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On the identification of de facto currency pegs

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Bénassy-Quéré, Agnès, Cœuré, Benoît, and Mignon, Valérie—On the identification of de facto currency pegs

We describe an exchange rate peg on a dollar/euro/yen basket as an orthogonality condition for bilateral exchange rates vis-à-vis these currencies. This approach avoids the choice of a numeraire and allows simple testing on the composition of the peg. GMM estimation is performed before and after the 1997–1998 crises for up to 139 currencies. We find that the number of pegs has not diminished after the crises. Intermediate regimes, defined as de facto pegs which are not reported as hard pegs to the IMF, have been replaced by hard pegs (primarily as a consequence of the launch of the euro) while the proportion of free floats has not increased. The dollar remains the main anchor currency. *J. Japanese Int. Economies* **20** (1) (2006) 112–127. University Paris X—Nanterre and CEPII, 9 rue Georges Pitard, 75015 Paris, France; French Ministry of Economy and Finance, 75572 Paris cedex 12, France; THEMA–CNRS, University Paris X—Nanterre, 200 avenue de la République, 92001 Nanterre cedex, France.

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1. Introduction

In the aftermath of the 1997–1998 emerging market crises, it has been recognised that, in a world of free capital movements, conventionally fixed exchange rate regimes are vulnerable to sudden shifts of capital flows. So-called "two-corner" exchange rate regimes, i.e. free floating regimes and hard pegs (currency boards, full dollarisation, or monetary union) should therefore crowd-out intermediate regimes (i.e. adjustable exchange rate pegs), see Eichengreen (1994), Fischer (2001). Such a "hollowing out" of intermediate regimes over the 1990s has been evidenced ex post by the IMF (1997), Caramazza and Aziz (1998), Eichengreen (1999) or Fischer (2001), although Masson (2001) has shown that the long term dynamics of exchange rate regime change does not point to a convergence towards a "two-corner" international monetary system.

It has been increasingly recognised however that official exchange rate regimes as declared to the IMF by participating countries often differ from de facto exchange rate regimes, which can be inferred from the behaviour of exchange rates and of official reserves. The main references in the literature go as follow.

Early evidence can be found in Frankel and Wei (1993) who uncover de facto pegs on the US dollar in a number of countries which claim to be floating. Calvo and Reinhart (2002) compare the official and actual regimes of 39 countries on the basis of variables related to exchange rate management, namely the volatility of: the nominal exchange rate, foreign exchange reserves, the nominal interest rate, and base money. They find that "countries that say they allow their exchange rate to float mostly do not" (Calvo and Reinhart, 2002, p. 379). Bofinger and Wollmershäuser (2001) classify officially floating regimes into three sub-categories: pure floats (monetary authorities do not intervene on the foreign exchange market), independent float (they intervene to stabilise the exchange rate around its market-determined trend) and managed floats (they follow an unannounced target path for the exchange rate). Relying on monthly foreign exchange reserve data, they show that pure floaters are indeed a minority.

Following early work by Ghosh et al. (1997) which already made a distinction between "frequent" and "infrequent" peg adjustments, the IMF itself revised its assessment of "official regimes" in 1999 by correcting declared regimes for the observed behaviour of nominal exchange rates and official reserves. Using this methodology, Bubula and Ötker-Robe (2002) provide a comprehensive classification of exchange rate regimes over the 1990–2001 period for all IMF members. They confirm the rising number of flexible regimes (free floats and managed floats) and of hard pegs. The decline of intermediate regimes results from the sharp drop in the number of basket pegs and is concentrated in industrialised countries, whereas soft pegs have remained popular amongst low income countries. Finally, they confirm the findings by Masson (2001) that transitions between exchange rate regimes are infrequent and that any single regime can be reached starting from any other one, although the probability to remain in a corner increased in recent years.

As Bubula and Ötker-Robe (2002), Reinhart and Rogoff (2004) rely on a mix of official declarations and of de facto observations. However they depart from the former by using information on dual (or multiple) exchange rate systems and parallel markets. On the basis of their classification for 153 countries over 1946–2001, they show that in reality, floating regimes were more frequent than usually thought during the Bretton Woods era, whereas

there was no clear relationship between official and de facto regimes after 1974. Their observations are based on absolute monthly variations of exchange rates against a single key currency or against Special Drawing Rights (SDR). This does not allow them to identify de facto basket pegs.

Finally, Levy-Yeyati and Sturzenegger (2002) propose a classification of de facto exchange rate regimes which does not rely on information on official regimes. Contrasting with the official picture, they find that the proportions of free floating regimes, fixed pegs and managed floats did not change a lot during the 1990s. However they are not able to distinguish between conventional fixed pegs and hard pegs.

Most of these studies suffer from a common drawback: they measure the stability of nominal exchange rates against a single reference currency (generally, the US dollar), whereas in practice, regimes with limited flexibility have often taken as a reference either a basket of key currencies—say, the dollar, the Deutschmark (DM) or more recently the euro, and the yen—or a single currency (say, the French franc), the exchange rate of which is not fixed to the US dollar.

