WP/01/46

IMF Working Paper

How Do Countries Choose Their Exchange Rate Regime?

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INTERNATIONAL MONETARY FUND

 WP/01/46

IMF Working Paper

Research Department

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Authorized for distribution by Eduardo Borensztein

April 2001

Abstract

This paper investigates the determinants of exchange rate regime choice in 93 countries during 1990-98. Cross-country analysis of variations in international reserves and nominal exchange rates shows that (i) truly fixed pegs and independent floats differ significantly from other regimes and (ii) significant discrepancies exist between *de jure* and *de facto* flexibility. Regression results highlight the influence of political factors (political instability and government temptation to inflate), adequacy of reserves, dollarization (currency substitution), exchange rate risk exposure, and some traditional optimal currency area criteria, in particular capital mobility, on exchange rate regime selection.

JEL Classification Numbers: F33, F41, O10

Keywords: exchange rates, developing countries, dollarization, optimal currency areas

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I. INTRODUCTION

Over the last decades, the number of countries switching to more flexible exchange rate regimes has increased continuously (Table A1). In the 1990s, several countries also switched to extreme forms of pegs such as currency unions –notably in Europe - and currency boards (Table A2). These trends have been well documented and analyzed, in Caramazza and Aziz (1998) for instance. Together with the Asian and Russian currency crises of 1997-98, they sparked a renewal of theoretical debate on the optimal exchange rate regime. Arguing that higher capital mobility makes it more difficult and potentially costly to defend standard pegs, some have concluded that the trend will continue, i.e. free floats and hard pegs will increasingly prevail as the only sustainable regimes in a world of high capital mobility.[2] Others such as Collins (1996) and Edwards (1996) have highlighted the role of political factors (political instability and government temptation to inflate) in influencing the choice of exchange rate regime. Finally, proponents of the "fear of floating" approach, including Calvo and Reinhardt (1999, 2000), Hausman, Panizza, and Stein (2000), and Levy Yeyati and Sturzenegger (1999), have argued that some countries which *de jure* have switched to floating exchange rates are *de facto* still pegging, due to a high exchange rate risk exposure (unhedged foreign currency liabilities). Baliño, Bennet, and Borensztein (1999) highlight dollarization (the widespread holding of foreign currency denominated assets) as another factor increasing incentives to fix the exchange rate. In the fear of floating view, the apparent trend toward increased flexibility is to a certain degree a fallacy.

Recent contributions have been mostly theoretical, and while both the fear of floating and political economy studies present some supportive empirical evidence, neither the effect of increased capital mobility nor the effect of dollarization (currency substitution) have been tested empirically. An early study by Holden, Holden, and Suss (1979) found that, if anything, higher capital mobility increases the likelihood of fixing the exchange rate, against the current view that it increases the incentives for choosing greater flexibility. Moreover, existing results are sensitive to omitted variables bias. The fear of floating studies do not control for political factors and conversely, the political economy studies do not control for exchange rate risk exposure and dollarization. Finally, although the fear of floating studies rightly stress the distinction between different types of floats (true floats vs. *de jure* floats), other empirical studies generally ignore this distinction, as well as the one between different types of pegs (e.g. they do not distinguish truly fixed pegs such as currency unions and currency boards from standard pegs). Failing to make these distinctions may lead to overlook relevant cross-country variation in exchange rate regime choice.

This paper seeks to address these shortcomings by (i) using better indicators of exchange regime choice and (ii) controlling for the largest possible number of potential explanatory variables. To avoid a potential omitted variables bias, both political economy and fear of floating variables are included, together with more traditional structural criteria of exchange

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[2] Masson (2000) finds however not much empirical support in favor of this "hollowing-out" or "two poles" hypothesis. See also Fischer (2001), and Frenkel (1999) for the view that intermediate regimes will remain in favor, because the solution to the trade-off that financially integrated countries face between monetary independence and exchange rate stability is likely to be an interior rather than a corner one.

regime choice. In order to capture more adequately the choice of exchange rate regime faced by countries, we use the revised IMF classification scheme which distinguishes truly fixed pegs from other pegs, and managed floats with a preannounced path from other managed and free float. The new classification also makes adjustments for countries which have a *de facto* peg (China, Maldives, Macedonia, El Salvador, and a number of Middle Eastern countries including Jordan, Egypt, Iran, and Lebanon), or keep the exchange rate within a target band (Croatia, Ukraine, Vietnam) under an announced managed or independently floating arrangement. Following the fear of floating approach, we also use an alternative flexibility index based on movements in exchange rates and international reserves. In addition to capturing potential discrepancies between *de facto* and *de jure* regimes beyond those already adjusted for in the new IMF classification, the index ranks countries on a continuous scale of exchange rate flexibility rather than lumping them in arbitrarily defined categories.[3] We construct it for 164 countries, using monthly data through December 1998. Analysis of its cross-country variations shows that *de facto* flexibility significantly differs from the rest in countries with either truly fixed pegs or free floats. This first result suggests that the distinctions made in theory between standard and truly fixed pegs, and between managed and free floats are significant empirically, and failing to acknowledge them leads to overlook a significant source of cross-country variation in exchange rate regime flexibility.

Regression results for 93 developing countries over 1990-98 show that countries' exchange regime decisions reflect primarily their size (GDP), vulnerability to external shocks, inflation, product diversification, capital mobility, level of reserves, political stability, and temptation to inflate faced by the government, i.e. both certain traditional optimal currency area criteria and the recently highlighted political factors. Our results also confirm the fear of floating view, showing that dollarization (currency substitution) and the degree of exchange rate risk exposure (measured by the ability to hedge) are significant factors explaining cross-country differences in exchange rate regime choice. Both increase the likelihood of fixing the exchange rate. In contrast, we find no significant role for traditional optimal currency area criteria such as trade openness, dominant trading partner, and economic development level. Based on these findings, the trend toward increased flexibility observed in recent years can be expected to continue, both *de jure* and *de facto*, as more countries become financially integrated, macroeconomically stable (lower temptation to inflate), and gain the ability to hedge their exchange rate risk exposure.

The rest of the paper is organized as follows. Section II summarizes theoretical considerations on the exchange rate regime choice, with an emphasis on recent theories. Section III briefly discusses measurement problems and the data set, before presenting the estimation results. Section IV concludes.

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[3] The index however does not differentiate exchange regimes where the exchange rate is very stable due to positive economic fundamentals and absence of exogenous shocks, even without intervention by the authorities in the foreign exchange markets, from those where the stability of the exchange rate is owed to excessive intervention by the authorities under a de facto peg regime. The index would take a value close to zero in each case. In this sense, the results obtained with this index are only tentative. We show them as complements rather than substitutes to those obtained using the (new) discrete IMF classification.

II. Theoretical Considerations

This section briefly reviews recent theories and empirical evidence.[4] Tables A3 and A4 in Appendix 1 summarize other traditional arguments on exchange rate regime choice. Recent theoretical contributions can be grouped under two broad headings, political economy and fear of floating approaches. The former emphasizes political factors such as political stability and the government's temptation to inflate as important criteria influencing the choice of exchange rate regime (e.g. Collins, 1996, Edwards, 1996). The latter focuses on the presence of currency mismatches in balance sheets to explain why some countries which are *de jure* floating their exchange rate are *de facto* pegging it to the currency in which their foreign currency liabilities and/or assets are denominated (e.g. Calvo and Reinhart, 2000, Hausman, Panizza, and Stein, 2000, Baliño, Bennet, and Borensztein, 1999, and Berg and Borensztein, 2000).

Political economy theories show that a country lacking political stability has an incentive *ceteris paribus* to let its exchange rate float as it lacks the political ability and political support for the unpopular measures that may be required to defend a peg. Also, under a floating regime, exchange rate adjustments are less highly visible to the public and consequently less politically costly than a devaluation under a peg (Collins, 1996). Finally, as argued in Edwards (1996), a government with an "ambitious" unemployment objective has a high temptation to inflate, and thus *ceteris paribus* a high incentive to "tie its own hands" by pegging the exchange rate.

According to the fear of floating approach, countries with high unhedged foreign currency denominated debt and a correspondingly high exchange rate risk exposure have an incentive to peg to the foreign currency in which they have borrowed even if they are officially floating (Calvo and Reinhart, 2000, Hausman, Panizza, and Stein, 2000). The inability to hedge in turn usually reflects the inability of these countries to borrow abroad in their own currency and the reluctance of nonresidents to take net long positions in their currencies.

