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Exchange Rate Regimes 20 years later: The prevalence of floats.*

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Abstract

De facto exchange rate classifications are a standard tool in international finance. In this paper we update our (2005) *de facto* classification through 2022. We find that the US dollar remains as valid as reference currency as it was during the Bretton Woods period. We also show that there has been a steady trend towards floating regimes with 20% more countries floating than 50 years ago. However, when adjusted by GDP, the share of floats has remained very high and stable over time, while fixed regimes have mostly been confined to smaller economies. We also find that discrepancies between *de jure* and *de facto* regimes is presently at an all time low.

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1 Introduction

The analysis of the implications of alternative exchange rate regimes is arguably one of the key questions in international economics, as well as one with important measurement obstacles. Up until the late 90s most of the empirical discussion on exchange rate regimes used the official (de jure) regime classification that the IMF compiled based on the exchange rate arrangements periodically reported by the country's monetary authorities, despite well-documented mismatches between reports and reality. For instance, it was recognized that many alleged floaters intervened in foreign exchange markets so pervasively that, in terms of the exchange rate flexibility-monetary autonomy mix, in practice they behaved closer to a conventional peg. Conversely, many pegged regimes with autonomous (and often inconsistent) monetary policies realigned the parity so often that they behaved, for most practical purposes, as floats. These discrepancies, in turn, tended to mislead and ultimately frustrate empirical work in the field. For example, attempts to identify the benign effect of pegs on chronic inflation or the link between exchange rate flexibility and the depth of the business cycle or growth were hampered by miss-classification problems.

This issue was quickly recognized and, by 1998, the IMF had already started to modify its exchange rate classification to deal with these discrepancies. In (Levy-Yeyati and Sturzenegger, 2001, 2005, LYS) we addressed these concerns by building a *de facto* classification based on a clustering procedure of three variables: the relative volatility of the exchange rate, its rate of change, and the volatility of central bank foreign currency reserves. We clustered observations of the three classification variables at a country-year level, and assigned them intuitively: the cluster with relatively high volatility of reserves and low volatility of the nominal exchange rate was associated with pegs; the cluster with low volatility of international reserves and volatility of the nominal exchange rate was identified with floats; and countries with intermediate levels of volatility on all fronts were labeled “intermediates”—a group that included economies with managed floats, binding exchange rate bands, and frequently realigned pegs.

Other researchers that contributed to the foray in the following years include Shambaugh (2004), who classified on the basis of exchange rate volatility, and Reinhart and Rogoff (2004), who use a combination of statistical and informed decisions through a verification method: reported arrangements that were consistent with actual outcomes were classified according to their stated regime; otherwise they were re-classified. Indisputably, *de facto* classifications entailed an improvement in the ability of testing hypotheses relative to alternative *de jure* regimes and became the norm ever since.

After more than 20 years from the start of this shift from *de jure* to *de facto* regimes, our paper extends our original *de facto* classification through 2022. In the process, we provide some important improvements, both in the classification procedure and in the degree of coverage, which allows us to more than double the number of country-year observations classified (3335 to 7983). Given that Ilzetzki, Reinhart, and Rogoff (2019, IRR) have also produced a recent update of their classification and that the IMF continues to do so constantly (Habermeier et al., 2009), it is an ideal moment to take stock and provide a comparative analysis of all three main *de facto* groupings. This extension also gives us the opportunity to describe and analyze the main stylized facts in the evolution of exchange rate regime choices in the past fifty years.

There are two main differences between the LYS, on the one hand, and the IMF *de facto* and IRR classification, on the other: the larger reliance of the former on objective statistical criteria (as opposed to subjective analyses of exchange rate policies) and the use of the variation of international reserves (a proxy for foreign exchange intervention) as a key variable identification variable (as opposed to classifying purely based on exchange rate movements). Thus, while IMF and IRR “correct” the *de jure* classification whenever the self-reported regime contradicts the exchange rate volatility displayed by the country, LYS starts from a textbook definition whereby fixed regimes are associated with changes in international reserves aimed at containing the volatility of the nominal exchange rate, and flexible regimes are characterized by stable reserves and volatile exchange rates. The combined analysis of

the classification variables should be sufficient, we argue, to assign regimes to a broad fix-float grouping, independently of the country's official self-reporting. By the same token, the volatility of exchange rates is not sufficient to tell the difference between floats and fixes because countries with volatile exchange rates may intervene more heavily than countries with less volatile exchange rates. Simply put, exchange rate fluctuations often reflect the volatility of the context. Thus, from the perspective of the way exchange rate policy interacts and conditions monetary policy, the country with the lower volatility may behave closer to a floating regime than the country with the higher volatility.

The plan of the paper is as follows. Section 2 describes the updated data and explains the improvements to our original classification procedure. It also presents a brief analysis of the evolution of reference currencies over time, and the incidence of the dollar as a global currency: we show that the dollar has preserved its prevalent role as reference currency around the world. Section 3 discusses the stability of the exchange rate grouping and introduces a simple updating methodology that allows to continuously update the classification as new relevant data becomes available. Section 4 compares the three main *de facto* exchange rate classifications: IMF, IRR and LYS, and highlights the key similarities and differences between them. Finally, section 5 documents the main stylized facts of the evolution of exchange regime choices over the last five decades: while the percentage of countries under flexible arrangements has grown slightly, once countries under each regime are aggregated adjusting by GDP, we find that between 60% and 80% of the global economy operates under a floating regime, a share that has remained fairly stable since the demise of Bretton Woods. We also show that the discrepancies between stated and implemented regimes, of which we identify four types, has also distinctly declined. While differences between *de jure* and *de facto* regimes persist, the difference between the two is the smallest since the end of Bretton Woods.

2 Methodology

2.1 Classification variables

In the textbook description, flexible exchange rates combine no intervention in the foreign exchange market with unbounded volatility of the nominal exchange rate. Conversely, a fixed exchange rate regime implies that the exchange rate does not move while reserves fluctuate as a result of heavy intervention. Under a crawling peg, changes in the nominal exchange rate should exhibit stable increments, so that the volatility of exchange rate *changes* is relatively low, as active intervention keeps the parity on the desired path. Finally, a dirty float would be associated with relatively high volatility on all fronts, with exchange rate fluctuations only partially smoothed out by intervention.

With this description in mind, regimes could be broadly characterized by the relative behavior of three variables: the exchange rate volatility σ_e , measured as the average of the absolute monthly percentage changes in the nominal exchange rate during a calendar year, the volatility of exchange rate changes $\sigma_{\Delta e}$, computed as the standard deviation of monthly percentage changes in the exchange rate, and the volatility of reserves σ_r .

2.2 The country sample

Our first decision point relates to the countries to be considered. While our objective is to include all countries in the world, countries that are not IMF members such as Liechtenstein, Monaco and Vatican City, as well as semi-independent countries, dependencies or territories, are excluded.¹ Three countries (Andorra, Nauru and Tuvalu) joined the IMF in the 2000s

¹These countries typically have fixed exchange rates, as they use the currency of the parent country (e.g. Greenland or Faroe Islands) or the currency of other countries (for example Kosovo or the West Bank). The sole exception is Taiwan, which is non-independent and uses its own currency. For completion, we include the exchange rate regime of these countries in a separate and compatible data set. The list includes some years for the following countries: Angola, Anguilla, Antigua and Barbuda, Belize, Cabo Verde, Comoros, Djibouti, Dominica, Eritrea, Faroe Islands, French Polynesia, Gibraltar, Greenland, Guernsey, Isle of Man, Jersey, Kiribati, Kosovo, Micronesia, Montenegro, Montserrat, Mozambique, Namibia, New Caledonia, Papua New Guinea, Reunion, Seychelles, Solomon Islands, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, São Tomé and Príncipe, Timor-Leste, Vanuatu

and are added to the data after they join. With this sample we align with the IMF, which also provides a classification only for independent nations.

The reason to exclude observations from non-independent countries should be clear: We want to identify the extent to which the exchange rate regime constraints macroeconomic policy, a concept that does not apply to economies without an independent macroeconomic management.²

2.3 The reference currency

To compute the first two variables needed for our classification, we need to identify an appropriate reference currency. In some cases, this poses no problem (for example, the U.S. dollar for the Mexican peso, or the Deutsche Mark for the Italian lira) but the reference is not always obvious (for example, for the UK pound or the Swiss franc, the US dollar and the Deutsche Mark both appear to be, a priori, equally good candidates). In addition, there is the question of what reference is most natural for the reference currencies themselves, such as the U.S. dollar or the euro.

To sort this out, we use the following criterion: if the country reports a peg, we use the legal peg currency; otherwise, we use the currency against which it exhibits the lowest bilateral exchange rate volatility. In the case of the US dollar and the euro, we use Bloomberg's DXY and EXY indexes, respectively.

