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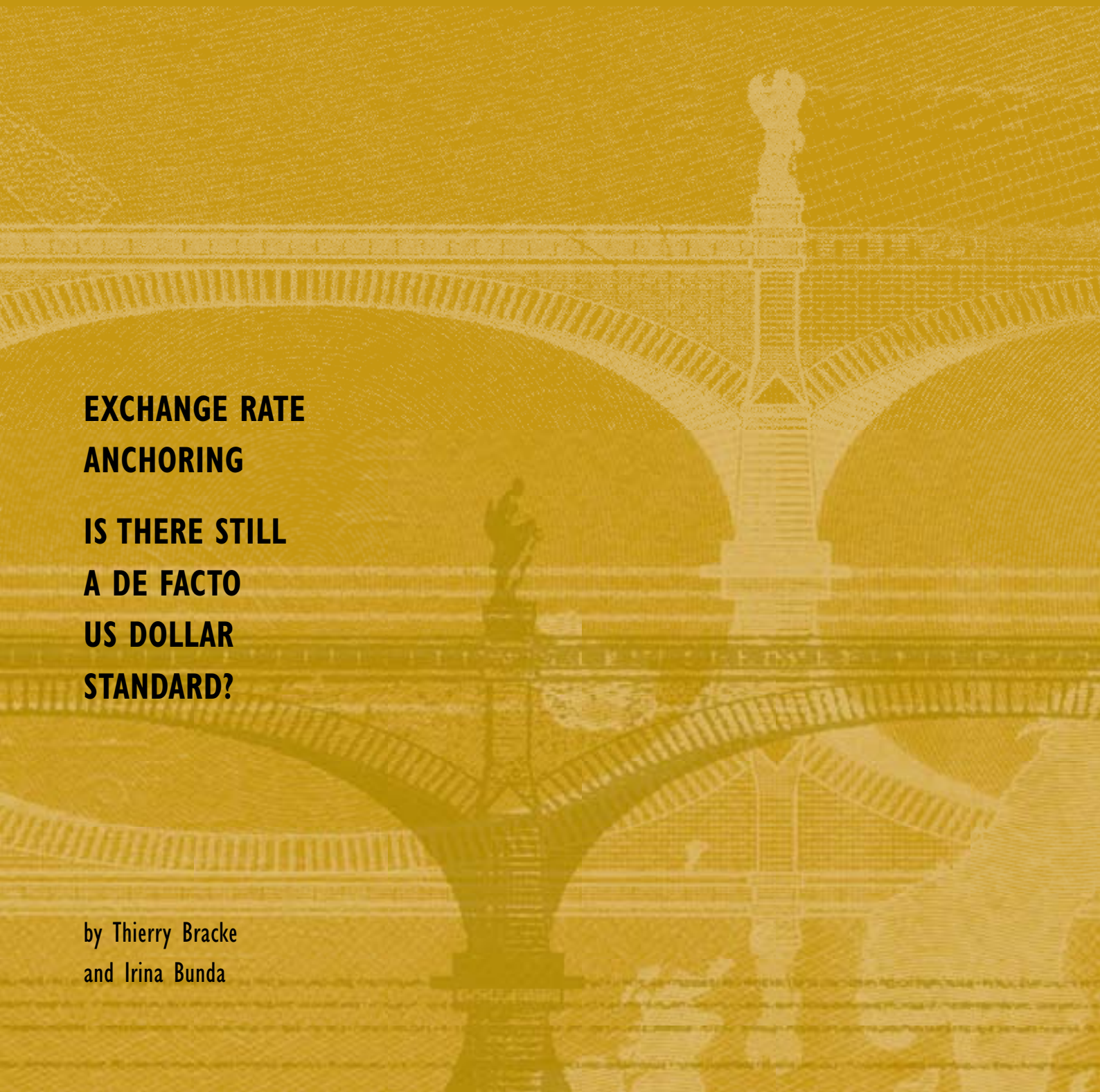

EXCHANGE RATE ANCHORING

IS THERE STILL A DE FACTO US DOLLAR STANDARD?

by Thierry Bracke
and Irina Bunda

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CONTENTS

Abstract

The paper provides a measure of exchange rate anchoring behaviour across 149 emerging market and developing economies for the 1980-2010 period. An extension of the Frankel and Wei (2008) methodology is used to determine whether exchange rates are pegged or floating, and in the case of pegs, to which anchor currencies they are pegged. To capture the role of major currencies over time, an aggregate trade-weighted indicator is constructed based on exchange rate regimes of individual countries. The evolution of this aggregate indicator suggests that the US dollar has continuously dominated exchange rate regimes, despite some temporary decoupling during major financial crises.

JEL Classification Numbers: F30, F31, F33

Keywords: de facto exchange rate regimes, international monetary system, emerging and developing economies, global currencies.

NON-TECHNICAL SUMMARY

Over the past three decades many small open economies have used the US dollar as nominal anchor in their exchange rate regime with the aim of reducing and stabilising inflation and/or fostering international regional integration. In the wake of the currency crises that affected emerging and developing countries in the 1990s, many systemically important economies in Latin America and Asia have started to increase the flexibility of their exchange rate in order to stabilise output and deal with volatile capital flows.

This paper contributes to the empirical literature on the de facto exchange rate regimes in emerging and developing economies. We propose a synthetic measure of exchange rate practices over the period 1980 to 2010, using a sample of 149 emerging and developing countries. We use an enhanced version of the methodology proposed by Frankel and Wei (2008). Under this methodology, the degree of exchange rate flexibility and the anchor choice are simultaneously estimated. We improve upon the original methodology by proposing a dynamic measure of exchange rate practices obtained through recursive constrained linear least-squares of the currency exchange rate variation against the variation of SDR currencies and a flexibility indicator. This enables us to generate anchor currency weights for all countries in the sample on a monthly basis from 1980 to 2010.

The individual country results are then aggregated on a trade-weighted basis into a global indicator of exchange rate regime choice. This indicator captures both the degree of exchange rate flexibility and the global weights of the main anchor currencies. Our global indicator suggests that there have been over the past 30 years no systematic or trend shifts in exchange rate practices of emerging market and developing countries. The US dollar has remained the main anchor currency, with the euro as a distant second, throughout the entire sample period. Nevertheless, there has been some short-term variation in exchange rate practices, in particular during major financial crises when several emerging markets were forced to (temporarily) abandon or adjust their pegs. Also, we find some more heterogeneous evolutions at a regional level, in particular for central and eastern European and CIS countries, where the US dollar's weight has decreased over the past two decades at the benefit of a shift toward euro anchoring and enhanced exchange rate flexibility.

To examine the main drivers of these observed tendencies, we provide an empirical examination of the determinants of anchor currency choice. Given the specific nature of our indicator of exchange rate regimes, we perform tobit panel estimations that include as explanatory variables trade network effects, the currency denomination of long-term debt as well as regional aspects. The panel estimation results suggest that the evolution of exchange rate configurations can be mainly explained by structural shifts in global trade and long-term external debt denomination. Also regional network effects play a significant role in explaining anchor currency choices, suggesting that, at a regional level, a shift of one or several major countries towards another currency anchor, or towards more flexibility, may encourage their neighbours to follow such a shift.

I. INTRODUCTION

The demise of the Bretton Woods system in the early-1970s marked the end of the US dollar's *official* role as a pivotal currency in global exchange rate arrangements, but many small open economies have since chosen to maintain some form of exchange rate link to a reserve currency such as the US dollar. This role of the US dollar as an exchange rate anchor is confirmed by both de jure and de facto exchange rate regime classifications.[1] The role of other anchor currencies, such as the British pound, virtually disappeared towards the end of the 1970s, while the role of the euro has become relatively more significant, albeit being largely limited to countries with close institutional and geographical ties with the euro area. [2]

Developments in the international financial system over the past decade have reshaped the evolution of the US dollar's role in exchange rate regimes. Many large and systemically important emerging market economies in Latin America and Asia have adopted more flexible exchange rate regimes, in part due to their policy response to the financial crises of the second half of the 1990s. These policies were largely underpinned by the need to gain monetary policy autonomy, especially for countries adopting inflation targeting regimes. In the past few years, emerging market economies have taken steps to reduce the anchoring role of the US dollar. The global financial crisis of 2007-2010 may have triggered a further shift, as some countries (e.g. Russia) increased the flexibility of their exchange rates and lowered the weight of the US dollar in the currency basket used for setting exchange rate policy.

The assessment of de facto exchange rate regimes is an important issue that has national and global implications. At the national level, the evolution of the so-called *natural* regime can be a useful tool to measure the disparity between the de jure and de facto exchange rate regime over time.[3] At the global level, such an assessment may have consequences for the pattern and adjustment of external imbalances. An aggregate measure of anchor currency choices may help gauge the impact that changes in the exchange rates between the main currencies could have for the unwinding of imbalances across countries and regions.

Hence, there is a need for a better understanding of exchange rate practices in emerging markets and developing economies. This paper provides a systematic way of looking at the role played by anchor currencies or baskets of currencies, based on a sample of 149 emerging

[1] Tavlas et al (2008) provide a survey of the literature on de facto and de jure exchange rate regime classifications.

[2] Meissner and Oomes (2008) show that the share of countries anchoring their currency to the British pound declined from around 20 percent in the 1950s and 1960s to zero percent by the early-1980s. ECB (2009) lists around 50 countries and territories that assign some role to the euro in the formulation of their exchange rate policies. Most of these countries and territories are located on the European continent or have close institutional ties with the euro area countries.

[3] The natural classification was introduced by Reinhart and Rogoff (2004). The gap between the de jure and de facto exchange rate regime can indicate "fear of floating" or alternatively, more discretion in the conduct of monetary policy.

market and developing countries. An extension of Frankel and Wei (2008) is used to assess a country's de facto exchange rate regime (i.e., hard peg, intermediate or freely floating) by simultaneously estimating the degree of exchange rate flexibility and the choice of the anchor. The paper is thus related with two strands of literature. On the one hand, in order to estimate the degree of exchange rate flexibility, we use techniques borrowed from the fixed-versus-floating literature on the de facto exchange rate regime that a country follows in practice. On the other hand, for pegged regimes, we identify the currency or basket of currencies to which a particular country's exchange rate is linked, and for currency baskets, we calculate the importance (weights) of individual currencies, similar to the literature on the choice of currency basket weights.

Besides combining these two approaches on a larger set of countries, the paper proposes a measure of country exchange rate practices that varies over time. Individual country results are further aggregated on a trade-weighted basis into a composite measure of exchange rate regime choice. Such a global indicator is used to assess the importance of the US dollar, euro or other major currencies as exchange rate anchor anchors. Finally, we explore the determinants of anchor choices for emerging and developing countries.

The main findings of our paper are twofold. First, there is no evidence of a systematic shift away from the US dollar as an anchor currency at the global level, based on the trade-weighted indicator of exchange rate regimes. However, panel estimation results show heterogeneous trends at the regional level. In particular, for Central and Eastern European and CIS countries, the US dollar anchor weight has declined in tandem with a move towards a closer tracking of the euro and enhanced exchange rate flexibility. Second, the results suggest that the evolution of the anchoring role of currencies can be mainly explained by structural shifts in global trade and the currency denomination of long-term external debt. Moreover, regional network effects play a significant role in explaining anchor currency choices, suggesting that, if one or several major countries move towards an alternative currency anchor, or towards more flexibility, this encourages their neighbours in the region to follow.

