad i = 1,...,N \qquad t = 1,...,T \tag{1}$$

where δ is a scalar, $x_{it}^{'}$ is a vector of dimension 1xk that represents a group of variables that potentially affect RER volatility and β is kx1. Assuming that the υ_{it} follow a one-way error component model:

$$\upsilon_{it} = \mu_i + \nu_{it} \tag{2}$$

where $\mu_i \sim \text{IID}(0, \sigma_\mu^2)$ and $\nu_{it} \sim \text{IID}(0, \sigma_\nu^2)$ are independent of each other and among themselves.

Since R_{it} is a function of μ_i, $R_{i,t-1}$ is also a function of μ_i. Therefore, $R_{i,t-1}$, a right-hand regressor in (1), is correlated with the error term. This renders the Ordinary Least Square (OLS) estimator biased and inconsistent even if the ν_{it} are not serially correlated. In relation to the Fixed Effect (FE) estimator, the Within transformation wipes out the μ_i, though $(R_{i,\,t-1} - \overline{R}_{i,\,t-1})$ where $\overline{R}_{i,\,t-1} = \sum_{t=2}^{T} R_{i,\,t-1} \big/ (T-1)$ will still be correlated with $(\nu_{it} - \overline{\nu}_i)$ even if the ν_{it} are not serially correlated. This is because $R_{i,t-1}$ is correlated with $\overline{\nu}_i$ by construction. The latter average contains $\nu_{i,\,t-1}$ which is obviously correlated with $R_{i,\,t-1}$. In fact, the Within estimator will be biased and only if $T \to \infty$ will the Within estimator of δ and β be consistent for the dynamic error component model. The same problem springs up with the Random Effect Generalized Least Square estimator (GLS) because $(R_{i,\,t-1} - \theta \overline{R}_{i,\,t-1})$ will be correlated with $(\upsilon_{i,\,t} - \theta \overline{\upsilon}_{i,\,t-1})$.

An alternative transformation that wipes out the individual effects, yet does not create the above problem, is the first difference transformation. In fact, Anderson and Hsiao (1981) suggested, firstly, differencing the model to get rid of μ_i, and then, using $\Delta R_{i,\,t-2} = (R_{i,\,t-2} - R_{i,\,t-3})$ or $R_{i,\,t-2}$ as an instrument for

$\Delta R_{i,\,t-1} = (R_{i,\,t-1} - R_{i,\,t-2})$. These instruments will not be correlated with $\Delta \nu_{it} = \nu_{it} - \nu_{i,\,t-1}$, as long as the ν_{it} themselves are not serially correlated. This instrumental variable estimation method leads to consistent but not necessarily efficient estimates of the parameters in the model, because it does not make use of all the available moment conditions as Ahn and Schmidt (1993) show, and it does not consider the differenced structure on residual disturbances ($\Delta \nu_{it}$).

A methodology considering country specific effects and the bias of dynamic panel data models is the GMM estimator developed by Arellano and Bond (1991). This estimator works in the following way: first, take first differences of a model like (1) which, generalized to a model containing k lagged dependent variable as regressor, leave:

$$\Delta R_{it} = \sum_{j=1}^{k} \delta_j \Delta R_{i,\,t-j} + \beta' \Delta x_{it} + \Delta \nu_{it} \qquad (3)$$

where $\Delta R_{it} = R_{it} - R_{i,\,t-1}$. First differencing gets rid of the country specific effects, but leads by construction to a correlation between the differenced lagged dependent variable and the differenced error term. Therefore, these authors propose using lagged levels of the explanatory variables, including the lagged dependent variable, as instruments.

The GMM estimator will be consistent if the lagged levels of explanatory variables are valid instruments for differenced explanatory variables. This will hold if the error term is not serially correlated and the explanatory variables are weakly exogenous. These assumptions can be tested by using the tests proposed by Arellano and Bond (1991). The first is a Sargan test of overidentifying restrictions, which tests the overall validity of the instruments. Failure to reject the null hypothesis gives support to the model. The second is a test for serial correlation in the error term. If such test does not reject the null hypothesis of second order correlation absence, it can be concluded that the original error term does not have serial correlation.

3. Data

The sample embraces a panel of 93 countries[4] –21 OECD countries and 72 non-OECD- for the 1980-1999 period. The source of data used for the macroeconomic variables were the *IMF* and the *World Bank*. The sources of data for exchange rate regimes were the *IMF Annual Report on Exchange Arrangements and Exchange Restrictions*, for *de jure* exchange rate classification and *de facto Exchange Rate Classification Database* by Levy Yeyati and Sturzenegger (2002). All the data used is based on annual frequency, except for the components of real exchange rates (nominal exchange rates and prices) that are on a monthly basis.

3.1. Macroeconomic variables

The RER volatility is obtained by calculating the standard deviation of the effective RER over each year using monthly data. Openness, rate of growth of real per capita GDP, shock in trade terms, changes in the capital account, rate of growth of M2, growth of government consumption and different classifications of exchange regimes specifically discussed in the following sub-section are used as explanatory variables[5].

[4] The complete list of countries included in this paper is presented in the Data Appendix 8.1.

[5] For more details regarding the construction of the variables see Data Appendix 8.2.