On the asset side, the prevalence of currency substitution (the use of foreign currency denominated assets for transactions) also tends to strengthen the case for fixing the exchange rate. Such an arrangement protects the economy from the effects of potentially excessive exchange rate and money market volatility (Baliño, Bennet, and Borensztein, 1999 and Berg and Borensztein, 2000). First, when there is extensive currency substitution it is likely that monetary shocks will be relatively larger in magnitude, as unexpected shifts between domestic and foreign money may occur. This would support the desirability of fixing the exchange rate. Second, the volatility of a floating exchange rate will tend to be excessive in an economy with important currency substitution. This is because a higher interest elasticity of domestic money demand in a dollarized economy makes the exchange rate more sensitive to expected changes in the money supply (the interest elasticity is higher because in addition to the usual effect of interest rates on overall money demand, the domestic component of money will also be affected by changes in its opportunity cost relative to foreign money in a dollarized economy). However, this conclusion is not absolute because the source of shocks still matters, as in the general case. If monetary shocks dominate, fixed exchange rates

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[4] See Eichengreen and Masson (1998), Caramazza and Aziz (1998), Edwards and Savastano (1999), Frenkel (1999), Baliño, Bennet, and Borensztein (1999), Swoboda and Zettelmeyer (1999), and Mussa et al. (2000) for a more general survey of the literature.

provide more stability, but if shocks are mostly real or external, floating rates are more efficient in reducing volatility.

The analysis is somewhat different when dollarization takes the form of asset substitution (the use of foreign currency denominated assets as financial assets or store of value). Dollarization in this form implies a situation akin to high capital mobility, with low transaction costs to move from foreign currency to domestic-currency assets, and presumably higher sensitivity to interest rate differentials. The effect on the choice of exchange rate regime is ambiguous: on the one hand the high degree of capital mobility and substitutability can make sterilization more difficult and costly, suggesting a case for floating the exchange rate; on the other hand, if shocks mostly originate in the money markets, a fixed rate would be more efficient in stabilizing output.

At the empirical level, recent contributions are also divided in two distinct groups, closely associated with the two sets of theories mentionned above. Studies testing the new political economy theories' predictions include Méon and Rizzo (1999), Rizzo (1998), Collins (1996), and Edwards (1996) while fear of floating studies by Calvo and Reinhart (2000) and Hausman, Panizza, and Stein (1999) focus exclusively on the choices of floaters (countries which are officially in a free float or managed float). Both groups of studies find evidence in support of the underlying theories, i.e. political instability indicators (resp. exchange rate risk exposure indicators) influence the choice of exchange rate regime (in the case of fear of floating studies, the choice by floaters of an effective degree of flexibility). Concerning dollarization (currency and/or asset substitution), to our knowledge, there has been no empirical investigation to date of its effect on the choice of exchange rate regime. This reflects mainly the difficulty of compiling a comparable indicator of dollarization for a large sample of countries.

III. Empirical Results

A. Measurement Issues

Classification of exchange rate regimes

Measuring the degree of exchange rate regime flexibility is probably the main challenge confronting the empirical analysis of exchange rate regime choice. Two approaches have been used to date. The first and most widely used is based on the official IMF classification published in the International Financial Statistics and explained in more detail in the *Annual Report on Exchange Rate Arrangements and Restrictions.* [5] Its main drawback is that there is no adjustment for possible discrepancies between *de jure* and *de facto* policies, such as the *de facto* peg of East Asian currencies to the US dollar until the 1997 Asian crisis. A secondary drawback is that while distinguishing between managed and free floats, the official IMF classification lumps all the fixed exchange rate regimes in one category, making no distinction between standard and hard pegs such as currency unions or currency boards. Most empirical tests compound this last problem by

[5] E.g. Heller (1978), Melvin (1985), and Rizzo (1998).

distinguishing only two regimes (fixed vs. flexible).[6] The revised IMF classification, available since December 31st 1997 only, notably improves on the old classification by distinguishing hard pegs (currency unions, currency boards) from other pegs (International Monetary Fund, 1999). It also uses available information contained in IMF staff and country reports and other relevant sources, as well as exchange rate data, to identify the countries that declare managed or independent floats but in reality keep their exchange rate virtually fixed (e.g. the *de facto* peg of China to the US dollar). To our knowledge however, it has not been used to date in empirical work.

The second approach, pioneered by Holden, Holden, and Suss (1979) – thereafter HHS - attempts to characterize the *de facto* exchange rate regime, taking into account nominal exchange rate volatility and the degree of intervention in the foreign exchange market, as measured by variations in international reserves. While conceptually attractive, this approach faces serious challenges in practice. The most important is how to measure the degree of intervention. Using changes in reserves is not fully satisfactory, because the authorities do not necessarily intervene through direct purchases and sales of reserves. Even when they do, intervention through reserves can be undertaken along two or more dimensions, i.e. relative to several currencies. Also, it is difficult to distinguish exchange rate changes associated with intervention from those due to exogenous shocks (see footnote 3). Relatively few studies have consequently followed this approach although more have been doing so recently, especially in the fear of floating literature.[7]

Given the measurement difficulties discussed above, this study does not rely on one unique indicator of exchange rate regime flexibility, but uses alternatively four different flexibility indexes. The first three, *EXR, FLEX*, and *PEG,* are based on the revised IMF classification as of January 1st, 1999, while the fourth, *FLT*, is based on observed volatility of exchange rate and reserves during the 12 months to December 1998:

- Our benchmark index is *EXR*, which conventionally classifies exchange rate regimes in three categories, pegged, intermediate, and independently floating, according to the new IMF classification;
- *FLEX* is a more detailed classification in five categories, distinguishing truly fixed pegs (currency unions and currency boards) from other pegs and managed floats with no-preannounced path from other intermediate regimes;
- *PEG* further distinguishes within the pegs category currency unions from currency boards and single currency from basket pegs, and otherwise is similar to *FLEX.*

FLT is an alternative index, which unlike the three previous ones is a continuous variable, based on observed movements in reserves and exchange rates. Specifically, *FLT* is the ratio of exchange rate volatility to variations in reserves, both in absolute value, with changes in

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[6] One exception is Méon and Rizzo (1999), who use a four-regimes classification.

[7] See also Weymark (1997).

reserves normalized by the monetary base.[8] It captures the extent to which monetary authorities intervene in the foreign exchange market through direct sales and purchases of reserves. The *FLT* index, calculated for 164 countries for the 12 months to December 1998, ranges in value from 0 (currency unions and a number of *de jure* or *de facto* pegs) to more than 5 in Japan (Table 1). It also takes relatively high values for other independent floaters like the US, Thailand, South Africa, Australia, the UK, Indonesia, and Sudan, and for managed floaters without a preannounced path like the Kirgyz Republic, the Czech Republic, and Russia. The currency board countries in contrast have, as expected, very low scores (0 for Argentina, Djibouti, and Lithuania, 0.005 for Hong Kong, 0.019 for Estonia, and 0.072 for Bulgaria).

The *FLT* index confirms the existence of discrepancies between *de jure* and *de facto* exchange rate arrangements, beyond the adjustments already made in the revised IMF classification. Among the countries announcing an independent float or managed float regime, eight (Armenia, Mongolia, Mozambique, Nigeria, Sao Tome, and Suriname) are *de facto* pegging their exchange rate (to the US dollar). Several countries officially classified as independent floaters have relatively low scores on the *FLT* index (less than 0.25): Canada, The Gambia, Guatemala, Guyana, Sweden, Switzerland, Tanzania, Trinidad, Uganda, and Yemen. In contrast, some of the countries classified as having a peg, crawling peg, target zone, or crawling band regime have relatively high scores on the *FLT* index: in particular, Ukraine (target zone), Angola (crawling peg), Israel (basket peg with crawling band), Malaysia (peg), and Colombia (crawling band).

Despite the discrepancies discussed above, Table 3 shows that *FLT* broadly captures the increase in flexibility from hard pegs to free floats. Interestingly, the average values of *ME* and *MR* for each regime in Table 3 show that differences between regimes in the *FLT* index reflect mostly variations in exchange rate volatility rather than in the extent of intervention through reserves. The truly fixed pegs and the independent floats are the categories that differ most from the rest in terms of their average score on the *FLT* index. Single currency pegs and basket pegs also differ markedly in terms of their average *FLT* scores. These results imply that one ignores a significant part of the cross-country variation in exchange rate flexibility when failing to distinguish truly fixed from conventional pegs, independent from managed floats, and basket pegs from single currency pegs

Finally, unlike the discrete IMF indexes, the *FLT* index accounts for within group variation in exchange rate flexibility. As shown in Table 3, the standard deviation of *FLT* within each exchange regime group is quite high, suggesting that one overlooks an important part of the cross-country variation in exchange rate flexibility when using a discrete classification scheme.

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[8] Following Levy Yeyati and Sturzenegger (1999). See Appendix II for details on the construction of *FLT*.