The remainder of the paper is organised as follows. Section 2 reviews the methodology and data used in the paper. Section 3 presents the main results of the estimation techniques for a number of individual countries and compares them to those with well-established exchange rate classifications, by way of robustness checks. Section 4 discusses the proposed new composite indicator of exchange rate regime choice, while Section 5 examines its main determinants. Section 6 concludes and draws some policy implications.

II. METHODOLOGICAL ISSUES AND DATASET

This study proposes a time-varying measure of exchange rate regimes choices for emerging market and developing economies to assess whether there is a systematic shift away from the

US dollar standard in recent years. The measure is based on countries' actual (de facto) exchange practices, rather than stated (de jure) behaviour.

The two main aspects of regime choice, i.e. the degree of exchange rate flexibility and, in case of a peg or a managed float, the choice of the anchor currency/currencies, are jointly estimated. More precisely, monthly data on individual countries' exchange rate fluctuations are explained by changes in anchor currencies and an exchange market pressure index reflecting the degree of currency flexibility. Our measure of exchange rate regime choice thus combines some methodological aspects from the literature on de facto exchange rate regimes with findings from the literature on basket currency weights.

The literature on de facto regimes was developed by Ghosh et al. (2002), Levy-Yeyati and Sturzenegger (2003, 2005), Reinhart and Rogoff (2004), Calvo and Reinhart (2002), and Shambaugh (2004) to provide more accurate exchange rate classifications on the basis of observed exchange rate developments, rather than the declared behaviour by the authorities. The methodologies developed to this end aim to address a number of shortcomings of exchange rate regimes classifications, including the official (de jure) classification compiled by the IMF until the early-2000s.

The literature on basket currency weights was developed during the first half of the 1990s by Frankel (1993) and Frankel and Wei (1994, 1995) to empirically infer the composition of exchange rate baskets. These techniques regained attention recently, as Eichengreen (2006), Yamazaki (2006), Frankel and Wei (2006) and Shah and Patnaik (2007) applied them to infer the basket weights in the exchange rate of the Chinese renminbi or the Indian rupee.

The estimation procedure used in the paper is derived from Frankel and Wei (2008), the first authors to propose a systematic synthesis of the literature on de facto exchange rate regimes and basket currency weights. Frankel and Wei (2008) quantify the degree of exchange rate flexibility and the anchor currency choice in one single step by estimating the following relationship between exchange rate fluctuations of the home currency, exchange rate fluctuations of the basket currencies, and a market pressure index.

For each country *i* at time *t*:

$$\ln e_{it+s} - \ln e_{it} = \beta_{i0} + \beta_{iFLEX}(emp_{it+s} - emp_{it}) + \sum_{k=1}^{4} \beta_{ik}(\ln c_{ikt+s} - \ln c_{ikt}) + \varepsilon_{it} \qquad (1a)$$

$$with \;\; emp_{it+s} - emp_{it} = (\ln e_{it+s} - \ln e_{it}) + (\ln RES_{it+s} - \ln RES_{it}) \qquad (1b)$$

$$\text{Subject to} \sum_{k=1}^{4} \beta_{ik} = 1 \qquad (1c)$$

In the above set of equations, the change in the exchange rate of the home currency (e_t) over a selected time span (*s* periods, typically a few months) is regressed on the percentage change in an exchange market pressure index (emp_t) and the exchange rates of the four main currencies (euro, US dollar, Japanese yen and British pound, denoted $c_k, k = 1,4$). The

exchange rates are expressed in terms of a numeraire currency (the SDR). The coefficients β_{FLEX} and $\beta_k, k = 1,4$ indicate, respectively, the degree of independence of the exchange rate and the degree of anchoring vis-à-vis the four main anchor currencies. The exchange market pressures index (equation 1b) is computed as the unweighted average of changes in the exchange rate and changes in foreign exchange reserves (RES_t). As in Reinhart and Rogoff (2004), the bivariate index of exchange market pressure captures the degree of free floating as well as the episodes of free falling in the aftermath of a speculative attack. Finally, the regression equation is subject to the constraint that the weights on anchor currencies should add up to unity (equation 1c). This constraint is imposed on the model by subtracting the exchange rate of the British pound from both sides in equation (1a), which yields:

$$d\ln e_t - d\ln GBP_t = \beta_0 + \beta_{FLEX}(emp_{t+s} - emp_t) + \beta_1(d\ln EUR_t - d\ln GBP_t) + \\ + \beta_2(d\ln USD_t - d\ln GBP_t) + \beta_3(d\ln JPY_t - d\ln GBP_t) + \varepsilon_t \qquad (1d)$$

Following the estimation of relation *(1d)* over a 4-year window of monthly data, Frankel and Wei (2008) provide estimates of anchor currency weights for 20 currencies characterised by different exchange rate arrangements over the last three decades.

We extend and adjust Frankel and Wei's (2008) methodology in several ways and estimate the following model, for each country *i* at time *t*:

$$d\ln e_{it} = \beta_{i0}{}^t + \beta_{i1}{}^t FLEX_{it} + \beta_{i2}{}^t d\ln EUR_t + \beta_{i3}{}^t d\ln USD_t + \beta_{i4}{}^t d\ln JPY_t + \\ + \beta_{i5}{}^t d\ln GBP_t + \varepsilon_{it} \qquad (2a)$$

$$\text{with } FLEX_{i,t} = d\ln e_t + \frac{\sigma_e^2}{\sigma_{RES}^2} \cdot d\ln RES_t \qquad (2b)$$

$$\text{Subject to } \beta_{i1}{}^t + \beta_{i2}{}^t + \beta_{i3}{}^t + \beta_{i4}{}^t + \beta_{i5}{}^t = 1 \qquad (2c)$$

$$\beta_{i1}{}^t, \beta_{i2}{}^t, \beta_{i3}{}^t, \beta_{i4}{}^t, \beta_{i5}{}^t \geq 0 \qquad (2d)$$

where e_{it} denotes the nominal exchange rate of currency *i* against the reference currency (the SDR), EUR_t, USD_t, JPY_t, and GBP_t are the exchange rates of the anchor currencies, $\beta_2, ..., \beta_5$ are the potential weights of the four anchor currencies (euro, US dollar, Japanese yen and British pound) in the currency basket, and ε_{it} is the error term. $FLEX_{it}$ is a bivariate flexibility index computed at the country level based on several variables that capture the policy choices and the behaviour of monetary authorities (see definition below).[4] The β_{i1} coefficient can thus be interpreted as the degree of currency flexibility. Finally, for all beta coefficients, the index *t* denotes the end date of the rolling 24-month window.

[4] In a recent survey paper, Tavlas et al. (2008) suggest to include monetary policy variables, such as interest rates. We only focus on the reserves variation instrument for data availability purposes but also because many developing countries have maintained controls on interest rates over the period under consideration.

Our methodology differs from Frankel and Wei's (2008) in several respects:

First, the system is dynamically estimated by introducing a 24- month rolling estimation window. This allows us to produce time-varying weights (the betas) and is, in our view, preferable to a splitting of the sample period in specific sub-periods.

Second, the exchange rate flexibility index ($FLEX_{it}$) is defined as the weighted (rather than the unweighted) average of the variation in exchange rates and the variation in reserves. The weights of the two components are determined by their relative volatility (where σ_e^2 and σ_{RES}^2 denote the variance of the monthly variation in the nominal exchange rate and in total reserves over the period 1978-2010). This methodology is similar to Goldstein, Kaminsky and Reinhart (2000) and Calvo and Reinhart (2002) and allows us to adjust the index for differences in the amplitude of both components. The choice of these two components reflects the idea that monetary authorities can respond to pressures on the currency, by selling reserves in the foreign exchange market and/or by letting the currency depreciate, especially when defending a certain level of the exchange rate entails significant reserve losses. An estimated coefficient of zero for the flexibility indicator signifies a totally fixed exchange rate, whereas a coefficient of *1* signifies a freely floating currency and the absence of any intervention in the foreign exchange market. A strictly positive coefficient reflects either some degree of currency flexibility in the absence of real shocks on the currency, or an episode of speculative attack involving both changes in reserves and in the level of the exchange rate.[5]

Third, the constraint that coefficients sum up to 1 includes not only the coefficients on the individual anchor currencies, but also the coefficient on the flexibility indicator (equation 2c). Additionally, all coefficients are non-negative. A coefficient of *0* for one of the four main currencies ($\beta_{i1},...,\beta_{i4} = 0$) indicates that the evolution of the exchange rate cannot be associated to changes in one major anchor currency, while a coefficient of *1* suggests that the currency is fully pegged to one of the four main currencies under consideration.

Finally, the imposition of these constraints implies that the estimation technique is based on a constrained linear least squares optimisation procedure. The beta coefficients for the

[5] Apart from the clear cases of conventional and hard pegs, in practice, countries that declare to follow a floating regime actually intervene in the exchange market in order to limit the variability of their currency (*fear of floating*). There may also be the opposite case that countries declaring to follow a fixed exchange rate regime may adjust periodically the value of their currency or revise the reference for exchange rate (one example of exchange rates within crawling bands is Belarus, where the band widths are frequently adjusted). All these intermediate regimes require the presence of a flexibility index that includes not only the variability of the exchange rate itself but also a measure of the amount to which the authorities make use of the reserves instrument in order to smooth the fluctuations in the exchange rate. By construction, the flexibility index thus combines currency floating in absence of real shocks and cases of de-pegging in the aftermath of speculative attacks on the currency. Even if, conceptually, the turmoil periods are not per se cases of de facto currency floating, it is necessary to control for these episodes, in our optimization framework, through the flexibility index.

flexibility indicator and the four anchor currencies are estimated recursively, as the solution to a standard problem of square residuals minimisation under in/equality constraints.[6] The optimisation technique assigns to each term on the right hand side of relation *(2)* a continuous weight between *0* and *1*, and helps estimate the individual-specific mix of currency fixity and flexibility that a given country follows in practice.

One important modelling option concerns the choice of the potential basket currencies, which in this case includes the euro, the US dollar, the British pound, and the Japanese yen. These four currencies are found to have played an anchoring role in different degrees during the past two or three decades, as shown by the various studies on the exchange rate regime and anchor currencies (see, for instance, the IMF exchange rate regime classifications, as well as Reinhart and Rogoff, 2004 and Ilzetzki, Reinhart and Rogoff, 2008).

Prior to 1999, the euro exchange rate is proxied by the exchange rate series of the French franc. There are three main reasons for doing so. First, it is not possible to introduce several euro legacy currencies into the estimation framework. Given that their exchange rates are too closely correlated, this may introduce a severe multicollinearity bias into the estimations. Second, the alternative of introducing the exchange rate of the synthetic euro, as computed, inter alia at the ECB, would be problematic, as it would assign some weight to legacy currencies that did not play any anchoring role in the past. Third, available studies such as Reinhart and Rogoff (2004) and Meissner and Oomes (2008) show that the French franc is the main euro legacy currency that provided some anchoring role at the global level, including for the countries of the African CFA franc zone.[7] While the Deutsche mark served as an anchor in the exchange rate policies of some transition economies during the 1990s, this is, in our view, fully captured by the French franc exchange rate series. The explanation lies with the fact that in the 1990s, the Deutsche mark and the French franc exchange rates have showed almost a perfect correlation (around *0.95* over the period 1990-2008).

The exchange rate series are first differenced to address the potential problem of non-stationarity and multicollinearity implied by a regression on levels. The choice of SDR (defined as the weighted average of the four anchor currencies) as the numeraire currency also helps reduce the multicollinearity problem. Indeed, the pairwise correlations between the main variables that enter the model are negative (see Table 1), with the exception of the euro-British pound prior to the launch of the euro in 1999 and the pairs euro-British pound and Japanese yen-US dollar after 1999, for which correlations are positive, but smaller than *0.6*.