4. Classifying Exchange rate regimes classifications: How to detect inconsistencies?

Economic literature shows several options to carry this out: a *de jure* classification, based on the commitment adopted by the central banks and a *de facto* classification, product of the actual behavior. Neither of these methods is entirely satisfactory. The *de facto* classification has the advantage that it is based on observed behavior, but does not make it possible to distinguish between stable nominal exchange rates resulting from the absence of shocks, and the stability produced by political actions counteracting the shocks. Because of this, it fails to capture what might be the essence of an exchange rate regime -the real quality of the commitment by the central bank to intervene and subordinate its money policies in the exchange market. The *de jure* classification captures this formal commitment, but fails to control it if the central bank is inconsistent with this commitment.

Having taken these two points into account, two different exchange rate regime classifications are used in this work:

- In the first step, a three-category *de jure* classification is considered: fixed, intermediate and flexible. The fixed regimes cover: a single currency peg; SDR peg; other official basket pegs; and a secret basket peg, according to IMF terminology. The intermediate group includes: cooperative arrangement, unclassified flexible, rule based, crawling peg and target zone[6]. While the flexible group includes independent floating and managed floating[7].

- Secondly, a new exchange rate regime classification is suggested, which captures both, the central bank commitment to intervene and subordinate its monetary policy to the foreign exchange market and the possible inconsistencies in its behavior is used. So, in order to control for the consistency between deeds and words the *de jure* classification of the IMF and the *de facto* classification by Levy Yeyati and Sturzenegger (2002)[8] (presented in Table A-1) are combined under a grouping criterion. They take in consideration three determinants: the volatility of nominal exchange rate, the volatility of the rate of change of the nominal exchange rate and the volatility of reserves. Table A-1 in the appendix presents the *de facto* classification of Levy Yeyati and Sturzenegger based on these criteria

Tables A-2 and A-3 describe, through the "crossing" of the *de jure* and the *de facto* classifications, the main characteristics of the regimes for the 1974-1998 period in quantitative terms. Some of them are:

- An important proportion of the de facto inconclusive regimes are present for all the de jure exchange rate regimes, but the greatest proportion of inconclusive regimes is concentrated in de jure fixed regimes (Table A-2). A not very important proportion of the de facto inconclusive regimes is present for each of de jure exchange rate regimes and they are specially concentrated in the de jure flexible.

- While 57% of the regimes showing a flexible behavior are defined as such, 61% of the ones behaving as fixed admit being so (Table A-2). The remaining 49% that behaves as fixed declare to be flexible or intermediate. This strategy configures the "fear of pegging", that is, de facto pegs that choose not to explicitly commit to a fixed parity. According to Levy Yeyati and Sturzenegger (2002) this group has shown a clear increase since the late eighties. Instead, in the 81% of which behaves as a flex declare to be flex or and intermediate.

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[6] Countries participating in the European "snake" in the mid-seventies and later in the EMS have fixed exchange rate regimes among then, but they float against other currencies. In agreement with other papers -Ghosh et al. (1997) and Levy Yeyati and Sturzenegger (2002)- they are classified as intermediate.

[7] It was considered as floating because it is more relevant to know whether there is a commitment or not on the part of the central bank than if they effectively intervene or not in the exchange market. In fact, according to Levy Yeyati and Sturzenegger (2002), only a few more than 30% of the countries are considered to have a floating exchange rate regime behaving as such. This behavior is usually called "fear of floating" (Calvo and Reinhart, 2001).

[8] Specifically the 2nd round classification is used. In this paper, the dirty floating categories and crawling peg by Levy Yeyati and Sturzenegger (2002) have been grouped under the *de facto* intermediate category.

- In Table A-3 is possible to see that 18%+32% of those that declare to be flex behave as a fixed or an intermediate. Notice that only 45% of declared flex really behave like that. A 50% of declared floaters intervene actively in the foreign exchange market; this configures the so called "fear of floating" (Calvo and Reinhart, 2001). This behavior could rationalize by thinking that these central bankers desire stability of RER but do not want to take any compromise that reduces their potential ability to intervene in the currency market.

As a general result we can see an important difference between the central bank declared commitment regarding the exchange rate regimes and the behavior observed according to homogeneous parameters.

4.1. A new classification: deeds and words

On the basis of the characteristics mentioned above, the theoretical and empirical elements considered for building the new classification of exchange rate regimes are:

- The categories' diversity should balance a trade-off between greater information and limitations imposed by econometric restrictions.

- A clear difference between commitment and behavior according to *de jure* exchange rate regimes is observed, with greater divergence for fixed regimes.

- The categories' diversity should consider the credibility problem involved in the contrast between the observed and declared behavior. For example, while it seems to be obvious that a country with a *de jure* fixed regime (showing an intermediate or flexible behavior) is inconsistent with this commitment, it is not clear that an economy with flexible regime, behaving as fixed, violates any kind of commitment which makes it inconsistent. In fact, if after having behaved as a fix, a declared flexible moves the parity is not violating any obligation.

The new suggested classification of exchange rate regimes -with the letters identifying the different categories- is presented in Table 1.

Table 1

New classification of exchange rate regimes

		de facto Classification			
		Fixed	Intermediate	Flexible	Inconclusive
de jure Classification	Fixed	a	b	c	d
	Intermediate	e	f	g	h
	Flexible	e	f	g	h

This new classification is composed of eight categories:

- (*a*) *de jure* fixed regimes behaving consistently with the commitment. For example: Ireland 1974-1978, The Bahamas 1974-1998, Argentina 1992-1995, Lesotho 1980-1998.
- (*b*) *de jure* fixed regimes which, having behaved in the opposite way regarding the commitment –have variations in their exchange rates–, had strong movements on their reserves, probably because they were detected as inconsistent and punished for this behavior. For example: Argentina 1975-1976, Chile 1974-1976 and Bolivia 1982-1985.

