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EDITORIAL

Le premier numéro de l'année 2017 (n° 63) présente dix articles et s'inscrit sous l'angle de la régularité et de la qualité. Les thèmes de recherche abordés sont de type variés avec le taux de change, les déterminants de crédit ou encore les relations croissance production manufacturière. Des questions microéconomiques sont traitées telle la vulnérabilité à la pauvreté et les chocs climatiques.

YOUGBARE Lassana (UO 2), dans le premier article, tente de mesurer les effets du désalignement des régimes de change. Il montre que le désalignement est plus important dans les régimes à taux de change fixes que dans les régimes à taux de change flottants.

A travers le deuxième article de la revue, **Christophe Adassé CHIAPO (Institut National Polytechnique Félix Houphouët-Boigny)** identifie les déterminants et les conditions d'acceptation de la riziculture contractuelle en Côte d'Ivoire.

Didier ZOUNGRANA (Université Ouaga 2) dans le troisième article traite de la validité de la courbe environnementale de Kuznets à travers les effets de la croissance économique et de l'ouverture commerciale sur la pollution atmosphérique.

Le quatrième article arbore l'efficience de l'endettement extérieur. Par la technique de la frontière de production stochastique, **Komlan A. ADEVE (Université de Lomé)**, prouve que l'endettement extérieur améliore l'efficience productive. Toutefois, il met en exergue la nécessité d'une meilleure allocation de cet endettement comme condition de bonne performance.

Le cinquième article est d'**Adama DIAW et Abdramane SOW (Université Gaston Berger de Saint Louis).** Ils testent la validité de la première loi de KALDOR en vérifiant la relation à court et long terme entre le PIB et la production manufacturière au Sénégal.

Salifou OUEDRAOGO (UO2) aborde dans le sixième article, les déterminants de l'offre et de la demande de crédit dans l'UEMOA. Sur un échantillon comportant toutes les banques de l'Union, il fait une analyse de la période de 2000 à 2013.

Le septième article de **N'Gomory M. SYLLA (Université Alassane Ouattara)** fait une analyse causale des emprunts extérieurs publics sur le comportement fiscal et l'évolution de la dette intérieure de la Cote d'Ivoire de 1974 à 2009.

Le huitième article de **Hamidou OUEDRAOGO (UO2)** analyse la nature de l'effet du « prêt de fête » dans l'UEMOA. Il critique ce produit bancaire comme potentiellement inefficace et créateur de bulle à terme.

Le neuvième article de ce numéro de **Mariama A. K. NDEYE (UCAD),** met en avant l'analyse de contenu comme approche qualitative pertinente pour étudier l'évolution de la carrière des enseignants chercheurs à l'UCAD.

Le dernier article est l'œuvre d'Issoufou **SOUMAILA MOULEYE (Université de Bamako)**. Il analyse la vulnérabilité des unités de production agricole à la pauvreté non monétaire. L'auteur fait en outre une spécification selon le genre et fait le lien avec le niveau de vie des unités de production.

Pr Idrissa OUEDRAOGO
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Misalignment-Effects of Exchange Rate Regimes : Contrasting Words and Deeds

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Abstract

We study the misalignment-effects of exchange rate regimes by exploring two avenues. First, we assess the effects of de jure and de facto exchange rate regimes on average misalignment. Then, we analyze whether the average misalignment-impact of the exchange rate system stems from different probabilities of overvaluation and undervaluation.

The empirical investigation proceeds in two steps. In the first one, non-stationary panel econometric techniques are used to estimate the relationship between the real exchange rate and its determinants. The estimated relationship is then used to compute the equilibrium real exchange rate and derive misalignment. In the second step, the effects of alternative de jure and de facto exchange rate systems on average misalignment and overvaluation are estimated over the period 1973-1999 in low-income, middle-income and high-income countries.

The results show that misalignment is larger in fixed regimes than in floating ones, with middle-income and the CFA franc countries displaying the largest effect. This result likely stems from more frequent overvaluation episodes. Intermediate regimes are associated with the smallest misalignment in middle-income countries and a larger misalignment than floats in low and high-income countries. Only in the latter does this impact result from more frequent overvaluation episodes.

Keywords : *Equilibrium real exchange rate, Misalignment, Overvaluation, de facto exchange rate regimes, de jure exchange rate regimes*

JEL classification *: F31, F41*

Misalignment-Effects of Exchange Rate Regimes : Contrasting Words and Deeds

INTRODUCTION

The real exchange rate plays a prominent role in open economies. When misaligned, it distorts the efficient allocation of resources and hampers the international competitiveness of domestic producers. Misalignment may as well be an omen for crisis, trigger beggar-thy-neighbour policies and ultimately hamper growth.

Economic theory states that the equilibrium real exchange rate is exchange-rate-regime-independent while misalignment depends on it. Indeed, due to nominal rigidities, the real exchange rate adjusts rapidly to shocks through nominal exchange rate fluctuations in floating regimes while it departs from equilibrium in fixed ones. Supportive evidence is provided by Sarno et al. (2004) and Catão and Solomou (2005).

In a fixed regime, devaluation may speed up misalignment correction. However, besides not being always available[1] devaluation faces various obstacles such as its political costs (Collins, 1996), uncertainty about the extent of misalignment and uncertainty about the nature and scale of shocks hitting the economy. A mild misalignment would thus likely be corrected through protracted price adjustment while a severe one would ultimately entail a devaluation (see Burstein, Eichenbaum and Rebelo, 2005; Parsley and Popper, 2001; Goldfajn and Valdes, 1999).

The faster adjustment in floating regimes also hinges crucially on policy credibility. Absent credibility, flexibility will heighten monetary instability and impede real exchange rate adjustment. Fixity, instead, would foster credibility and monetary stability albeit at the expense of monetary policy autonomy when capital is highly mobile. However, fixity is no panacea for credibility (see Calvo, 1986; Calvo and Végh, 1991; Guidotti and Végh, 1999).

The exchange rate crisis literature stresses that balance sheet effects[2] lead to "fear of floating": floating rates countries are reluctant to let their exchange rate fluctuate freely (Calvo and Reinhart, 2000 and, Céspedes, Chang and Velasco, 2004). Misalignment may thus build up (Dornbusch, 2001; Frankel, 2005). Further, Aizenman and Glick (2008) argue that a fixed regime may lock a country in a trap which ultimately entails a costly exit. Indeed, when confronted with adverse shocks, the authorities should stabilise either the nominal exchange rate or the interest rate (Calvo and Mishkin, 2003; Obstfeld, 1996). When a speculative attack finally forces the transition to a more flexible regime, the nominal exchange rate depreciates sharply, thereby generating real undervaluation.