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[6] The algorithm for solving the least square problem, $\min_b \|Xb - y\|_2^2$, under linear constraints on coefficients *(2c-d),* involves convergence to a global optimum through iterations over two-dimension trust regions around the initial values of variables. In equation *(3)*, X is a matrix of independent variables $[1 \;\; FLEX \;\ldots\; d\ln GBP]$, y the vector of the dependent variable, $\|\;\|_2$ the two-norm and b the vector of coefficients i.e. the solution of minimized square errors.

[7] Besides the CFA franc zone countries (Benin, Burkina Faso, Cameroon, Chad, Republic of Congo, Côte d'Ivoire, Gabon, Guinea-Bissau, Mali, Niger, Senegal, Togo), there were some other countries that anchored their currencies at some point during the 1980s or 1990s to the French franc, including Algeria, Lao, Madagascar, Mauritania, Morocco, and Tunisia.

Table 1: Pairwise correlations of global currencies exchange rates

Table 1a: January 1978 to December1998

	French franc	US dollar	Japanese yen	British pound
French franc				
US dollar	-0.23*			
Japanese yen	-0.49*	-0.68*		
British pound	0.59*	-0.49*	-0.87*	

Table 1b: January1999 to December 2008

	Euro	US dollar	Japanese yen	British pound
Euro				
US dollar	-0.96*			
Japanese yen	-0.58*	0.46*		
British pound	0.33*	-0.34*	-0.72*	

Note: First difference of the log of each currency exchange rate against the SDR, * denotes statistical significance at the 10% level.

The estimation of exchange rate regimes encompasses a sample of 149 emerging market and developing economies. Out of the 141 countries, 135 countries fall under the IMF International Financial Statistics category of "emerging and developing economies". Another 9 Central and Eastern European countries that joined the European Union in 2004 and 2007, are added, while the 5 Asian Newly Industrialised Economies and Middle East economies that have graduated from emerging market economies were included in the sample. An overview of countries and time periods covered is provided in Appendix 1.

The empirical estimations are conducted, as far as data availability allows, from January 1978 to February 2010. Given that our estimations are performed over a 24-month rolling window, the global indicator is generated starting with January 1980. Monthly exchange rates against the SDR, as well as the exchange rates of the four anchor currencies, are taken from the IMF's International Financial Statistics.[8] To compute the flexibility index presented in equation (2c), foreign exchange reserves are calculated by subtracting gold from the total reserves, which are also available from the IMF International Financial Statistics (line 11.d).

III. ESTIMATION RESULTS FOR INDIVIDUAL COUNTRIES

This study measures the exchange rate anchoring behaviour for the 149 countries in the sample by estimating constrained OLS regressions of the model previously described in equations (2a-2d). The optimisation algorithm enables us to retrieve the coefficients estimates as the global solution of the least square problem, over the 24-month rolling window.

This section presents the results for a few salient and well-documented emerging markets and developing country cases (Subsection A) and provides a systematic comparison of our results

[8] We use end-of-period exchange rates against the SDR as available under code "aa" in the International Financial Statistics.

with those of well-established de facto exchange rate regime classifications (Subsection B). As an additional robustness check, we apply our estimation technique to a few advanced economies that are not issuers of global currencies (Subsection C).

A. Review of selected country cases

This subsection examines some of the individual country cases, selecting different examples across the spectrum of exchange rate regimes. The sample ranges from cases of hard pegs (Hong Kong SAR, Saudi Arabia, Lithuania) to conventional pegs against a currency or a composite (China, Russia), as well as some intermediate and flexible regimes (Ukraine, South Africa and Mexico).

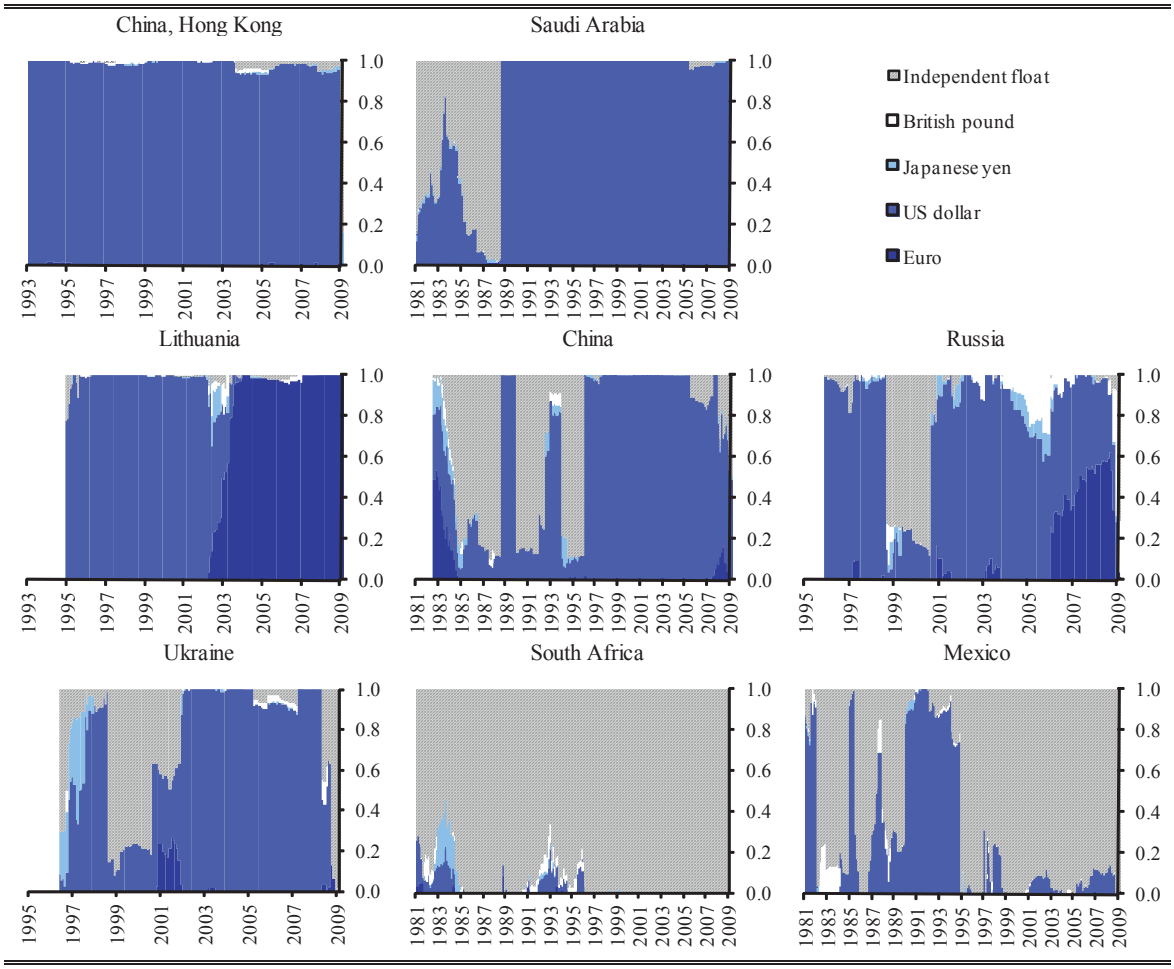
Estimates for **Hong Kong SAR** indicate a weight of 1 for the US dollar until 2004, in line with the adoption of a currency board arrangement against the US dollar since 1983. Furthermore, a slightly lower weight for the US dollar since 2004 reflects a certain degree of flexibility in the currency, with the adoption of a narrow trading band.

The results indicate that **Saudi Arabia** has consistently tracked the US dollar from 1989 onwards, with an estimated coefficient of 1 (Figure 1b). This is in line with Ilzetzki, Reinhart and Rogoff's (2008) findings, and with the de facto IMF classification, which also date the shift to a US dollar peg in 1989. Prior to 1988, our results highlight a mix of flexibility and fixity vis-à-vis the US dollar. In particular, the coefficient on the US dollar is relatively high during 1983-1985, which is consistent with the IMF classification of a narrow crawling peg/band in 1983-1984, while suggesting a lower degree of commitment to the US dollar for the rest of the 1980s.

The results for **Lithuania** suggest that the country shifted to a US dollar peg in late 1994, when the estimated coefficient on the US dollar increased to almost 1, and to a euro peg in 2002 with an estimated coefficient on the euro of almost 1 (Figure 1c). These results mirror the IMF classification, which identifies a currency board regime from 1994 onwards.[9]

[9] The flexibility indicator is around *0.1* over the period 2003-2006.

Figure 1a-h: Estimated anchor weights for selected emerging market economies



The estimated results for **China** are also consistent with the de factor regime. The estimates show a high level of flexibility until 1995, during the period of an intermediate exchange regime. However, China appears to have limited the renminbi's fluctuations vis-à-vis the US dollar at certain periods during the phase of currency inconvertibility, before 1994 (see Figure 1d). The estimates suggest that the currency was pegged to the US dollar starting from 1996, although this starting point of the move to a full peg regime is different from Ilzetzki, Reinhart and Rogoff (2008), who identify the shift as taking place two years earlier. This result is also different from the IMF's de facto classification, where the renminbi is pegged on the US dollar starting with 1998. The results capture a decline in the weight of the US dollar anchor, and a small move towards limited flexibility in 2005 (i.e., the US dollar anchor coefficient declines from 1 in 2004 to 0.94 in 2005). These results seem to reflect China's announced move to a more flexible exchange rate regime in July 2005. At the same time, based on our estimates, the US dollar weight in China's exchange rate regime remained high, and appeared to increase again from August 2009 onwards. As of February 2010, our results suggest a weight on the US dollar of around 0.75, while the flexibility component is around 0.24.

In the case of **Russia**, the results point to quite significant shifts in the exchange rate regime over time (Figure 1e). Unlike the two alternative classifications, the estimates from this study show more fixity of the Russian rouble from the mid-1990s onwards. The US dollar anchor weight is considerably higher during the first part of the sample period from 1995 to 1998, while it falls under the freely floating category in Ilzetzki, Reinhart and Rogoff (2008), and the soft peg/managed floating category, under the IMF classification. The flexibility indicator during the Russian crisis goes from almost zero, in September 1998, to 0.7-0.8 in the following two years, as the exchange rate saw significant pressure during this period--in line with the findings of the other two classifications. Starting with 2005, there is evidence of a shift away from the US dollar anchor towards a closer tracking of the euro. The US dollar coefficient drops from 0.84 on average in 2004 to 0.58 in 2006 and 0.37 in 2008, while the euro share raises from zero, on average, in 2005 to 0.33 in 2006 and 0.50 in 2008. This shift away from the US dollar is in line with Ilzetzki, Reinhart and Rogoff (2008), who find that Russia "in principle, targets a US dollar-euro basket", and it is also in line with Central Bank of Russia statements that the weight of the euro in the basket peg has been gradually increased over time. More recently, the estimated flexibility coefficient has increased sharply, peaking at 0.67 in January 2009, reflecting the impact of the global financial crisis on the exchange rate.

The **Ukrainian** hryvnia exhibits large fluctuations in both the flexibility coefficient and the US dollar coefficient, in line with the two other classifications that assign the currency to either freely floating/falling or the soft peg/managed floating categories until 2002. Our results suggest a shift to a full US dollar peg in 2002, which is again consistent with the other two classifications. However, results from more recent period, during the global financial crisis, point to a small degree of currency flexibility and de-pegging from the US dollar standard. The flexibility coefficient increases sharply after May 2008, systematically exceeding 0.90 during the rest of the sample period. While the two other classifications are not yet available for this most recent time period, the finding seems to be in line with the temporary decoupling of the Ukrainian hryvnia from the US dollar and its large depreciation in the wake of the global financial crisis (see Figure 1f).