- (*c*) *de jure* fixed regimes which, even if they have changes in their exchange rates, are not detected or punished for such behavior as they do not show greater changes on their reserve levels. For example: Brazil 1975-1977, Poland 1992-1995 and Sweden 1980-1982.
- (*d*) A priori, they could be thought of as fixed regimes having stable economies, with no greater external shocks or credibility problems. For example: Austria 1981-1983, Cyprus 1993-1994 and Tonga 1989-1990.

The remaining categories have been grouped according to their observed behavior. In theoretical terms the disagreement between both classifications seems not to create any kind of inconsistency.

- (*e*) economies behaving as fixed, that do not want to be limited or judged by the rules governing the *de jure* fixed regimes. They are linked to the "fear to floating" concept. For example: Finland 1992-1998, Ireland 1987-1998, Denmark 1978-1998 and New Zealand 1992-1998.
- (*f*) they have important movements in their reserves, also changing and volatile exchange rates, but are not engaged with the exchange rate fixation. For example: Argentina 1981-1985, Brazil 1987-1993 and Switzerland 1991-1998.
- (*g*) within this classification, is the closest to pure flexible, as it does have important variations in the exchange rate but little movement on its reserves. For example: Chile 1983-1990 and 1992-1998, Germany 1974-1998, Japan 1974-1998 and United States 1974-1998.
- (*h*) they include stable economies, with no important or strong external shocks so as to avoid greater effects on their exchange rates or reserves. For example: Belgium 1994-1998, Egypt 1992-1997, Lebanon 1996-1998.

5. Empirical results

5.1. Some preliminary inspections

Figure 1 shows for the *de jure* classification of the intra-annual RER volatility vs. intra-annual nominal ER. The fixed regime shows lower nominal variations but a big dispersion in real volatility. On the contrary, flexible shows a higher positive nominal variations and lower RER volatility. Figure 2 (in the appendix) shows the same variables within the new classification.

Figure 1. Intra-annual RER volatility vs. intra-annual nominal ER variation using the de jure classification.

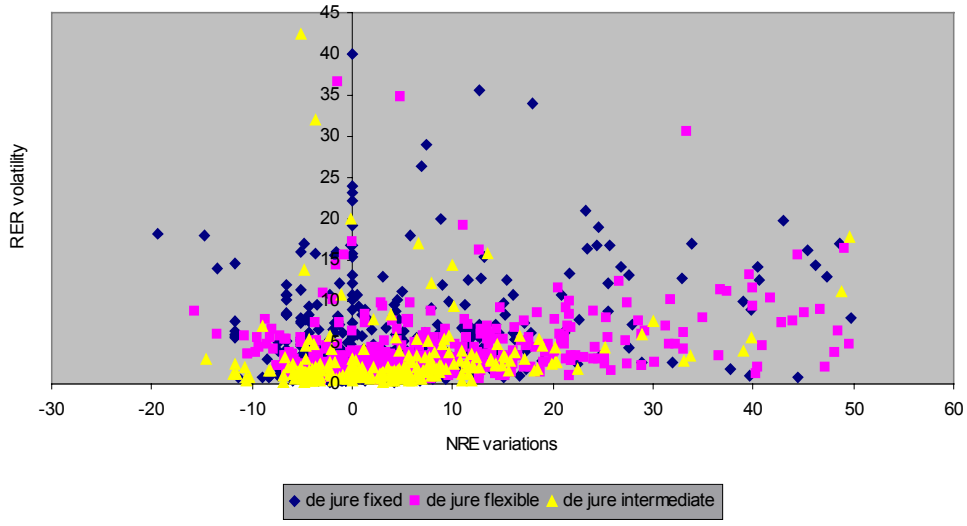

Table A-4 presents the percentage corresponding to each of the new classification categories considering all, the Non-OECD and OECD countries, respectively. It is possible to see that 37.2% of countries declared to be fix and 62.8% to be flex or intermediate, so the world trend seems to go towards to the predominance of flex de jure regimes. But, when we test consistency we discover that, only 22.8% and 26.6% are consistently fix and flex respectively. Another interesting feature is that OECD countries tend to declare as flexible and their behavior is clearly concentrated on two categories: consistently flex and de facto fix, but without such a commitment. Contrarily, non-OECD countries have no such concentrated feature, showing two main characteristics: Firstly they behave less flexible and, secondly the countries that behave as fixed tend to declare themselves in such a way, perhaps because they want to gain something by declaring as that.

Insert Table A-4 about here

Insert Table A-5 about here

Tables A-5 and A-5b describes the standard deviation mean of the Multilateral Real Exchange Rate (MRER) and Bilateral one (BRER), respectively. In bold letters the whole sample is considered, while in italics the non-OECD and OECD are described. It can be seen that the mean of the standard deviation of effective RER shows a value of 8.8 for *de jure* fix regimes and 7.2 for *de jure* flexible and intermediate ones. This outcome contradicts traditional results established since Mussa´s (1986) pioneering paper regarding the lower volatility of fix regimes. The columns show strong differences according to their *de facto* regimes. Impressively, the *de facto* intermediate regimes have 19.6 of volatility. Consistent fix and flex have similar volatility around 3.4 and 3.8. Notably, the lowest volatility is 3.1, the corresponding to regimes that behave as a fix but declare to be flex (fear of pegging).