Table 1. Country Scores on the *FLT* Index, 161 Countries, 1998

Country	*ME*	*MR*	*FLT*	Country	*ME*	*MR*	*FLT*
Afghanistan	0.000		0.000	Portugal	0.003		0.000
Antigua	0.000	0.050	0.000	Qatar	0.000		0.000
Argentina	0.000	0.054	0.000	St. Kitts	0.000	0.083	0.000
Austria	0.001		0.000	St. Lucia	0.000	0.032	0.000
Bahamas	0.000	0.049	0.000	St. Vin.	0.000	0.067	0.000
Bahrain	0.000	0.102	0.000	San Marino	0.002		0.000
Barbados	0.000	0.077	0.000	Saudi Arabia	0.000	0.038	0.000
Belgium	0.001		0.000	Senegal	0.000	0.078	0.000
Belize	0.000	0.061	0.000	Spain	0.001		0.000
Benin	0.000	0.105	0.000	Suriname	0.000	0.048	0.000
Bhutan	0.000	0.140	0.000	Swaziland	0.000	0.537	0.000
Brunei	0.000		0.000	Syria	0.000		0.000
Burkina Faso	0.000	0.058	0.000	Togo	0.000	0.073	0.000
Cameroon	0.000	0.002	0.000	UAE	0.000	0.031	0.000
CAF	0.000	0.058	0.000	Hong Kong	0.001	0.122	0.005
Chad	0.000	0.058	0.000	Sao Tome	0.002	0.174	0.013
China	0.000		0.000	Denmark	0.001	0.067	0.017
Comoros	0.000	0.078	0.000	Estonia	0.002	0.101	0.019
Congo	0.000	0.046	0.000	Lebanon	0.001	0.038	0.027
Cote d'Ivoire	0.000	0.073	0.000	Armenia	0.005	0.154	0.032
Djibouti	0.000	0.037	0.000	Kuwait	0.003	0.098	0.034
Dominica	0.000	0.044	0.000	Slovenia	0.006	0.176	0.035
Egypt	0.000	0.005	0.000	Solomon Island	0.006	0.163	0.039
El Salvador	0.000	0.072	0.000	Botswana	0.028	0.550	0.051
Equ. Guinea	0.000	0.167	0.000	Azerbaijan	0.002	0.036	0.051
Finland	0.002		0.000	Bolivia	0.004	0.065	0.065
France	0.003		0.000	Mongolia	0.009	0.123	0.071
Gabon	0.000	0.171	0.000	Honduras	0.005	0.063	0.072
Germany	0.003		0.000	Bulgaria	0.007	0.091	0.072
Grenada	0.000	0.042	0.000	Brazil	0.007	0.084	0.079
Guinea-Bissau	0.000	0.104	0.000	Macedonia	0.005	0.062	0.082
Iraq	0.000		0.000	Mozambique	0.007	0.082	0.088
Jordan	0.000	0.021	0.000	Vanuatu	0.012	0.139	0.089
Lesotho	0.000	0.289	0.000	Libya	0.001	0.016	0.093
Lithuania	0.000	0.092	0.000	Tunisia	0.006	0.069	0.093
Luxembourg	0.001		0.000	The Gambia	0.006	0.062	0.100
Maldives	0.000	0.021	0.000	Trinidad	0.004	0.041	0.102
Mali	0.000	0.039	0.000	Kazakhstan	0.009	0.081	0.107
Micronesia	0.000		0.000	Norway	0.012	0.112	0.110
Myanmar	0.000	0.000	0.000	Western Samoa	0.012	0.107	0.116
Namibia	0.000	0.429	0.000	Venezuela	0.014	0.116	0.121
Netherlands	0.001		0.000	Singapore	0.027	0.222	0.122
Niger	0.000	0.162	0.000	Tonga	0.018	0.143	0.126
Nigeria	0.000	0.028	0.000	Bangladesh	0.005	0.037	0.148
Oman	0.000	0.094	0.000	Nicaragua	0.009	0.064	0.148
Panama	0.000		0.000	Sweden	0.015	0.095	0.153

Note: Continued on the next page. Source: Author's calculations.

Table 1 (concluded). Country Scores on the *FLT* Index, 161 Countries, 1998

Country	*ME*	*MR*	*FLT*	Country	*ME*	*MR*	*FLT*
Pakistan	0.004	0.024	0.155	Peru	0.012	0.025	0.484
Rwanda	0.009	0.060	0.157	Paraguay	0.019	0.037	0.502
Ethiopia	0.009	0.054	0.158	Mauritius	0.029	0.057	0.512
Latvia	0.005	0.032	0.167	Romania	0.034	0.066	0.518
Guatemala	0.010	0.056	0.183	Cambodia	0.026	0.049	0.532
Costa Rica	0.009	0.045	0.196	Albania	0.019	0.035	0.534
Tanzania	0.009	0.042	0.204	Madagascar	0.018	0.033	0.548
Croatia	0.008	0.038	0.208	Malawi	0.072	0.119	0.604
Uruguay	0.008	0.037	0.210	Poland	0.023	0.037	0.620
Nepal	0.005	0.025	0.212	Kenya	0.019	0.029	0.646
Switzerland	0.010	0.046	0.221	Morocco	0.009	0.014	0.655
Canada	0.016	0.069	0.226	Philippines	0.045	0.063	0.714
Yemen	0.008	0.036	0.226	India	0.010	0.013	0.750
Algeria	0.011	0.051	0.227	Moldova	0.084	0.110	0.757
Guyana	0.018	0.074	0.237	Chile	0.011	0.014	0.765
Uganda	0.018	0.072	0.247	Cape Verde	0.013	0.016	0.770
Sri Lanka	0.008	0.033	0.252	Dominic Rep	0.014	0.018	0.777
New Zealand	0.032	0.118	0.269	Laos	0.090	0.115	0.784
Greece	0.020	0.074	0.273	Thailand	0.066	0.079	0.842
PNG	0.042	0.148	0.282	Kyrgyz Rep	0.055	0.064	0.855
Seychelles	0.010	0.036	0.289	South Africa	0.037	0.042	0.875
Iceland	0.016	0.054	0.305	Ukraine	0.058	0.065	0.884
Georgia	0.028	0.093	0.305	Angola	0.089	0.097	0.923
Cyprus	0.016	0.049	0.331	Australia	0.028	0.029	0.974
Turkey	0.042	0.121	0.349	Czech Rep.	0.029	0.029	0.999
Korea	0.067	0.185	0.365	U.K.	0.014	0.014	1.027
Burundi	0.026	0.068	0.374	Israel	0.022	0.021	1.030
Sierra Leone	0.033	0.087	0.374	Malaysia	0.053	0.044	1.210
Malta	0.010	0.026	0.383	Colombia	0.025	0.020	1.249
Zambia	0.042	0.106	0.390	Indonesia	0.258	0.134	1.919
Slovak Republic	0.016	0.041	0.391	Russia	0.135	0.061	2.229
Jamaica	0.004	0.009	0.400	Sudan	0.027	0.011	2.446
Ecuador	0.044	0.110	0.405	United States	0.014	0.003	4.940
Fiji	0.033	0.080	0.414	Japan	0.036	0.006	5.613
Mexico	0.026	0.056	0.470				

Source: Author's calculations.