Countries that peg to a basket are treated equally: the currency to which they peg is the announced basket. If the central peg parity or basket weights are unknown, we use a similar procedure as when the reference currency is not known: we estimate the combination of (global) currencies and main trading partners that provides the lowest volatility for the dollar value of the domestic currency during the first year of the peg (we assume that the

²This is a substantial difference with respect to the IRR data set, which assigns regimes to some non-independent countries. For instance, former Soviet Union republics prior to the dissolution of the Soviet Union are labeled by IRR as pegs because they are considered a part of a "block". Taking this logic to the limit, were California or Alaska to become independent in the future, they would be tagged, retroactively, as a pegs during the pre-independence years.



Figure 1: Baskets

weights of the peg remain unchanged thereafter, until a change of its *de jure* regime).³ In most cases, the fit matches the evolution of the exchange rate quite closely, providing confidence in the methodological approach. Figure 1 illustrates the dollar value of the local currency and the dollar value of the basket for the cases of Australia, China, Morocco, Russia, Sweden and Zimbabwe.⁴

Once reference currencies are selected, we can compute the percentage of countries using each particular currency as a reference (both in quantity and GDP weighted) in Figures 2 and 3.⁵ As can be seen, the dollar has remained the most important reference currency throughout the period. Interestingly, whereas at a country level its use looks quite stable, once measured in GDP weighted terms its relevance has *increased* in recent years, a result in line with those reported by IRR. The complete list of reference currencies used in each

³We run the dollar value of the domestic currency against the dollar value of the euro, the yen, the pound, the sdr, the ecu, and in some cases regional currencies of main trading partners (rand -Botswana and Mozambique, rupee -Nepal and Bangladesh since 1999, Australian dollar -Fiji, New Zealand, Papua New Guinea, etc.) with the restriction of non-negative coefficients. The exchange is computed as the dollar value of the currency relative to the dollar value of the basket.

⁴A complete list of cases with their regressions are reported online in www.fsturzenegger.com.ar/publications

⁵We include the U.S. dollar into the dollar zone, even though the dollar is not the reference currency for the U.S.

case is reported in Appendix A.

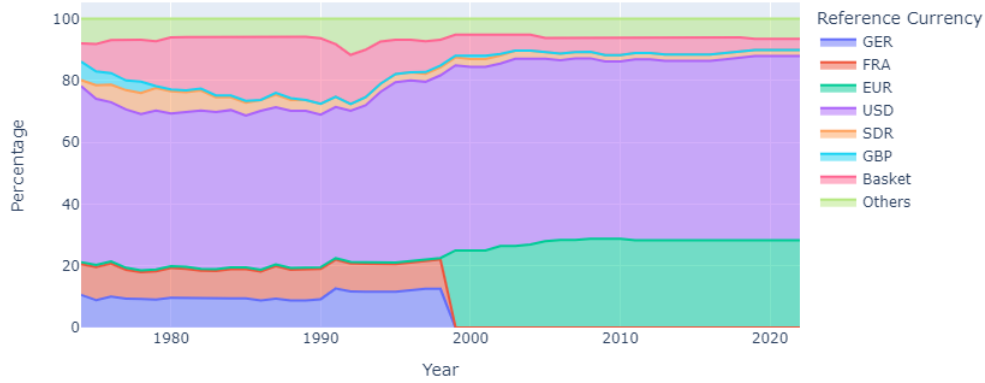


Figure 2: Reference Currencies

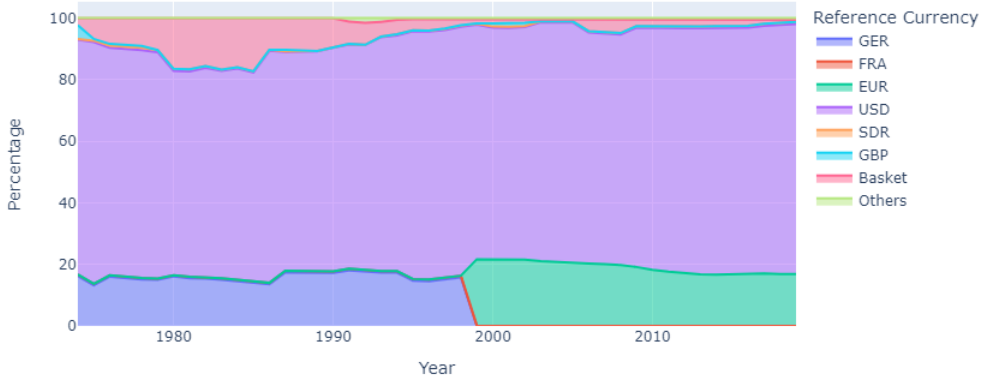


Figure 3: GDP-weighted Reference Currencies

2.4 Estimating the classification variables

The estimation of the exchange rate variables is straightforward. The volatility of the exchange rate is built as the average of the monthly absolute changes, computed over a calendar year. The volatility of the exchange rate changes is computed as the standard deviation of those changes.

The volatility of reserves (σ_r), our third classification variable, requires particular care. Reserves are notoriously difficult to measure, as there is usually a difference between changes in reserves and the actual volume of intervention due, for example, to valuation effects. We define net reserves in U.S. dollars as:

$$R_t = \frac{\text{Foreign Assets}_t - \text{Foreign Liabilities}_t}{e_t}. \quad (1)$$

Because in the IFS data set *Foreign Assets* and *Foreign Liabilities* are denominated in local currency, we divide them by e , the price of a dollar in local currency, to convert the data to dollar values. Our measure of the monthly intervention in the foreign exchange market, r_t is, in turn, defined as

$$r_t = \frac{R_t - R_{t-1}}{\frac{\text{Monetary Base}_{t-1}}{e_{t-1}}} = \frac{\Delta R_t}{\frac{\text{Monetary Base}_{t-1}}{e_{t-1}}}. \quad (2)$$

The relevance of the intervention has to be measured against the size of monetary aggregates, which we proxy by the monetary base.⁶ In turn, the volatility of reserves is computed as the average of the absolute monthly change in r_t .

How does our intervention variable compare with other measures of foreign exchange intervention? Figure 4 shows a plot comparing our interventions with those in Adler et al. (2021) (we use their Spot Proxied Foreign Exchange Intervention, which is closest to our definition). Reassuringly, the correlation among the two is positive and very high at 0.61, which provides an implicit validation of our choice. In particular, it shows that whatever valuation effects may be intervening in the change in reserves are not significantly biasing our measure.⁷

Our three classification variables yield three-dimension country-year observations for each of the IMF-reporting countries between 1974 and 2022, with a total of 9075 observations. Figure 5 shows the cluster of points once 5% of outliers are removed.⁸ In about 2000 country-

⁶In practice we use line 11 (or FASAF when available) from the IFS for Foreign Assets and line 16c (or FASLF when available) for Foreign Liabilities. Line 14 (or FASMB when available, or 14a if none of the previous options were at hand) lagged one month is used for the monetary base. We use the change in reserves relative to the monetary base, as opposed to the percentage change in reserves used by Calvo and Reinhart (2002) Calvo and Reinhart (2002) because we believe it to be a better measure: a given percentage change in reserves in countries with low monetization would imply a stronger intervention.

⁷Unfortunately we attempted but could not match our results with those in Fratzscher et al. (2019) because their data is not public.

⁸As noted, we consider each country only since its independence or inclusion in the sample. In fsterzenegger.com.ar/publications researchers can look at this image and the following ones and rotate them at will for a better inspection.