The **South African rand** has been associated with a freely floating regime since mid-1990s. Estimates from our study provide similar results, with a flexibility coefficient close to 1 from 1996 onwards. Prior to that, our estimates suggest that the currency's degree of flexibility was high, roughly above 0.8, even though, at times, there is some evidence of tracking the US dollar (for instance, in early-1980s). This finding is in line with Ilzetzki, Reinhart and Rogoff's (2008) classification according to which the currency followed a managed floating/dual rate regime during this period.

To take another example, this study shows that the **Mexican peso** moved from a US dollar peg to independently floating regime at end-1994 and maintained a very high degree of flexibility since, with a flexibility coefficient generally above 0.8 (see Figure 1h). This finding coincides with Ilzetzki, Reinhart and Rogoff (2008) for the period 1994-1996, but it differs in later years, when the Mexican peso is classified as managed float/de facto crawling band vis-à-vis the US dollar.

This descriptive review of selected country cases tentatively suggests that our estimation results are economically meaningful and broadly compatible with the established exchange rate regime classifications or official announcements by authorities. The estimation procedure also does a reasonably good job of detecting turning points, as seen through the sharp increase in the flexibility coefficients during the sharp depreciations of the Mexican peso in December 1994, the Russian rouble and the Ukrainian hryvnia in the second half of 2008. Our methodology also picks up sudden shifts in anchor currencies, as it was the case of the Lithuanian Litas that moved from an US dollar to a euro peg in early-2002, or more nuanced shifts of exchange rate regimes, as in the case of the Chinese renminbi after July 2005.

There are, however, instances where the estimated results did not correspond with other regime classifications. In particular, the estimation methodology does not always adequately detect the precise degree of exchange rate anchoring in the case of intermediate regimes. The results for the Mexican peso provide an illustration of this issue, where the estimates show a considerable degree of flexibility, while other classifications point to a managed float. This result is perhaps not surprising given the very nature of intermediate regimes, and the difficulties generally encountered in the literature in classifying them accordingly. In some other limited cases, the methodology in this study is unable to disentangle uncontrolled exchange rate depreciations ("freely falling" episodes) and intended and well-controlled parity revaluations.

Finally, the equivalence between our continuously estimated betas and other de facto regimes classifications, based on different estimation techniques, is not necessarily linear, as the coefficients come from an optimisation procedure. Therefore there may be thresholds in our coefficients estimates above or below which they fall more easily under the hard peg or free floating/falling extreme categories.

B. A systematic comparison of our results with other classifications

A systematic comparison of this study with available exchange classifications is not straightforward. Our study provides a continuous ordering of the exchange rate regime and is therefore "richer" than other classifications, which offer only a discrete measure of such ordering. To compare results, we have to reduce the information content of our estimated exchange rate regimes by transforming our continuous classification into a discrete one and make some ad hoc assumptions on the cut-off values. This is a partly arbitrary exercise, as the coefficient thresholds for narrow crawling peg/band and soft peg/managed floating in the sense of harmonised Ilzetzki, Reinhart and Rogoff (2008) and IMF de facto classifications are difficult to identify. Nevertheless, we identify four broad groups of exchange rate regimes, in line with the two above mentioned classifications, by applying the following conditions on the continuous coefficient estimates:

hard peg: one of the anchor currency coefficient is larger than 0.9, i.e. $\beta_{i,k} \geq 0.9, k = 1,4$

This category includes cases of no separate legal tender, pre announced peg or currency board arrangement, pre announced horizontal band that is narrower than or equal to +/-2% as well as de facto pegs according to the Ilzetzki, Reinhart and Rogoff (2008) and de facto IMF classifications.

narrow crawling peg or band: the flexibility coefficient is between 0.1 and 0.5, i.e. $0.1 \leq \beta_{i,FLEX} < 0.5$

The equivalent discrete regimes which fall into the second category are pre announced crawling pegs, pre announced crawling bands narrower than or equal to +/-2%, de facto crawling pegs and de facto crawling bands narrower than or equal to +/-2%.

soft peg or managed floating: the flexibility coefficient is between 0.5 and 0.9, i.e. $0.5 \leq \beta_{i,FLEX} < 0.9$

The third category includes the pre announced crawling bands wider than or equal to +/-2%, de facto crawling bands narrower than or equal to +/-5%, moving band narrower than or equal to +/-2% (i.e., that allows for both appreciation and depreciation over time) as well as the managed floating regimes.

freely floating or freely falling regime: the flexibility coefficient exceeds 0.9, $\beta_{i,FLEX} \geq 0.9$

The fourth category includes the freely floating, freely falling regimes as well as the cases of dual market in which parallel market data is missing.

For robustness checks, the four classes can be further grouped into hard/conventional pegs, intermediate and flexible regimes by merging categories (2) and (3).

Table 2 reports the results of two nonparametric measures of association (Spearman and Kendall tau-b correlation coefficients[10]) based on the ranks of the de facto regimes identified by the three methodologies. The regimes are grouped in either four or three equivalent categories according to their degree of fixity, from the most rigid (that falls into the low category) to most flexible (that falls into the upper category) of the spectrum.

Table 2: Pairwise rank correlation coefficients (End-2007, 119 countries)

		Our study, IRR (1)	Our study, IMF (2)	IRR, IMF (3)
Spearman	4 classes	0.58*	0.49*	0.64*
	3 classes	0.58*	0.49*	0.61*

[10] The Kendall tau-b correlation coefficient is adjusted for ties (Kendall, 1970) and based on the number of concordances and discordances in paired observations that makes it sometimes preferred to Spearman rank correlation as it does estimate a population parameter.

Kendall's tau-b	4 classes	0.50*	0.43*	0.59*
	3 classes	0.54*	0.45*	0.59*

Notes: * denotes significance at 5% level; IRR denotes Ilzetzki, Reinhart and Rogoff (2008) and IMF, the IMF de facto classification.

Columns (1) and (2) present the rank correlation coefficients between our study and the other two well established classifications. Both Spearman and Kendall tau-b correlation coefficients, adjusted or not for ties, show a higher concordance of our results with the Ilzetzki, Reinhart and Rogoff (2008) *natural* classification (in the range of 0.5 –0.6) than with the IMF de facto classification (around 0.4).[11] At the same time, it is worth noting that the correlation between the two studies is not particularly high (around 0.6, reported in the Column (3) of Table 2).

C. Robustness check: Results for advanced economies

As a further robustness check we apply our estimation technique to selected advanced economies other than the issuers of global currencies and compare our results with the two alternative classifications (IMF and Ilzetzki, Reinhart and Rogoff, 2008). Overall, the model provides satisfactory results (see Figures 2a-e).

In the case of the **Australian dollar**, the estimated weight of the flexibility component was almost 1 for the period for which data is available (i.e., starting with 1993), with the exception of 1997-98 during the Asian crisis and in the second half of 2000s, when the currency showed a correlation of around 0.2 with the Japanese yen.

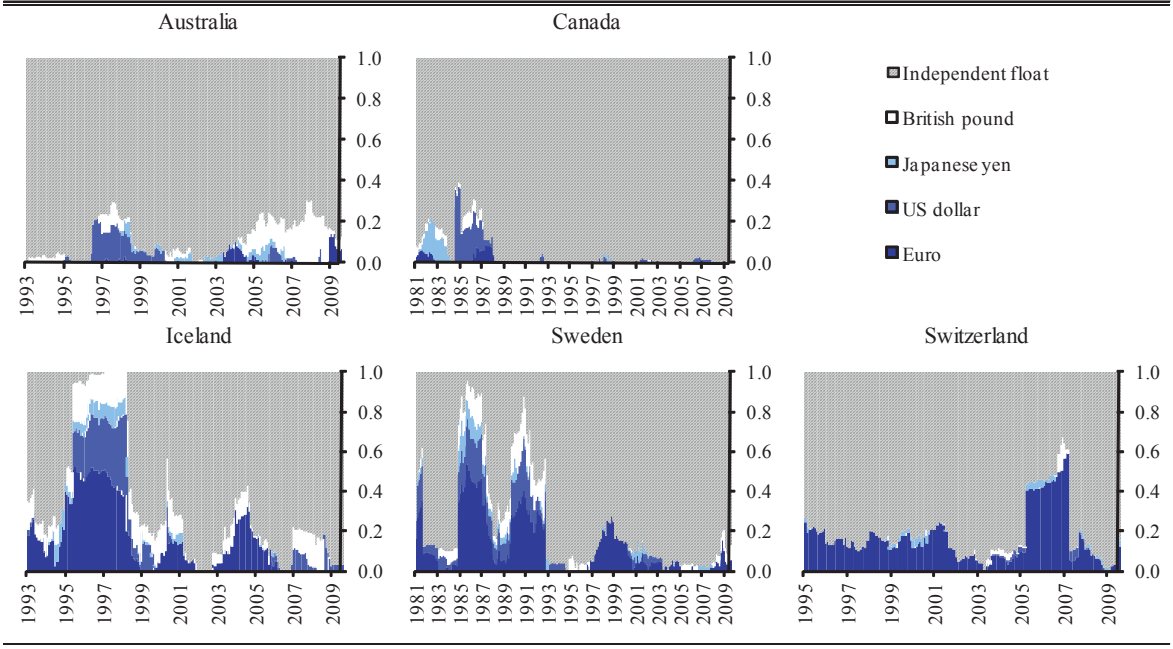
Another typical example of fully flexible exchange rate according to the IMF, the **Canadian dollar** shows an estimated degree of flexibility of almost 1 during the last three decades. By contrast, Ilzetzki, Reinhart and Rogoff (2008) find that a moving band around the US dollar would be more in line with the regime effectively followed by the Canadian dollar over the last three decades.

From mid-1980s onward, the **Icelandic krona** has been officially pegged to a basket of currencies with the ECU/euro playing a preponderant role (more than ¾). In practice, the regime effectively followed by the monetary authorities has been classified by the IMF as a facto peg around the Deutsche mark until 1997; with more flexibility progressively being allowed to the currency (managed floating up to 2001 followed by freely floating). However, for Ilzetzki, Reinhart and Rogoff (2008) the regime followed by Iceland is a more intermediate one, without big regime shifts: a crawling band around the Deutsche mark until 2000 followed by managed floating. Our results tend to suggest that during the 4-year period before the launch of the euro, Iceland maintained a conventional peg in which the euro's legacy currencies accounted for around 39% on the average. During more recent period

[11] There is a case where $\beta_{i,FLEX} < 0.1$ but there is not only one currency (hard peg on a basket): this is taken into account as soft peg but including it as narrow crawling peg/band does not affect the rank correlation results.

(2003-2005) the currency seemed to still track the euro (for around 16% on the average), but overall the currency is characterized by a large degree of flexibility.

Figures 2a-e: Estimated anchor weights for selected advanced economies



The **Swedish krona** followed, according to the IMF classification, a fixed exchange rate regime until 1994 when more flexibility was allowed to the currency, under the form of managed floating up to 2001 and freely floating after that date. Ilzetzki, Reinhart and Rogoff (2008) classify the regime as a de facto crawling band around the Deutsche mark until the EMS crisis and as a flexible regime since the beginning of the 1990s. The results from this study suggest that the currency was indeed pegged to the euro's legacy currencies up to 1993, and tracked the euro to a certain extent in late 1990s, but overall, the Swedish krona seems to have followed a flexible exchange regime over the last decade.