Table 2. Classifying Exchange Regimes: Deeds vs. Words, 93 Countries

Country	*EXR*	*FLEX*	*PEG*	*FLT*	Country	*EXR*	*FLEX*	*PEG*	*FLT*
AUSTRIA	1	1	1	0.000	ICELAND	2	3	5	0.305
BELGIUM	1	1	1	0.000	CYPRUS	2	3	5	0.331
CAMEROON	1	1	1	0.000	TURKEY	2	3	5	0.349
CENTRAL AFRICAN REP.	1	1	1	0.000	ECUADOR	2	3	5	0.405
COTEDIVOIRE	1	1	1	0.000	CHILE	2	3	5	0.765
FINLAND	1	1	1	0.000	COLOMBIA	2	3	5	1.249
FRANCE	1	1	1	0.000	HUNGARY	2	3	5	
GABON	1	1	1	0.000	NIGERIA	2	4	6	0.000
ITALY	1	1	1	0.000	SLOVENIA	2	4	6	0.035
NETHERLANDS	1	1	1	0.000	NORWAY	2	4	6	0.110
PANAMA	1	1	1	0.000	SINGAPORE	2	4	6	0.122
PORTUGAL	1	1	1	0.000	PAKISTAN	2	4	6	0.155
SENEGAL	1	1	1	0.000	ETHIOPIA	2	4	6	0.158
SPAIN	1	1	1	0.000	ALGERIA	2	4	6	0.227
TOGO	1	1	1	0.000	JAMAICA	2	4	6	0.400
IRELAND	1	1	1		PARAGUAY	2	4	6	0.502
ARGENTINA	1	1	2	0.000	ROMANIA	2	4	6	0.518
ESTONIA	1	1	2	0.019	MALAWI	2	4	6	0.604
BULGARIA	1	1	2	0.072	KENYA	2	4	6	0.646
BAHRAIN	1	2	3	0.000	DOMINICAN REP.	2	4	6	0.777
BELIZE	1	2	3	0.000	CZECH REPUBLIC	2	4	6	0.999
BHUTAN	1	2	3	0.000	MOZAMBIQUE	3	5	7	0.088
CHINA,P.R.:MAINLAND	1	2	3	0.000	SWEDEN	3	5	7	0.153
EGYPT	1	2	3	0.000	GUATEMALA	3	5	7	0.183
EL SALVADOR	1	2	3	0.000	SWITZERLAND	3	5	7	0.221
JORDAN	1	2	3	0.000	CANADA	3	5	7	0.226
OMAN	1	2	3	0.000	YEMEN,REP. OF	3	5	7	0.226
SAUDI ARABIA	1	2	3	0.000	NEW ZEALAND	3	5	7	0.269
NEPAL	1	2	3	0.212	KOREA	3	5	7	0.365
MALAYSIA	1	2	3	1.210	ZAMBIA	3	5	7	0.390
KUWAIT	1	2	4	0.034	MEXICO	3	5	7	0.470
BANGLADESH	1	2	4	0.148	PERU	3	5	7	0.484
BURUNDI	1	2	4	0.374	MAURITIUS	3	5	7	0.512
POLAND	1	2	4	0.620	ALBANIA	3	5	7	0.534
MOROCCO	1	2	4	0.655	MADAGASCAR	3	5	7	0.548
ISRAEL	1	2	4	1.030	PHILIPPINES	3	5	7	0.714
DENMARK	2	3	5	0.017	INDIA	3	5	7	0.750
BOLIVIA	2	3	5	0.065	THAILAND	3	5	7	0.842
HONDURAS	2	3	5	0.072	SOUTH AFRICA	3	5	7	0.875
BRAZIL	2	3	5	0.079	AUSTRALIA	3	5	7	0.974
TUNISIA	2	3	5	0.093	U. K.	3	5	7	1.027
VENEZUELA	2	3	5	0.121	INDONESIA	3	5	7	1.919
NICARAGUA	2	3	5	0.148	UNITED STATES	3	5	7	4.940
COSTA RICA	2	3	5	0.196	JAPAN	3	5	7	5.613
URUGUAY	2	3	5	0.210	CONGO,DEM.REP.	3	5	7	
SRI LANKA	2	3	5	0.252	ZIMBABWE	3	5	7	
GREECE	2	3	5	0.273					

Note: As of January 1, 1999.

Table 3. Summary Statistics for *FLT* and its Components Tabulated by Revised IMF Classification, 89 Countries, 1998

EXR	*FLT*	*ME*	*MR*	Frequency
1: peg	0.125 (0.297)	0.005 (0.011)	0.063 (0.041)	35
2: intermediate	0.329 (0.303)	0.016 (0.015)	0.066 (0.048)	31
3: independent float	0.971 (1.420)	0.036 (0.051)	0.060 (0.045)	23
FLEX				
1: truly fixed peg	0.005 (0.017)	0.001 (0.002)	0.078 (0.045)	18
2: other peg	0.252 (0.393)	0.009 (0.015)	0.055 (0.038)	17
3: crawling peg, target zone, crawling band	0.290 (0.305)	0.015 (0.012)	0.064 (0.031)	17
4: managed float without preannounced path	0.375 (0.307)	0.019 (0.019)	0.070 (0.065)	14
5: independent float	0.971 (1.420)	0.036 (0.051)	0.060 (0.045)	23
PEG				
1: currency union	0.000 (0.000)	0.001 (0.001)	0.076 (0.054)	15
2: currency board	0.030 (0.037)	0.003 (0.003)	0.082 (0.025)	3
3: single currency or SDR peg	0.129 (0.364)	0.005 (0.016)	0.060 (0.042)	11
4: basket peg	0.477 (0.367)	0.015 (0.010)	0.046 (0.032)	6
5: crawling peg, target zone, crawling band	0.290 (0.305)	0.015 (0.012)	0.064 (0.031)	17
6: managed float without preannounced path	0.375 (0.307)	0.019 (0.019)	0.070 (0.065)	14
7: independent float	0.971 (1.420)	0.036 (0.051)	0.060 (0.045)	23
All countries	**0.414** **(0.829)**	**0.017** **(0.031)**	**0.064** **(0.045)**	**89**

Note: *MR* averages for the 1st categories of each indexes exclude 9 Euro-zone countries (no monetary base data).

Choice of regressors

Measurement problems here concern especially criteria highlighted in recent theories (political uncertainty, exposure to exchange rate risk, and dollarization) and some of the OCA criteria (capital and labor mobility and wage flexibility). For capital mobility, we use the index of openness to international capital flows constructed by Gastanaga, Nugent, and Pashamova (1998) for 49 developing countries, based on the IMF publication, *Annual Report on Exchange Rate Arrangements and Restrictions*. The index is constructed by assigning a rating of 0 if restrictions are high, 1 if they are moderate, and 2 if they are low or non-existent, for each of five controls on different types of capital account transactions: FDI outflows, portfolio inflows and outflows, and the right of ownership of a bank account by non-residents. The overall index is the sum of the five ratings and therefore ranges from 0 (highly restricted) to 10 (highly open). Our sample overlaps with the Gastanaga, Nugent, and Pashamova sample for 46 countries. Labor mobility and wage flexibility indicators are unfortunately not available on a cross-country comparable basis and thus are not controlled for.

Political variables

Existing studies (Méon and Rizzo, 1999, Edwards, 1996) use standard political instability indicators (frequency of government changes and/or frequency of transfers of power to an opposition party). Another indicator used is a dummy variable for dictatorships versus democracies (or single party vs. coalition governments in Edwards, 1996), to proxy for government strength (i.e. its ability to implement unpopular measures): the underlying assumption is that governments are stronger under a dictatorial (or single party) system than under a democratic (or multi-party) system because they are less politically accountable under the former system.[9] We considered initially three different indicators : a democracy rating by *Freedom House*, averaged over 1990-95, the number of government changes and the number of revolutions (irregular transfers of power), both averaged over 1990-93.[10] The frequency of government changes is however a questionable proxy for political instability, as government changes are not necessarily a sign of political instability. They can result from the normal functioning of the political process. The frequency of revolutions or irregular transfers of power is thus our preferred indicator of political conditions (indeed, it is the only measure of political conditions to enter significantly in the exchange rate regime choice regressions estimated).

To measure the government temptation to inflate, we follow Edwards (1996) and Collins (1996) and use a dummy variable for past negative GDP growth. Alternatively, we use the past average unemployment rate. Both measures are averages over 1990-96. Arguably, the lower past growth (or the higher past unemployment), the higher the temptation to inflate facing the government and the higher its incentive to « tie its own hands ». The use of past

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[9] To what degree this assumption is valid in practice remains of course open to question.

[10] See Appendix I for sources.

averages here mitigates to a certain extent potential simultaneity problems stemming from the reverse causality from exchange rate regime to growth. But in countries where the exchange rate regime has been in place since the beginning of the 1990s, the simultaneity problem is still present, even with past averages.

Dollarization

Previous empirical studies on dollarization are based on the ratio of foreign currency deposits (FCDs) to broad money (see Baliño, Bennet, and Borensztein, 1999), although it likely underestimates the extent of dollarization by not accounting for cash holdings of foreign currency and foreign currency deposits abroad. It is used mainly because reliable information is available only for FCDs. Here we use data on foreign currency deposits in 1995 or the nearest year, whenever available, from IMF *International Financial Statistics* and various national sources, for 78 countries in our sample.

Exchange rate risk exposure

For a sample of 30 emerging market and industrial economies, Hausman, Panizza, and Stein (2000) proxy for the degree of exchange rate risk exposure using two different measures of the ratio of foreign borrowing in own currency relative to total foreign borrowing (*ABILITY1* and *ABILITY2* from an unpublished BIS database). They argue that a country's ability to borrow abroad in its own currency can be used as a proxy for its ability to hedge its exchange rate risk exposure. Alternatively, they use the ratio of total foreign securities issued in the country's currency to total foreign securities issued (*ABILITY3*). The rationale here is that if non-residents are able to borrow in the country's currency, they may then be able to swap their obligations in the country's currency for foreign currency obligations of a resident, thus providing the basis for a hedge. Our sample overlaps with theirs for 29 countries. We use their indicators for 1998-99 (Table 3, p. 14 in Hausman, Panizza, and Stein, 2000). Unfortunately, the sample covers only countries with floating regimes (12 managed floaters and 17 free floaters).