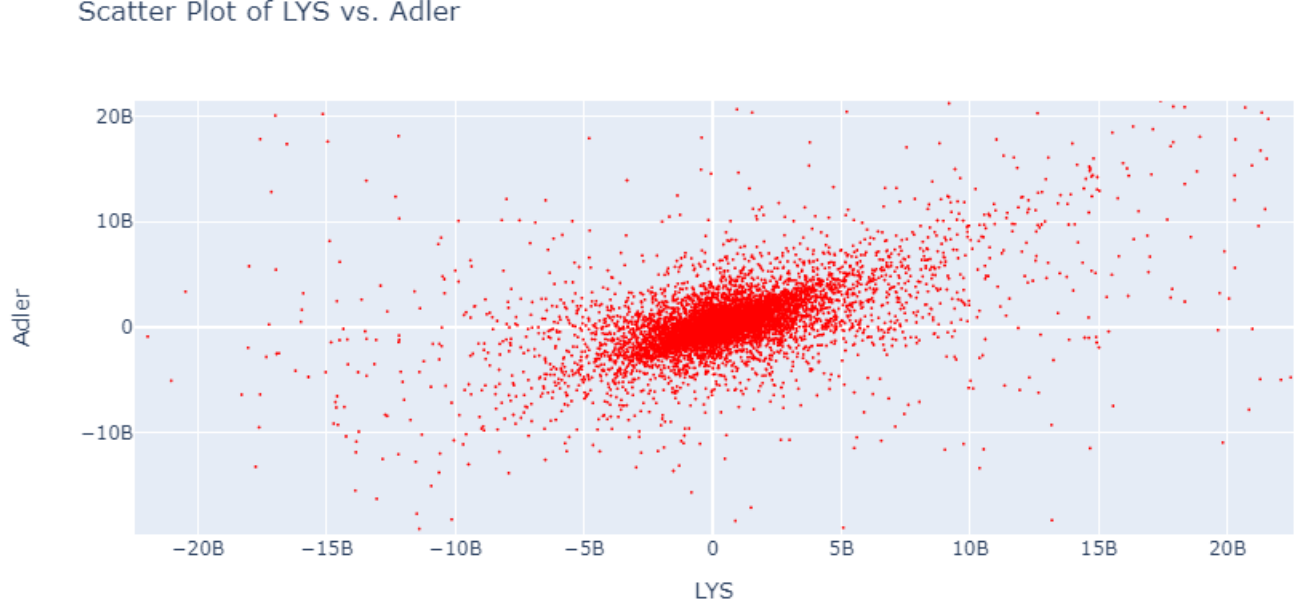


Figure 4: LYS vs. Adler et al (2021)

year observations, one of the three classification variables is missing (in most cases, the reserve variable). Also, 733 country-years are excluded as outliers (we come back to these observations later in the paper).

2.5 Classification procedure

The classification process is based on a clustering procedure. We use centroid sorting cluster analysis (KMC; Anderberg (1973)) to identify the regime groups based on the three classification variables described above. The KMC algorithm groups the observations into five different groups in a three-dimensional space: floats, dirty floats, crawling pegs, pegs and a fifth, inconclusive group with little variability that is reclassified in a second round. Because KMC uses the relative distance between points, we need to ensure that all three measures should be comparable. To that end, we eliminate the five percent-upper tail of observations for each of the three classification variables, which excludes 733 outliers out of 7067 data points. Because these outliers do not present classification problems, we re-classify them ex-post by assigning them to the cluster with the nearest centroid. Next, we z-normalize the

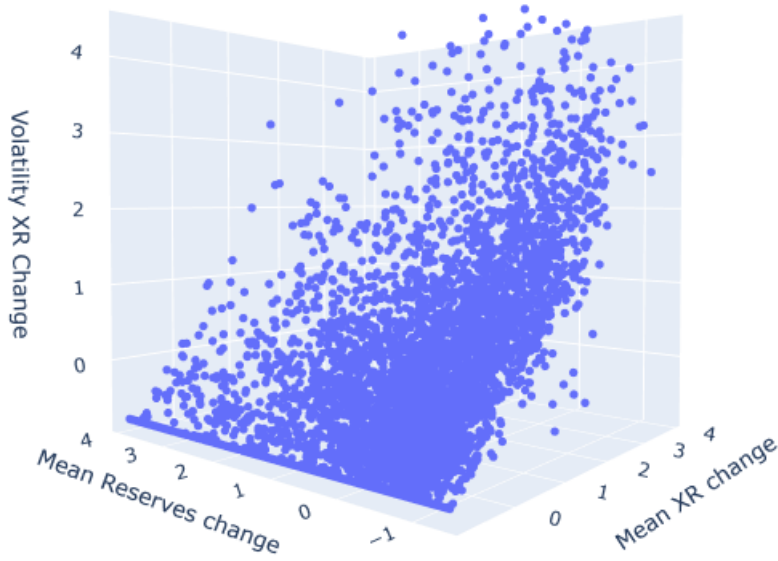


Figure 5: Country year data

remaining 6334 observations. Figure 6 and 7 show the result of this classification from two angles.

Note that the clusters match our theoretical intuition. Fixers cluster around the axis with low volatility of the exchange rate and volatility in reserves, while the opposite is true for floats. Intermediates lie further away from the origin and, as Figure 7 shows, they split clearly in terms of the third classification variable, with crawling pegs having a visibly lower volatility of the rate of change of the exchange rate. As noted, many observations (3163) show little variability along the three variables and are not assigned to any group at this stage. Because in this group the exchange rate regime actually implemented is not obvious from simple inspection (due to the absence of a shock that elicits a visible exchange rate or reserve response), we label it "inconclusive" and leave it (at this stage) unclassified.

This initial, first-round classification assigns a regime to 3171 data points and allocates 3163 observations to the "inconclusive" category. Importantly, whereas in classifications based solely on the dynamics of the exchange rate the latter group would be typically tagged as pegs, in our approach, based on the relative importance of the variation of the exchange



Figure 6: Caption



Figure 7: Caption



Figure 8: Second Round Clusterization

rate and reserves, we need to zoom in on them to correctly identify the policy regime. More specifically, variations in the classification variables within this group may be small relative to the observations clustered in the first round, but they still display enough variability to differentiate exchange rate regimes within the group. We do that in a second clustering round where we apply the same methodology this time only to the inconclusive data, with one difference: as the inconclusive cluster is surrounded by pegs and floaters, we set the procedure to identify only three clusters this time: fixed and floating regimes, as well as a new cluster of (final) inconclusives. This second round assigns 1829 out of the 3163 inconclusive observations, where regimes split based on the ratio of foreign exchange and reserves volatility, leaving 1333 observations unclassified (Figure 8). Figure 9 combines the results from both rounds.

The procedure assigns an exchange rate regime to most data points in the sample, but leaves 1333 second-round inconclusives unclassified. Many of these unclassified observations can still be identified in an uncontroversial way (e.g., Panama’s or Ecuador’s unilateral dollarization, or Hong-Kong’s currency board agreement). Within this group, whenever the exchange rate is perfectly stable, we classify the observation as a peg. To include as many observations as possible, we also assign a fixed exchange rate regime to those classified as

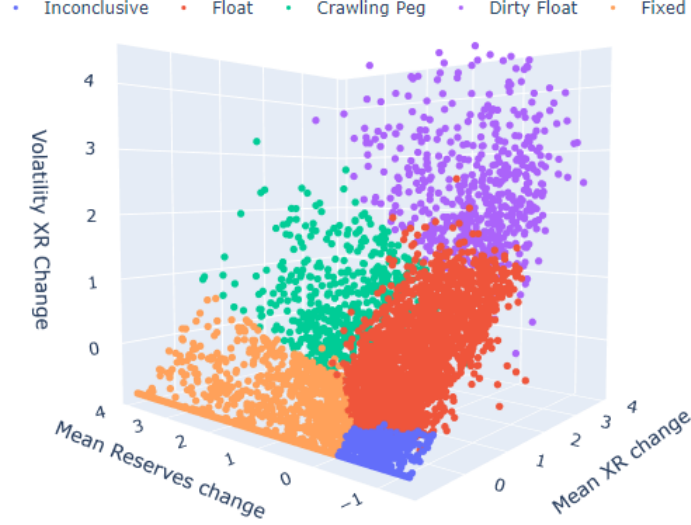


Figure 9: Final Cluster Classification

fixed by the IMF (obviously these two groups mostly overlap but they do not match exactly, in fact there are cases where the exchange rate does not move at all and the IMF does not report it as a fixed. We find such cases in Azerbaijan, Guyana and Iraq). Similarly, we mark as floaters observations with a volatile exchange rate that are under a flexible regime according to the IMF. Also, there are a few inconclusive cases in between observations with a well defined regime; for example, if a country runs a peg before and after the inconclusive observation, we assume the peg is also the regime in the intermediate years (for up to four years). Ultimately, only 128 out of 1333 inconclusives are left unclassified.

With this classification at hand, we can complete the grouping by assigning outliers and observations with missing data. The former is done by associating the observation to the group with the nearest centroid. For the latter, we classify as pegs countries with missing reserve data but zero exchange rate volatility.⁹

Within this group we have the Euro countries that do not report reserves. Since our objective is to understand the extent to which the exchange rate regime conditions monetary

⁹As we mentioned above the West Bank is the only country that does not report an exchange rate because they do not have a national currency. Because it uses the Israeli shekel, the U.S. dollar, and the Jordanian dinar as legal tender, we classify the West Bank as a fix.