In this paper, we derive an empirical method to identify de facto exchange rate stability without having to rely on an arbitrary numeraire. Specifically, we define an exchange rate basket peg as resulting in a stable linear combination of the variations of bilateral exchange rates against the dollar, the euro and the yen. When significant, the coefficients can be interpreted as the implicit weights of the basket. Whenever a basket peg can be identified, it can be either officially acknowledged as a "hard peg" or not (in which case we shall consider it an "intermediary" exchange rate regime). The sample includes 139 currencies observed before and after the 1997–1998 currency crises.

Section 2 discusses methodological pitfalls associated with exchange rate regime identification. Section 3 presents our approach. In Section 4, the results are presented, and in Section 5 they are compared to available classifications. Section 6 concludes.

2. Implicit basket pegs: methodological pitfalls

The most commonly used method to identify implicit basket pegs consists in relating the rate of return of any given currency i to the return of reference currencies, usually the US dollar, the euro or before 1999 the Deutschmark, and the yen:[1]

$$\Delta e_{ikt} = a_0 + a_1 \Delta e_{\$kt} + a_2 \Delta e_{€kt} + a_3 \Delta e_{¥kt} + u_t \tag{1}$$

where Δe_{ikt} denotes the log-change of currency i in terms of a numeraire currency k. a_0 captures the average rate of depreciation, e.g. in the case of a crawling peg. a_j $(j > 0)$ is the weight of currency j in the implicit basket peg. If none of the coefficients is significant then i is considered a floating currency. If one coefficient a_j does not significantly differ

[1] To our knowledge, Haldane and Hall (1991) were the first ones to use such methodology for studying the linkages amongst the Sterling, the US dollar and the Deutschmark. The methodology was then applied to estimate de facto basket pegs by Frankel and Wei (1993, 1995) and later by Bénassy-Quéré (1999), Frankel et al. (2001), Galati (1999) and Ohno (1999).

from unity and all others do not differ significantly from zero, then i has a unitary peg to the currency j. In other cases, i is considered pegged to a basket.

This method has the virtue of simplicity but it relies heavily on the choice of a numeraire currency. If the numeraire moves in line with one or several of the currencies included in the basket, then one of the exogenous variables has a small variance and may be confused with the constant term. As pointed out by Galati (1999), this prevents from using the Swiss franc (which used to be linked to the DM), the pound sterling (which is partially linked to the dollar and to the DM), or else the Australian dollar (which is partially linked to the US dollar).

Thus, a given currency should be used as a numeraire only if there is an a priori presumption that it is uncorrelated with all other currencies involved. Accordingly, Frankel and Wei (1994) use the Swiss franc as the numeraire to study countries which have to choose between the dollar and the yen, but not the DM. Yet another solution is to use a basket of currencies: SDR in Frankel and Wei (1993) or a basket of group of seven currencies in Frankel et al. (2001). However, when reference currencies have a significant weight in this basket, it is easy to check that the right hand side of (1) can be close to zero even when i is not pegged to the basket. This is why Frankel (1993) chooses to express the exchange rates in terms of a common basket of goods, instead of currencies. This solves the previous problem but pegs are then estimated in real, not nominal terms.

The last solution is to use one of the reference currencies as the numeraire as in Bénassy-Quéré (1999):

$$\Delta e_{i\$t} = a_0 + a_1 \Delta e_{€\$t} + a_2 \Delta e_{¥\$t} + u_t. \tag{2}$$

However, this method does not allow to discriminate between a dollar peg and a free float. It is indeed possible to use the euro or the yen as the numeraire in a second stage. But second step estimates may not be consistent with those obtained with the dollar, due to the correlation among exogenous variables and because the tests are not properly nested.

3. A method of moment approach

We define an implicit basket as resulting in a stable linear combination of bilateral exchange rate variations. We use bilateral exchange rates against the three major currencies, which are known to be floating against each other: the US dollar, the yen and the euro. Let $\Delta e_{ij} = \ln(e_{ij})_t - \ln(e_{ij})_{t-1}$ be the first difference between time $t-1$ and t of the logarithm of the nominal exchange rate between currency i and currency j, and let $X_{it} = (\Delta e_{i\$}, \Delta e_{i€}, \Delta e_{i¥})'_t$ where $e_{i\$}$, $e_{i€}$ and $e_{i¥}$ stand for the exchange rate of currency i against the US dollar, the euro and the yen respectively. We shall say that currency i is pegged on a dollar/euro/yen basket with weights $\alpha_i = (\alpha_{i\$}, \alpha_{i€}, \alpha_{i¥})'$ if and only if, for any outside numeraire j, the variation of i against j is a weighted average of the variations of the three reference currencies against j:

$$\forall t, \quad \Delta e_{ijt} = -\alpha'_i X_{jt} + \beta_i. \tag{3}$$

Substituting $\Delta e_{j\$}$ with $(\Delta e_{i\$} - \Delta e_{ij})$ leads to $(1 - \alpha_{i\$} - \alpha_{i€} - \alpha_{i¥})\ \Delta e_{ijt} = -\alpha'_i X_{it} + \beta_i$ for all t, thus, the weights summing to one:

$$\forall t, \quad \alpha'_i X_{it} = \beta_i. \tag{4}$$

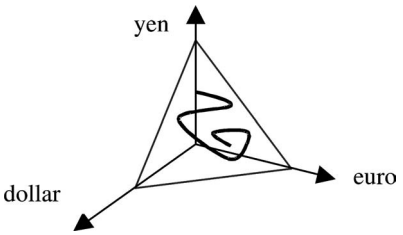

Fig. 1. The exchange rate path in the dollar/euro/yen space in the case of a basket peg.