The **Swiss Franc** is another interesting case as it plays, along with the Japanese yen, a role of safe haven currency. The Swiss Franc is freely floating according to the IMF de facto classification, although Ilzetzki, Reinhart and Rogoff (2008) classify it as a de facto soft peg that has tracked the Deutsche mark/euro fluctuations within a moving band from 1981 onwards. Our estimation results point to a limited role for the euro as anchor for the Swiss Franc (weight in the range 0.1- 0.2 since mid-1995), with the exception of 2005-2007 when the weight of the euro increased to around 0.4.

IV. GLOBAL INDICATOR OF EXCHANGE RATE REGIMES

To compute a global indicator of exchange rate regimes, this study aggregates individual country results for emerging and developing countries. As a first attempt at constructing such

a global indicator, we count the number of countries that chose a given exchange rate anchor currency in a given year. For the construction of such a "count-based" indicator, countries are assigned to either a fixed or a floating regime over time, according to the importance of the main currencies and/of flexibility indicator in determining their exchange rate trajectory. Using a 0.5 cut-off for either the main currencies or the degree of flexibility we classify a given currency as dominantly following either one or another of the bipolar regimes.

Figure 3 illustrates the evolution of the number of emerging and developing countries assigned to the euro and US-dollar pegs, or to a flexible exchange rate regime, based on this criterion. Overall, it is difficult to disentangle, over time, the observed gradual trend toward bipolar regimes and the general increase in the total number of countries. For instance, in the case of the euro, at end-1998, there were 18 countries that had chosen it as main anchor currency, compared to 20 in early-2010. For the US dollar the number of countries has been rather stable throughout the 1990s, but it dropped rather strongly during the last years, from around 50 in 2007 to 30 in early-2010.

Figure 3: Number of countries with predominantly fixed or floating exchange rate regimes*

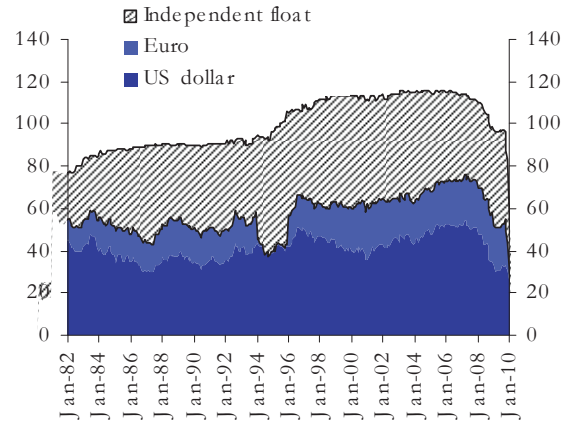
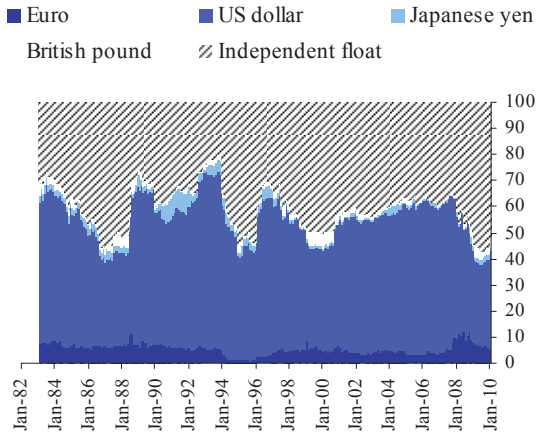


Figure 4: Trade-weighted global indicator of de facto exchange rate regime choice



*Anchor currency or independent floating weights of at least 0.5 respectively.

Beyond the artificial translation of continuous weight into a discrete measure, the main caveat to the previous method is the fact that countries are treated equally when they are assigned to a given category. Thus the information conveyed by a categorical approach may not be useful to assess the global role of currencies.

To deal with this caveat, we aggregate individual country results into a trade-weighted global indicator of the exchange rate regime choice. More precisely, the weight assigned to each currency is the share of its imports and exports in total world trade. In order to disentangle

the volume effects stemming from the changing patterns of trade over the last four decades[12] and those coming from changes in the anchor currency, or in the degree of flexibility per se, we impose that the trade shares across the group of emerging and developing countries add up to one. The evolution of the global indicator is illustrated on Figure 4.

The results convey, at the global level, some important features on the long trends in the share of the main anchor currencies. On a trade-weight basis, over the period 1999-2010, the euro's weight as an anchor currency has maintained relatively stable, at around 7.5%. There was some volatility during the recent global financial crisis, as weight of the euro as anchor currency picked up to around 10% during 2008, and subsequently returned to around 6% by early-2010.

The role of the US dollar as anchor currency proved to be relatively volatile over the past decades. Its weight in the exchange rate configurations of emerging and developing countries hovered around 50% over the past 30 years, but with some volatility and notable troughs in the late-1980s, the mid-1990s, the late-1990s and the end of the last decade (2008 and 2009). These troughs in the US dollar's global role as an anchor currency appear to coincide broadly with periods of crisis or stress in the global financial system, forcing some countries to abandon their pegs to the US dollar (e.g., the emerging market crises of the mid-1990s and late-1990s, as well as the recent global financial crisis). After each of these crisis episodes, however, the US dollar appeared to consistently re-establish its global anchoring role.

The role of the British pound declined over time, from mid-1990s levels of around 4% to roughly 2% over the period 1999-2010. The trade-weighted share of the Japanese yen, although very volatile, was around 3% on average over 1999-2010. At the same time, the share of independent floating regimes weighted by countries' trade has fluctuated considerably, as has mainly mirrored the fluctuations in the global weight of the US dollar.

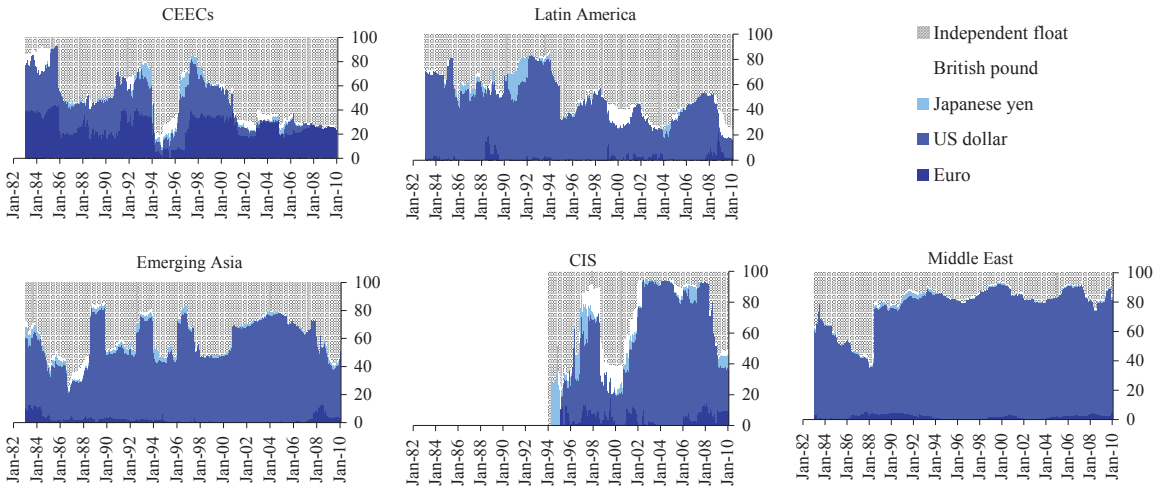
Similar indexes may be computed at the regional level in order to capture potentially different patterns in the evolution of anchor currency choices. Their evolution, in selected regions, is illustrated on Figures 5a-e.

As expected, the role of global currencies has been quite heterogeneous across regions. If we focus on the last decade since the launch of the euro, on average, the single currency accounted for 2% in emerging Asia and the Middle East, 3% in Latin America, 5% in the CIS and 26% in Central and Eastern European countries (CEECs). The regional distribution of the US dollar as anchor currency shows even larger discrepancies. Over the same period, the US dollar accounted on average for 7% in the CEECs, 32% in Latin America, 62% in Asia, 63% in the CIS and 83% in the Middle East. Mirroring these trends, the weight of de facto flexibility was only 13% on average in the Middle East countries, 23% in the CIS, 34% in emerging Asia and considerably higher, around 59 and 62% in Latin America and the CEECs respectively. In terms of trends over time, and focusing on the most recent years, the

[12] The share of emerging and developing countries in total world trade has evolved from 30% at the beginning of the 1980s, to 20% at the time of the early 1990s recession and has systematically risen to around 40% in 2009.

most notable changes were observed in Latin America and the CIS, as in both regions the importance of floating currencies increased strongly during the global crisis of 2008-2009. This appears to reflect the (partly forced, partly voluntary) abandoning of fixed exchange rate regimes in some countries.

Figures 5a-e: Trade-weighted regional indicator of de facto exchange rate regime choice



V. WHAT DRIVES THE EVOLUTION OF THE ANCHOR CURRENCY WEIGHTS?

We now try to explain, at the group level, the determinants of the degree of fixity, estimated above, vis-à-vis the four global currencies, on a monthly basis over 1980-2010. Similar to Meissner and Oomes (2008), we take into account as explanatory variables the network effects stemming from trade, as well as the currency denomination of debt.

Trade relations are measured by bilateral exports and imports between each emerging and developed country and the four main countries/regions issuing global currencies, provided on a monthly basis by the IMF Direction of Trade Statistics. Data on the currency composition of external debt are from the World Bank Global Development Finance, which contains data for the emerging market countries that report public and publicly guaranteed debt under the Debtor Reporting System. Data are available on an annual basis and linearly interpolated to obtain a time series with monthly frequency for the regressions. In the end, we retain 119 emerging and developing countries for which data is available.

This choice of determinants reflects the idea that emerging and developed countries are assigning a higher weight to anchor currencies if they trade more and borrow more with the country issuing the anchor currency. To avoid scaling problems, for each anchor currency specification, we use the shares of trade and long-term debt in total trade and long-term debt of each country in the sample with the anchor currency. We also include regional dummies to capture other considerations than trade and debt denomination that may affect the choice of an anchor currency.

Given the nature of our explanatory variables, i.e. the betas as estimated above which are bounded between 0 and 1, a double-censored pooled tobit specification seems the most appropriate (Model 1):

For each country i and currency c, at time t:

$$\hat{\hat{\beta}}_{ict} = \gamma_{0c} + Trade_{ict}\gamma_{1ic} + LTDebt_{ict}\gamma_{2c} + dummy\_Asia_i\gamma_{3c} + dummy\_Africa_i\gamma_{4c} + dummy\_CEECs_i\gamma_{5c} + dummy\_CIS_i\gamma_{6c} + dummy\_MiddleEast_i\gamma_{7c} + \varepsilon_{ict}$$

$$\hat{\hat{\beta}}_{ict} = \begin{cases} 0, if\ \hat{\beta}_{ict} \le 0 \\ \hat{\beta}_{ict}, if\ 0 < \hat{\beta}_{ict} < 1 \\ 1, if\ \hat{\beta}_{ict} \ge 1 \end{cases} \qquad (4a)$$

where $\hat{\beta}_{ict}$ denotes the uncensored vector of reference currency weights previously estimated for each currency $c=1,4$ (euro, US dollar, Japanese yen and British pound), $Trade_{ict}$ the share of trade with the country/region issuing the anchor currency c in total trade of country i, $LTDebt_{ict}$ the share of long-term debt denominated in currency c in total long-term external debt of country i, $dummy\_Africa_i$,..., $dummy\_MiddleEast_i$ the regional dummies[13] that equal *1* if country *i* belongs to a given region and *0* otherwise, γ_{0c},…, γ_{7c} the tobit regression coefficients and ε_{ic} the associated vector of disturbances.