Table 1: Centroids

	Average monthly volatility in the exchange rate			Average monthly volatility in the change of the exchange rate			Average monthly volatility in international reserves		
Round 1	Min	Centroid	Max	Min	Centroid	Max	Min	Centroid	Max
Float	0.44%	1.40%	4.05%	0.06%	1.76%	4.29%	0.00%	3.74%	8.00%
Fixed	0.00%	0.22%	1.30%	0.00%	0.28%	1.80%	9.40%	14.03%	24.64%
Dirty Float	1.29%	3.02%	4.64%	0.68%	4.11%	6.76%	0.01%	5.01%	21.03%
Crawling Peg	0.55%	1.70%	3.79%	0.23%	2.14%	5.09%	7.13%	12.47%	24.55%
Round 2									
Float	0.21%	0.12%	1.25%	0.05%	0.14%	1.38%	0.01%	3.36%	8.28%
Fixed	0.00%	0.00%	0.95%	0.00%	0.01%	1.45%	5.00%	4.80%	9.46%
Inconclusive	0.00%	-0.01%	0.51%	0.00%	-0.00%	0.58%	0.00%	3.01%	5.05%

policy, we see no reason in this case to treat France different from the euro zone, much in the same way we would not treat California different from the U.S.: both have a common currency and a common central bank. Hence, we categorize the regime implemented by the European Central Bank (ECB) and assign this regime to all members of the euro zone. This is consistent with the way the IMF classifies euro members, but it is a departure from IRR that treat euro zone countries as fixers.¹⁰

Finally, some observations with one missing classification variable are, again, classified assuming the continuity of the regime in place before and after (as before, for gaps of up to four years).¹¹

Figure 10 shows the classification methodology, including the composition of the 7983 classified observations. Naturally, the clustering procedure is not constrained to deliver similar cluster sizes; the fact that all clusters are of well populated indicates that the classification is not driven by the influence of remaining outliers.¹²

Table 1 shows, for each cluster, its central values as well as the upper and lower bounds of

¹⁰The IMF seems to have had a hard time to figure out what to do: it classifies the regime as a hard peg until 2005 and as floaters after that!

¹¹For example Argentina does not show data for 1989 but shows a dirty float both in 1988 and 1990. We assume them that 1989 was also a dirty float.

¹²As noted in Figure 10, we assign the US to the float category: as the U.S. has virtually no reserves, small variations in reserves may mis-classify the observation as a dirty float.

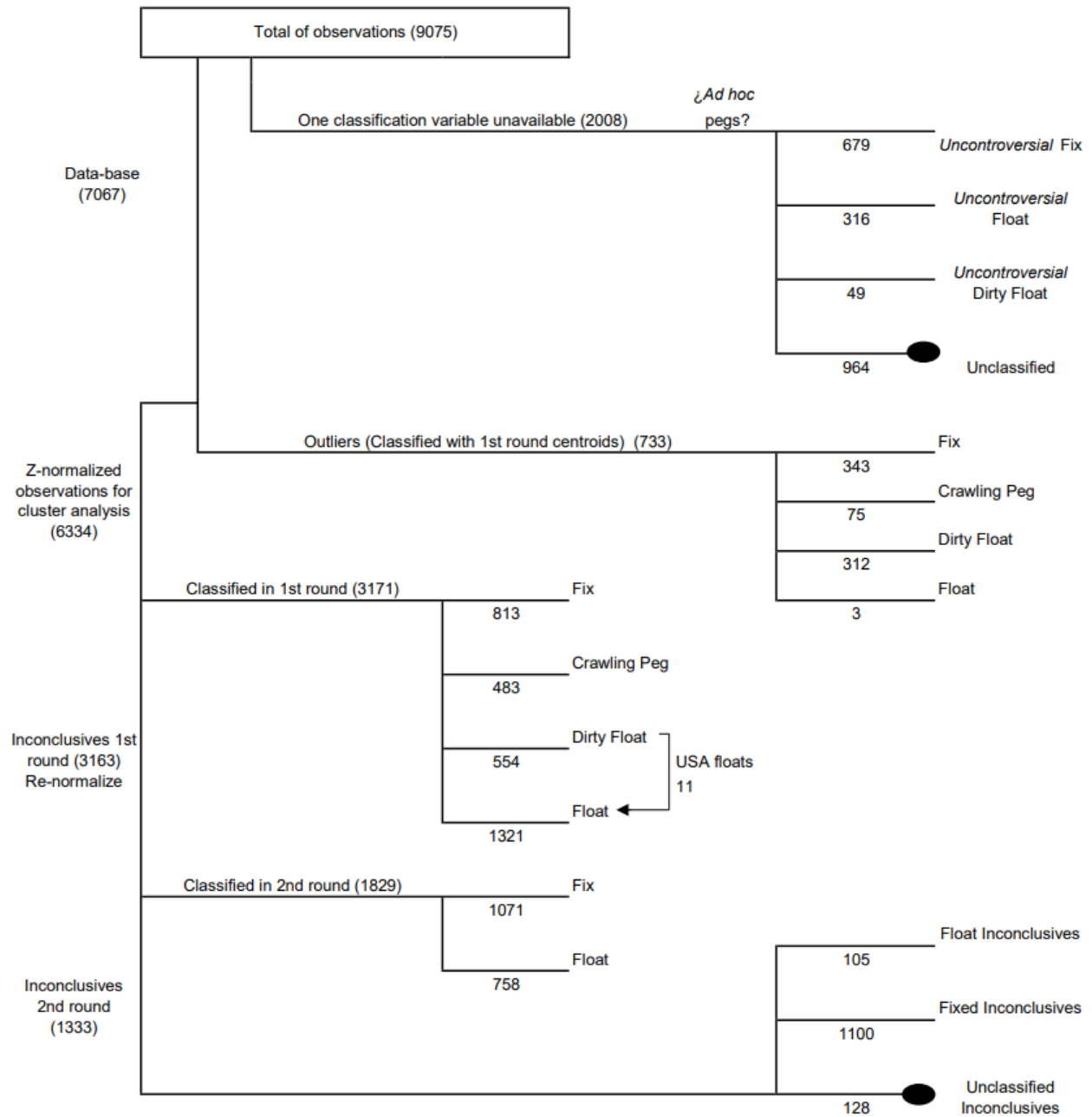


Figure 10: Classification process

the classification variables. Comparing the centroid values, fixed regimes are characterized by relatively low nominal exchange rate volatility (with an average absolute change of 0.22% per month as opposed to 1.40% in the case of floats), and high volatility in reserves (14.03% against 3.74% for floats). The two intermediate groups, on the other hand, exhibit not only substantial intervention in the exchange rate market but also the highest exchange rate volatility. Note however that crawling pegs have a distinctly lower volatility in the rate of change of the exchange rate (2.11% vs 4.11%). Appendix B reports the complete country-year classification.¹³

2.6 Updating the classification

Our revision adds 22 years of data to the original classification, thereby allowing us to check the stability of the classification procedure over different periods. In addition, it is important to test the robustness of the classification to the presence of outliers.

Figure 11 addresses both points, by comparing the classification centroids with those obtained from an earlier sample (up to 2000), and excluding 5%, 10% and 15% of the data as outliers. Reassuringly, while the centroids tend to diverge slightly for lower cutoffs (as more extreme values are included), they appear to be fairly robust. Specifically, the Figure shows that the centroids for the current classification and for the one resulting from the earlier period are quite stable, and that the results from different cutoffs are close to each other, although one centroid for the 5% cutoff is a bit off. Given this robustness, we believe it is safe to update the classification looking forward simply by assigning new country-year observations to the closest of the centroids estimated in our clustering reported in the paper.

¹³The database can be downloaded from www.fsturzenegger.com.ar/publications

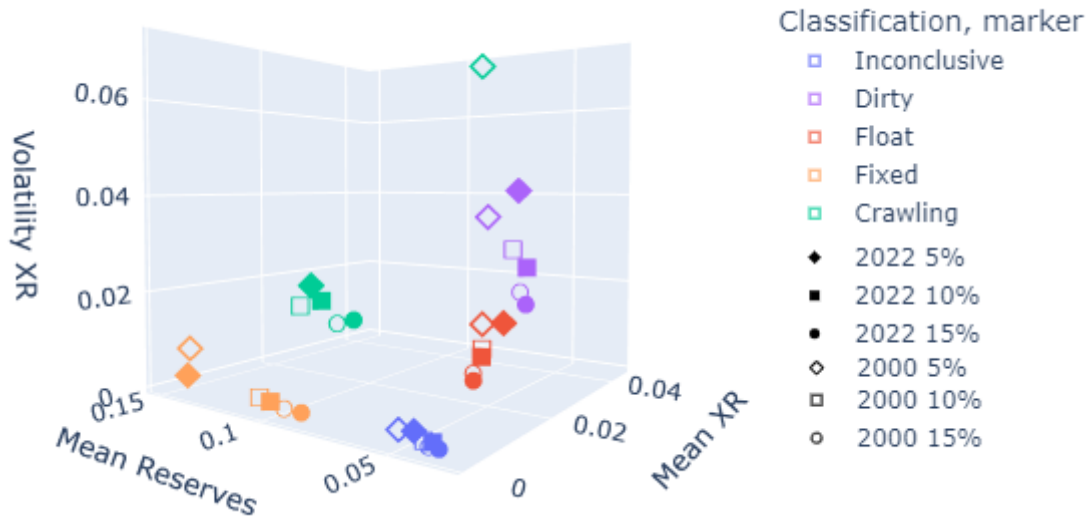


Figure 11: All centroids, different cutoff thresholds and periods

3 A comparison of classifications

With more than thirty years of *de facto* exchange rate classifications, this seems a good time to make an assessment of alternative groupings and analyze their differences. In order to do so, in this section we compare our classification with that of the IMF and IRR.