The left-hand side of (4) can be interpreted as a constant effective exchange rate against the three main currencies, the weights of which are endogenously determined. A geometrical interpretation is the following. In the three-dimension space where Cartesian coordinates are the exchange rates against the reference currencies, i is pegged to a basket α_i of the reference currencies if and only if the path of X_{it} over time is bound within a plan orthogonal to vector α_i. The empirical application then amounts to choose the combination of these three currencies which tracks best the observed behaviour of currency i, i.e. the plan on which the path of X_{it} over time can best be projected (Fig. 1).

In the case of a managed float, the peg is not legally binding but it is only an objective of monetary authorities. Equation (4) does not necessarily hold at all time, but the deviation from the peg must be orthogonal to the information set of market participants. Thus the peg can be described as an orthogonality condition $E(\alpha_i' X_i - \beta_i) \cdot Z_i = 0$ where Z_i is a vector of k instruments belonging to the information set of market operators and monetary authorities. This suggests using a method of moments to identify the parameters (α_i, β_i). The GMM (Generalised Method of Moments) estimator $\hat{\alpha}_i$ minimises the following criterion function:

$$J_T(\alpha, \beta) = 1/T^2 \left(\sum_t (\alpha' X_{it} - \beta) \cdot Z_t \right)' W^{-1} \sum_t (\alpha' X_{it} - \beta) \cdot Z_t \tag{5}$$

where T is the number of observations and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are identified by imposing the constraint $\alpha_{i\$} + \alpha_{i€} + \alpha_{i¥} = 1$. The distance (or weighting) matrix W which yields an asymptotically efficient estimator is the asymptotic covariance matrix of the empirical moments (Hansen, 1982). Hansen's J test statistic, which is equal to T times the value of the criterion at the optimum, can be used as a test of the validity of the instruments. Under the null hypothesis $(E(\alpha_i' X_i - \beta_i) \cdot Z_i = 0)$, J is distributed as chi-squared with $(k - 3)$ degrees of freedom, since there are three independent coefficients. Note that J cannot be used to test the *existence* of a basket peg for two reasons: first, it also evaluates the relevance of the instruments since for the null hypothesis to hold, the currency has to be basket pegged *and* the instruments have to be valid, second, this would induce a bias towards pegs since the null hypothesis would then be the existence, not the absence of a peg.[2]

We consider a currency to be pegged to a basket when at least one of the basket coefficients is significantly different from zero. We then test for the presence of a unitary dollar

[2] This bias was present in the first version of this paper.

peg $\{\alpha_{i\$} = 1\}$, euro peg $\{\alpha_{i€} = 1\}$ or yen peg $\{\alpha_{i¥} = 1\}$ by estimating the model under the corresponding constraint and computing the likelihood ratio statistics, which is T times the difference between the value of the criterion J_T in the restricted and unrestricted models.[3] It is distributed as chi-squared with two degrees of freedom under the null hypothesis of a unitary peg.

The constraint that the basket weights should sum to one makes it possible for the coefficients to be interpreted in a policy perspective.

An important caveat is that this method is purely empirical: it allows to conclude on the stability of nominal exchange rates, but it does not identify whether this stability results from exchange rate policy or from other mechanisms, e.g. a business cycle correlated with that of large economies. Hence, it should be viewed as a complement rather than a substitute to the studies reviewed in Section 1.

4. Estimation results

Our sample comprises monthly, weekly and daily nominal exchange rates for up to 139 currencies from 1994 to 2004. They are end-of-period, closing day exchange rates taken from the Ecowin database. We work on the log-variations of these exchange rates on two sub-periods: a *pre-crisis* period beginning in January 1994 and ending just before the devaluation of the Thai baht (42, 181 and 901 observations for respectively monthly, weekly and daily data from 17 January 1994 to 30 June 1997) and a *post-crisis* period beginning after the financial market turmoil of end-1998 and the creation of the euro in January 1999 (65, 280 and 1392 observations from 1 January 1999 to 3 May 2004). The euro is identified with the ECU before 1 January 1999. CFA countries, which over the period have been pegged on the French franc, then on the euro, are removed from the sample. Conversely, the sample includes European currencies that were merged into the euro in January 1999.

Instruments include a constant and lags of endogenous variables. The number of lags is determined so as the sum of squared residuals is minimised. The J-statistics criterion is used to test for over-determination. In other words, we use it to test the validity of overidentifying restrictions where there are more instruments than parameters to estimate. Our GMM estimates are robust to heteroskedasticity and autocorrelation: we use a Bartlett-type kernel to weight the autocovariances in computing the weighting matrix, together with a Newey–West's fixed bandwidth selection criterion.[4] All tests are accepted at the 5% significance level.[5]

In some cases, the econometric estimates lead to a peg on a basket with a very high weight on the US dollar and a very small, but still significant weight on one of the two

[3] Both estimations use the efficient distance matrix of the unconstrained model so that the J can be compared.