Lastly, the monetary approach cautions that floating exchange rates may raise misalignment more than fixed ones.

All in all, the theoretical misalignment-effects of the exchange rate system are not clear-

1 In hard pegs such as currency boards institutional reforms may be required to devalue the currency or change the regime altogether.

2 Balance sheets effects mean that nominal exchange rate fluctuations affect firms' net worth and financing costs because of exchange rate and maturity mismatches in their assets and liabilities, especially in emerging markets.

cut. Furthermore, the empirical research is still somewhat limited and has yet to yield conclusive evidence. Besides, it is now widely accepted that the exchange rate regime many countries announce differs substantially from the one they actually run (see Calvo and Reinhart, 2002). As a result, more effort was devoted to categorising exchange regimes according to what countries do rather than what they say, resulting in de facto classifications. This article takes advantage of the sound de facto classification developed by Reinhart and Rogoff (2004) to supplement the self-declared regimes, thus allowing us to contrast the misalignment-effects of actual and declared regimes.

More precisely, the paper empirically investigates the following questions. Does misalignment vary across alternative de jure and de facto regimes? Do those misalignment-effects of exchange rate regimes stem from different probabilities of under- and over-valuation episodes?

To answer these questions, non-stationary panel econometric techniques are used, in a first step, to estimate the relationship between the real exchange rate and its determinants. The estimated relationship is then used to compute the equilibrium real exchange rate and derive misalignment. In a second step, the misalignment-effects of alternative exchange rate systems are assessed.

The rest of the paper proceeds as follows. The next section defines and measures the equilibrium real exchange rate and misalignment. The third one turns to the econometric analysis. Concluding remarks are offered in the last section.

1. Equilibrium real exchange rate and misalignment

1.1. Definition

Following Edwards (1989a) the equilibrium real exchange rate is defined as '*the relative price of tradables to nontradables that, for given sustainable (equilibrium) values of other relevant variables such as trade taxes, international prices, capital and aid flows, and technology, results in the simultaneous attainment of internal and external equilibrium'*. It is time-varying because it depends solely on real variables or fundamentals that vary over time. The actual real exchange rate, by contrast, depends on both fundamentals and monetary variables. It thus deviates from equilibrium due to the monetary variables and transitory changes in the fundamentals.

To estimate the unobserved equilibrium real exchange rate, we use the behavioural equilibrium real exchange rate (BEER) approach which defines it as the rate determined by economic fundamentals. Equilibrium is not imposed subjectively but is derived from econometric estimation.
Other approaches were suggested in the literature[3]. One of them, the purchasing power parity (PPP) predicts that the long-term real exchange rate is constant. Though simple, it lacks statistical fit and ignores the role of fundamentals.
Next, the paper turns to the estimation of the equilibrium real exchange rate.

3 Thorough reviews of the approaches to estimate the equilibrium real exchange rates were conducted by Driver and Westaway (2004), Isard (2007) and Hinkle and Montiel (1999).

1.2. Estimation of the equilibrium real exchange rate

First, the relationship between the real exchange rate and its determinants is estimated. The equilibrium rate is then computed using the estimated coefficients[4].

1.2.1. The econometric model

In line with the existing empirical literature, the relation between the (actual) real exchange rate and its real and monetary determinants is given by :

$$RER_{it} = \alpha_i + \gamma_t + \beta_{1i}TOT_{it} + \beta_{2i}PROD_{it} + \beta_{3i}FF_{it} + \beta_{4i}GC_{it} + \beta_{5i}Open_{it} + \theta_{1i}MP_{it} + \theta_{2i}Deva + \varepsilon_{it} \qquad (1)$$

α_i and γ_t are country and time specific effects respectively. ε is a random disturbance term. The β's and θ's are parameters to be estimated whose expected signs are discussed below along with the measurement of the variables.
For data availability reasons, the real exchange rate (*RER*) is measured by a consumer price index-based effective real exchange rate as follows:

$$RER_t = \prod_{i=1}^{10}\left(\frac{E_{it}^*}{E_t} \text{x} \frac{P_t}{P_{it}^*}\right)^{w_i}, \quad with \sum_{i=1}^{10} w_i = 1.$$

E_i^* and E are partner country i and home country nominal exchange rate respectively, expressed as local currency units per unit of US dollar. P and P_i^* are the consumer price index in the home and partner i countries respectively. w_i measures the share of home country imports from trading partner country *i* over the period 1980-1986. An increase in *RER* represents a real appreciation of the domestic currency.

Note that the weighting scheme does not take into account exports, competition on third countries' markets and changes in the set of major trade partners.

As regards the explanatory variables, the impact of a permanent terms of trade (*TOT*) change on the equilibrium real exchange rate is ambiguous because of a negative income effect and a positive substitution effect. However, empirical studies suggest that a durable terms of trade improvement appreciates the equilibrium real exchange (see, Calderon, 2004). Terms of trade are measured by exports as capacity to import, in constant local currency as in Edwards and Levy Yeyati (2005). The productivity growth variable (*PROD*) – measured as the rate of growth of output per unit of labour[5] – captures the Balassa-Samuelson effect, thus a positive coefficient is expected as in Dufrenot and Yehoue (2005).

A permanent increase of financial inflows (*FF*) raises the demand for the domestic currency, thus tending to appreciate the equilibrium real exchange rate (Razin and Collins, 1997). We measure external financial flows by the ratio of private capital flows to GDP in middle and high-income countries. These countries are better integrated to world capital markets, hence private capital flows play an important role there. In low-income countries, external financial flows are measured by the sum of net income from abroad and aid, as a percentage of GDP.

4 A similar approach was used by Edwards (1988), Baffes, Elbadawi and O'Connell (1997), Calderon (2004), and Dufrenot and Yehoue (2005).

5 Productivity is measured by output per capita in Antigua and Barbuda, Dominica, Saint Kitts and Nevis, Saint Vincent and Grenadines, Seychelles and Vanuatu where labour data is missing.

An increase in government consumption (*GC*) will induce a real appreciation if it falls mainly on nontradables and if the government propensity to consume nontradables is larger than the private sector's (Galstyan and Lane, 2009). If the increased spending falls mainly on tradables or on imports, depreciation will ensue. The empirical evidence points to the first effect (see, Goldfajn and Valdes, 1999, and Ricci et al., 2013).

An increase in trade openness (*Open*) stemming from trade liberalisation will likely depreciate the equilibrium real exchange rate by shifting demand from nontradables towards importable goods and production from the latter towards nontradable and exportable goods (Dufrenot and Yehoue, 2005). Trade openness is measured by the sum of exports and imports as a ratio of GDP.