B. Model and Estimation Results

The base specification is estimated with data for 93 countries (89 when *FLT* is the dependent variable). While the dependent variable is the exchange rate regime as of January 1st, 1999 (or during the 12 months to December 1998 when *FLT* is the dependent variable), the explanatory variables are all averaged over the previous period (1990-96 or earlier, depending on data availability). [11] This should mitigate simultaneity problems which would arise from using contemporaneous values of the explanatory variables.

The base specification includes explanatory variables which are available for the 93 countries in the sample: economic size (GDP, PPP), development level (GDP per capita, PPP), inflation, reserves, production and exports diversification, trade openness, vulnerability to

[11] See Appendix I for sources and definitions.

external shocks, and political instability. The other explanatory variables that we consider subsequently are available only for a reduced sample: index of capital controls, geographical concentration of trade (export share with the major trade partner), dollarization, ability to hedge, dummy for past negative growth rate, and past unemployment rate.

Table A5 gives summary statistics for the various variables. In line with the results from Table 3 (discussed in the previous section), the sample of countries is classified into three subgroups: truly fixed pegs, other pegs and managed floats, and independent floats. The data indicate that on average, in contrast to independent floats, truly fixed pegs have smaller economic size, lower inflation, external vulnerability, political instability,[12] and capital mobility (more capital controls). They also have higher trade openness, temptation to inflate (measured both by past growth performance and past unemployment), and dollarization. Interestingly, both truly fixed pegs and independent floaters have lower reserves, higher geographical trade diversification, and higher economic development level. Countries with intermediate regimes have intermediate inflation, trade openness, external vulnerability, political instability, temptation to inflate, capital mobility, and dollarization. They also have a lower ability to hedge their foreign borrowing compared to free floaters. Finally, on average the intermediate countries (and not the truly fixed pegs) have the highest level of reserves and geographical concentration of trade, and the lowest production diversification, economic size, and economic development level.

Table A6 gives the pairwise matrix of correlation coefficients. The four indexes of exchange rate flexibility are all positively and significantly correlated with each other. Correlations among the three IMF indexes are very high while their respective correlations with the *FLT* index, although positive and significant as expected, are much lower.[13] This reflects mainly the fact that although the exchange rate volatility (*ME*), or first component of the *FLT* index, is significantly and positively correlated with the three IMF flexibility indexes, the change in reserves (*MR*), or second component of the *FLT* index, is not significantly correlated with any of the three IMF indexes.

Most explanatory variables are correlated with the same sign with all four exchange rate flexibility indexes, but the correlations are significant only in some cases. **Economic size** and **capital mobility** are strongly, significantly, and positively correlated with the *FLT* index (0.43 and 0.31 respectively). They are also positively correlated with the three IMF indexes, but the correlations are not significant in the case of capital mobility and are significant only for *EXR* and *FLEX* in the case of economic size. Similarly, **production diversification** is positively correlated with all four indexes, but significantly so only with the *FLT* index. **Trade openness** is negatively correlated with all exchange rate flexibility indexes, but significantly so only with *EXR* and *FLT*. Finally, the indicators of **ability to hedge** are

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[12] As measured by *REV*. If *GOVC* is used, the truly fixed pegs appear more politically unstable (more frequent changes of government) than average. However, as discussed above, the *GOVC* measure is questionable and *REV* is our preferred measure of political conditions.

[13] This reflects the differences between the *FLT* and IMF indexes for some countries shown in Table 2.

positively correlated with all four exchange rate flexibility indexes (and very highly positively correlated between themselves as expected). The correlations are all significant, except those between *ABILITY2* and the IMF indexes. They are stronger (0.59 to 0.79) with the *FLT* index than with the IMF indexes (0.32 to 0.36).

Interestingly, for some of the explanatory variables, the pairwise correlations change signs between the IMF indexes and the *FLT* index. **Inflation** and **political instability** are significantly and positively correlated with the three IMF indexes, with correlation coefficients ranging from 0.19 to 0.28, but the pairwise correlations of these two variables with the *FLT* index are weak, negative, and not significant (-0.10 in the case of inflation and –0.02 in the case of political instability). Similarly, the correlations of the IMF indexes with the **economic development level** are weak, negative, and not significant, while this variable is positively and significantly correlated with *FLT* (0.19).

The pairwise correlations between the explanatory variables indicate some potential for multicollinearity: **capital mobility** and **ability to hedge the exchange rate risk** are both significantly and positively correlated with the **economic development level** (0.44 to 0.57) ; the indicators of **ability to hedge** are also significantly and positively correlated with **economic size** (0.46 to 0.65) and **sectoral diversification** (0.33 to 0.40), and negatively and significantly correlated with **inflation** (-0.37). **Capital mobility** is significantly and positively correlated with **trade openness** (0.49). Finally, there are significant positive correlations between **economic size**, **production diversification**, and **economic development level**, and all three variables are significantly negatively correlated with **vulnerability to external shocks**.

For *EXR*, *FLEX*, and *PEG* (which are discrete qualitative and ordered dependent variables) ordered probit regressions are estimated and ordinary least squares regressions in the case of *FLT*. Standard errors are computed with the White formula and thus robust to heteroskedasticity. The regression estimates of the base specification, both with and without PPP GDP per capita (including it causes multicolinearity problems when PPP GDP is also included), are summarized in Table 4. Table 5 reports the results of regressions adding other explanatory variables to the base specification one at a time (excluding PPP per capita GDP due to multicolinearity problems). Finally Table 6 reports the results of adding the indicators of ability to hedge to the regressions for the *FLT* index (the probit models could not be estimated in this case due to the insufficient number of observations). In the case of ordered probit regressions, a positive coefficient indicates that the variable increases the likelihood of adopting a more flexible exchange rate regime. Two measures of adjustment quality are

Table 4. Determinants of Exchange Rate Flexibility, 93 countries, 1990-98

Dep. Variable	*EXR*	*FLEX*	*PEG*	*FLT*
INF	**0.139** (0.078)	0.100 (0.211)	**0.134** (0.064)	-0.054 (0.350)
RESIMP	**-0.141** (0.017)	**-0.089** (0.094)	-0.086 (0.108)	-0.039 (0.191)
SECTDIV	**0.851** (0.048)	**0.805** (0.054)	**0.788** (0.051)	0.202 (0.400)
OPEN	-0.229 (0.493)	-0.116 (0.683)	-0.094 (0.734)	-0.178 (0.256)
TTGVAR	1.729 (0.169)	**2.282** (0.022)	**2.342** (0.009)	0.728 (0.124)
REV	**0.200** (0.006)	**0.187** (0.014)	**0.179** (0.016)	-0.004 (0.865)
GDP	0.153 (0.103)	0.104 (0.164)	0.109 (0.144)	**0.179** (0.030)
Const[a]				**-3.813** (0.035)
Obs.	93	93	93	89
P-value[b]	0.0001	0.0002	0.0001	0.1189
Pseudo R2[c]	0.113	0.059	0.057	0.210

Notes : P-value (significance level) in parentheses.
[a]Coefficient not reported for ordered probit regressions.
[b]For Wald test of joint significance of all variables.
[c]R2 in the case of *FLT*.

Table 4 (Concluded). Determinants of Exchange Rate Flexibility, 93 countries, 1990-98

Dep. Variable	*EXR*	*FLEX*	*PEG*	*FLT*	*EXR*	*FLEX*	*PEG*	*FLT*
INF	**0.153** (0.058)	0.092 (0.248)	**0.128** (0.074)	-0.054 (0.332)	**0.150** (0.066)	0.091 (0.257)	**0.127** (0.079)	-0.064 (0.262)
RESIMP	**-0.148** (0.015)	**-0.087** (0.101)	-0.085 (0.115)	-0.039 (0.212)	**-0.141** (0.017)	-0.085 (0.101)	-0.083 (0.118)	-0.039 (0.188)
SECTDIV	**0.807** (0.065)	**0.824** (0.045)	**0.802** (0.043)	0.203 (0.388)	**0.993** (0.015)	**1.001** (0.012)	**0.979** (0.012)	**0.502** (0.071)
OPEN	-0.290 (0.434)	-0.079 (0.799)	-0.062 (0.832)	-0.177 (0.322)	-0.480 (0.209)	-0.263 (0.404)	-0.253 (0.416)	-0.475 (0.116)
TTGVAR	1.821 (0.154)	**2.245** (0.022)	**2.311** (0.009)	0.727 (0.131)	1.680 (0.184)	**2.131** (0.029)	**2.197** (0.013)	0.585 (0.186)
REV	**0.222** (0.004)	**0.175** (0.027)	**0.169** (0.031)	-0.005 (0.861)	**0.245** (0.001)	**0.199** (0.011)	**0.194** (0.013)	**0.033** (0.049)
GDP	0.126 (0.213)	0.121 (0.133)	0.122 (0.134)	**0.179** (0.029)				
PCGDP	0.105 (0.500)	-0.061 (0.632)	-0.048 (0.707)	-0.001 (0.989)	0.193 (0.168)	0.034 (0.768)	0.048 (0.694)	0.143 (0.136)
Const[a]				**-3.812** (0.037)				-0.545 (0.341)
Obs.	93	93	93	89	93	93	93	89
P-value[b]	0.0001	0.0003	0.0002	0.1797	0.0002	0.0008	0.0006	0.2491
Pseudo R2[c]	0.115	0.060	0.057	0.210	0.107	0.053	0.052	0.133

Notes : P-value (significance level) in parentheses.
[a]Coefficient not reported for ordered probit regressions.
[b]For Wald test of joint significance of all variables.
[c]R2 in the case of *FLT*.