[4] Our aim is not to model exchange rate dynamics but to identify statistical regularities among currencies. We do not want to make assumptions on the data generating process, hence the Newey and West's (1987) non-parametric approach is used. W is estimated iteratively, starting from the identity matrix and using the residuals of the previous stages until convergence.

[5] The results are very similar with a 10% level or a 1% level.

other currencies. In these cases, we decided to classify the corresponding currencies as dollar peggers when the difference between the weight on the dollar and one was less than 0.01 in absolute value. This choice can somewhat appear arbitrary since a 0.98 on the dollar is not considered as a unitary peg here whereas 0.99 is. However the weights on each key currency for basket peggers are provided below in order to help drawing a bridge between dollar peggers and close-to-dollar peggers.

The results are summarised in Table 1. They show that, before the crises, most currencies were de facto pegged to one of the three key currencies or to a basket of these currencies. This proportion did not fall significantly after the crises. At the daily and weekly horizons most de facto pegs appear to be against the US dollar, whereas at the monthly horizon, the majority of pegs are against baskets. However the dollar is generally prominent in basket pegs. At this horizon, the proportion of basket pegs rises at the expenses of pegs to the dollar in the second period, whereas all proportions remain fairly stable when the daily and weekly frequencies are considered. An explanation of the somewhat different results obtained at a lower frequency is the smaller number of observations: coefficients are estimated which a much larger error, leading to fewer unitary pegs.

One could argue that the apparent stability of de facto pegs over the two periods could be due to the widening of the sample for the second period. Table 2 controls for this effect

Table 1
GMM summary results

	No. of currencies	Floating regimes (%)	Pegged regimes (%)	of which (%)			
				USD	Eur	Yen	Basket
Pre-crises							
daily	84	2	98	62	14	0	21
weekly	84	6	94	50	18	0	26
monthly	70	3	97	23	3	0	71
Post crises							
daily	139	4	96	70	15	0	12
weekly	138	7	93	62	14	0	17
monthly	131	5	95	34	17	0	44

Source: Author's calculations.

Table 2
GMM summary results, same sample over the three frequencies and two periods

	No. of currencies	Floating regimes (%)	Pegged regimes (%)	of which (%)			
				USD	Eur	Yen	Basket
Pre-crises							
daily	70	1	99	61	16	0	21
weekly	70	4	96	50	19	0	27
monthly	70	3	97	23	3	0	71
Post crises							
daily	70	4	96	54	30	0	11
weekly	70	7	93	47	27	0	19
monthly	70	4	96	29	33	0	34

Source: Author's calculations.

Table 3
GMM summary results, same sample over the three frequencies and the two periods, Eurozone excluded

	No. of currencies	Floating regimes (%)	Pegged regimes (%)	of which (%)			
				USD	Eur	Yen	Basket
Pre-crises							
daily	59	2	98	73	3	0	22
weekly	59	5	95	59	8	0	27
monthly	59	2	98	27	2	0	69
Post crises							
daily	59	5	95	64	17	0	14
weekly	59	8	92	56	14	0	22
monthly	59	5	95	34	20	0	41

Source: Authors' calculations.

by comparing the proportion of pegs across frequencies and periods on a given sample of currencies. The conclusions remain unaffected.

It could also be argued that the stable number of pegs over the second period could be due to the introduction of the euro, which by construction has consolidated twelve pegs to the euro. Table 3 shows that this is not the case: when excluding the euro area, the proportion of pegs to the euro rises by up to 18 percentage points between the two periods, mostly at the expense of basket pegs.

Tables 4a and 4b investigate de facto pegs in some more detail at a weekly horizon. Consistent with widespread empirical evidence, most East Asian currencies were de jure or de facto pegged to the US dollar prior to the 1997 crises. Singapore, Thailand and Vietnam were pegged on a basket, but the share of the dollar was prominent. Major Latin American economies also pegged there currencies to the dollar over the pre-crises period. However after the crises, only Brazil and Chile (in Latin America) and Indonesia (in East Asia) moved to floating regimes. Other countries still pegged their currencies on the dollar or on a basket with a large weight on the dollar. All countries with a peg on the euro or on a euro-dominated basket belong to Europe or to its close neighbourhood. It is worth noting that the pound sterling seems equally pegged to the euro and the dollar after the crises.

We now separate hard pegs from soft pegs. Specifically, we define intermediate regimes as those regimes evidencing a stable combination of bilateral exchange rate changes but which were not declared as hard pegs to the IMF at the corresponding time (respectively, end-1996 and end-2003).[6] Hard pegs include monetary unions, full dollarisation and currency boards. Again, the proportion of intermediate regimes should be viewed as an upper estimate since it stems from an extensive definition of pegs. Figure 2 shows that this proportion did decline after the crises, to the benefit of hard pegs. However the decline is almost entirely explained by the launch of European monetary union: when Eurozone countries have been removed from the analysis, the proportions of free floats, intermediate regimes and hard pegs remain almost the same before and after the crises.