An expansionary monetary policy (*MP*) raises the demand for nontradable goods, appreciates the real exchange rate and exerts an overvaluation pressure. Monetary policy is measured by the excess growth of the M1 money stock over the previous year GDP growth rate.

Misalignment tends to dissipate over time but this process may be protracted. Devaluation (*Deval*) may speed it especially when it is supplemented with consistent macroeconomic policies (Edwards, 1998). We measure devaluation by changes in the effective nominal exchange rate[6] and expect a positive coefficient.

Appendix B contains the data sources. The IMF has discontinued its classification of exchange rate regimes based solely on notifications by member countries in 1999. Nevertheless, we decided to use the full time length of the effective exchange rate database so that the study period is 1970-2003 in order to improve the estimation efficiency. When working with exchange rate regimes later, we will limit the sample time dimension to 1999. Countries are grouped in low, middle and high-income samples according to the World Bank 2003 classification (see appendix A). The data are in logarithm except ratios and growth rates that are percentages.

1.2.2. Estimation strategy and results

Empirical studies of the equilibrium real exchange rate rely more and more on non-stationary dynamic panel estimators[7] that are more efficient than time series estimators. This paper uses the fully modified ordinary least squares (FMOLS) of Pedroni (2000), which permits heterogeneous cointegration vectors and short run dynamics. In fact, Dufrenot and Yehoue (2005) and Calderon (2004) provided evidence of heterogeneous cointegration vectors between the real exchange rate and its determinants. FMOLS also corrects for endogeneity and some basic form of cross-sectional dependency and yields asymptotically unbiased estimators and nuisance parameter free standard normal distributions (Pedroni 2000).

Pedroni (2000) argued that the between or group mean panel FMOLS variant is better suited for actual estimation than the within or pooled panel FMOLS one. To maximise

6 The effective nominal exchange rate appears suitable to our analysis because it describes the evolution of the domestic currency relative to the currencies of the country's largest trade partners. Moreover, even if the official bilateral nominal exchange rate remains unchanged, an appreciation of the domestic currency against the currencies of competitors may signal a competitiveness loss.

7 See Pedroni (2001), Soto and Elbadawi (2008) and references therein.

small sample properties of the estimator, we divide the data into three samples of low, middle and high-income countries[8]. Before running FMOLS regressions, we carry out panel unit root and cointegration tests.

Unit root tests

We apply the tests of Hadri (2000) and Maddala and Wu (1999). The null is stationarity in the former and non-stationarity in the latter.

Insert Table 1 here

Table 1 shows that Hadri's test rejects stationarity for all variables in all samples according to its heteroskedasticity robust statistics. Moreover, in high-income countries, terms of trade and government consumption variables are I(2).

Insert Table 2 here

Maddala and Wu's test results, reported in table 2, do not always agree with those of Hadri's test. Indeed, non-stationarity is rejected for external financial flows, productivity growth, monetary policy and devaluation in low-income countries and only for the last three variables in middle and high-income countries. We hereafter adopt Hadri's test results.

Cointegration tests

Panel cointegration tests are more powerful than those for time series and have normal asymptotic distributions. Pedroni's (1999) panel cointegration test, used in this paper, posits a null of no cointegration. It allows for heterogeneous short run dynamics and heterogeneous cointegrating vectors and provides four "between" statistics and three "within" statistics. It is less restrictive than Kao's (1999) tests which have an alternative hypothesis of homogeneous cointegration vector. It is also free of nuisance parameters and robust to endogeneity like McCosky and Kao's (1999) test.

Insert Table 3 here

Table 3 displays the results. The null of no cointegration is rejected in all samples at the 1% significance level, except for the panel-v statistics in high-income countries which is significant at the 5% level.

FMOLS results

The estimation of equation 1 in the sample[9] of 35 low-income countries gives :

$$RER = \underset{(6.31)}{0.08\,TOT} - \underset{(-5.95)}{0.05\,GC} - \underset{(-11.86)}{0.43\,Open} + \underset{(3.41)}{0.3\,PROD} + \underset{(4.17)}{0.01\,FF} + \underset{(9.73)}{0.00\,MP} + \underset{(9.70)}{0.36\,Deval} \qquad (2)$$

For the sample of 45 middle-income countries, we have :

$$RER = \underset{(9.93)}{0.21\,TOT} + \underset{(-5.19)}{0.04\,GC} - \underset{(-25.59)}{0.72\,Open} + \underset{(-12.10)}{0.13\,PROD} + \underset{(11.09)}{0.07\,FF} - \underset{(4.26)}{0.00\,MP} + \underset{(28.61)}{0.64\,Deval} \qquad (3)$$

8 Razin and Collins (1997) and Dufrenot and Yehoue (2005) followed a similar approach.

9 The number of years per country varies. T-statistics are given in brackets. In the sample of low income countries, Sudan, Central African Republic and Guinea were excluded from the estimation because the t-statistics of their coefficients were excessively large.

In the sample of 24 high-income countries, we get :

$$RER = \underset{(-0.16)}{-0.04}\,\Delta TOT + \underset{(10.78)}{0.80}\,\Delta GC - \underset{(-20.11)}{0.46}\,Open + \underset{(5.07)}{0.24}\,PROD + \underset{(2.63)}{0.03}\,FF + \underset{(1.24)}{0.00}\,MP + \underset{(12.82)}{0.81}\,Deval \quad (4)$$

Ceteris paribus, a permanent 10 percent improvement of terms of trade significantly appreciates the actual and equilibrium real exchange rates by 0.8 percent in low-income countries and 2.1 percent in middle-income countries. This finding is consistent with Edwards (1988), Dufrenot and Yehoue (2005), Razin and Collins (1997), Goldfajn and Valdes (1999), Calderon (2004) and Ricci et al. (2013). By contrast, in high-income countries, a statistically insignificant real depreciation ensures.

The regression results also reveal that when external financial flows increase or productivity growth accelerates durably, the actual and equilibrium real exchange rates appreciate significantly in all samples. Similar results for external financial flows were obtained by Dufrenot and Yehoue (2005) in middle-income countries, Razin and Collins (1997) in developing countries and Calderon (2004). However, contrary to our results, no significant impact was found by Dufrenot and Yehoue (2005) in low-income countries and Razin and Collins (1997) in industrial countries. As to productivity growth, our finding accords with Dufrenot and Yehoue (2005) whereas Edwards (1988), Razin and Collins (1997) and Ricci et al. (2013) uncovered no significant effect.

Our results also reveal that a 10 percent permanent increase in trade openness induces a significant actual and equilibrium real depreciation of 4.3 percent, 7.2 percent and 4.6 percent in low, middle and high-income countries, respectively. Dufrenot and Yehoue (2005), Ricci et al. (2013) and Goldfajn and Valdes (1999) reached similar conclusions. In fact, in countries that are more open to trade (as a result of trade liberalisation), domestic producers face increased competition from abroad which enhances economic efficiency. Ultimately, it may also lower domestic prices hence an equilibrium real depreciation.