At the core of the latter is a validation/confirmation algorithm: if the stated regime is verified in the data, then the regime is confirmed; if not, then there is a procedure to validate the actual regime. In the IMF classification, this validation relies on the criterion of the analyst though recent updates have constrained the level of discretion (see Habermeier et al., 2009). The IMF classification also drops all unverifiable regimes into a generic “others category”. The IRR classification follows a similar pattern, except that the verification is based mostly on the movements of the nominal exchange rate. In addition, IRR use the free market rates when a dual exchange rate is present. They also take several methodological choices, like assigning a fixed regime to countries prior to independence, or to split from the floating group those economies where the exchange rate drops very significantly (they call them “free falling” regimes).

Our classification differs from the IMF and IRR in two fundamental ways. First, it

reduces discretion to a minimum and uses mostly a statistical procedure for identification. Second, the statistical procedure relies fundamentally on the volatility of reserves, which we believe is a critical variable to identify exchange rate regimes for a given degree of exchange rate variability. Reserve changes (due to foreign exchange intervention) have a direct impact on monetary policy, and are thus critical to answer a key question behind the characterization of exchange rate regimes: to what extent the regime interacts with monetary policy and conditions the monetary stance. Indeed, one could think of a simplified setting in which a central bank can respond to a real shock by letting the exchange rate adjust or, alternatively, it can attenuate the adjustment through intervention. The regime would be defined by the response mix. In this sense, different exchange rate volatility would not be enough to differentiate the regimes, particularly if they do not display a proportional intervention intensity.

The distinction between floats and freely floating regimes does not help address this question. For sure, the latter category is special in that it occurs in economies with higher macroeconomic volatility. But considering a currency collapse as a distinct regime simply excludes these observations from the general fix vs. float analysis. Under our criteria a floating regime is identified by the intensity of foreign exchange intervention relative to the variability of the exchange rate, as opposed to solely as a function of the size of the exchange rate move.

The same goes for the use of the black market exchange rate: Exchange rate volatility would not be enough to characterize the regime, particularly if the government is intervening in the official market. Take, for instance, the case of a country like Argentina in recent years, when an official rate coexisted with a black market rate. Monetary policy has been strongly influenced by the objective of controlling, through direct intervention, the official rate regardless of the variations of a black market premium. Thus, we consider more accurate a classification based on the intervened official exchange rate than one based on a volatile parallel market parity.

Table 2: IRR vs. LYS

IRR LYS	Fixed	Interm	Float	Missing	All
Fixed	2586	965	10	445	4006
Interm	116	1098	117	131	1462
Float	587	1572	122	234	2515
Missing	294	395	3	400	1092
All	3583	4030	252	1210	9075

Table 3: IMF de facto vs. LYS

IMF LYS	Fixed	Interm	Float	Missing	All
Fixed	1393	329	55	177	1954
Interm	53	234	445	37	769
Float	191	584	745	71	1591
Missing	85	166	41	115	407
All	1722	1313	1286	400	4721

For the purpose of comparison, we conflate the classifications into the traditional three-way division of regimes: fixes, intermediates, and floats, as they summarize more clearly the nature of the intervention policy and its interaction with monetary policy.

Tables 2 through 4 show pairwise comparisons between the three classifications: LYS, IRR and IMF.

There is a reasonably high overlap between both the IRR and LYS groupings, on the one hand, and the (shorter) IMF classification, on the other, as illustrated by the diagonal

Table 4: IRR vs. IMF de facto

IRR IMF	Fixed	Interm	Float	Missing	All
Fixed	1336	218	0	168	1722
Interm	251	900	1	161	1313
Float	267	724	134	161	1286
Missing	74	1	0	325	400
All	1928	1843	135	815	4721

of Tables 3 and 4, which shows a large number of observations with a similar classification (around 60% of the total number of classified observations in both cases). The fact that LYS matches so well with IMF is reassuring since our methodology ignores the IMF classification. Interestingly, while it would have been natural to find that the IRR would match better with the IMF classification as both are validations of the formal or *de jure* IMF classification, this does not appear to be the case.

The off-diagonal elements highlight a few discrepancies. A number of cases classified by both the IMF and IRR as intermediate are split by LYS into the fix or float categories. This happens because, while it is easy to validate an intermediate regime as such when the exchange rate actually moves, this movement may occur with small or large interventions. Our approach helps distinguish the two situations, as in our case it is the relative size of the intervention that determines the regime for a given variability of the exchange rate. Notice the large amount of IMF floats that IRR classifies as fixers. These discrepancy mostly refers to euro countries (the same mismatch extends to a comparison between the IRR and LYS classification).

There is also an ostensible discrepancy between both LYS and IMF relative to IRR in that the latter identifies a much smaller (larger) number of floats (intermediates), possibly due to IRR's more restrictive definition of a floating regime.

Another notable difference, this time between LYS and IMF, relates to the shift between floaters and intermediates. As can be seen in Figure 6, the dirty float cluster includes cases where the exchange rate moves significantly more than reserves, and some cases are pulled from the float group into the intermediate group, and vice versa. Along the same lines, there is a relatively large number of observations that are tagged as intermediates by the IMF that are grouped as pegs by LYS based on the relative intensity of intervention.

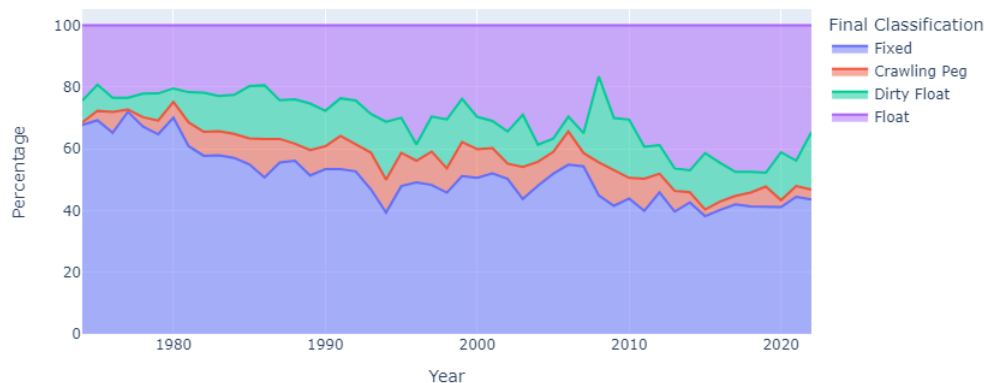


Figure 12: Percentage of countries by classification

4 Five decades of exchange rate regimes

4.1 The evolution of exchange rate regimes

The current revision gives us the opportunity to have a panoramic glance at the evolution of exchange rate regimes over the last five decades including the most recent two in the new millenium. We show this in Figure 12.

Since the demise of Bretton Woods, there has been a persistent trend towards floating regimes, only transitorily interrupted during the great financial crisis (GFC) in 2008, and a slight reversal during the Covid-19 pandemic. Today, close to 40% of the countries float, up from around 20% in the early 70s. This increase in floats has been mostly at the expense of pegs.

The graph does not provide a clear evidence of the missing-middle hypothesis postulated by Fischer (2001). In anything, it is only recently, since the GFC, that the percentage of countries under intermediate regimes has been on the decline.