[6] Given the stability of hard-peg regimes in general, defining hard pegs on the basis of say end-1995 and end-2002 official declarations would not change the picture.

Table 4a
Detailed results, 1994–1997 period (weekly frequency)

No peg	Peg on US dollar		Peg on euro	Peg on basket*
Bulgaria	Albania	Lithuania	*Austria*	Costa Rica (0.97, 0.01, 0.02)
Nigeria	Argentina	Malaysia	Belarus	Cyprus (0.35, 0.83, −0.18)
Romania	Australia	Mexico	*Belgium*	Czech Rep. (0.38, 0.65, −0.03)
Turkey	Azerbaijan	New Zealand	Croatia	Estonia (0.38, 0.45, 0.17)
Venezuela	Bahrain	Pakistan	*Denmark*	*Greece (0.06, 0.90, 0.03)*
	Brazil	Papua	*Finland*	Hungary (0.29, 0.70, 0.01)
	Canada	Paraguay	*France*	Iceland (0.26, 0.69, 0.05)
	Chile	Peru	*Germany*	*Ireland (0.29, 0.44, 0.27)*
	China	Philippines	*Netherlands*	*Italy (0.52, 0.53,* −0.05*)*
	Colombia	Qatar	Norway	Jordan (0.89, 0.07, 0.04)
	Ecuador	Russia	*Portugal*	Kuwait (0.85, 0.09, 0.05)
	Egypt	Saudi Arabia	Slovenia	Latvia (0.51, 0.29, 0.20)
	Ghana	Serbia & M.	*Spain*	Malta (0.33, 0.61, 0.05)
	Georgia	South Africa	Sweden	Morocco (0.27, 0.76, −0.03)
	Guatemala	S. Korea	Switzerland	Poland (0.43, 0.59, −0.02)
	Haiti	Taiwan		Singapore (0.84, 0.06, 0.09)
	Hong Kong	Ukraine		Slovak Rep. (0.41, 0.51, 0.08)
	India	U.A.E.		Sri Lanka (0.88, −0.04, 0.16)
	Indonesia			Thailand (0.85, 0.06, 0.09)
	Israel			Tunisia (0.38, 0.57, 0.05)
	Jamaica			UK (0.48, 0.71, −0.19)
	Kazakhstan			Vietnam (0.98, −0.03, 0.05)
	Kenya			
	Lebanon			

* Weights on dollar, euro, yen in parentheses. Eurozone countries in italics. *Source*: Authors' calculations.

Hence, the observed "hollowing out" of intermediate regimes after the currency crises comes mainly from the reduction in the number of basket pegs due to the creation of the euro. This finding is consistent with Bubula and Ötker-Robe (2002) who show the "hollowing out" to be due to fewer basket pegs in developed countries. It is also consistent with official classifications themselves: when conventional fixed pegs, crawling pegs, pegs with fluctuation bands and managed floating regimes are grouped together as intermediate regimes, the share of this group follows a V-shaped curve: it falls dramatically between end-1996 and end-2000, but rises again from end-2000 to end-2003. On the whole, the share of intermediate regimes remains constant between end-1996 and end-2003, and it even rises when Eurozone countries have been removed from the analysis (Fig. 3).[7] However, among intermediate regimes, the share of conventional fixed pegs, crawling pegs and exchange rate bands has been declining to the benefit of managed floats,[8] which are much less demanding in terms of credibility.

[7] It can be argued that from end-1999, the classification published by the IMF has, to some extent, accounted for de facto policies, leading to a rise of intermediate regimes. This could have participated in the rise of intermediate regimes from end-1996 to end-2003, but not for the fall at end-2000.

[8] Among intermediate regimes, the share of managed floats rose from 29% in 1998 to 48% in 2003.

Table 4b
Detailed results, 1999–2004 period (weekly frequency)