5.2. The importance of choosing the correct estimation method

There is little consensus about the RER volatility determinants in specific theoretical models. So, the inclusion of explanatory variables is not derived from a particular model but from the mostly accepted determinants in recent literature. In this way the experiment is general enough as to test different hypothesis. The model is estimated for the 1980-1999 period and considers, in addition to the lagged of the dependent variable and the exchange rate regimes a set of independent variables as potential determinants of RER volatility is included. The structural and policy variables are: openness, rate of growth of per capita GDP, shocks in terms of trade, changes in the capital account, growth of M2 and growth in government consumption.

It is worth mentioning that the Sargan test and the serial correlation test cannot reject the null hypothesis for all the models estimated through GMM, supporting the use of appropriate lags of the explanatory variables as instruments for the estimation.

For a proper reading of the exchange rate regimes' coefficients, it is important to mention that they refer to their differential compared to their flexible effect –*de jure* flexible regime in the IMF classification and pure flexible regime for the new classification (category g)-. So, as an example, a positive sign in fixed exchange rate regime means that this regime causes -constant the rest- more RER volatility than a flexible one.

Models 1 and 2 of tables A-6 consider the *de jure* exchange regimes -fixed, intermediate and flexible- and differ in the estimate methodology depending on whether it is FE or GMM respectively. The results show the great importance of the proper choice of the method. On the one hand, with fixed effects, all variables tend to reduce their significativity and, on the other hand, the effect of the regimes suffers some changes, not only in significativity but also in direction and magnitude. With GMM intermediate change from negative to positive. If, as we argue in the Econometric methodology section, GMM is superior in respect

to FE, this result is very important in the correct evaluation of intermediate regimes.

5.3. RER volatility using the de jure classification.

Focusing the attention on GMM methodology and in the *de jure* classification, it is possible to see in models 2 and 3, depending on the real exchange rate definition used. Model 2 considers the effective or multilateral RER; while model 3 considers the bilateral definition[9]. Setting apart the exchange rate definition, both models show robust results for the rest of the variables. Acceleration in the capital inflows, shocks in the rate of growth of broad money and growth of government consumption increase RER volatility, while a greater degree of openness, increases in the rate of growth of GDP per capita and improvement in the term of trade reduce it.

- A greater degree of openness reduces RER volatility. This result supports the theoretical prediction by Hau (2000) and Obstfeld and Rogoff (2000) and also the empirical evidence obtained by Hau (2001). The intuition for this effect is as follows: more imported goods provide a channel for a quick adjustment of the domestic aggregate price level (a high pass trough). This in turn reduces any short-run effect of money supply or real shock on the real household balances and then the effects on either consumption or the RER. In the case of bilateral RER the sign is positive and the level is very low.

- An increase in the rate of growth of GDP per capita reduces RER volatility. It seems reasonable that this variable represents an important control variable, due to the various development levels that the data set combines. In the Balassa-Samuelson effect higher productivity increases are associated with lower level of equilibrium RER. The convergence to a new lower equilibrium could be reached with nominal revaluations. It is possible to postulate a certain asymmetry in the convergence to a new equilibrium RER where the adjustment to a lower one is less traumatic and volatile than the convergence to a higher one.

- An improvement in terms of trade tends to reduce RER volatility. This might indicate that an improvement in the external purchasing capacity can reduce prices of imported goods. This result could be coupled with the conventional idea that this effect improve the equilibrium RER (Edwards, 1989), then it could require nominal revaluations to go to the lower new equilibrium RER. Again, it is possible to apply the idea of easier convergence to a lower RER requires lower nominal revaluations than in the case of nominal devaluations in order to adjust the economy to a higher equilibrium RER. As in the case of openness when we analyze bilateral RER the sign is positive and the level is very low.

- An acceleration in capital inflows increases the RER volatility. Standard open economy models predict that capital inflows lead to an excessive expansion of aggregate demand and this is likely to be reflected in inflationary pressures, due to the fact that non-tradeable goods supply is more rigid than tradeable goods supply. In an intertemporal view, additional capital flows increases debt and, if these capitals do not increase productivity, a future real devaluation will be necessary in order to pay the debt. Another interpretation taken from Razin and Rose (1994) emphasizes, based on comparative advantages, that financial integration increases specialization and thus increases the vulnerability to shock and the necessary changes in RER. Finally, our result could be connected to other evidence from Prasad, Rogoff, Wei and Kose (2003) according to which financial integration boost, instead of reducing, macroeconomic volatility.

Regarding economic policy variables the results confirm some expected relationships.

- A shock in the growth of broad money aggregates is positively associated with RER volatility. This can be accounted for nominal devaluations as well as increases in prices.

[9] From our theoretical discussion we consider effective RER to be the most important definition. However, bilateral RER is used in some papers and works as a control of the results.

- An expansion in government consumption tends to increase RER volatility. This expansion appreciates the RER if it increases the overall demand for non-tradable goods. This would be the case if, as is expected, government propensity to consume non-tradable goods is larger than that of the private sector.