According to equations 3 and 4, a 10 percent permanent rise in government consumption induces a statistically significant appreciation of both the actual and equilibrium real exchange rates of 0.4 percent and 8 percent in middle and high-income countries respectively. By contrast, in low-income countries, a significant 0.5 percent real depreciation ensues. Therefore government consumption spending falls largely on tradables in low-income countries and on nontradables in middle and high-income ones.

As to the nominal variables, monetary policy has no long-term effect in all samples. Measuring it by the domestic credit growth rate gives broadly similar results[10]. Devaluation induces a real depreciation as in Edwards (1988) and Goldfajn and Valdes (1999) hence helping to alleviate misalignment.

Though we favour the FMOLS results, we also present panel dynamic ordinary least squares (DOLS) results as a sensitivity check. DOLS assume a homogeneous cointegrating vector and allow for heterogeneous short run dynamics. The estimation results[11] in low, middle and high-income countries are as follows, respectively :

10 The results which are not displayed here to save space are available from the author upon request.

11 The regressions were run with automatic leads and lags selection in low and middle income countries. In high income countries, one lead and one lag are used due to data constraints and a trend is added to the cointegration estimation.

$$RER = -0.11\,TOT + 0.57\,GC - 0.76\,Open + 1.52\,PROD + 0.00\,FF + 0.00\,MP + 0.22\,Deval \quad (2')$$
$$(-1.80) \quad (4.91) \quad (-6.22) \quad (2.22) \quad (0.03) \quad (2.09) \quad (1.17)$$

$$RER = -0.25\,TOT + 0.05\,GC - 0.27\,Open + 0.86\,PROD + 0.1\,FF + 0.00\,MP + 0.22\,Deval \quad (3')$$
$$(-5.78) \quad (0.51) \quad (-2.57) \quad (1.23) \quad (2.99) \quad (2.30) \quad (4.73)$$

$$RER = -0.08\,\Delta TOT + 0.43\,\Delta GC - 0.38\,Open + 0.01\,PROD - 0.00\,FF + 0.00\,MP + 1.27\,Deval \quad (4')$$
$$(-0.48) \quad (1.73) \quad (-8.50) \quad (0.04) \quad (-0.15) \quad (0.52) \quad (8.75)$$

The results are broadly qualitatively similar to those of FMOLS. Nevertheless, some differences exist between the two sets of results. Indeed, the number of countries falls[12] substantially in each sample when DOLS are used. Furthermore, in low-income countries the coefficients of terms of trade and government consumption change sign while financial flows and devaluation lack statistical significance. The effects of the fundamentals also rise. In middle-income countries, only the coefficient of terms of trade changes sign. Government consumption and productivity growth become statistically insignificant. DOLS lead to a nil coefficient for financial flows in high-income countries where productivity growth loses significance. Globally, the estimated coefficients show no uniform variation relative to those of FMOLS in middle and high-income countries. Next, we compute the equilibrium real exchange rate and derive misalignment.

1.3. Misalignment indicators

The equilibrium real exchange rate (*ERER*) is computed using long-term values of the fundamentals (with the superscript HP) obtained from a Hodrick-Prescott filter in low, middle and high-income countries respectively :

$$ERER = 0.08\,TOT^{HP} - 0.05\,GC^{HP} - 0.43\,Open^{HP} + 0.3\,PROD^{HP} + 0.01\,FF^{HP} \quad (5)$$
$$ERER = 0.21\,TOT^{HP} + 0.04\,GC^{HP} - 0.72\,Open^{HP} + 0.13\,PROD^{HP} + 0.07\,FF^{HP} \quad (6)$$
$$ERER = 0.8\,\Delta GC^{HP} - 0.46\,Open^{HP} + 0.24\,PROD^{HP} + 0.03\,FF^{HP} \quad (7)$$

Eliminating individual and time specific effects, misalignment (MIS_{it}*) is then calculated as follows :

$$MIS_{it}^{*} = MIS_{it} - \overline{MIS_{i.}} - \overline{MIS_{.t}} + \overline{\overline{MIS}} \quad (8)$$
$$where\ MIS_{it} = logRER_{it} - ERER_{it},\ \ \overline{MIS_{i.}} = \sum_{i=1}^{T_i} MIS_{it},$$
$$\overline{MIS_{.t}} = \sum_{i=1}^{N} MIS_{it}\ \ and\ \ \overline{\overline{MIS}} = \sum_{i=1}^{N}\sum_{t=1}^{T_i} MIS_{it}$$

A graphical analysis of the computed misalignment is done later in the paper.

2. Econometric analysis of the misalignment-effects of exchange rate systems

We summarise previous empirical studies before laying out our methodology and discussing the estimation results.

12 There are now 23 low income, 28 middle income and 18 high income countries.

2.1. Previous empirical evidence

Empirical studies of the exchange rate regime-misalignment linkages are still somewhat limited. Testing for difference of means, Coudert and Coharde (2009) linked de facto floats to larger undervaluation and fixed regimes to larger overvaluation in emerging and developing countries. Their findings for intermediate regimes were mixed. In stark contrast, Dubas (2009) carried out a regression analysis and found that de jure fixed and intermediate regimes reduce absolute misalignment in developed countries. In developing countries, only intermediate regimes significantly lower misalignment. Floats have no significant impact in all countries.

The exchange rate crisis literature also links fixed regimes to persistent and growing overvaluation. Examples include Kempa and Nelles (1999) for the 1992 speculative attacks on the European Exchange Rate Mechanism and Sazanami and Yoshimura (1999) for the 1997 East Asian crisis. In a similar spirit, Alberola, Lopez and Serven (2004) attribute the Argentine peso overvaluation under its currency board (1991-2001) mainly to divergent patterns of foreign assets and productivity growth with the United States before 1997 and to an unsuitable dollar anchor afterwards.

The aforementioned studies suggest a non-negligible misalignment-impact of exchange rate regimes. Nonetheless, they have some limitations. First, computed misalignment generally drops as the number of fundamentals rises. So failing to control for a "fair" number of fundamentals may result in overstating misalignment (Abdih and Tsangarides, 2010) and the impact of exchange rate regimes. To deal with this problem, we used a large set of determinants gathered from the extant literature.

Second, FMOLS estimation from a single large sample of countries as in Coudert and Coharde (2009) may prove problematic given the estimator's weak performances in small samples. Moreover, Dufrenot and Yehoue (2005) found that common factors among real exchange rate determinants differ between middle and low-income countries. So pooling them altogether may lead to inefficient estimation. We tried to improve upon these shortcomings by splitting countries into low, middle and high-income countries samples.