However, the story behind the distribution of regimes changes substantially when country-year observations are weighted by their GDP as shown in Figure 13: Now, about 80% of the world economy takes place under floating arrangements. Fixers are, indeed, less relevant than intermediate regimes according to this measure -and have been so since the end of Bretton Woods! Thus, as large economies tend to prefer flexible arrangements,

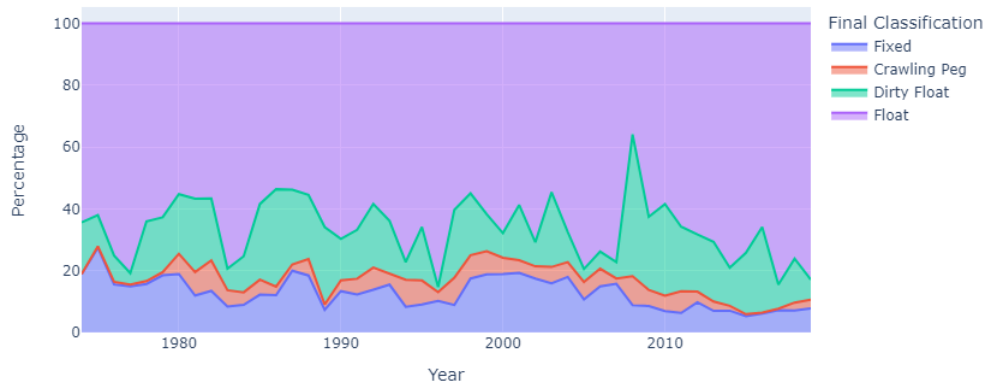


Figure 13: GDP-weighted percentage of countries by classification

from a global perspective floats are (and have been) the prevailing exchange rate regime. In line with the literature, which has argued theoretically and documented empirically the convenience and preference for conventional pegs in island and small open economies, the comparison of the last two figures suggests that, while pegs are chosen by a large fraction of countries, the group is typically comprised mainly of relatively smaller economies.

Part of the variation in the distribution of regimes may reflect a sample bias as new, typically smaller countries appear in the post-Bretton Woods period, particularly after the collapse of the Soviet Union. But a quick look at a balanced sample of the economies classified for post-Bretton Woods years in Figure 14 shows that a similar pattern emerges.

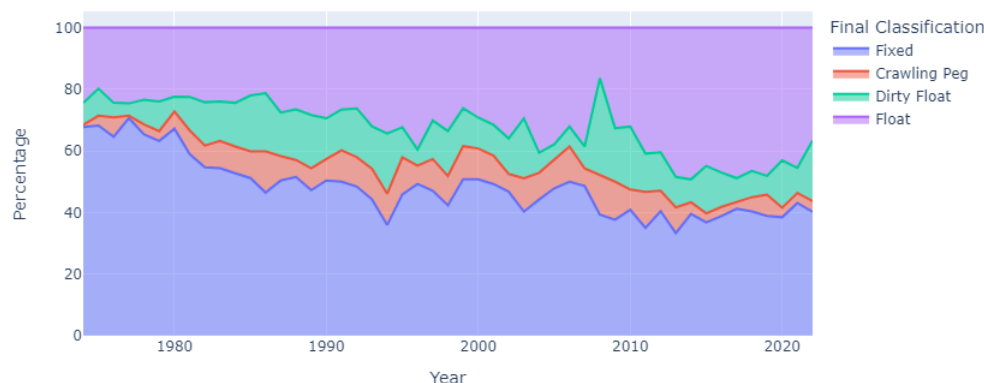


Figure 14: Percentage of countries by classification in a balanced panel

Finally, Figures 15 through 17 help draw a basic identikit of fixes and floats by tracing the evolution of the median per capita GDP, population and trade openness, both for the

full unbalanced sample and for a balanced subsample. They show that the typical floater is larger, richer, and (until 2010) less open than fixers, in line with the conventional wisdom in the literature (see Levy-Yeyati and Sturzenegger, 2010).¹⁴

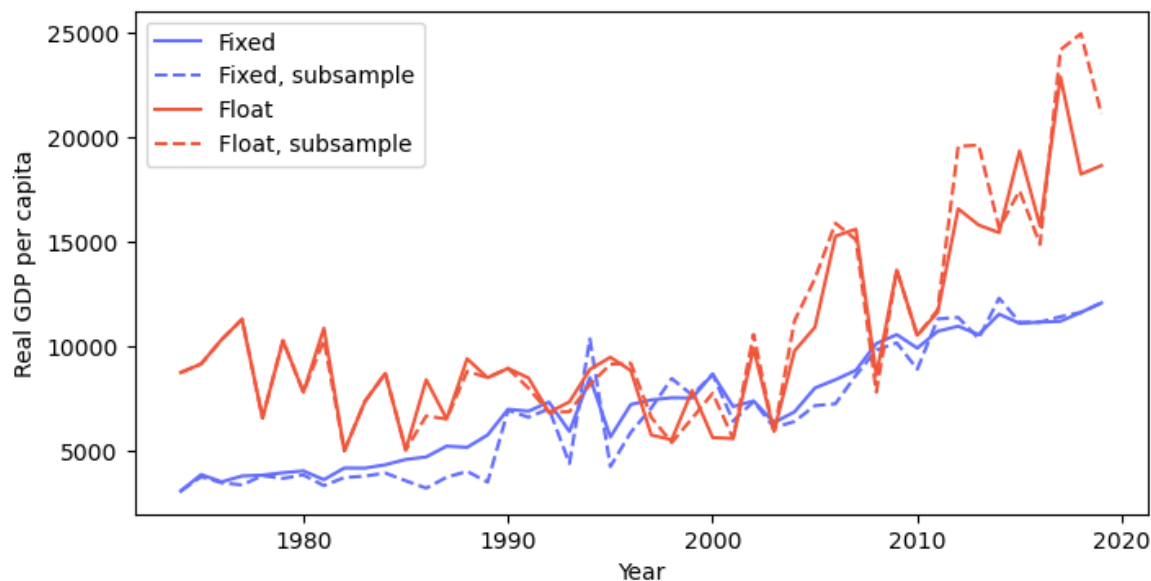


Figure 15: GDP per capita (average between countries

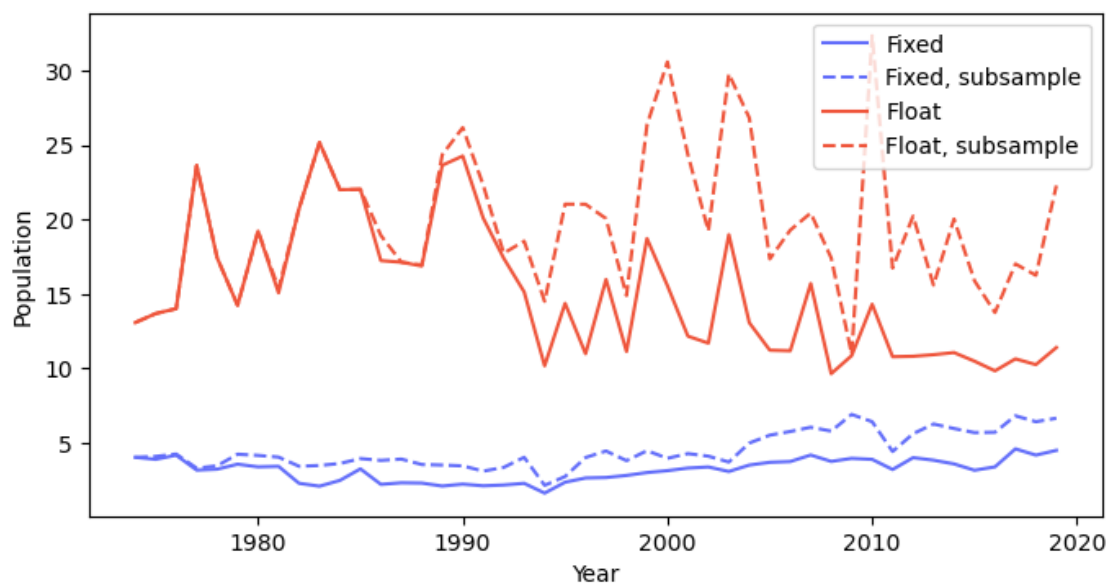
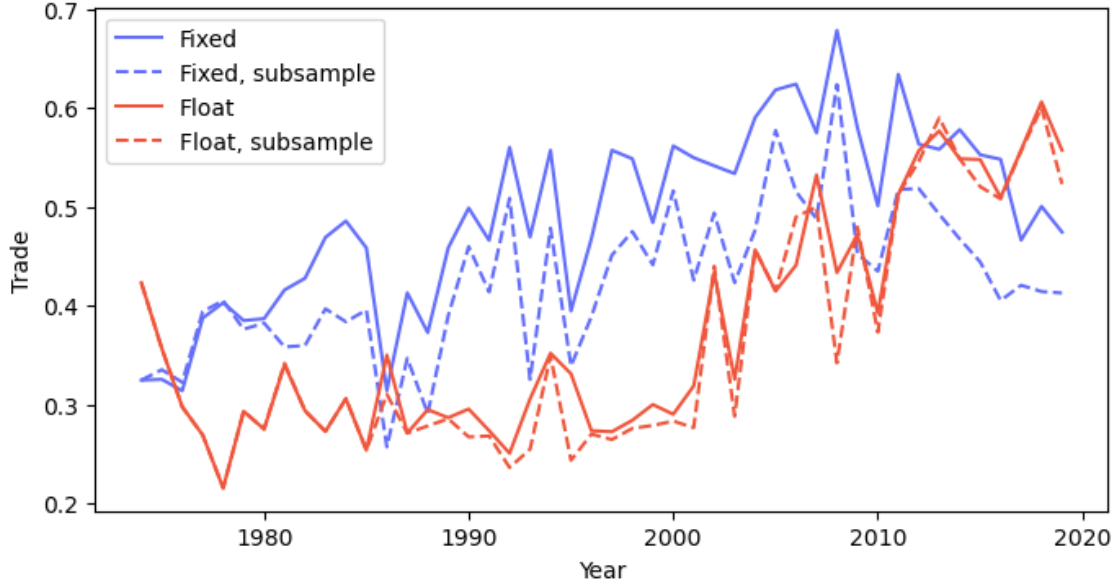


Figure 16: Population by Classification

¹⁴We use data from Penn World Table (version 10.01).