Table 5. Other Determinants of Exchange Rate Flexibility, 1990-98

Explanatory Variable	*EXR*	*FLEX*	*PEG*	*FLT*	Obs.[a]	P-value[b]	Pseudo R2[c]
GEOGCONC	0.448 (0.594)	0.599 (0.450)	0.538 (0.505)	0.317 (0.530)	91, 91 91, 87	0.0002, 0.0005 0.0004, 0.1965	0.112, 0.061 0.058, 0.223
FCDM2	-0.765 (0.240)	**-1.085** (0.089)	**-1.126** (0.076)	-0.318 (0.133)	78, 78 78, 75	0.0000, 0.0000 0.0000, 0.1035	0.169, 0.099 0.093, 0.210
CONTROLS	0.094 (0.200)	0.113 (0.105)	**0.122** (0.081)	**0.061** (0.031)	46, 46 46, 45	0.0000, 0.0001 0.0001, 0.0485	0.195, 0.143 0.139, 0.400
GDPGN	**-0.561** (0.100)	**-0.688** (0.056)	**-0.546** (0.068)	0.126 (0.365)	92, 92 88, 88	0.0002, 0.0006 0.0005, 0.2052	0.125, 0.069 0.063, 0.213
UNEMPL	**-8.477** (0.011)	**-7.205** (0.036)	**-7.397** (0.025)	-3.514 (0.161)	61, 61 61, 59	0.0183, 0.0749 0.0328, 0.5970	0.115, 0.073 0.061, 0.247

Notes : P-value (significance level) in parentheses.
[a]For each of the four regressions.
[b]Wald test of joint significance of all variables, for each of the four regressions.
[c]R2 in the case of *FLT*, for each of the four regressions.

Table 6. Exchange Rate Risk Exposure and the De Facto Exchange Rate Regime
1990-98, 29 Countries

	FLT	*FLT*	*FLT*
INF	-0.069 (0.505)	-0.009 (0.947)	-0.079 (0.592)
RESIMP	-0.016 (0.856)	-0.051 (0.610)	-0.110 (0.392)
SECTDIV	-0.665 (0.489)	-1.380 (0.228)	-1.051 (0.366)
OPEN	0.042 (0.833)	0.173 (0.434)	0.189 (0.458)
TTGVAR	5.701 (0.133)	1.838 (0.642)	5.754 (0.229)
REV	-0.063 (0.491)	0.018 (0.735)	-0.050 (0.493)
GDP	0.167 (0.219)	**0.258** (0.096)	**0.430** (0.035)
ABILITY1	**4.889** (0.002)		
ABILITY2		**5.012** (0.000)	
ABILITY3			**0.816** (0.090)
Const	-3.364 (0.271)	-5.388 (0.150)	**-9.521** (0.052)
P-value[a]	0.0140	0.0003	0.2212
R2	0.678	0.638	0.535

Notes: P-value (significance level) in parentheses.
[a]For Wald test of joint significance of all variables.

reported: the R2 (pseudo R2 in the case of probit models) and a Wald test of joint ignificance of the explanatory variables.[14] The main results of the regressions are as follows:[15]

- Both **economic size** and **capital mobility** matter for the choice of exchange rate regime: larger and more financially integrated economies tend to select more flexible exchange rates. The coefficients are always positive for all indexes and statistically significant for the *PEG* index (in the case of capital mobility) and for *FLT* in both cases. These results confirm the findings of HHS and others (for economic size) and the view that financial integration increases the incentives for selecting a more flexible regime.
- Higher **inflation** (in log so as to avoid the results being dominated by extreme values of inflation), **political instability, diversification of production, external vulnerability,** and **dollarization,** lower **reserves,** and lower government **temptation to inflate** all have a positive and significant effect on exchange rate regime flexibility as indicated by the IMF indexes, in line with the predictions of political economy and OCA theories. However, except for production diversification, the effect of these variables on *de facto* flexibility as measured by *FLT* is not statistically significant and the coefficient even changes sign in the case of inflation and political instability. This last result can be traced back to the unconditional correlations between these variables and *FLT*, which are not statistically significant (Table A4). In the case of production diversification, the effect on *FLT* is significant only if GDP is not included, signaling a potential multicollinearity problem.
- A lower **ability to hedge the exchange rate risk** tends to decrease *de facto* flexibility, confirming the fear of floating view. The effect is statistically significant for each of the three indicators used.
- Finally, three traditional OCA criteria do not appear relevant to the choice of exchange rate regime: the **economic development level,** the **geographic**

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[14] The pseudo R2 is computed as 1-L1/L0 where L1 is the likelihood of the estimated model and L0 the likelihood of the model in zero (Domencich and McFadden, 1975). It is equal to one when the model is a perfect predictor and to zero when the explanatory variables have absolutely no explanatory power. Unfortunately, intermediate values do not have an intuitive interpretation.

[15] The results presented in Table 4 might be subject to simultaneity bias owing to the endogeneity of certain explanatory variables, namely reserves as a ratio to imports (*RESIMP*), dummy for past negative GDP growth (*GDPGN*), and past unemployment rates (*UNEMPL*). This problem is only partly mitigated by the use of past averages (when the exchange rate regime has been in place prior to the 1990s, the use of period averages over the 1990s as we do here does not correct the simultaneity problem). In the case of *RESIMP*, we tried interacting it with a dummy variable for countries which have switched regimes during the 1990s, in order to give a weight in the estimation only to those observations which are effectively predetermined. The results, which are not presented here, show that the signs and magnitude of the coefficients are generally maintained and even improved (the coefficient in the *PEG* regression becomes significant).

concentration of trade, and **trade openness**. When the **economic development level** is included as an explanatory variable (Table 4), its coefficient is positive but not statistically significant and the *GDP* variable becomes insignificant in the *EXR* regression,[16] suggesting multicollinearity between the two variables (the pairwise correlation in Table A6 between the two variables is indeed high and significant). The coefficient of *PCGDP* is negative and insignificant in all the other regressions (this result is contrary to the prediction of traditional OCA theory). Even when excluding *GDP* (Table 5), the coefficient still remains statistically insignificant, suggesting that the result does not reflect only a multicollinearity problem (although it does become positive then, in line with OCA theory predictions). The finding in the case of **geographic trade concentration** contradicts the traditional OCA prediction: the coefficient of *GEOGCONC* is positive (although not statistically significant).[17] In the case of **trade openness**, the result conforms with traditional OCA theory predictions (the coefficient is negative in all four regressions), but the effect found is not statistically significant.[18]

As a general remark, it can be noted that the joint significance level of the explanatory variables considered is high in all the IMF indexes regresssions (cf. P-values in Tables 4 and 5), but rather low (often not statistically significant at conventional levels) in the *FLT* regressions. The exceptions are the *FLT* regressions where capital mobility and exchange rate risk exposure (measured by *ABILITY1* and *ABILITY2*) are included (Tables 5 and 6). Then, the P-values indicate joint significance at the 5 percent level at least. This is consistent with the results summarized above, showing that only economic size, capital mobility, and ability to hedge appear to have a significant influence on cross-country variation in scores on the *FLT* index.

IV. Conclusion

This paper investigated empirically the determinants of exchange rate regime choice in a cross-section of 93 countries, during 1990-98. The explanatory variables considered included two sets of criteria highlighted in recent theoretical analyses: political factors and degree of exchange rate risk exposure and dollarization. The four different exchange rate regime indicators used alternatively as dependent variables included a *FLT* index of *de facto* flexibility based on nominal exchange rate and reserves changes. On average, countries with hard pegs and with independent floats scored respectively much lower and much higher on the *FLT* index than the rest, and countries with basket pegs scored considerably higher than countries with single currency pegs. This first result highlights the importance of going beyond the binary view (fixing vs. floating), when analyzing the choice of exchange rate regime, i.e. using an exchange rate regime index that

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[16] It remains significant in the *FLEX* regression.