At the outset, it should be noted that our specification may be subject to an endogeneity bias leading to inconsistent coefficient estimates. More precisely, the reverse causality, i.e., the fact that the currency denomination of debt and trade patterns may be influenced by the anchor currency choice has already been documented in the empirical literature.

First, a large and positive impact of the exchange rate regime (or the exchange rate variability) on trade flows was put forward in the case of currency unions, unilateral dollarisation and currency board arrangements by Rose (2000), Engel and Rose (2000), Alesina, Barro and Tenreyro (2002)[14]. More recently, Adam and Cobham (2007) study the effect of de facto exchange rate, in the sense of Reinhart and Rogoff (2004), on bilateral trade. They find that currency unions and more generally all the regimes that reduce the exchange rate uncertainty and transaction costs related to international trade are more "pro-trade" than managed and freely floating exchange rate regimes.

Second, the reverse causality stemming from the debt variable would imply that the share of debt denominated in a given currency is influenced by the degree of fixity vis-à-vis that currency. In the literature on the determinants of currency mismatches in the balance sheets of emerging and developing countries, the exchange rate policy and, in particular, fixed

[13] The Latin America group is the reference group; therefore the dummy is not included in the specification.
[14] See Baldwin (2005) for a literature review.

exchange rate regimes tend to encourage the accumulation of foreign currency-denominated debt. As shown by Martinez and Werner (2001) on the example of Mexico before the 1994-95 crisis, when the exchange rate had a predetermined path, there are little incentives on the side of the domestic borrowers to fully hedge the exchange rate risk. Instead, fixed exchange rate regimes provide an implicit insurance thus lowering the cost of borrowing in foreign currency. Arteta (2003) challenges this view by showing that liability dollarisation can also be encouraged by floating exchange rate regimes as hedging may become too costly in presence of highly volatile exchange rates and/or insufficient developed financial markets. More recently, using detailed micro-level data on the currency composition of firms' balance sheets in seven Latin American countries over the period 1992-2005, Kamil (2006) shows that more exchange rate flexibility tends to be associated with lower levels of unhedged foreign currency denominated debt.

This endogeneity problem can be addressed through the use of instrumental variables, either internal or external to the model. The larger the difference between initial and corrected coefficients, the more important the endogeneity bias. As an external correction is more likely to provide better results in reducing the endogeneity bias than a lagged structure, we develop an instrumental variables (IV) approach in a two-stage tobit setting (Model 2). These estimators solve the endogeneity problem by instrumenting the potentially endogenous regressors (shares of trade and debt) using exogenous variables as instruments.

In a first step, we estimate gravity models of trade and debt shares on a set of instruments standard in the empirical literature in order to get estimated trade and debt shares according to other criteria than the choice of the anchor currency.

Extensively used to explain the determinants of bilateral trade flows, the basic gravity model relates, by analogy to gravity laws in physics, bilateral trade between two countries to their size and to the distance between them. Given the specificity of our explained variable, for each country (i) and anchor currency (c), we use the real growth ($rYdiff_{ict/-c}$) and the per capita GDP differentials ($PCGDPdiff_{ct/-c}$) among countries issuing the anchor currencies to proxy for the size effect, i.e. the fact that emerging and developing countries will choose to trade more with a relatively faster growing and richer economy/region. Trading costs are proxied by the geographical ($dist_{ic}$) and cultural distance (colonial past COL_{ic}) between emerging and developing countries and a given anchor country. These variables are computed as the difference between the anchor currency and the arithmetic mean of the three other anchor currencies.

Finally, we include the share of debt denominated in the anchor currency in total long-term debt to capture complementarities between trade and financial flows that may also influence the costs of trade (see Shin and Yang, 2006):

Gravity model of Trade

For each country i and global currency c, at time t:

$$Trade_{ict} = \delta_{0ic} + rYdiff_{ct/-c}\delta_{1ic} + PCGDPdiff_{ct/-c}\delta_{2ic} + dist_{ic}\delta_{3c} + Debt_{ict}\delta_{4c} + COL_{ic}\delta_{5c} + \quad (5a)$$

The debt shares are instrumented using a gravity model similar to the ones used to explain cross-border financial flows. As shown by Martin and Rey (2004), Faruqee, Li and Yan (2004), bilateral asset holdings can be explained, similar to trade flows, by the size of the market, transaction and information costs in addition to the expected return on assets.[15] Our specification will thus include, apart from real growth rate ($Ydiff_{ict}$) and per capita income differentials ($PCGDPdiff_{ict}$) between the country that issues the currency of choice and the other main currencies, the relative geographical ($dist_{ic}$) and cultural distance (COL_{ict}), debt and trade complementarities as well as proxies for the effective cost of debt (interest rate differentials ($idiff_{ct}$) and bilateral exchange rates of anchor currencies ($FX_{ct/-c}$)). As in the case of the gravity model of trade, the differential variables for each anchor currency are computed relative to the arithmetic average of the other three anchor currencies.

Gravity model of Debt

For each country i and global currency c, at time t:

$$Debt_{ict} = \lambda_{0ic} + rYdiff_{ct/-c}\lambda_{1c} + PCGDPdiff_{ct/-c}\lambda_{2c} + dist_{ic}\lambda_{3c} + Trade_{ict}\lambda_{4c} + COL_{ict}\lambda_{5c} + \\ + idiff_{ct/-c}\lambda_{6c} + \sum_{k=7}^{8} FX_{ct/-c}\lambda_{kc} + v_{ict} \qquad (5b)$$

We denote the estimated shares of trade and debt from the two gravity models by $\hat{Trade}$ and $\hat{LTDebt}$.

In a second step, we perform pooled tobit estimations of equation (4a) on the beta coefficients using the estimated values of trade and debt shares instead of initial ones.

Model 2:For each country i and global currency c, at time t:

$$\hat{\beta}_{ict} = \gamma_{0ic} + \hat{Trade}_{ict}\gamma_{1ic} + \hat{LTDebt}_{ict}\gamma_{2ic} + dummy\_Asia_i\gamma_{3ic} + ... \\ ... + dummy\_MiddleEast_i\gamma_{7ic} + \varepsilon_{ict} \qquad (4b)$$

As far as the data sources for the gravity models are concerned, real growth rate, per capita nominal GDP, and bilateral exchange rates are taken from the IMF International Financial Statistics (lines 99BVPZF, 99b/99Z and rf respectively). Long-term interest rates are the 10-year benchmark government bond yields provided by Haver Analytics for the US, Japan and the UK whereas for the euro area long-term interest rates, we used a synthetic measure computed at the ECB. Finally, the relative distance to the anchor currency country is computed based on the great circle distance between capital cities ("as the crow flies") a common measure in the empirical literature on the determinants of bilateral trade and financial flows.

[15] See also Portes and Rey (2005) and Shin and Yang (2006) on the role of geographical and cultural distance in explaining financial transactions.

Table 3: Determinants of anchor currencies: The case of the euro

	Model 1 / pooled tobit		Model 2 / IV tobit (based on gravity equations)	
	1a)	**1b)**	**2a)**	**2b)**
Share of trade_euro area	0.49***(0.01)	0.48***(0.01)	0.36*** (0.03)	0.27*** (0.03)
Debt denomination_euro	0.80***(0.01)	0.73***(0.01)	2.05*** (0.07)	1.70*** (0.07)
Africa		0.08***(0.00)		0.11*** (0.00)
Asia		-0.04***(0.00)		-0.04***(0.00)
CEECs		-0.10***(0.01)		0.10***(0.01)
CIS		-0.20***(0.01)		-0.16***(0.01)
Latin America		REF		REF
Middle East		-0.19***(0.00)		-0.16***(0.01)
_const	-0.33***(0.00)	-0.31***(0.00)	-0.50*** (0.00)	-0.42***(0.01)
Number of obs.	*32,972*	*32,972*	*18,912*	*18,912*
No of uncensored obs	*20,334*	*20,334*	*11,171*	*11,171*
left-censored	*12,105*	*12,105*	*7,345*	*7,345*
right-censored	*533*	*533*	*396*	*396*

Notes: Specifications 1a) and 2a) do not take into account regional aspects; regional dummies are included in specifications 1b) and 2b); * denotes significance at 10%, ** denotes significance at 5%,*** denotes significance at 1%; robust std. errors between brackets

Tables 3 and 4 report the estimation results for the euro and US dollar respectively.[16] The first two columns present the estimation results of Model 1 (pooled tobit), with and without regional dummies while the third and fourth columns refer to Model 2 (IV approach) that corrects for the endogeneity bias through the estimation of gravity equations for trade and debt. The results of the first-step of the IV approach (i.e. the estimation of the gravity equations for trade and debt, relations 5a-b) for the four anchor currencies, are reported in Appendix 2 (Tables A2.1-4).

In the case of the euro shares (Table 3), the coefficients of the share of trade with the euro area and euro- denominated debt are statistically significant and enter with expected positive sign across the two specifications. The small difference between pooled tobit and the IV approach results for trade show that there is only a limited endogeneity bias coming from trade that is likely to distort the initial results.

The result implies, for instance, in the case of a country pegging on a currency basket with variable composition, that if the euro trade share increases by 1 p.p., the country is more likely to increase the importance of the euro in the currency basket by 0.5 p.p., at the expense of other currencies in the basket. The coefficient for debt denomination looks less stable though. Indeed, after correcting for two-way causality in the relation between anchor currency choice and the choice of currency of denomination of external debt, network effects from the denomination of external debt seem to play a bigger role in driving the preference for the euro anchor. The regional effects also have a role to play, with Africa and CEECs being characterised by higher levels- and CIS and Middle East countries by lower levels- than the reference group (Latin America), independent of the amount of trade with the euro area or the amount of euro denominated debt.

[16] Results for the Japanese yen and the British pound are not reported.

Table 4: Determinants of anchor currencies: The case of the US dollar

	Model 1 / pooled tobit		Model 2 / IV tobit (based on gravity equations)	
	1a)	**1b)**	**2a)**	**2b)**
Share of trade_US	0.63*** (0.01)	0.05*** (0.01)	0.06 (0.06)	0.50*** (0.06)
Debt denomination_USD	0.41*** (0.01)	0.20*** (0.01)	1.87*** (0.11)	-1.04*** (0.11)
Africa		-0.54*** (0.00)		-0.65*** (0.01)
Asia		-0.36*** (0.00)		-0.43*** (0.01)
CEECs		-0.48*** (0.01)		-0.63*** (0.01)
CIS		-0.19*** (0.01)		-0.25*** (0.01)
Latin America		REF		REF
Middle East		0.06*** (0.01)		0.18*** (0.01)
_const	-0.12*** (0.00)	0.50*** (0.01)	-1.03*** (0.06)	1.33*** (0.07)
Number of obs.	*32,972*	*32,972*	*18,912*	*18,912*
No of uncensored obs.	*24,549*	*24,549*	*13,757*	*13,757*
left-censored	*6,118*	*6,118*	*4,072*	*4,072*
right-censored	*2,305*	*2,305*	*1,083*	*1,083*

Notes: Specifications 1a) and 2a) do not take into account regional aspects; regional dummies are included in specifications 1b) and 2b); * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets.

Turning now to the determinants of pegging on the US dollar, the effects stemming from trade with the US and US dollar-denominated debt are smaller than their equivalent for the euro pegs. At the same time, as the results reported in Table 4 tend to suggest, regional aspects are likely to play a larger role, than in the case of the euro, in driving the preference for a US dollar peg. Middle East countries are characterised by a slightly higher level of US dollar share than the reference group, independently of the amounts of trade and debt. Conversely, regions like the CEECs, Africa, and to a lower extent, Asia and the CIS, exhibit a smaller level of US dollar pegging than what can be explained by trade and finance network effects. Endogeneity also plagues our initial estimation and after correcting for it, the role of trade and debt seem to be significantly lower.