Finally, we explore whether different likelihoods of real overvaluation/undervaluation in de jure and de facto regimes may explain their misalignment-effects.

2.2. Econometric approach

This subsection presents the empirical models, outlines the estimation methodology and discusses the estimation results.

2.2.1. Empirical models

2.2.1.1. Exchange rate systems and misalignment

To assess the exchange rate system effects on misalignment, we estimate the following equation :

$$MIS_{it}^{*} = \beta_0 + \alpha_1 FIX_{it} + \alpha_2 INTERM_{it} + \beta_1 \pi_{it} + \beta_2 \widetilde{TOT}_{it} + \beta_3 \widetilde{Open}_{it} + \beta_4 \widetilde{GC}_{it} + \varepsilon_{it} \quad (9)$$

where ε is a disturbance. FIX_{it} ($INTERM_{it}$) is a dummy variable which takes the value one if the regime of country i during year t is fixed (intermediate) and zero otherwise. Floats are the omitted category.

Fixed regimes are expected to induce larger differential misalignments because they hinder the economy's adjustment. The impact of intermediate regimes will likely depend on the level of development. Indeed, rich countries have better institutions and well-developed financial systems which enhance their adjustment ability and make floats more appealing than intermediate regimes. Middle income countries are more integrated to the world economy and finance than low income countries albeit less than high-income ones. Their institutions are also less developed than those in high-income countries. These features make intermediate regimes attractive (Frankel, 1999 and 2003) to reduce misalignment. We, therefore, assume that in middle-income countries misalignment is smaller (larger) in intermediate (fixed) regimes than in floating ones.

The explanatory variables in equation 9 also include temporary terms of trade shocks () and deviations of government consumption () and trade openness () from their respective long-run values. Their expected effects are as those on the equilibrium real exchange rate. We also include the inflation rate – measured as deviation from the relevant sample yearly mean inflation – because domestic inflation pushes nontradable goods price upwards hence inducing real appreciation. Likewise, high inflation – stemming form unsustainable policies – hinders exchange rate pegs because it feeds real overvaluation (Edwards, 1989b). Resultant devaluations would ultimately make the real exchange rate behaves alike in fixed and flexible regimes. Controlling for inflation may help attenuate that blur.

2.2.1.2. Distinction of overvaluation and undervaluation episodes

To investigate whether the average misalignment-impact of the exchange rate system stems from different probabilities of overvaluation and undervaluation, we estimate the probability of overvaluation[13] (*OVER*) :

$$OVER_{it} = \beta_0 + \alpha_1 FIX_{it} + \alpha_2 INTERM_{it} + \beta_1 \pi_{it} + \beta_2 \widetilde{TOT}_{it} + \beta_3 \widetilde{Open}_{it} + \beta_4 \widetilde{GC}_{it} + \varepsilon_{it} \quad (10)$$

$$\text{with } OVER_{it} = \begin{cases} 1 \; if \; MIS^*_{it} > 0 \\ 0 \; if \; MIS^*_{it} \leq 0 \end{cases}$$

According to our previous arguments, a higher probability of overvaluation is expected in fixed regimes in all countries and in intermediate regimes in low and high-income countries, than in floats. In middle-income countries, by contrast, overvaluation would be less likely in intermediate regimes. Overvaluation probability also rises with inflation and transitory increase in terms of trade or government consumption. It falls with a transitory rise in trade openness.

2.2.2. Estimation methods, data and sources

All regressions are run by ordinary least squares with heteroskedasticity-robust standard errors. Equations with dependent binary variables are estimated by logit. De jure regimes are taken from the IMF's "Annual Report on Exchange Arrangements and Exchange Restrictions". Fixed regimes encompass monetary unions, dollarization, currency boards

13 Episodes of overvaluation and undervaluation are symmetric by definition.

and conventional pegs. Floats consist of managed and independently floating regimes. The remainder form intermediate regimes. De facto regimes are drawn from Reinhart and Rogoff's[14] (2003) (hereafter RR) historical classification of exchange rate regimes. Fixed regimes are comprised of "No separate legal tender", "Pre announced peg or currency board arrangement", "Pre announced horizontal band that is narrower than or equal to +/- 2%", and "de facto peg". Floats consist of managed and freely floating arrangements. The rest constitutes intermediate regimes. The sample covers the period 1973-1999 because the IMF has stopped publishing the self-declared exchange rate regimes by member countries in 1999. Appendix B contains more information about the variables and data.

2.2.3. Results and interpretation

Before proceeding further, we graphically describe yearly average misalignment in fixed, intermediate and floating regimes in each sample.

2.2.3.1. Descriptive analysis

Figure 1 displays yearly average misalignment across exchange rate regimes in the three samples of countries. In low-income countries, from the late 1970s to the mid 1980s, misalignment was the largest in intermediate regimes and the smallest in fixed ones. Over the period, it remained quite stable in fixed regimes whereas it dropped in floats and fell sharply in intermediate regimes. After 1985, misalignment became the largest in fixed regimes and kept rising until the early 1990s. It fell in intermediate and floating regimes until 1987, the trend reversed thereafter. From 1992 it rose markedly in intermediate regimes to become the largest.

Misalignment displays large swings under de facto regimes.

The evolution of misalignment in fixed regimes contrasts with that of the other two regimes which move together, albeit with some lags. Overall, misalignment was the smallest in fixed regimes until the mid-1980s. Afterwards, it rose sharply and remained the largest until 1993. Thereafter, it fell markedly to become the smallest from 1994 to 1998. A comparison of the CFA countries[15] to other fixed regimes reveals an upward trend, broken off in 1994 in the former by the 50 percent devaluation of the CFA franc against the French franc. Misalignment in non-CFA de facto fixed regimes displays large fluctuations over time.

Figure 1 here

In middle-income countries, figure 1 shows that misalignment remained relatively small over time and was, most of the time, the smallest in de jure intermediate systems and the largest in de jure fixed ones. Using de facto regimes instead confirms these findings. The main difference with de jure regimes is that misalignment was the smallest in de facto floats which exhibit an undervaluation most of the time. Moreover the real exchange rate was sometimes slightly overvalued sometimes weakly undervalued in de facto intermediate regimes.

14 Observations labelled "dual missing" are excluded.

15 The African CFA franc arrangement consists of two monetary unions with the same fixed nominal exchange parity with the French franc from its inception in 1948 up to 1999 and the euro thereafter. The West African Monetary Union (UMOA) is composed of Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo. Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea and Gabon constitute the Central African Monetary Union (UMAC). The CFA francs of the two unions are not convertible into each other.