- The coefficient of the lagged dependent variable in models 2 and 3 differs, while on MRER it always has a negative sign, on BRER it is positive. That is regarding MRER, it reflects a tendency to reduce RER volatility caeteris paribus. It means that, after controlling for country-specific characteristics, structural variables and domestic and external shocks; the RER volatility tends to reduce over time. Obviously, this result does not contradict the positive first order correlation found for the countries in the sample (0.291), due to the fact that this correlation come from a non-conditioned analysis. On the other hand, BRER has a very high correlation (0.945) and, shows an important inertia in all models which could be due to the fact that BRER is measured only in relation to the dollar.

As regards the influence of the exchange rate regimes, this first results using the *de jure* classification support the non-neutrality idea. In model 2, results show that fixed and intermediate regimes generate greater RER volatility than flexible ones. This result shows the importance of the conditional analysis, because it clearly shows different results when compared to the ones obtained by some traditional papers as Mussa (1986) and Kent and Naja (1998).

5.4. Consistent regimes and their effects on volatility: the benefits of using the new classification.

In the previous section we saw a strong result based in de jure classification. Nevertheless, we remarked that the de jure classification is not good as approximation to the behavior of policymaker. As we mentioned it is necessary to have the consistency of central bank behavior. In order to consider the central bank commitment to intervene and subordinate its monetary policy to the currency market, as well as the possible inconsistencies in its conduct, the new classification suggested in section 4 is used, and the econometric results are presented in Table A-7, model 4 presents the main results using the effective RER.

Discussion about this new classification allows use to get to the bottom of certain behaviors that the *de jure* classification does not recognize. The results obtained indicate that declared fixed regimes, that have successfully defended the exchange parity (cell a in the new classification), are prone to lower RER volatility than pure flexible regimes. All the other categories (including the *de jure* fixed regimes that change parity -b-, those that do not allow their reserves to be modified -c- or those that have not suffered significant shocks-d-) show a greater RER volatility in relation to the pure flexible regimes defined as -g- or in relation to the consistent fixed regimes defined as -a-. So, as a general result we see that extreme consistent regimes (corner solutions) form a subgroup with lower volatility. In the rest the RER volatility is higher.

It is very important to remark that almost all control variables have the same sign with the new classification than with the *de jure*. Then, the change of relationship between RER volatility and regimes are concentrated only in the regime's definitions.

Complementarily, when the dependent variable is bilateral RER (model 6 Table A-7) the difference between consistent fix and flex regimes tend to disappear. So, both consistent regimes have similar RER volatilities.

On one hand, it is reasonable to think that inconclusive categories -d, h- may generate a moderate RER volatility due to the fact that these economies are subject to moderate shocks, in other words, their regimes were not tested. On the other hand, these might be because of the few observations (see table A-4).

More interestingly in this regression is the fact that Intermediate or flexible regimes that behaves as fix

(the fear of pegging) show lower bilateral RER volatility. It seems to be a successful strategy in order to reduce RER volatility avoiding the cost of a commitment to fix.

5.5. Core vs. Periphery: Are OECD and non-OECD intrinsically different?

Many recent discussions on dynamics of the exchange rate regimes, that are useful in order to cope with financial instability, rest on the observation that the challenges of globalization are not quite the same depending on whether it refers to developed or developing countries[10]. Specifically, these discussions focus on the role of technological progress in money and finance. They argue that the more financially developed part of the world has been able to exploit to its fullest possible extent its ability to float, while the less financial developed ones have always faced serious difficulties due to the "original sin" and "hollowing out" hypotheses (Hausmann R., M. Gavin, C. Pages and E. Stein, 1999).

Likewise, and in agreement with the previously mentioned reasoning, the data for the sample of 93 countries shows a notorious difference in terms of the RER volatility according to the degree of development of the country (See Figure 3). Whereas for the full sample the mean of the RER volatility is 7.6, when it is evaluated for the non-OECD and OECD countries, it reaches average values of 10.6 and 2.3 respectively (see Table A-5).

Insert Figure 3 about here

For this reason, it is considered appropriated to replicate model 4 but evaluating it in a different sub-samples when the country is non-OECD (Table A-7, model 5 for MRER and model 7 for bilateral RER volatility). The evidence in the effective RER case (model 5) shows that b, c and h have higher volatility than the flexible benchmark g. In the rest of the categories we can not reject the null at 10% of significativity.

In the bilateral case, results are similar to the ones obtained for the full sample, as a main difference, consistent fix have the same volatility than flexible. Countries with a fear of pegging (e) have lower volatility than pure fix or flex. Analyzing the complete (e) row in Table A-7 it is possible to deduce that non-OECD countries have used this strategy to lower both real and nominal volatilities.

While for the OECD countries (the results are not shown) almost all control variables are of little significance, which might be the result of the little variability in the RER volatility, at least in terms of the non-OECD countries. This lower relationship could be related with the apparent "disconnection" among RER volatility and macro variables that is discussed in recent works (Devereux and Engel, 2002). This intuition could also be seen in tables A-5 and A-5b where, independent of the regimes the OECD countries show, in comparative terms, lows and a much more similar mean standard volatility than non-OECD ones.

In this sense, the results obtained in this subsection are powerful indicators that the OECD and the non-OECD countries should be treated separately. On this line it is possible to understand that, because the RER volatility is not so high in OECD countries, then some contradictory results appear about the effects of RER volatility on trade and other macro variables. On the contrary, RER volatility seems to be extremely relevant in emerging and developing countries.