Table 5: De Facto versus de Jure Classification

Jure LYS	Fixed	Interm	Float
Fixed	OK	Fear of Pegging	Fear of Floating/Fear of Pegging
Interm	False Fix	OK	Fear of Floating
Float	False Fix/Shy Float	Shy Float	OK

**Figure 17:** Trade openness

4.2 Discrepancies between *de jure* and *de facto* classifications

How often do countries state a regime different from the one they actually pursue? Has this disconnect changed over time? The fact that *de jure* and *de facto* classifications frequently diverge indicates that many countries misreport their actual exchange rate regime. Here, we examine whether and how this misrepresentation has changed in recent years.

Table 5 illustrates our characterization of the different discrepancies: 1) fear of floating: countries that report a float but are *de facto* classified differently; and 2) fear of pegging: countries that report that they float (either fully or partially, as intermediates) but *de facto* are identified as pegs; 3) failed anchors: countries that commit to a peg but allow the exchange rate to adjust, or, alternatively, commit to an intermediate regime (for example,

crawling pegs or bands) but in reality let the exchange rate float; and 4) shy floats: countries that *de facto* float despite reporting a managed exchange rate policy.

The first case is in the spirit of Calvo and Reinhart (2002) original definition, which pointed out at reasons (exposure to real depreciations in financially dollarized economies, a large exchange rate pass through to prices) why countries may be willing to partially relinquish its monetary autonomy for a stable exchange rate.¹⁵ In turn, fear of pegging may be the result of the well documented propensity of conventional pegs to face speculative currency attacks -one of the rationales to opt for either flexible or super fixed regimes proposed by Fischer (2001) 's "bipolar view". Failed anchors are characteristic of countries that try to shore up credibility by committing to a (fixed, crawling or range bound) parity that ultimately is abandoned or collapses due, for example, to exchange market pressure. Finally, shy floats correspond to the cases where countries want to reduce volatility by claiming they are willing to intervene but actually prefer (or are forced) to float their exchange rates.

How have these discrepancies evolved over time? To address this question, we first need to extend the *de jure* classification that the IMF discontinued in 1998. We do this in two steps. First, we use the work of Anderson (2012), who compiles a *de jure* classification until 2006 -a database that has been cited, i.a. , by IMF researchers and exchange rate regime specialists Ghosh et al. (2015)). For the remaining period we count on the fact that the IMF, starting in 2008, provides both *de facto* and *de jure* regimes in their reports, leaving year 2007 with no available data. Because the IMF does not publish a time series of this *de jure* classification, updating these data entailed scraping from these files and mapping the reported IMF regimes onto our categories: We classified the IMF's 'Exchange arrangement with no separate legal tender', 'Currency board arrangement' and 'Conventional pegged arrangement' as fixed; 'Floating' and 'Free floating' as floats; and others as intermediates. In this way, we could identify *de jure* regimes since 2008, and compile a new updated data

¹⁵We may add the fear of the effects of a cyclical appreciation on domestic economic activity, as flagged by Levy-Yeyati et al. (2013).

Table 6: De Facto versus de Jure Classification

Jure LYS	Fixed	Interm	Float
Fixed	2574	693	276
Interm	245	463	694
Float	405	834	1134

set of three-way *de jure* grouping.¹⁶

Once we have a complete set of *de jure* and *de facto* regimes, we can look at the evolution of their main discrepancies. Table 6 shows the discrepancies between the two classifications are significant: nearly 47%, of which fear of floating, fear of pegging, failed anchors and shy floaters represent 13.3%, 13.2%, 8.9%, and 11.4%, respectively.

How have these discrepancies evolved over time? In Figure 18, we characterize the evolution of these cases as percentages of the total countries each year, so that the lines add up to the share of discrepancies per year.¹⁷ The figure draws what amounts to a brief history of the interaction between exchange rate and monetary policies. Failed anchors were typical of the early post-Bretton Woods years, when countries around the globe attempted to borrow their monetary credibility, often unsuccessfully, from a few anchor currencies. Fear of floating increased in the 1990's, as many countries started to embrace (managed) exchange rate flexibility. Fear of pegging and shy floating, in turn, display a downward trend over the sample, particularly in the past twenty years. More generally, the comparison shows that, with a predictable and transitory disruption during the Great Financial Crisis, the share of discrepancies have declined in the new millennium, possibly as a reflection of the improved quality of macroeconomic management in many countries, which enabled a gradual decoupling of exchange rates and monetary policies and, accordingly, a reduction in the discrepancies between *de jure* and *de facto* regimes.

¹⁶The complete extended *de jure* classification can be downloaded from www.fsturzenegger.com.ar/publications.

¹⁷Failed anchors are computed as the sum of *de jure* fixers that are either *de facto* intermediates or floaters plus *de jure* intermediates that are *de facto* floaters.

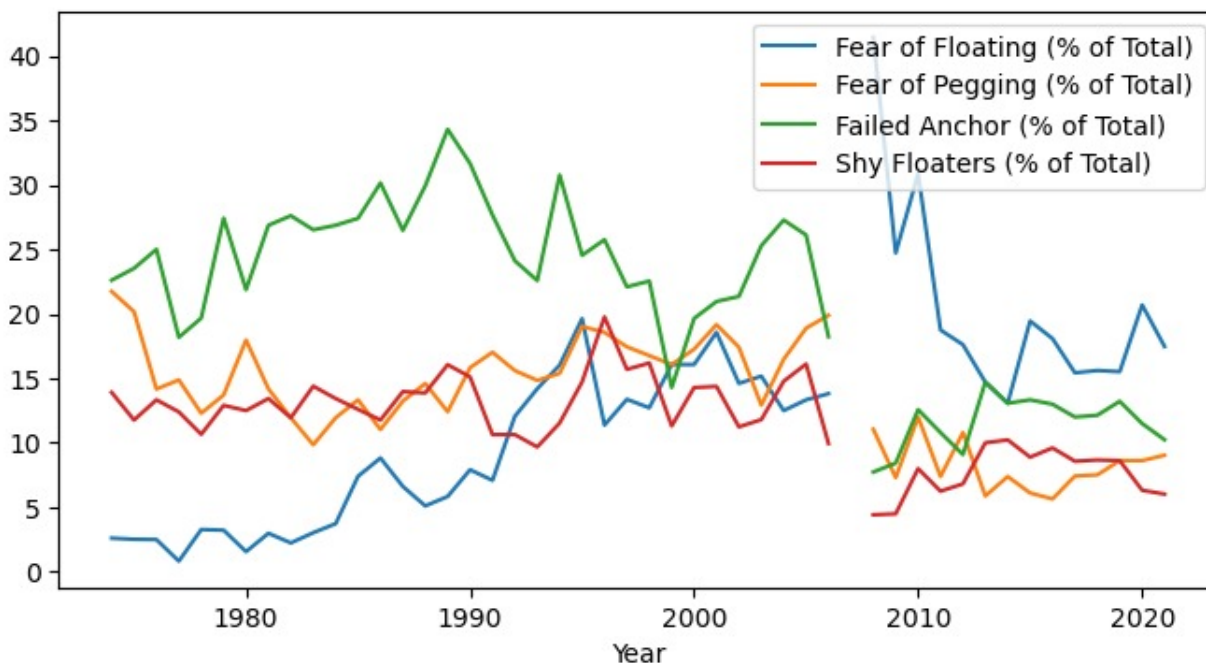


Figure 18: Discrepancies

5 Final remarks

Several *de facto* versions of the traditional *de jure* exchange regime classification developed in the past 20 years have become critical inputs for researchers in international finance. This paper contributes to that vast literature by broadening and extending Levy-Yeyati and Sturzenegger (2001, 2005) *de facto* classification to the present and providing a simple procedure to keep the classification updated in the future.

We use this extended data set to compare the results with two alternative *de facto* classifications, we update and enrich the main stylized facts identified in the original paper to document the declining share of mismatches between *de facto* and *de jure* regimes, which includes frequent failed exchange rate anchors in the 80s and early 90s, and persistent fear of floating since the early 90s (with peaks during periods of global financial distress such as the GFC and the pandemic), the stability of the U.S. dollar as a reference currency in the new millennium, the prevalence of floating regimes among larger and richer economies and the growing incidence of flexible arrangements on the world economy as a whole.