Finally, as a robustness check, but also in order to detect potential shifts over time in the patterns of trade, debt and regional considerations, we run the pooled tobit estimation (Model 1) on two sub-periods, before and after the launch of the euro in 1999. The results for the euro and US dollar shares are reported in Tables 5-6. Appendix 2 (Tables A2.5-6) contains the results for the British pound and the Japanese yen.

Overall, network effects coming from trade and finance as well as regional aspects help explaining the anchor currency choice during the two sub-periods. Even if their importance may have shifted, there is no indication of a break in the relationship over time, related to the introduction of the euro.

Table 5: Outcome of pooled tobit estimations before and after 1999_Euro shares

	Model 1/pooled tobit				Model 2/ IV tobit (based on gravity equations)			
	1a)		1b)		2a)		2b)	
	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99
Share of trade	0.43***	0.59***	0.42***	0.52***	0.36***	0.50***	0.06**	0.09***
	(0.01)	(0.01)	(.01)	(.02)	(0.03)	(0.02)	(0.02)	(0.02)
Debt denomination	0.92***	0.62***	0.87***	0.55***	2.05***	0.70***	0.10***	0.53***
	(0.02)	(0.02)	(0.01)	(.02)	(0.07)	(0.02)	(0.01)	(0.02)
Africa			0.03***	0.16***			-0.57***	-0.47***
			(0.00)	(0.01)			(0.01)	(0.01)
Asia			-0.04***	-0.06***			-0.41***	-0.33***
			(0.00)	(0.00)			(0.01)	(0.01)
CEECs			-0.10***	-0.05***			-.47***	-0.47***
			(0.01)	(0.02)			(.01)	(0.02)
CIS			-0.13***	-0.24***			-.23***	-0.09***
			(0.01)	(0.01)			(0.02)	(0.02)
Latin America			REF	REF			REF	REF
Middle East			-0.16***	-0.24***			-0.02	0.39***
			(0.01)	(0.01)			(0.01)	(0.02)
_const	-0.31***	-0.36***	-0.29***	-0.32***	-0.50***	-0.41***	0.58***	0.11***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(.01)	(0.01)	(0.03)
Number of obs.	*20,562*	*12,410*	*20,562*	*12,410*	*34,579*	*12362*	*20549*	*12362*
uncensored obs.	*12,825*	*7,509*	*12,825*	*7,509*	*14376*	*8068*	*14376*	*8068*
left-censored	*7,459*	*4,646*	*6,418*	*4,646*	*4553*	*3760*	*4553*	*3760*
right-censored	*278*	*255*	*309*	*255*	*1620*	*534*	*1620*	*534*
Chow test	*89.45 [0.00]***		*306.34 [0.00]***		*151.68 [0.00]***		*516.59[0.00]***	

Notes: Pooled tobit specifications 1a) and 2a) do not take into account regional aspects; regional dummies are included in specifications 1b) and 2b) specifications; * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets; The outcome of a Chow test for coefficients equality is reported.

In the case of the euro (Table 5), there is evidence of an increased role for trade with the euro area, over the second sub-period, in motivating the adoption of a euro peg. There also seems to be a larger interest in euro pegs over the second period from regions like CEECs and Africa, compared to CIS and Middle East that shifted more to US dollar pegs. As far as Asia is concerned, while the regional dummy coefficient for the US dollar is slightly higher over the second sub-period, there is no significant change in the case of the euro share.

Regarding the evolution of the main determinants of US dollar pegs (see Table 6), after taking into account regional aspects, the role of trade appears unchanged while the role of debt becomes more important over the period from 1999 to present. At the regional level, Middle East and CIS countries seem to have shifted to US dollar for considerations other than trade and debt denomination. In the case of CEECs and Africa, there is no indication of such shift one decade ago, that cannot be attributed to higher trade with the euro area or to the use of debt instruments denominated in euros.

Table 6: Outcome of pooled tobit estimations before and after 1999_US dollar shares

	Model 1/pooled tobit				Model 2/ IV tobit (based on gravity equations)			
	1a)		1b)		2a)		2b)	
	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99
Share of trade	0.69***	0.53***	0.06***	0.07***	0.72***	0.50***	0.06**	0.09***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Debt denomination	0.35***	0.62***	0.11***	0.46***	0.35***	0.70***	0.10***	0.53***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
Africa			-0.55***	-0.49***			-0.57***	-0.47***
			(0.01)	(0.01)			(0.01)	(0.01)
Asia			-0.37***	-0.32***			-0.41***	-.33***
			(0.01)	(0.01)			(0.01)	(0.01)
CEECs			-0.41***	-0.43***			-0.47***	-0.43***
			(0.01)	(0.02)			(0.01)	(0.02)
CIS			-0.23***	-0.12***			-.23***	-0.09***
			(0.02)	(0.02)			(0.02)	(0.02)
Latin America			REF	REF			REF	REF
Middle East			-0.03*	0.35***			-0.02	0.39***
			(0.01)	(0.02)			(0.01)	(0.02)
_const	-0.06***	-0.29***	0.59***	0.23***	-0.12***	-0.41***	0.58***	0.11***
	(0.00)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)
Number of obs.	*20,562*	*12,410*	*20,562*	*12,410*	*20549*	*12362*	*20549*	*12362*
uncensored obs.	*15,493*	*9,056*	*15,493*	*9,056*	*14376*	*8068*	*14376*	*8068*
left-censored	*3,364*	*2,754*	*3,364*	*2,754*	*4553*	*3760*	*4553*	*3760*
right-censored	*1,705*	*600*	*1,705*	*600*	*1620*	*534*	*1620*	*534*
Chow test	*114.82 [0.00]****		*545.34 [0.00]****		*151.68 [0.00]****		*516.59[0.00]****	

Notes: Pooled tobit specifications 1a) and 2a) do not take into account regional aspects; regional dummies are included in specifications 1b) and 2b) specifications; * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets; The outcome of a Chow test for coefficients equality is reported.

To conclude, we find that network effects stemming from trade and finance, as well as regional effects, explain the role of euro and US dollar as anchor currencies for emerging and developing economies. There has been some change over time, particularly in the case of the euro, with trade relations becoming increasingly important. In the case of the US dollar, debt related aspects seem to matter more, over the last decade, in driving the anchor currency choice. Regional aspects have remained broadly stable, except for the CEECs and Middle East countries, more biased toward the euro and US dollar respectively, at same levels of trade and debt as the other regions. These findings are actually in line with the stylised facts reviewed in Subsection 3.1, of shifts in the anchor currency, from SDR basket or solely US dollar peg to an euro peg in the CEECs region (e.g., Lithuania) or to the gradual move to a full peg on the US dollar for some Middle East countries (e.g., Saudi Arabia) over the last decade.

VI. CONCLUSION

This study extends the Frankel and Wei (2008) methodology to estimate the exchange rate anchoring behaviour in a sample of 149 emerging and developing economies, tracking changes over time during the period 1980-2010. Robustness checks based on individual country results show a high degree of correlation of our results with the equivalent discrete de facto classifications of Ilzetzki, Reinhart and Rogoff (2008) and the IMF.

The study constructs an aggregate trade-weighted global indicator of exchange rate regime choice to capture the role of the global currencies and their long-term trends in the evolution of the exchange rates of selected emerging market and developing countries. The overall results suggest that the US dollar has over the past three decades maintained a clear leading role as an important exchange rate anchor currency, with a trade-weighted share of around 50% on average. On a trade-weighted basis, the shares of the euro and the Japanese yen are far smaller, at around 7.5% and 3%, respectively, whereas the share of the British pound has virtually vanished over the last decade compared to earlier periods.

Over time, there have been some important fluctuations in the anchoring role of currencies, mainly of the US dollar. Especially around the times of global financial crisis such as the Asian crisis of the late-1990s, some emerging and developing economies appear to have temporarily abandoned (partly voluntary, partly forced) US dollar pegs, but in general the US dollar re-established itself quickly as the leading anchoring currency after each crisis episode. Also during the recent global financial crisis 2008-2009, the US dollar lost some of its anchoring role, as some large emerging market economies (e.g. Russia) were forced to temporarily abandon their exchange rate targets. Whether the US dollar's leading anchoring role will re-emerge to pre-crisis levels remains to be seen and cannot be answered yet with the analysis in this study.

The paper finds that network effects related to trade and currency denomination of debt play a significant role in determining the anchor currency weights. The empirical analysis points to a significant role, especially in the case of the euro, for "transaction motives", i.e., trade linkages and external debt denomination. As for the US dollar, regional factors also have a strong influence on the choice of the anchor currency. There is some evidence, following the launch of the euro in 1999, of an increasing role of trade relations in explaining the euro share, while an increasing role of debt denomination in explaining the US dollar share.

The results of the study have some important policy implications. The "US dollar block" within the emerging and developing country sphere has over the past decades remained very strong and important, despite temporary decouplings from the US dollar around the time of crises (e.g., Asian crisis). This appears to confirm the global relevance of the fear of floating argument and implies that the room for independent monetary policy conduct remains limited in the emerging and developing countries as a group. Also, as a result, global exchange rate configurations continue to be characterised by an element of inflexibility, as the lack of adjustment of some leading emerging and developing country currencies vis-à-vis the US dollar may complicate the adjustment of global trade imbalances.

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VIII. APPENDIX 1. COUNTRY AVAILABILITY

The countries listed below were included in the main analysis of de fact anchor currency choice and the construction of aggregate indicators. Data are available on a monthly basis from January 1978 to December 2008 unless otherwise stated. The asterisk denotes the countries included in the analysis of the determinants of the degree of pegging on a global currency (Section 5).