6. Conclusions

This paper seeks to analyze the relationship between exchange rate regimes and short-term volatility of the effective real exchange rate. To these ends, a sample of 93 countries for the 1980-1999 period, the GMM methodology for dynamic panel models proposed by Arellano and Bond (1991) and diverse exchange classifications are used. In relation to the latter, this paper discusses recent regime

[10] Bordo and Flandreau (2001) and Hausmann, et al (1999).

classifications and proposes a new exchange rate classification that contrasts *de facto* and *de jure* classifications. It allows the checking of possible inconsistencies between the commitment of the central bank and its observed behavior.

The main results of the paper confirm the non-neutrality of regime regarding real exchange rate volatility. This is valid for all the classifications and RER specifications.

Using *de jure* traditional classification, it is found that fix and intermediate regimes induces more volatility than flexible ones. This result contrasts with the findings of previous empirical research and could be a stimulus to improve general equilibrium models results' for RER.

With the new classification, it is found that the corner solution or pure regimes have lower volatility than the rest of intermediate regimes. Whereas fixed de jure regimes that have successfully managed to defend the exchange parity has lower volatility than a pure flexible regime.

While there is a non linear relationship between the formal degree of rigidity of the ER regime and the level of RER volatility, it seems possible that this relation is based on the degree of consistency of the commitment, instead. Specifically, this result introduces an important dichotomy in the evaluation of fixed regimes. When they successfully maintain the commitment, its volatility is lower than a flex (for the MRER), but when the central bank fails in maintaining the commitment to fix, the volatility is higher.

So, the evidence seems to suggest to countries to select extreme regimes and remain consistent with that selection. However, it is possible that the costs are not the same between being a consistent fix and a consistent flex. It should be interesting for further research to determine which of the two regimes purvey higher net benefits.

Consistent fix purveys a bit less MRER volatility than pure floaters but perhaps presents more cost. When countries don't have problems with credibility and reputation it seems that they prefer floating from available corner solutions (see that for OECD countries this consistent fix is quantitatively not important). Nevertheless, for non-OECD countries, that normally have problems with reputation, successful strong fixation could have an additional benefit that is lower nominal volatility in the whole economy.

It is important to note that countries that committed to fix and failed (b, c, d) are worse than those which have a commitment to float and don't float (fear of floating). This is the counterpart of an essential asymmetry in exchange regime behavior: to promise to be fixed and then devaluate is more discrediting than to promise to be flex and intervene in order to avoid exchange rate fluctuations.

Then, crossing the observed behavior with the regime commitment seems to be a better strategy of classification than the *de jure* or *de facto* ones in order to obtain results regarding the effects of consistent or sustainable selection. So, given the possibility of having such a classification, these results could help to explain the hollowing out hypothesis (Einchengreen, 1994) or the bipolar view (Fisher, 2001) that claims that countries tend to select the extreme or polar exchange rate regimes.

In relation to the rest of the RER volatility determinants, openness is an important structural condition in order to diminish it. Meanwhile higher positive changes in per capita GDP and in the terms of trade reduce RER volatility, acceleration in capital inflows increase it. Regarding the economic policy, both, a monetary or a public expenditure shocks increase real volatility. As an advantage of this methodology as was remarked is the possibility of having a dynamic analysis, in every model the evidence shows that the dynamics of effective RER volatility converges slowly to the equilibrium. It could imply that in the long run a sort of PPP holds. When we test for bilateral RER the convergence doesn't exist, the reason could be due to the fact that prices are set in dollars.

Finally, evidence is also obtained that supports the view according to the analysis of the dynamics of the exchange rate regimes needs to differentiate between developed and developing or emerging countries. In

these countries the relationship between volatility and exchange rate regime is a key question in reassuring a stable macroeconomic performance and a correct selection of the exchange rate regime.

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8. Data Appendix

8.1. Countries' samples

21 OECD countries: Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States.

72 Non-OECD countries: Algeria, Antigua and Barbuda, Argentina, Bahamas, Bahrain, Bangladesh, Barbados,

Belize, Bolivia, Botswana, Brazil, Bulgaria, Burundi, Chile, China, Colombia, Costa Rica, Cyprus, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Ghana, Grenada, Guatemala, Guyana, Honduras, Hungary, India, Iran, Israel, Jamaica, Jordan, Kenya, Kuwait, Lesotho, Malawi, Malaysia, Mauritania, Mauritius, Mexico, Morocco, Namibia, Nepal, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Rwanda, Seychelles, Sierra Leone, Slovak Republic, South Africa, Sri Lanka, St. Kitts and Nevis, St. Vincent and the Grenadines, Swaziland, Syrian Arab Republic, Thailand, Trinidad and Tobago, Tunisia, Uganda, Uruguay, Venezuela, Zambia and Zimbabwe.