No peg	Peg on US dollar				Peg on euro	Peg on basket*
Brazil	Argentina	Guyana	Mexico	Swaziland	*Austria*	Albania (0.69, 0.30, 0.01)
Chile	Armenia	Haiti	Mongolia	Tanzania	*Belgium*	Algeria (0.43, 0.49, 0.08)
Gambia	Azerbaijan	Honduras	Myanmar	Thailand	Bulgaria	Australia (0.07, 0.61, 0.32)
Ghana	Bahrain	Hong Kong	Nepal	T. & Tobago	Cyprus	Croatia (0.10, 0.90, −0.00)
Indonesia	Bangladesh	Iceland	Nicaragua	Uganda	Czech Rep.	Denmark (0.01, 0.98, 0.01)
New Zel.	Belarus	India	Oman	Ukraine	Estonia	Kuwait (0.86, 0.09, 0.05)
Nigeria	Bolivia	Iran	Pakistan	UAE	*Finland*	Latvia (0.53, 0.33, 0.13)
Romania	Cambodia	Israel	Panama	Uruguay	*France*	Lesotho (0.44, 0.35, 0.21)
Syria	Canada	Jamaica	Papua	Uzbekistan	*Germany*	Malta (0.35, 0.66, −0.01)
	Cayman Isl.	Jordan	Paraguay	Venezuela	*Greece*	Moldova (1.51, −0.20, −0.32)
	China	Kazakhstan	Peru	Vietnam	Hungary	Morocco (0.24, 0.70, 0.07)
	Colombia	Kenya	Philippines	Yemen	*Ireland*	Mozambique (1.30, −0.27, −0.04)
	Costa Rica	Kyrgyzstan	Poland	Zambia	*Italy*	Namibia (0.61, 0.23, 0.16)
	Djibouti	Lebanon	Qatar	Zimbabwe	*Netherlands*	Norway (0.08, 0.82, 0.10)
	Domin. Rep.	Libya	Russia		*Portugal*	Serbia & M. (1.21, −0.13, −0.08)
	Ecuador	Lithuania	Rwanda		Slovenia	Singapore (0.72, 0.14, 0.14)
	Egypt	Macau	Saudi Arabia		*Spain*	Slovak Rep. (0.06, 0.86, 0.08)
	El Salvador	Macedonia	Seychelles		Sweden	South Africa (0.40, 0.33, 0.26)
	Ethiopia	Madagascar	Sierra Leone		Switzerland	Taiwan (0.90, 0.06, 0.05)
	Falkland Isl.	Malawi	Solomon Isl.			Tonga (1.25, −0.08, −0.17)
	Fiji	Malaysia	Somalia			Tunisia (0.27, 0.71, 0.02)
	Georgia	Maldives	S. Korea			Turkey (0.59, 0.44, −0.03)
	Guatemala	Mauritania	Sri Lanka			UK (0.52, 0.56, −0.08)
	Guinea	Mauritius	Sudan			Vanuatu (0.62, 0.27, 0.11)

* Weights on dollar, euro, yen in parentheses. Eurozone countries in italics. *Source*: Authors' calculations.

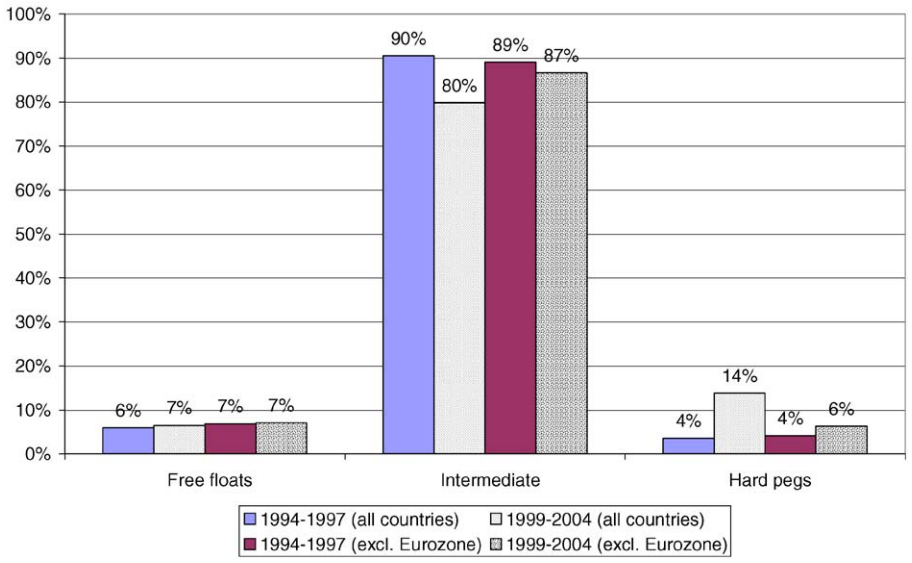

Fig. 2. De facto regimes before and after the crises. *Source*: Authors' calculations.

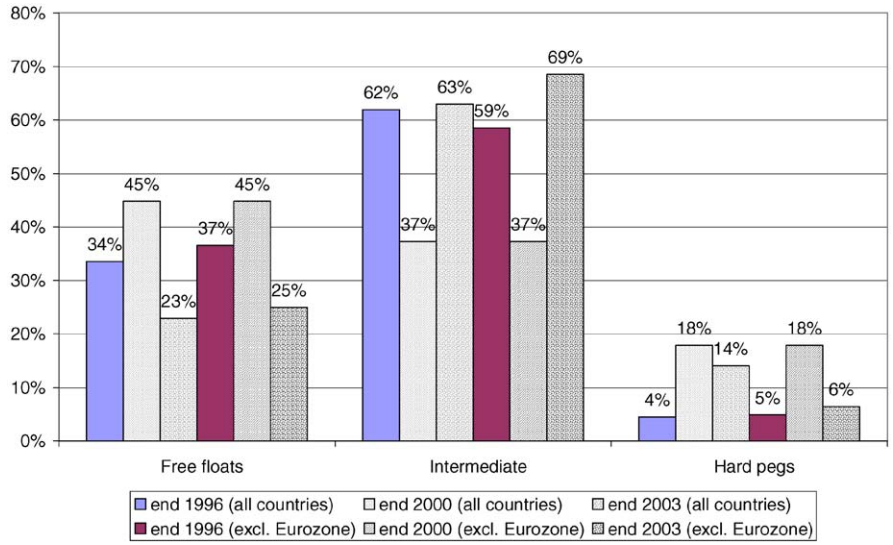

Fig. 3. Official regimes before and after the crises. *Source*: IMF, Exchange Arrangements and Exchange Restrictions, various issues.