Emerging market and developing economies: Albania* (Jan. 1994-) Algeria*, Angola* (Jan. 1996-), Antigua and Barbuda (Feb. 1979-), Argentina*, Armenia* (Jan. 1993-), Azerbaijan* (Apr. 1993-), The Bahamas, Bahrain (- Feb. 2005), Bangladesh*, Barbados, Belarus* (Jan. 1995-), Belize*, Benin* (-Oct. 2008), Bhutan (Jan1984- Jan. 2008), Bolivia*, Botswana (-Nov. 2008), Bosnia and Herzegovina* (Sep.1997-), Brazil*, Brunei Darussalam (Jan. 2000- Nov. 2008), Burkina Faso* (-Oct. 2008), Burundi*, Cambodia* (Jan1994-), Cameroon*, Cape Verde* (Apr. 1978-), Chad*, Chile*, China* (Aug. 1980-), Colombia*, Comoros* (Jan. 1981-), Dem. Rep. of Congo* (-Sep. 2008), Rep. of Congo*, Costa Rica*, Côte d'Ivoire* (-Oct. 2008), Croatia* (Jan. 1993-), Djibouti* (Jan. 1985- Sep. 2008), Dominica* (Feb. 1979-), Dominican Republic*, Ecuador* (-Apr2000), Egypt* (-Jul. 2008), El Salvador*, Equatorial Guinea* (Jan. 1983-), Eritrea (Jan. 1996- Nov. 2008), Ethiopia*, Fiji* (-Oct. 2006), Gabon* (Mar. 1978-), The Gambia* (-Mar. 2008), Georgia* (Nov. 1995-), Ghana* (-Apr. 2007), Grenada*, Guatemala*, Guinea* (Aug. 1991- Sep. 2006), Guinea-Bissau* (Feb. 1987- Oct. 2008), Guyana*, Haiti*, Honduras* (-Nov. 2008), India*, Indonesia*, Iraq (Jan. 2005- Dec. 2006), Jamaica*, Jordan* (-Sep. 2008), Kazakhstan* (Dec. 1993-), Kenya*, Kuwait, Kyrgyz Republic* (Jan. 1994), PDR Lao* (Jan. 1989- May. 2008), Lebanon*, Lesotho (Feb. 1980- May 2007), Liberia* (-Apr. 2008), Libya, Former Yugoslav Republic of Macedonia*, (Jan. 1994-), Madagascar*, Malawi* (-Oct. 2008), Malaysia*, Maldives* (Feb. 1981-), Mali* (-Oct. 2008), Mauritania* (-Jun. 2008), Mauritius*, Mexico*, Moldova* (Apr1992), Mongolia* (Jan. 1993- Mar. 2008), Morocco*, Rep. of Mozambique* (Apr. 1984- Aug. 2008), Myanmar* (-Jun. 2007), Namibia (Feb. 1992-), Nepal* (-May. 2006), Nicaragua*, Niger* (-Oct. 2008), Nigeria* (-Sep. 2008), Oman*, Pakistan*, Panama* (-Apr. 2008), Papua New Guinea* (-Nov. 2008), Paraguay*, Peru*, Philippines*, Qatar, Russia* (Jan. 1994-), Rwanda*, Samoa*, São Tomé and Príncipe* (Sep. 1995-), Saudi Arabia, Senegal* (-Oct. 2008), Seychelles* (Jan. 1979), Sierra Leone* (-Nov. 2008), Solomon Islands* (-Nov. 2008), South Africa*, Sri Lanka* (-Nov. 2008), St. Kitts and Nevis* (Feb. 1981-), St. Lucia* (Feb. 1979-), St. Vincent and the Grenadines* (Feb. 1979-), Sudan*, Suriname, Swaziland, Syrian Arab Republic* (-Jun. 1989), Tajikistan* (Feb. 1997-Nov. 2007), Tanzania* (-Nov. 2008), Thailand*, Dem. Rep. of Timor-Leste (Aug. 2002-), Togo* (-Oct. 2008), Tonga*, Trinidad and Tobago, Tunisia*, Turkey*, Uganda*, Ukraine* (Jan. 1993-), United Arab Emirates (-Nov. 2008), Uruguay*, Vanuatu* (Feb. 1981-), Venezuela (-Sep. 2008), Vietnam* (Feb. 1995-), Yemen (Jun. 1990-), Zambia*, Zimbabwe* (-Dec. 2002).

New EU member states: Bulgaria* (Jan. 1992-), Czech Republic, Slovak Republic, Estonia (Jul.1992-), Hungary* (Jan. 1984), Latvia* (Aug. 1993-), Lithuania* (Jan. 1993-), Poland* (Jan. 1985-), Romania* (Feb. 1979-)

Former emerging market economies: Hong Kong SAR, Israel, South Korea, Singapore, Taiwan.

IX. APPENDIX 2: RESULTS OF GRAVITY MODELS ESTIMATIONS

Table A2.1: Gravity models for trade and debt share in euros

Tobit regression	**Dependent variable:**	
Explanatory Variables	**trade_Euro Area**	**debt_euro**
Euro Area real growth differential	0.48***(0.12)	-1.34***(0.18)
Euro Area per capita nom.GDP differential with	-0.54***(0.04)	2.32***(0.26)
Relative distance from the euro area	-1.58*** (0.02)	-0.25***(0.01)
Trade with the euro area		0.17*** (0.00)
Debt in euro	0.31*** (0.01)	
Former French colony	0.18*** (0.00)	0.10*** (0.00)
Euro Area interest rate differential		-0.37 (0.33)
FX_euro/US dollar		-0.21*** (0.02)
FX_euro/Japanese yen		-11.61*** (1.95)
FX_euro/British pound		0.13*** (0.02)
_const	-2.14***(0.22)	12.20*** (1.37)
Number of obs.	*34,579*	*20,098*
No of uncensored obs.	*34,348*	*19,497*
left-censored	*146*	*601*
right-censored	*85*	*0*

Notes: * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets

Table A2.2: Gravity models for trade and debt share in US dollar

Tobit regression	**Dependent variable:**	
Explanatory Variables	**trade_US**	**debt_US dollar**
US Real growth differential	-0.09 (0.08)	-0.19 (0.23)
US Per capita nom. GDP differential	0.28*** (0.02)	0.19** (0.09)
Relative distance from the US	-0.87*** (0.01)	-0.33*** (0.01)
Trade with the US		0.12*** (0.00)
Debt in US dollar	0.14*** (0.00)	
US Interest rate differential		2.08*** (0.47)
FX_US dollar/euro		-0.06**(0.03)
FX_ US dollar /Japanese yen		1.27 (2.27)
FX_ US dollar /British pound		0.00 (0.03)
_const	-0.13***(0.02)	0.62*** (0.07)
Number of obs.	*34,579*	*20,098*
No of uncensored obs.	*33,553*	*19,851*
left-censored	*1,023*	*0*
right-censored	*3*	*247*

Notes: * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets

Table A2.3: Gravity models for trade and debt share in British pound

Tobit regression	**Dependent variable:**	
Explanatory Variables	**trade_GB**	**debt_GBP**
GB Real growth differential	0.37*** (.04)	0.09 (.08)
GB Per capita nom. GDP differential	-0.02* (.01)	-0.41*** (.02)
Relative distance from the GB	-0.09*** (.00)	-0.06*** (.00)
Trade with Great Britain		.13*** (.00)
Debt in British pound	0.59*** (.01)	
Former UK colony	0.09*** (.00)	0.03*** (.00)
GB Interest rate differential		0.27* (0.15)
FX_ British pound /euro		0.00 (0.01)
FX_ British pound /US dollar		0.00 (0.01)
FX_ British pound / Japanese yen		1.46 (1.13)
_const	0.01 (.03)	-.83*** (.04)
Number of obs.	*34,579*	*20,098*
No of uncensored obs.	*34,055*	*13,022*
left-censored	*522*	*7.076*
right-censored	*2*	*0*

Notes: * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets

Table A2.4: Gravity models for trade and debt share in Japanese yen

Tobit regression	**Dependent variable:**	
Explanatory Variables	**trade_JP**	**debt_JPY**
JP Real growth differential	0.69*** (0.04)	-0.25*** (0.08)
JP Per capita nom. GDP differential	0.14*** (0.01)	0.07** (0.03)
Relative distance from Japan	-0.19*** (0.00)	-.03*** (0.00)
Trade with Japan		.35*** (0.01)
Debt in Japanese yen	0.47*** (0.00)	
JP Interest rate differential		-0.56** (0.24)
FX_US dollar/euro		0.00 (0.00)
FX_ US dollar /Japanese yen		0.00 (0.00)
FX_ US dollar /British pound		.00 (.00)
_const	-0.75***(.07)	-.40** (.19)
Number of obs.	*34,579*	*20,098*
No of uncensored obs.	*33,692*	*15,744*
left-censored	*878*	*4,354*
right-censored	*9*	*0*

Notes: * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets

Table A2.5: Outcome of pooled tobit estimations before and after 1999_British pound shares

	Model 1/pooled tobit				Model 2/ IV tobit (based on gravity equations)			
	1a)		1b)		2a)		2b)	
	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99
Share of trade	0.01**	0.08***	0.01	0.08***	0.72***	0.50***	0.06**	0.09***
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Debt denomination	0.13***	0.12***	0.16***	0.02	.35***	.70***	0.10***	0.53***
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.02)	(0.01)	(0.02)
Africa			0.04***	0.01***			-0.57***	-0.47***
			(0.00)	(0.00)			(0.01)	(0.01)
Asia			0.02***	-0.01***			-0.41***	-0.33***
			(0.00)	(0.00)			(0.01)	(0.01)
CEECs			0.08***	0.09***			-0.47***	-0.43***
			(0.00)	(0.00)			(0.01)	(0.02)
CIS			0.09	0.05***			-0.23***	-0.09***
			(0.01)	(0.00)			(0.02)	(0.02)
Latin America			REF	REF			REF	REF
Middle East			0.01***	-0.03***			-0.02	0.39***
			(0.00)	(0.00)			(0.01)	(0.02)
_const	-0.02***	-0.01***	-0.05***	-0.03***	-0.12***	-0.41***	0.58***	0.11***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.03)
Number of obs.	*20,562*	*12,410*	*20,562*	*12,410*	*20549*	*12362*	*20549*	*12362*
uncensored obs.	*12,707*	*7,827*	*12,707*	*7,827*	*14376*	*8068*	*14376*	*8068*
left-censored	*7,836*	*4,583*	*7.836*	*4,583*	*4553*	*3760*	*4553*	*3760*
right-censored	*19*	*0*	*19*	*0*	*1620*	*534*	*1620*	*534*
Chow test	*90.36 [0.00]****		*125.58 [0.00]****		*151.68 [0.00]****		*516.59[0.00]****	

Notes: Pooled tobit specifications 1a) and 2a) do not take into account regional aspects; regional dummies are included in specifications 1b) and 2b) specifications; * denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%; robust std. errors between brackets; The outcome of a Chow test for coefficients equality is reported.

Table A2.6: Outcome of pooled tobit estimations before and after 1999_Japanese Yen shares

	Model 1/pooled tobit				Model 2/ IV tobit (based on gravity equations)			
	1a)		1b)		2a)		2b)	
	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99	Before Jan-99	After Jan-99
Share of trade	0.02***	-0.00	0.04***	0.00	0.72***	0.50***	0.06**	0.09***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.02)	(0.02)
Debt denomination	0.01***	0.02***	0.01**	0.01***	0.35***	0.70***	0.10***	0.53***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.01)	(0.02)
Africa			0.01***	0.01***			-0.57***	-0.47***
			(0.00)	(0.00)			(0.01)	(0.01)
Asia			-0.00	0.01***			-0.41***	-.33***
			(0.00)	(0.00)			(0.01)	(0.01)
CEECs			0.04***	0.03***			-0.47***	-0.47***
			(0.00)	(0.00)			(0.01)	(0.02)
CIS			-0.02***	0.02***			-.23***	-.09***
			(0.00)	(0.00)			(0.02)	(0.02)
Latin America			REF	REF			REF	REF
Middle East			-0.01***	-0.00**			-0.02	0.39***
			(0.00)	(0.00)			(0.01)	(0.02)
_const	-0.01***	-0.01***	-0.02***	-0.03***	-0.12***	-0.41***	0.58***	0.11***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.03)
Number of obs.	*20,562*	*12,410*	*20,562*	*12,410*	*20549*	*12362*	*20549*	*12362*
uncensored obs.	*12,534*	*6,709*	*12,534*	*6,709*	*14376*	*8068*	*14376*	*8068*
left-censored	*8,027*	*5,701*	*8,027*	*5,701*	*4553*	*3760*	*4553*	*3760*
right-censored	*1*	*0*	*1*	*0*	*1620*	*534*	*1620*	*534*
Chow test	*17.49 [0.00]***		*92.83 [0.00]***		*151.68 [0.00]***		*516.59[0.00]***	

Notes: Pooled tobit specifications 1a) and 2a) do not take into account regional aspects; regional dummies are included in specifications 1b) and 2b) specifications; * denotes significance at 10%, ** denotes significance at 5%,*** denotes significance at 1%; robust std. errors between brackets; The outcome of a Chow test for coefficients equality is reported.