8.2. Macroeconomic variables' definitions

MRER	: Effective Real Exchange Rate *on* monthly basis *(IFS)*
BRER	: Bilateral Real Exchange Rate *on* monthly basis *(CPI(local)/CPI(US))* National Currency per US Dollar on monthly basis (IFS)*
σ_{RER}	: Standard deviation of the Real Exchange Rate over a each year using monthly data.
Openness	: Total of trade (imports+exports) to GDP ratio *(MTS)*
Δ GPDpc	: Rate of Growth of real per capita GDP *(WEO)*
Δ Terms of trade	: Change in terms of trade - exports as a capacity to import *(WDI)*
Δ Capital account	: Change in the capital account to GDP ratio *(IFS)*
Δ M2	: Rate of growth of M2 *(IFS)*
Δ Government consumption	: Growth of government consumption *(IFS)*

8.3. Table Appendix

Table A-1. *De facto* exchange rate regime classification criteria

	σ_e	$\sigma_{\Delta e}$	σ_r
Inconclusive	Low	Low	Low
Flexible	High	High	Low
Dirty Floatation	High	High	High
Crawling Peg	High	Low	High
Fixed	Low	Low	High

Note: σ_e, $\sigma_{\Delta e}$ and σ_r are exchange type volatility, volatility of exchange type variations and reserves' volatility respectively. Based on criteria used by Levy Yeyati and Sturzenegger (2002)

Table A-2 . De jure exchange rate regime percentage per de facto categories

		De facto classification			
		Fixed	Inter.	Flexible	Inconclusive
De jure classification	Fixed	61	29	19	17
	Inter.	19	19	24	26
	Flexible	20	52	57	57
	Total	100	100	100	100

Note: Using the 2nd round classification of Levy Yeyati and Sturzenegger (2002). 93 countries. Tot. obs:1392

Table A-3. De facto exchange rate regime percentage per de jure categories

		De facto classification				
		Fixed	Inter.	Flexible	Inconclusive	Total
De jure classification	Fixed	61	20	17	2	100
	Inter.	34	25	37	4	100
	Flexible	18	32	45	5	100

Note: Using the 2nd round classification of Levy Yeyati and Sturzenegger (2002). 93 countries. Total obs:1392

Table A-4. Percentage of each category of the new clasification

		De facto classification				
		Fixed	Inter.	Flexible	Inconclusive	Total
De jure classification	Fixed	***22.8*** *30.6 - 2.1*	***7.5*** *9.9 - 1.3*	***6.3*** *7.8 - 2.4*	***0.6*** *0.6 - 0.5*	***37.2*** *48.9 - 6.3*
	Inter.	***14.4***	***19.0***	***26.6***	***2.8***	***62.8***
	Flexible	8.2 - 31	20.1 - 16	19.8 - 44.6	3.1 - 2.1	51.1 - 93.7
	Total	***37.2*** 38.8 - 33.1	***26.5*** 30 - 17.3	***32.9*** 27.6 - 47	***3.4*** 3.7 - 2.6	***100.0*** 100 - 100

Note: Each cell makes reference to the volatility of RER, respectively, of **all**-*non oecd-oecd* countries
Using the 2nd round classification of Levy Yeyati and Sturzenegger (2002). 93 countries. Total obs:1392

Table A-5. Mean σ_{RER} by the new exchange rate regime classification (MRER)

		De facto classification				
		Fixed	Inter.	Flexible	Inconclusive	Total
De jure classification	Fixed	**3.4** *3.5 - 0.9*	**24.3** *26.3 - 1.2*	**7** *8 - 2.7*	**5.4** *7.7 - 0.8*	**8.8** *9.3 - 1.7*
	Inter.	**3.1**	**18**	**3.8**	**3.1**	**7.2**
	Flexible	*5.7 - 1.8*	*23 - 1.9*	*4.6 - 2.9*	*4.6 - 1.1*	*11.5 - 2.3*
	Total	**3.3** *4.2 - 1.8*	**19.6** *24 - 1.9*	**4.2** *5.3 - 2.9*	**3.6** *5.5 - 1*	**7.6** *10.6 - 2.3*

Note: Each cell makes reference to the volatility of RER, respectively, of **all**-*non oecd-oecd* countries
Using the 2st round classification of Levy Yeyati and Sturzenegger (2002). 64 countries. Total obs: 796

Table A-5B. Mean σ_{RER} by the new exchange rate regime classification (BRER)

		De facto classification				
		Fixed	Inter.	Flexible	Inconclusive	Total
De jure classification	Fixed	**0.2** 0.2 - 0.8	**1.9** 2.0 - 0.2	**1.8** *2 - 0.2*	**22.7** *30 - 0.9*	**1.3** *1.3 - 0.4*
	Inter.	**16.1**	**10.7**	**22.4**	**10.7**	**16.8**
	Flexible	34.5 - 1.7	13.4 - 1.8	*38 - 2.8*	*13.4 - 0.2*	*26.3 - 2.2*
	Total	**6.6** 8.1 - 1.6	**8.3** 9.9 - 1.6	**18.7** 28.7 - 2.7	**12.8** 16.2 - 0.4	**11.4** 14.9 - 2.1

Note: Each cell makes reference to the volatility of RER, respectively, of **all**-*non oecd-oecd* countries
Using the 2st round classification of Levy Yeyati and Sturzenegger (2002). 84 countries. Total obs: 1173

Figure 2.Intra-annual RER volatility vs. intra-annual nominal ER variation using the new classification