Turning to high-income countries, figure 1 reveals an upward misalignment in de jure regimes until the early 1980s (until 1995 in intermediate regimes). Misalignment subsequently fell until 1996 in fixed regimes and 1998 in intermediate and floating ones. Before 1985, the real exchange rate was the most undervalued in intermediate regimes and the most overvalued in fixed regimes. After 1989, intermediate regimes experienced the largest overvaluation and fixed regimes mostly recorded the smallest undervaluation. Using de facto regimes, differences in the evolution of misalignment appear much smaller. De facto floats display the best performance whereas de facto fixed regimes often have the largest overvaluation.

Firm conclusions cannot be drawn from the graphical analysis. So an econometric investigation is undertaken.

2.2.3.2. Exchange rate systems and misalignment

Table 4 (columns 1-4) contains the estimation results in low-income countries. Column 1 shows that yearly average misalignment was significantly larger in fixed and intermediate de jure regimes, the latter inducing the largest effect, than in floats. To verify whether the impact of fixed regimes is dominated by the CFA franc countries, we separate out the latter (*CFA*) from other fixed regimes (de jure *NonCFA*). Column 2a suggests that the significant larger differential misalignment in de jure fixed systems stems mostly from the CFA countries whose average misalignment is statistically significantly larger than that of de jure floats. Further breaking up the CFA countries into the West African Monetary Union (UMOA) and the Central African Monetary Community (UMAC) countries in column 2b reveals that both blocs of countries are associated with a larger misalignment than de jure floats. By contrast, de jure non-CFA fixed regimes induce no discernible differential effect.

As regards the remaining control variables, all but government consumption shocks appear in columns 1, 2a and 2b with statistically significant and rightly signed coefficients. All coefficients also display satisfactory size and sign stability.

Insert Table 4 here

Columns 3, 4a and 4b reproduce columns 1, 2a and 2b respectively, using RR's regimes instead. The largest misalignment still shows up in intermediate systems but fixed regimes have no discernible misalignment effect. When fixed rates are broken down, the impact of the CFA regime remains significant and fairly unchanged and is now driven by UMOA countries only. As before, de facto non-CFA fixed regimes still display no significant differential impact. The larger misalignment in the CFA countries relative to other fixed countries may be explained by the fact that the CFA franc parity was modified only once (in 1994) since the 1950s. The real exchange rate hence adjusted through changes in domestic prices and incidentally changes in the French franc parity vis-à-vis third currencies[16].

Nevertheless some differences exist between the two classifications of regimes. Indeed, the impact of fixed and intermediate regimes drops, sharply so for the latter. Moreover, misalignment in de facto fixed regimes and CMAC countries no longer significantly differs from that of floats. As regards the remaining control variables, their effects rise and temporary government consumption shocks remain insignificant. The stability of the coefficients estimated with RR's regimes slightly deteriorates when CFA countries are singled out.

16 These are the countries used to compute the effective real exchange rate.

The results for middle-income countries are displayed in table 5 (columns 1-4). As column 1 shows, de jure fixed regimes significantly raise misalignment relative to floats. Contrary to low-income countries where they raise misalignment, de jure intermediate regimes now significantly reduce it relative to floats. Turning to other control variables, only openness to trade has a significant negative coefficient.

Insert Table 5 here

In column 3, de facto regimes are used. Fixed regimes still significantly raise misalignment relative to floats. Now, the estimated coefficient of intermediate regimes turns positive and insignificant. Therefore, the effects of de facto intermediate and floating regimes on misalignment are statistically indiscernible in middle-income countries. As with de jure regimes, only openness to trade among the remaining control variables has a significant negative impact on misalignment. Finally, excluding the sole CFA country, Gabon, from the regression does not qualitatively alter the results as can be seen in columns 2 an 4.

In high-income countries, the more flexible the exchange rate regime the smaller misalignment is irrespective of the classification scheme used as shown by columns 1 to 4 in table 6. These findings thus corroborate the theoretical argument that developed countries fare better with floating exchange rates given their well-developed financial systems and institutions.

Insert Table 6 here

As regards the other covariates, a temporary terms of trade improvement significantly raises misalignment whereas a transitory rise in government consumption reduces it though not significantly. The coefficient of inflation is significantly negative and may suggest an overshooting of the exchange rate in a context of high international capital mobility. The exclusion of the inflation variable in columns 2 and 4 does not substantially alter the results. Once more, countries that are more open to trade experience significantly smaller misalignment.

In sum, a statistically significantly larger misalignment was found in de jure fixed regimes in all countries and in de facto fixed regimes in all but low-income countries. This result supports the view that fixing the exchange rate constrains a major adjustment mechanism and thus results in larger misalignments than floats.

Intermediate regimes, both de jure and de facto, significantly raise misalignment in low-income and high-income countries. An explanation may be that these regimes lack transparency and credibility thus making them prone to exchange rate crises in low-income countries. In contrast, in high-income countries floating exchange rates offer the best adjustment ability besides monetary policy autonomy as theory posits.

In middle-income countries, de jure intermediate regimes significantly reduce misalignment. A somewhat similar result was reached by Dubas (2009) who suggests that de jure intermediate regimes reduce misalignment relative to floats in developing countries. De facto intermediate regimes have no significant differential impact. The misalignment advantage of intermediate regimes may reflect balance sheet effects in middle-income countries or their intermediate level of institutional development and international financial integration.

Our findings for fixed regimes in all countries and intermediate regimes in low income and high-income countries contradict those obtained by Dubas (2009) which suggest that they limit misalignment relative to floats.

To further the analysis we now assess the impact of the exchange rate system on overvaluation episodes.

2.2.3.3. Exchange rate regimes and overvaluation

The probability of overvaluation is estimated in the three samples[17]. The results for low-income countries are displayed in columns 5 to 8 of table 4. All else equal, overvaluation is about 11 percent more likely to happen in de jure fixed regimes than in floats (see column 5). Digging further, we found the probability of overvaluation to be about 10.6 percent higher in the CFA countries and 11.5 percent higher in other de jure fixed regimes than in floats (see column 6a). All these effects are significant. Moreover, column 6b suggests that the higher probability of overvaluation in the CFA countries is attributable only to UMOA countries since the effect of UMAC membership lacks statistical significance. Therefore, the larger misalignment in de jure fixed systems and the CFA countries may be explained by the fact that they experience overvaluation (undervaluation) more (less) often than floats. At the same time, the scales of overvaluation and undervaluation in other non-CFA fixed countries seem to cancel each other so that average misalignment there does not differ from that of floats.