5. Comparisons with other classifications

Here we compare our regime classification (BQCM thereafter) with other existing classifications.

First, we use the official regimes provided by the IMF classifications, defining intermediate regimes in an extensive way as in Fig. 3 in order to fit our own extensive definition of intermediate regimes. CFA countries are still excluded from the analysis.

Levy-Yeyati and Sturzenegger (2002, LYS thereafter) provide a classification of de facto regimes in three groups. However conventional fixed pegs are grouped with hard pegs in a single "fixed peg" category. After removing "inconclusive regimes" from their analysis, we define hard peggers as countries found with a fixed regime in LYS but defined as hard peggers by the IMF. The remaining fixed pegs are grouped with intermediate regimes. This correction allows us to compare the LYS classification with ours (BQCM) and with official regimes (IMF).

Finally, we add the de facto classification provided by Bubula and Ötker-Robe (2002), noted BOR hereafter. This classification consists in correcting the official IMF classification with miscellaneous information ranging from the behaviour of official reserves to official reports and speeches. We aggregate the 13-item classification into three groups in order to match our own divide.

In Table 5, we report the coefficients of correlation between the various classifications for each period (pre/post crises) and for each classification across the two periods.[9] First,

[9] For IMF, LYS and BOR classifications, we use the end-1996 and end-2000 data. End-2000 is the latest available observation for the LYS classification.

Table 5
Coefficients of correlation between 3-item regime classifications

		Pre crises[a]				Post crises[b]			
		BQCM	LYS	IMF	BOR	BQCM	LYS	IMF	BOR
Pre crises[a]	BQCM	1							
	LYS	0.19	1						
	IMF	0.34	0.29	1					
	BOR	0.28	0.26	0.63	1				
Post crises[b]	BQCM	0.24				1			
	LYS		0.50			0.60	1		
	IMF			0.58		0.62	0.69	1	
	BOR				0.55	0.64	0.65	0.76	1

Source: Author's calculations.
[a] 1994–1997 (BQCM) or 1996 (LYS, IMF, BOR).
[b] 1999-2004 (BQCM) or 2000 (LYS, IMF, BOR).

the correlation of each classification over the two periods appears quite small, especially in the BQCM case. This result may appear surprising given Fig. 2 showing that the proportion of each exchange rate regime remained stable between the two periods. Although the proportion of each regime remained stable, there were substantial changes in the countries belonging to each category. Second, correlations across the classifications are higher in the post-crises period than in the pre-crises one. One reason may be that IMF classifications have taken account of de facto policies to a certain extent since 1999. However this does not explain why the correlations across de facto classifications have risen. Thirdly, in the second period the various correlations are close to each other (around 60–70%) whereas they vary from 19 to 63% for the first period. This confirms that there has been more consensus on the classification of exchange rate regimes over the second period.[10] Finally, the LYS classification, which accounts for official reserve changes, does not appear closer to the IMF than does the BQCM classification (which only accounts for exchange rate behaviour). It may be argued that the various coefficients of correlation are not calculated on the same sample of countries. However restricting the sample to countries which are studied by all four sources also leads to similar correlations between BQCM and IMF and between LYS and IMF.[11] Comparisons with the BOR classification lead to the same observations. However the correlations between LYS and BQCM are always the lowest.

Finally, a country-by-country comparison between our classification and official regimes is proposed in Table 6 for a sub-sample of countries in East Asia, Latin America, Central and Eastern Europe and the Mediterranean area. From this table, it is clear that, with the exceptions of Brazil, Chile and Indonesia, the move of official regimes towards self-reported "free floats" has not been accompanied by de facto currency independence. In addition, most emerging countries around the Eurozone have kept intermediate regimes with de facto pegs on the euro, on the dollar or on baskets.

[10] Comparing the BQCM and IMF classifications for year 2003 leads to a similar correlation (63%).
[11] The correlation coefficients with the IMF classification are 0.36 and 0.32 for BQCM and LYS respectively over the first period, 0.78 and 0.77 over the second one.