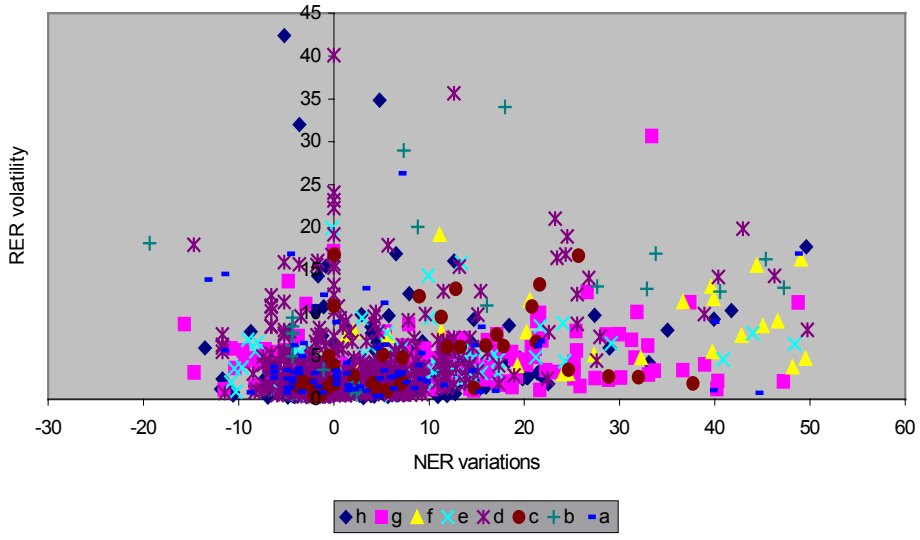

Table A-6 Econometric regressions using the *de jure* criteria for the period 1980-1999.

		All countries FE **MRER**	All countries GMM **MRER**	All countries GMM **BRER**
Model		**1**	**2**	**3**
Constant		25.976 **	0.219	0.094 ***
σ_{RER}	(t-1)	-0.019	-0.042 ***	0.656 ***
Fixed		*1.51*	*4.2* ***	*0.089* ***
Intermediate		*-3.982*	*2.181* ***	*0.287* ***
Openness	t	-0.103	-0.341 ***	0.009 ***
	t-1	-0.193	-0.457 ***	0.001 ***
∆ GPDpc	t	-0.289	-0.518 ***	-0.025 ***
	t-1	-0.701 *	-0.907 ***	-0.008 ***
∆ Terms of trade	t	-2.390 **	-3.023 ***	0.064 ***
	(t-1)	-1.045	-1.145 ***	0.028 ***
∆ Capital account	t	-0.015	0.695 ***	-0.004 ***
	(t-1)	0.145	0.199 ***	-0.013 ***
∆ M2	t	20.085 **	27.091 ***	0.718 ***
	(t-1)	-10.808	-3.295 ***	0.193 ***
∆ Government consumption	t	27.351 ***	27.418 ***	-0.164 ***
	(t-1)	-0.754	-2.456 ***	-0.416 ***
Sargan test (p value)			1	1
Second order serial correlation Test (p value)			0.763	0.692
Number of observations		809	738	1123
Number of countries		64	64	84

Note: *, ** and *** show that the null hypothesis is rejected at significant levels of 10%, 5% and 1% respectively.

Table A-7. Econometric regressions with the new classification criteria for the 1980-1999 period

		All countries GMM **MRER**	Non-OECD GMM **MRER**	All countries GMM **BRER**	Non-OECD GMM **BRER**
Model		**4**	**5**	**6**	**7**
Constant		0.163 **	-0.304	0,1 ***	0.092 ***
σ_{RER}	t-1	-0.044 ***	-0.037 ***	0.6582 ***	0.87 ***
FixedJ-FixedF (a)		*-2.637* **	*-12.84*	*0.078* ***	*0.013*
FixedJ-IntermF (b)		*6.298* **	*15.433* **	*1.07* ***	*0.993* ***
FixedJ-FlexibleF (c)		*6.757* ***	*18.557* ***	*0.964* ***	*0.942* ***
FixedJ-InconclusiveF (d)		*33.964*	*-1.411*	*-0.675* ***	*-0.878* ***
IntermJ-FixedF o FlexibleJ-FixedF (e)		*1.183* ***	*-1.355*	*-0.722* ***	*-0.773* ***
IntermJ-IntermF o FlexibleJ-IntermF (f)		*0.827* **	*-0.047*	*0.014* *	*0.08* ***
IntermJ-InconclF o FlexibleJ-InconcF (h)		*3.477* **	*7.339* *	*-0.8* ***	*-0.683* ***
Openness	t	-0.338 ***	-0.435 ***	0.011 ***	0.005 ***
	t-1	-0.467 ***	-0.421 ***	0.001	0.002 ***
Δ GPDpc	t	-0.520 ***	-0.556 ***	-0.028 ***	-0.023 ***
	t-1	-0.914 ***	-0.58 ***	-0.006 ***	-0.003 **
Δ Terms of trade	t	-3.105 ***	-2.454 ***	0.064 ***	0.067 ***
	(t-1)	-1.074 ***	-0.713 ***	0.026 ***	0.011 ***
Δ Capital account	t	0.075 ***	0.19 ***	-0.003 ***	0.002 **
	(t-1)	0.225 ***	0.266 ***	-0.009 ***	-0.006 ***
Δ M2	t	26.257 ***	25.138 ***	0.425 ***	0.619 ***
	(t-1)	-3.122 ***	-6.545 *	0.115 ***	0.209 ***
Δ Government consumption	t	27.17 ***	25.783 ***	-0.239 ***	-0.335 ***
	(t-1)	-1.886	-0.466	-0.278 ***	-0.198 **
Sargan test (p value)		1	1	1	1
Second order serial correl. Test (p value)		0.73	0.6	0.993	0.503
Number of observations		738	467	1123	835
Number of countries		64	45	84	67

Note: *, ** and *** show that the null hypothesis is rejected at significant levels of 10%, 5% and 1% respectively.