Though positive, the differential impact of de jure intermediate regimes on the probability of overvaluation is never significant. Thus, their larger average misalignment-impact does not stem from more (less) frequent overvaluation (undervaluation) episodes vis-à-vis floats. Instead, it may stem from larger (smaller) scale overvaluations (undervaluations) relative to floats.

Using the RR's classification, no statistically significant difference appears in the probability of overvaluation across de facto regimes (column 7). Therefore, once again the larger differential misalignment in intermediate regimes does not stem from a higher (lower) probability of overvaluation (undervaluation) in these regimes than in floats. Besides, de facto fixed regimes are not statistically different from floats in terms of average misalignment and overvaluation occurrence.

Isolating CFA countries from other de facto fixed regimes reveals that in the latter overvaluation probability is 12.4 percent lower than in de facto floats though it does not translate into statistically different average misalignments across these regimes (see columns 1-4). Column 8a also suggests that the larger misalignment in the CFA countries may not be the result of frequent overvaluation episodes. Instead, it may stem from overvaluation of larger scales and undervaluation of smaller scales than in floats. Further dividing the CFA countries into members of UMOA and UMAC (column 8b) does not significantly alter the previous findings.

The results for middle-income countries are shown in table 5 (column 5-8). Ceteris paribus, overvaluation is 15.6 percent more probable in de jure fixed systems than in floats. That probability slightly rises to 16.7 percent in column 6 when Gabon is excluded. The larger misalignment evidenced in de jure fixed systems in middle-income countries may thus come from more frequent overvaluation episodes than in de jure floats.

17 All probit estimation results are presented as marginal effects.

The same interpretation holds for de facto fixed regimes (columns 7 and 8) which, in addition, lead to larger marginal effects than de jure fixed regimes.

On the other hand, the smaller misalignment found in de jure intermediate regimes cannot be linked to less frequent overvaluation episodes for they have no significant differential effect on overvaluation occurrence. It may likely stem from a combination of smaller sized overvaluations and larger sized undervaluations than in de jure floats. By contrast, in de facto intermediate regimes overvaluation episodes are about 9.7 percent more likely to happen (columns 7 and 8) than in floats though they induce no discernible differential misalignment.

The estimation results for high-income countries, contained in table 6 (columns 5-8), allow a straightforward interpretation. Indeed, as found above, average yearly misalignment is significantly larger in de jure and de facto fixed and intermediate regimes than in floats. These differences likely come from a higher probability of overvaluation in fixed and intermediate regimes than in floats. For instance, column 5 shows that overvaluation is about 25 percent and 19 percent more probable in de jure fixed and intermediate regimes than in de jure floats, respectively. The corresponding effects for de facto fixed and intermediate regimes are 27 percent and 23.4 percent respectively in column 7.

Our finding that fixed regimes make overvaluation more probable than floats – except de facto regimes in low income countries - was also established by Coharde and Coudert (2009), Goldfajn and Valdes (1999). It also accords with Kubota (2011) who found that countries with more flexible regimes are more likely to record real undervaluation than those with fixed regimes.

3.2.4. Robustness analysis

To assess the robustness of our previous misalignment results, we discuss two variables used in the empirical literature that did not appear in our regressions. Dubas (2009) found that misalignment is attenuated by domestic financial sector development while it rises in periods of global crises. Regarding global crises, our regressions include time dummies that already control for their effects so we need not add them again. Therefore, we only add a domestic financial sector development variable, measured by the domestic banking sector credit to the private sector as a ratio of GDP.

In fact, the effect of financial development on misalignment is ambiguous. On the one hand, countries with a more developed financial system may be able to cope better with shocks and better manage financial flows. On the other hand, in a context of asymmetric information, short-sightedness in financial and economic decisions, lax supervision and regulation, financial flows may exacerbate instability and feed misalignment. Such a point is illustrated by the 1997-1998 East Asian crisis and several others in the developing world.

The regression results largely confirm our previous misalignment results. Indeed, table 7 reveals that, in low-income countries, the effects of de jure exchange rate regimes are unchanged in terms of sign and statistical significance. The misalignment-effects of de facto regimes are also not altered qualitatively. Contrary to our previous results, the coefficients of de facto fixed regimes and CMAC are now statistically significant. Domestic financial sector development help limit misalignment in low-income countries but only statistically so when de facto regimes are used.

In middle-income countries, the statistical significance of intermediate regimes weakens so that they become indiscernible from floats as table 8 shows. Fixed regimes are still associated with a significantly larger misalignment than floats. Financial development itself has no significant impact on misalignment in middle-income countries, an unsurprising result given the crisis-ridden history of several of these countries. It may also point to nonlinear effect of financial development on misalignment, an avenue that is not pursued in this paper.

Finally, previous findings in high-income countries are not altered by the addition of financial development, either qualitatively or in terms of statistical significance. Moreover, financial development significantly reduces misalignment in these countries.

CONCLUSION

This paper has assessed the misalignment-effects of de jure and de facto exchange rate systems in low, middle and high-income countries. Misalignment was found to be larger in fixed regimes than in floats in all countries, the largest impact appearing in middle-income and the CFA countries. In middle-income countries, the lower performance of fixed regimes may be explained by the usual case against fixed exchange rates. Moreover, their increasing but imperfect global trade and finance integration would amplify the costs of fixed rates especially during financial crises. The results also suggest that the larger misalignment in fixed regimes stems from more frequent overvaluation episodes than in floats.

Intermediate regimes are also associated with a larger misalignment in low and high-income countries. In middle-income countries, by contrast, they perform at least as better as floats thus corroborating Bordo's (2003) finding that corner exchange rate regimes do not suit emerging countries. However, only in high-income countries does this impact come from a higher probability of overvaluation episodes than in floats. In low and middle-income countries, it may be explained by overvaluation and undervaluation of different extents.

Large misalignments may entail substantial economic costs. Moreover, as stressed by Obstfeld and Rogoff (1995), no substitute exists for the real exchange rate adjustment though it may be facilitated and its costs attenuated. Therefore, whatever regime a country runs, enhancing the flexibility of the economy should remain an ultimate objective in order to facilitate adjustment to changing domestic and external economic conditions. Such flexibility may be achieved through the development of sound and well-regulated financial markets, strong institutions, more flexible labour and goods markets, sound macroeconomic policies and regional and international monetary cooperation.