Table 6
Country-by-country comparison between BQCM and IMF classifications

	Pre crises		Post crises	
	IMF (end-1996)	BQCM (1994–1997)	IMF (end-2003)	BQCM (1999–2004)
East Asia				
China	Intermediate	Peg on dollar	Intermediate	Peg on basket
Indonesia	Intermediate	Peg on dollar	Intermediate	No peg
Korea	Intermediate	Peg on dollar	Free float	Peg on dollar
Malaysia	Intermediate	Peg on dollar	Intermediate	Peg on dollar
Philippines	Free float	Peg on dollar	Free float	Peg on dollar
Singapore	Intermediate	Peg on basket	Intermediate	Peg on basket
Thailand	Intermediate	Peg on basket	Intermediate	Peg on dollar
Latin America				
Argentina	Hard peg	Peg on dollar	Free float	Peg on dollar
Bolivia	Free float	n.a.	Intermediate	Peg on dollar
Brazil	Intermediate	Peg on dollar	Free float	No peg
Colombia	Intermediate	Peg on dollar	Free float	Peg on dollar
Chile	Intermediate	Peg on dollar	Free float	No peg
Mexico	Free float	Peg on dollar	Free float	Peg on dollar
Peru	Free float	Peg on dollar	Intermediate	Peg on dollar
Uruguay	Intermediate	n.a.	Free float	Peg on dollar
Venezuela	Intermediate	No peg	Intermediate	Peg on dollar
CEEC				
Czech Rep.	Intermediate	Peg on basket	Intermediate	Peg on euro
Hungary	Intermediate	Peg on basket	Intermediate	Peg on euro
Poland	Intermediate	Peg on basket	Free float	Peg on dollar
Slovak Rep.	Intermediate	Peg on basket	Intermediate	Peg on basket
Slovenia	Intermediate	Peg on euro	Intermediate	Peg on euro
Mediterranean				
Algeria	Intermediate	n.a.	Intermediate	Peg on basket
Croatia	Intermediate	Peg on euro	Intermediate	Peg on basket
Cyprus	Intermediate	Peg on basket	Intermediate	Peg on euro
Israel	Intermediate	Peg on dollar	Intermediate	Peg on dollar
Jordan	Intermediate	Peg on basket	Intermediate	Peg on dollar
Lebanon	Free float	Peg on dollar	Intermediate	Peg on dollar
Malta	Intermediate	Peg on basket	Intermediate	Peg on basket
Morocco	Intermediate	Peg on basket	Intermediate	Peg on basket
Tunisia	Intermediate	Peg on basket	Intermediate	Peg on basket
Turkey	Intermediate	No peg	Free float	Peg on basket

Source: Authors' calculations.

Two opposite interpretations could be drawn from these results. The first interpretation ("fear of floating") has been identified by Calvo and Reinhart (2002): countries with high exchange rate pass-through to domestic prices, and dollar-denominated liabilities and foreign trade are reluctant to let their exchange rate float freely against the dollar. This could be the case for instance in Korea (see Park et al., 2001). The second interpretation points to the existence of a "natural co-movement" of exchange rates: higher economic integration lead to higher co-movements in growth, hence more stable bilateral exchange rates (or more regular exchange rate changes). Such a story can be heard in CEEC countries such as

Table 7
Countries with a de facto peg and a de jure free float

Pre crises		Post crises	
Country	Peg on	Country	Peg on
Albania	US dollar	Albania	Basket
Australia	US dollar	Australia	Basket
Azerbaijan	US dollar	Armenia	US dollar
Canada	US dollar	Canada	US dollar
Ghana	US dollar	Colombia	US dollar
Guatemala	US dollar	Dominican Rep.	US dollar
Haiti	US dollar	Guatemala	US dollar
India	US dollar	Iceland	US dollar
Jamaica	US dollar	Madagascar	US dollar
Lebanon	US dollar	Malawi	US dollar
Mexico	US dollar	Mexico	US dollar
New Zealand	US dollar	Norway	Basket
Papua New Guinea	US dollar	Papua New Guinea	US dollar
Paraguay	US dollar	Philippines	US dollar
Peru	US dollar	Poland	US dollar
Philippines	US dollar	Sierra Leone	US dollar
South Africa	US dollar	Somalia	US dollar
Sweden	Euro	South Africa	Basket
Switzerland	Euro	South Korea	US dollar
Tanzania	US dollar	Sri Lanka	US dollar
UK	Basket	Sweden	Euro
		Switzerland	Euro
		Tanzania	US dollar
		Turkey	Basket
		Uganda	US dollar
		UK	Basket
		Uruguay	US dollar
		Yemen	US dollar

Source: Author's calculations.

Poland: economic convergence with the rest of the EU should result in a stable exchange rate vis-à-vis the euro, without having to constrain nominal exchange policy e.g. by joining the European Exchange Rate Mechanism. The same story could be told in the case of Mexico and the United States.

Table 7 reports all countries exhibiting a de facto peg while officially floating. The "natural co-movement" interpretation seems appropriate for countries such as Canada, Mexico or Switzerland. However most countries in Table 7 have a peg on the US dollar even though the United States is not their main trade partner. In these countries, exchange rate stability against the US dollar is more likely to result from a policy decision.

6. Conclusion

In this paper, we have presented a new empirical method to identify exchange rate basket pegs without relying on a specific numeraire currency. Comparing de facto pegs with

official IMF classifications suggests that intermediate regimes have declined after 1997–1998 crises to the only benefit of hard pegs, not of free floating regimes. Furthermore, this shift can be explained entirely by the launch of the euro. Indeed, freely floating currencies seem to be very few in practice.

The "two-corner" approach to exchange rate regime choice has failed to explain the survival of official, and even more frequently, de facto intermediate regimes in a world of higher capital mobility. This can be explained either by "fear of floating," leading to an increasing number of managed floats with implicit nominal targets but no formal commitment, or as the consequence of higher economic integration with large developed economies. Empirically testing the two interpretations would require us to investigate the monetary and reserve management policy of these countries, which is beyond the scope of this paper.

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