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Appendix A: Reference Currencies

To the US Dollar

Afghanistan, Algeria (1995-), Angola (1976-), Antigua and Barbuda (1981-), Argentina, Armenia (1994-), Aruba (1986-), Australia, Azerbaijan (1994-), Bahamas, Bahrain, Bangladesh (1979-), Barbados (1975-), Belarus (1995-), Belize (1981-), Bermuda, Bolivia, Brazil, Bulgaria (1974-1995), Burundi, Cambodia, Canada, Chile, Hong Kong, China, Colombia, Dem. Rep. of the Congo, Costa Rica, Cuba, Curaçao (2011-), Djibouti (1977-), Dominica (1979-), Dominican Rep., Ecuador, Egypt, El Salvador, Eritrea (1993-), Ethiopia, Euro Area (1999-2004), Gambia (1986-), Georgia (1994-), Germany (1974-1998), Ghana, Grenada (1977-), Guatemala, Guinea (1986-), Guyana (1976-), Haiti, Honduras, Hungary (1974-1981), India (1975-), Indonesia, Iran, Iraq, Israel, Jamaica, Japan, Jordan, Kenya, Rep. of Korea, Kuwait, Kyrgyz Rep. (1994-), Lao People's Dem. Rep., Lebanon, Liberia, Libya (1974-1986), Lithuania (1990-2001), Malawi, Malaysia, Maldives, Mauritius (1995-), Mexico, Micronesia, Federated States of (1986-), Mongolia, Mozambique (1975-), Nepal (1974-1982), Netherlands Antilles, New Zealand (1982-), Nicaragua, Nigeria, Oman, Pakistan, Palau (1994-), Panama, Papua New Guinea (1995-), Paraguay, Peru, Philippines, Poland (1974-1979), Qatar, Romania (1974-2003), Russian Federation, Rwanda, Saudi Arabia, Seychelles (2007-), Sierra Leone (1983-), Singapore (1974-1975), Sint Maarten (2011-), Solomon Islands (1998-2012), Somalia, South Africa, South Sudan (2011-), Sri Lanka, St. Kitts and Nevis (1983-), St. Lucia (1979-), St. Vincent and the Grenadines (1979-), Sudan, Suriname (1975-), Syrian Arab Rep., São Tomé and Príncipe (1975-), Taiwan Province of China, Tajikistan (1993-), Tanzania, Thailand, Timor-Leste (2002-), Trinidad and Tobago (1976-), Turkmenistan (1993-), Türkiye, Uganda, Ukraine (1991-), United Arab Emirates, United Kingdom, Uruguay, Venezuela, Vietnam, Yemen Arab Rep. (1974-1990), Yemen, People's Dem. Rep. of (1974-1990), Yemen, Rep. of (1990-), Zambia, Zimbabwe

To the Euro (since 1999)

Albania, Andorra, Principality of, Austria, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Cabo Verde, Cameroon, Central African Rep., Chad, Comoros, Union of the, Rep. of the Congo, Croatia, Cyprus, Czech Rep., Côte d'Ivoire, Denmark, Equatorial Guinea, Estonia, Finland, France, Gabon, Germany, Greece, Guinea-Bissau, Hungary (2002-), Iceland, Ireland, Italy, Kosovo (2008-), Latvia (2005-), Lithuania (2002-), Luxembourg, Madagascar, Mali, Malta (2005-), Moldova, Montenegro (2006-), Netherlands, The, Niger, North Macedonia, Norway, Poland, Portugal, Romania (2004-), San Marino, Senegal, Serbia (2002-), Slovenia, Spain, Sweden, Switzerland, Togo, Tunisia.

To the German Mark (until 1998)

Albania, Austria (1995-), Belgium, Bosnia and Herzegovina (1993-), Bulgaria (1996-), Croatia (1991-), Czech Rep. (1997-), Czechoslovakia (1974-1992), Denmark, Estonia (1991-), Finland (1991-), France, Greece, Iceland (1974-1987), Ireland (1979-), Italy, Moldova (1993-), Netherlands, North Macedonia (1991-), Norway, Poland (1980-), Portugal, Slovak Rep. (1974-1992), Slovenia (1991-), Spain, Sweden, Switzerland, United Kingdom (1987-1994), Yugoslavia (1974-1992)

To the French Franc (until 1998)

Benin, Burkina Faso, Cabo Verde (1975-), Cameroon, Central African Rep., Chad, Comoros (1975-), Rep. of the Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Guinea-Bissau, Madagascar, Mali, Niger, Senegal, Togo, Tunisia (1987-), Vanuatu (1980-1987)

To the GBP

Bangladesh (1974-1978), Barbados (1974-1974), Dominica (1978-1978), Gambia, The (1974-1985), Grenada (1974-1976), Guyana (1974-1975), India (1974-1974), Iran (1987-2002), Ire-

land (1974-1978), Serbia (1997-2001), Seychelles (1976-1978), Sierra Leone (1974-1978), Trinidad and Tobago (1974-1975)

To the SDR

Burundi (1984-1991), Dem. Rep. of the Congo (1976-1982), Guinea (1974-1985), Guinea-Bissau (1978-1983), Jordan (1975-1987), Kazakhstan (1994-), Kenya (1975-1986), Latvia (1993-2004), Libya (1987-), Malawi (1975-1983), Mauritania (1987-), Mauritius (1974-1982), Myanmar, Rwanda (1983-1993), Seychelles (1979-1995), Sierra Leone (1979-1982), Tanzania, United Rep. of (1975-1978), Uganda (1977-1980), Zambia (1976-1982)

To a Basket

Albania (1992-1992), Algeria (1974-2017), Australia (1975-1983), Austria (1974-1994), Bangladesh (1980-2002), Botswana (1980-2004), Bulgaria (1990-1990), Burundi (1992-1998), Cabo Verde (1977-1997), China (1980-1985), Cyprus (1974-1991), Czech Rep. (1993-1996), Equatorial Guinea (1977-1978), Fiji (1975-), Finland (1974-1990), Greece (1975-1975), Guyana (1985-1986), Hungary (1982-2001), Iceland (1988-1998), India (1976-1992), Indonesia (1979-1981), Israel (1987-1991), Jordan (1989-1995), Kenya (1988-1993), Kuwait (1975-2018), Madagascar (1982-1986), Malawi (1984-1993), Malaysia (1976-2016), Maldives (1985-1986), Malta (1974-2004), Mauritania (1974-1995), Mauritius (1983-1994), Morocco, Mozambique (1977-1990), Nepal (1983-1992), New Zealand (1974-1981), Norway (1979-1990), Papua New Guinea (1978-1994), Poland (1986-1989), Portugal (1977-1977), Romania (1983-1990), Russian Federation (2006-2008), Samoa (1976-), Seychelles (1996-2006), Singapore (1976-), Slovak Rep. (1993-), Solomon Islands (1980-), Somalia (1988-1990), Spain (1975-1975), Sri Lanka (1976-1977), Sudan (1986-1987), Sweden (1978-1990), Syrian Arab Rep. (2009-2010), São Tomé and Príncipe (1987-1991), Tanzania, United Rep. of (1979-1993), Thailand (1978-1997), Tonga (1991-2018), Tunisia (1974-1986), Uganda (1990-1991), Vanuatu (1988-), Zambia (1983-1985), Zimbabwe (1981-1994)

Other Currencies:

To the Russian Ruble: Azerbaijan (1992-1993), Belarus (1992-1994), Georgia (1991-1993), Kazakhstan (1991-1993), Kyrgyz Rep. (1991-1993), Latvia (1992-1992), Moldova (1991-1992), Tajikistan (1992-1992), Uzbekistan (1991-)

To the Australian Dollar: Fiji (1974-1974), Kiribati (1979-), Nauru, Papua New Guinea (1975-1997), Samoa (1974-1975), Solomon Islands (1978-1979), Tonga

To the South African Rand: Botswana, Eswatini, Lesotho, Namibia (1990-)

To the Yugoslavian dinar: Armenia (1992-1993), Bosnia and Herzegovina (1992-1992)

To the Indian Rupee: Bhutan, Nepal (1993-)

To the DXY: United States

To the EXY: Euro Area (2005-)

To the ECU: Cyprus (1992-1998)

To the Belgian Franc: Luxembourg (1974-1998)

To the Italian Lira: San Marino (1974-1998)

To the Portuguese Escudo: Angola (1975-1975)

To the Singapore Dollar: Brunei Darussalam

To the Hong Kong Dollar: Macao

Appendix B: Final Classification

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