[17] Méon and Rizzo (1999) find a similar result.

[18] Other recent studies find on the contrary that trade openness increases the likelihood of a more flexible regime. Cf. Melvin (1985), Savvides (1990), Rizzo (1998), and Méon and Rizzo (1999).

distinguishes truly fixed from standard pegs, single currency from basket pegs, and free from managed floats.

Regression results using such disaggregated indexes of flexibility confirm the relevance of recently highlighted criteria such as political uncertainty, government temptation to inflate, dollarization, and exposure to exchange rate risk in influencing countries' exchange rate regime decisions. Among the more traditional criteria, we find that economic size, inflation, capital mobility, production diversification, adequacy of reserves, and external vulnerability weigh significantly on exchange rate regime decisions, unlike the criteria of trade openness, dominant trading partner, and economic development level which do not appear to have a significant influence.

For economic size, inflation, capital mobility, production diversification, and external vulnerability, results found are consistent with OCA theory: all tend to increase flexibility. The result for capital mobility confirms the current view that increased financial integration promotes more flexible exchange rate regimes. The result that a high degree of dollarization increases the likelihood of fixing the exchange rate is consistent with the predicted theoretical effect of currency substitution on the choice of exchange rate regime. We also find that a high exchange rate risk exposure measured by a low ability to hedge tends to decrease flexibility, confirming the fear of floating view. Finally, both political uncertainty and low reserves tend to increase the likelihood of a more flexible regime, while a high government temptation to inflate has the opposite effect, in line with the predictions of political economy theories.

The results using the *FLT* index, albeit tentative as this index is only an imperfect proxy of *de facto* flexibility, show significant discrepancies between the *de jure* and *de facto* exchange rate regime in some countries, beyond the adjustments already made in the revised IMF classification. The corresponding differences between estimation results using *FLT* and those using the IMF indexes highlight the importance of more accurate indicators of exchange rate regime flexibility in further empirical research.

Variables, Definitions, Data Sources

Variable	Definition	Source
AREAR	1 (peg US$), 2 (peg FF), 3 (peg other currency), 4 (peg SDR), 5 (peg basket), 6 (limited flexibility single currency), 7 (cooperative arrangement), 8 (set to indicators), 9 (other managed float), 10 (independent float)	Based on old IMF classification.
EXR	1 (peg), 2 (intermediate), 3 (independent float)	Based on IMF revised classification, as of January 1st, 1999
FLEX	1 (currency union or currency board), 2 (other pegs), 3 (crawling peg, target zone or band, crawling band), 4 (managed float without preannounced path), 5 (independent float)	Based on IMF revised classification, as of January 1st, 1999
PEG	1 (currency union), 2 (currency board), 3 (single currency or SDR peg), 4 (basket peg), 5 (crawling peg, target zone or band, crawling band), 6 (managed float without preannounced path), 7 (independent float)	Based on IMF revised classification, as of January 1st, 1999
FLT	Exchange rate flexibility index, 0 (perfect peg)	Authors' calculations
E	Monthly nominal exchange rate, 1998	IFS
R	Monthly international reserves minus gold, 1998	IFS
H	Monthly monetary base, 1998	IFS
GDP	GDP at market prices, PPP (current international $), 1990-96	WB_WDI
OPEN	Ratio of exports plus imports to GDP, 1990-96	WB_WDI
INF	Log of CPI inflation, 1990-94	IFS
PCGDP	Per capita GDP, PPP (current international $), 1990-96	WB_WDI
GEOGCONC	Share of major trade partner in total exports, 1990-96	UN/DOTS
SECTDIV	Share of manufacturing in value added, 1990-96	UN/DOTS
TTGVAR	Standard deviation of annual terms of trade growth, 1990-96	WEO
RESIMP	Gross international reserves in months of imports, 1990-94	WB_WDI
FCDM2	Ratio of foreign currency deposits to M2, nearest year to 1995	IFS and national sources.
ABILITY1	Ratio of international debt securities issued in own currency to total issued in all currencies, 1998-99	Hausman, Panizza, and Stein (2000)
ABILITY2	Ratio of bank debt in own currency to total bank debt in all currencies, 1998-99	Hausman, Panizza, and Stein (2000)
ABILITY3	Ratio of total foreign securities issued in the country's currency to total foreign securities issued by the country, 1998-99	Hausman, Panizza, and Stein (2000)
GDPGN	Dummy for negative GDP growth rate, 1990-96	WB_WDI
UNEMPL	Unemployment rate, 1990-96	WB_WDI
CONTROLS	Index of openness to international capital flows, 0 (high restrictions) to 10 (low or non-existent restrictions), 1990-95	Gastanaga, Nugent, and Pashamova (1998)
DEMOC	Index of democracy, 1-7, 1990-95	Freedom House
GOVC	Number of government changes, 1990-93	Arthur S. Banks Cross National Time Series Data Archive
REV	Number of revolutions, 1990-93	Arthur S. Banks Cross National Time Series Data Archive

Notes: IFS = IMF International Financial Statistics
WB_WDI = World Bank World Development Indicators
UN = United Nations
DOTS = Direction of Trade Statistics
INS = IMF Information Services
WEO = World Economic Outlook

Table A1. Evolution of Exchange Rate Regimes over Time

	Old IMF Classification			Revised IMF Classification 1/
	1975	1985	Jan. 1st, 1999	Jan. 1st, 1999
Single Currency and Basket Pegs	77	61	41	47
Crawling Pegs, Target Zones, Crawling Bands 2/	13	13	3	13
Managed Float without Pre-announced Path 3/	5	14	27	15
Independent Float	5	11	29	25
Countries	127	148	175	175

Notes: in percent of total of countries, end-year for 1975 and 1985. As of January 1, 1999, the 11 Euro-zone countries are included in the Single currency and basket pegs category.
1/ Available since December 31, 1997 only.
2/ For the old IMF classification, this category includes limited flexibility with respect to a single currency, cooperative arrangements, and exchange rate set to indicators.
3/ For the old IMF classification, this category includes other managed floats.

Table A2. Distribution of Exchange Rate Arrangements, as of January 1, 1999, 175 Countries (in percent)

<table>
<tr><th></th><th>AREAR</th><th>EXR</th><th>FLEX</th><th>PEG</th></tr>
<tr><td>Currency Unions</td><td rowspan="4">41</td><td rowspan="4">47</td><td rowspan="2">23</td><td>19</td></tr>
<tr><td>Currency Boards</td><td>4</td></tr>
<tr><td>Single Currency and SDR Pegs</td><td rowspan="2">24</td><td>16</td></tr>
<tr><td>Basket Pegs</td><td>8</td></tr>
<tr><td>Crawling Pegs, Target Zones, Crawling Bands</td><td rowspan="2">30</td><td rowspan="2">28</td><td>13</td><td>13</td></tr>
<tr><td>Managed Floats without Pre-announced Path</td><td>15</td><td>15</td></tr>
<tr><td>Independent Float</td><td>29</td><td>25</td><td>25</td><td>25</td></tr>
</table>

Notes: *AREAR* = classification index based on the old IMF classification, *EXR*, *FLEX*, and *PEG* based on the revised IMF classification. As of January 1st, 1999, the 11 Euro-zone countries are included in the Currency union category.

Table A3. Traditional Arguments in Favor of Fixing vs. Floating the Exchange Rate

	Fixed rate	Floating rate
Advantages	Limits the exchange risk for international transactions and foreign investments Decreases cost of access to international financial markets (lowers risk premium) Decreases domestic interest rates (reduces spread with the world market interest rate) Facilitates disinflation Impedes monetary financing of the fiscal deficit Neutralizes the impact of monetary shocks	Neutralizes the impact of external shocks Neutralizes the impact of real shocks Neutralizes the effect of inflation on export competitiveness
Disadvantages	Credibility is fragile. In case of crisis, adjustment may be too costly Dependence on the monetary policy of the peg country Strong sensitivity to external shocks and real domestic shocks Risk of real exchange rate appreciation and strong current account deterioration	Source of imported inflation Negative effect of strong volatility on trade and financial transactions In case of competitive devaluation, source of regional instability Can lead to postponement of required structural adjustments

Table A4. Theoretical Criteria of Exchange Rate Regime Choice

Variable	Effect on the likelihood of selecting a flexible exchange rate	
Trade openness	- (OCA)	+ if real shocks or external shocks dominate and no wage indexation
Inflation differential	+ (OCA)	
	+/- (PE)	+ if political cost of devaluation high and/or inflation is not the most pressing policy objective
Economic development level	+ (OCA)	
Capital mobility	+/- (OCA)	- if monetary shocks dominate and/or domestic resource reallocation costly
Dominant trading partner	- (OCA)	
Diversification of production and exports	+ (OCA)	
Size of the economy	+ (OCA)	
Labor mobility and nominal flexibility	- (OCA)	
High foreign currency denominated debt	- (FF)	
High dollarization (currency substitution)	- (FF)	
Lack of central bank credibility or high temptation to inflate	- (PE)	
Low reserves	+/- (PE)	+ if political cost of devaluing high

Notes: OCA: traditional optimal currency area theory. PE: political economy theories.
FF : fear of floating theories.

Index of Effective Exchange Rate Flexibility

Following the approach pioneered by HHS, and more recently advocated in the "fear of floating" literature and Weymark (1997), we measure the degree of *de facto* exchange rate flexibility of country *i* (*FLT*) by the ratio of the average absolute value of monthly nominal exchange rate depreciation (*ME*) to the average absolute value of the monthly change in reserves normalized by the monetary base in the previous month (*MR*), in order to proxy for the monetary impact of these changes. Both averages are calculated over 1998. For countries which are part of a currency union, *ME* is set to zero. For other countries with an officially fixed exchange rate, the bilateral nominal exchange rate used is the official one. For other countries, we use the bilateral exchange rate with the US dollar, unless the exchange rate with one of the other five major currencies (yen, French franc, DM, British pound, and SDR) exhibits significantly less volatility, in which case we use the bilateral exchange rate with the corresponding currency.

The rationale for using *FLT* as an indicator of *de facto* exchange rate flexibility is that if *MR* is high relative to *ME* (and therefore *FLT* is comparatively small) the monetary authorities are intervening relatively heavily on the foreign exchange market to offset market forces. *FLT* assumes values ranging from zero to infinity, with the limits being defined by a perfectly pegged policy at the one end (*ME*=0) and a completely intervention-free policy at the other (*MR*=0). A 12-month average is used to eliminate the effect of short-run fluctuations in either reserves or exchange rates, that do not accurately reflect longer run exchange rate policies. For country *i*:

$$FLT = \frac{ME}{MR} = \frac{\sum_{0}^{11} \left| E_{t-k} - E_{t-k-1} \right| / E_{t-k-1}}{\sum_{0}^{11} \left| R_{t-k} - R_{t-k-1} \right| / H_{t-k-1}}$$

where $E_{t,k}$ = nominal exchange rate in month t, R_t = net international reserves, minus gold, in month t, and H_t = monetary base in month t.

Table A5. Summary Statistics, 93 Countries, 1990-98

	Truly fixed pegs (19)	Other pegs and managed floats (49)	Independent floats (25)	Total (93)	Countries
INF	1.993 (1.504)	2.756 (1.534)	2.791 (1.947)	2.609 (1.662)	93
RESIMP	2.820 (2.231)	3.890 (2.112)	2.833 (1.553)	3.387 (2.053)	93
SECTDIV	0.645 (0.361)	0.599 (0.291)	0.715 (0.271)	0.639 (0.302)	93
OPEN	0.785 (0.432)	0.775 (0.546)	0.548 (0.228)	0.716 (0.465)	93
TTGVAR	0.055 (0.059)	0.086 (0.095)	0.095 (0.161)	0.082 (0.111)	93
REV	0.368 (0.956)	0.674 (1.144)	1.400 (2.180)	0.807 (1.498)	93
GDP	24.787 (1.805)	24.409 (1.553)	25.540 (1.992)	24.790 (1.778)	93
PCGDP	8.825 (1.042)	8.352 (1.009)	8.484 (1.235)	8.484 (1.084)	93
GEOGCONC	0.271 (0.127)	0.293 (0.144)	0.280 (0.173)	0.285 (0.148)	91
GDPGN	0.211 (0.419)	0.083 (0.279)	0.080 (0.277)	0.109 (0.313)	92
UNEMPL	0.104 (0.05)	0.087 (0.049)	0.074 (0.043)	0.088 (0.048)	61
CONTROLS	2.611 (3.623)	3.901 (2.914)	4.652 (2.700)	3.912 (2.889)	46
FCDM2	0.240 (0.324)	0.161 (0.184)	0.122 (0.147)	0.159 (0.195)	78
ABILITY1	n.a.	0.005 (0.010)	0.147 (0.228)	0.089 (0.187)	29
ABILITY2	n.a.	0.070 (0.079)	0.175 (0.207)	0.131 (0.172)	29
ABILITY3	n.a.	0.052 (0.111)	0.581 (0.785)	0.362 (0.653)	29

Table A6. Correlation Matrix, 93 Countries, 1990-98

	EXR	*FLEX*	*PEG*	*FLT*	*INF*	*RESIMP*	*SECTDIV*	*OPEN*	*TTGVAR*	*REV*	*GDPGN*	*GDP*	*PCGDP*	*GEOGCONC*	*UNEMPL*	*CONTROLS*	*ABILITY1*	*ABILITY2*	*ABILITY3*	*FCDM2*	*ME*	*MR*
EXR	1.00																					
FLEX	**0.96**	1.00																				
PEG	**0.91**	**0.98**	1.00																			
FLT	**0.39**	**0.39**	**0.38**	1.00																		
INF	**0.23**	**0.22**	**0.28**	-0.10	1.00																	
RESIMP	-0.16	-0.13	-0.07	-0.06	0.06	1.00																
SECTDIV	0.13	0.10	0.07	**0.19**	-0.11	0.10	1.00															
OPEN	**-0.21**	-0.15	-0.16	**-0.19**	**-0.28**	-0.08	0.09	1.00														
TTGVAR	0.07	0.11	0.13	-0.06	**0.25**	-0.01	**-0.46**	-0.11	1.00													
REV	**0.22**	**0.20**	**0.19**	-0.02	**0.21**	0.05	**-0.17**	-0.13	0.04	1.00												
GDPGN	-0.08	-0.09	-0.08	-0.04	**0.26**	-0.05	**-0.18**	-0.02	**0.36**	-0.07	1.00											
GDP	**0.22**	**0.17**	0.14	**0.43**	-0.09	0.10	**0.43**	**-0.30**	**-0.29**	0.02	**-0.21**	1.00										
PCGDP	-0.02	-0.10	-0.11	**0.19**	**-0.39**	0.09	**0.43**	**0.24**	**-0.32**	**-0.33**	**-0.19**	**0.46**	1.00									
GEOGCONC	-0.02	-0.02	-0.01	-0.04	0.03	0.05	-0.13	-0.04	-0.15	0.04	0.00	-0.15	-0.11	1.00								
UNEMPL	-0.21	-0.18	-0.18	-0.17	0.16	**-0.21**	-0.20	-0.09	**0.28**	0.08	0.01	-0.19	-0.20	0.00	1.00							
CONTROLS	0.09	0.15	0.15	**0.31**	-0.23	0.08	0.20	**0.49**	**-0.35**	0.02	-0.15	0.01	**0.44**	-0.04	0.15	1.00						
ABILITY1	**0.35**	**0.32**	**0.32**	**0.79**	**-0.37**	-0.26	**0.33**	-0.22	-0.28	-0.06	-0.09	**0.65**	**0.51**	-0.15	-0.12	-0.03	1.00					
ABILITY2	0.27	0.26	0.26	**0.75**	**-0.37**	-0.20	**0.40**	-0.22	-0.18	-0.22	0.13	**0.58**	**0.57**	-0.21	-0.21	-0.14	**0.89**	1.00				
ABILITY3	**0.36**	**0.32**	**0.32**	**0.59**	**-0.37**	-0.11	**0.38**	-0.21	-0.25	-0.17	-0.11	**0.46**	**0.53**	-0.25	-0.18	-0.12	**0.81**	**0.84**	1.00			
FCDM2	-0.07	-0.13	-0.12	-0.17	**0.30**	-0.10	-0.09	**0.20**	0.08	**0.19**	0.01	**-0.20**	-0.04	-0.04	0.15	0.26	-0.17	-0.21	-0.23	1.00		
ME	**0.40**	**0.40**	**0.39**	**0.35**	0.03	-0.03	0.04	-0.04	-0.01	0.04	-0.02	**0.20**	-0.04	0.00	**-0.27**	**0.33**	-0.10	-0.10	-0.12	-0.08	1.00	
MR	-0.01	-0.02	-0.04	**-0.29**	-0.03	0.02	-0.05	**0.42**	-0.04	-0.11	-0.06	**-0.19**	0.13	0.07	-0.20	0.23	**-0.34**	-0.28	-0.25	-0.01	**0.27**	1.00

Notes: Pairwise correlations, significant correlations at the 10 percent level in bold.

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