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Table 1 : Hadri's unit root test results

Variables	Low income countries (N = 38)		Middle income countries (N = 45)		High income countries (N = 24)	
	P-value of Z-stat	P-value of Het Z-stat	P-value of Z-stat	P-value of Het Z-stat	P-value of Z-stat	P-value of Het Z-stat
RER : Level	0.00	0.00	0.00	0.00	0 .00	0.00
RER : First difference	1.00	0.82	1.00	0.91	0.74	0.57
TOT : Level	0.00	0.00	0.00	0.00	0.00	0.00
TOT : First difference	0.59	0.20	0.56	0.48	0.00	0.00
TOT : Second difference					1.00	1.00
Open : Level	0.00	0.00	0.00	0.00	0.00	0.00
Open : First difference	1.00	0.98	0.99	0.99	0.95	0.98
PROD : Level	0.00	0.00	0.00	0.00	0.00	0.00
PROD : First difference	1.00	1.00	1.00	1.00	1.00	1.00
GC : Level	0.00	0.00	0.00	0.00	0.00	0.00
GC : First difference	1.00	0.99	1.00	0.97	0.77	0.00
GC : Second difference						1.00
FF : Level	0.00	0.00	0.00	0.00	0.00	0.00
FF : First difference	1.00	1.00	1.00	1.00	1.00	1.00
MP : Level	0.97	0.00	0.73	0.00	0.16	0.00
MP : First difference	1.00	1.00	1.00	1.00	1.00	1.00
Deval : Level	0.00	0.00	0.00	0.00	0.00	0.00
Deval : First difference	1.00	1.00	1.00	1.00	1.00	1.00

Notes : Z-stat and Het Z-stat are the Hadri's test statistics; the latter is robust to heteroskedasticity. Individual fixed effects are included. The null hypothesis is stationarity.

Table 2 : Maddala and Wu's unit root test results

Variables	Low income countries (N = 38)			Middle income countries (N = 45)			High income countries (N = 24)		
	P-value of Fisher Chi-2			P-value of Fisher Chi-2			P-value of Fisher Chi-2		
RER: Level	0.98	0.06	0.00	0.38	0.07	0.06	0.00	0.00	0.93
RER: First difference	0.00	0.00		0.00	0.00	0.00			0.00
TOT: Level	0.00	0.00	1.00	0.81	0.00	1.00	1.00	0.27	1.00
TOT: First difference			0.00	0.00		0.00	0.00	0.00	0.00
Open: Level	0.00	0.00	1.00	0.04	0.00	1.00	0.03	0.00	1.00
Open: First difference			0.00	0.00		0.00	0.00		0.00
PROD: Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GC: Level	0.00	0.00	0.97	0.00	0.01	1.00	0.02	0.06	1.00
GC: First difference			0.00		0.00	0.00	0.00	0.00	0.00
FF: Level	0.00	0.00	0.00	0.00	0.00	0.95	0.41	0.00	1.00
FF: First difference						0.00	0.00		0.00
MP: Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Deval: Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes : The null is non-stationarity. In the first sub-column, individual fixed effects are added; in the second one, individual fixed effects and individual linear trends are included; the third sub-column includes neither individual fixed effects nor individual linear trends.

Table 3 : Pedroni's cointegration tests results

Test statistics	Low income countries (N = 38)	Middle income countries (N = 45)	High income countries (N = 24)
panel v-stat	-12.96	-14.10	-2.42
panel rho-stat	15.51	13.94	6.03
panel pp-stat	21.72	-2.72	3.35
panel adf-stat	30.13	15.84	4.89
group rho-stat	8.57	10.74	7.81
group pp-stat	3.00	3.68	4.48
group adf-stat	4.84	5.34	5.51

Notes : The critical values of the test statistics are 2.57 at 1%, 1.96 at 5% and 1.64 at 10%.

The null hypothesis is no cointegration.

Table 4 : Misalignment and overvaluation regressions, low-income countries

	Misalignment regressions (1-4)						Overvaluation regressions (5-8)					
COEFFICIENT	(1)	(2a)	(2b)	(3)	(4a)	(4b)	(5)	(6a)	(6b)	(7)	(8a)	(8b)
de jure Fix	4.94**						0.111**					
	(1.98)						(2.56)					
de jure Interm	16.03*	15.99*	15.98*				0.087	0.087	0.087			
	(1.82)	(1.82)	(1.81)				(0.78)	(0.78)	(0.78)			
π	41.05**	42.44**	42.44**	49.73***	53.45***	53.50***	0.151	0.144	0.144	0.153	0.172	0.177
	(2.50)	(2.53)	(2.53)	(2.67)	(2.75)	(2.75)	(1.13)	(1.04)	(1.04)	(0.94)	(0.99)	(1.01)
$\widetilde{TOT}$	32.25**	32.29**	32.28**	41.57**	40.95**	40.94**	0.249*	0.249*	0.249*	0.360**	0.349**	3.352**
	(2.39)	(2.39)	(2.39)	(2.52)	(2.51)	(2.51)	(1.80)	(1.80)	(1.80)	(2.25)	(2.19)	(2.20)
$\widetilde{Open}$	-91.31***	-91.41***	-91.44***	-105.08***	-104.93***	-105***	-0.698***	-0.697***	-0.701***	-0.823***	-0.822***	-0.830***
	(-3.57)	(-3.57)	(-3.57)	(-3.50)	(-3.52)	(-3.53)	(-3.50)	(-3.50)	(-3.55)	(-3.63)	(-3.63)	(-3.70)
$\widetilde{GC}$	1.72	1.61	1.60	6.98	6.05	5.99	-0.050	-0.049	-0.050	0.028	0.003	-0.002
	(0.15)	(0.14)	(0.14)	(0.53)	(0.46)	(0.46)	(-0.27)	(-0.27)	(-0.27)	(0.14)	(0.02)	(-0.01)
CFA		6.01**			5.94*			0.106**			0,034	
		(2.27)			(1.88)			(2.13)			(0.60)	
UMOA			6.39**			6.47**			0.142***			0.073
			(2.31)			(1.97)			(2.68)			(1.24)
CMAC			5.10*			4.70			0.014			-0.060
			(1.79)			(1.37)			(0.20)			(-0.76)
de jure NonCFA		4.14	4.14					0.115**	0.116**			
		(1.55)	(1.55)					(2.46)	(2.46)			
de facto Fix				3,77						0,034		
				(1.35)						(0.71)		
de facto Interm				7.79***	8.00**	8.04**				0.065	0.039	0.041
				(2.71)	(2.53)	(2.54)				(1.17)	(0.66)	(0.71)
de facto NonCFA					-1,79	-1.76					-0.124*	-0.123*
					(-0.42)	(-0.42)					(-1.96)	(-1.93)
Constant	-7.45**	-7.27**	-7.29**	-2.73	-1.55	-1.59						
	(-2.35)	(-2.32)	(-2.33)	(-0.82)	(-0.43)	(-0.44)						
Observations	842	842	842	704	704	704	842	842	842	704	704	704
Number of countries	35	35	35	29	29	29						
R2/Pseudo R2	0.15	0.15	0.15	0.15	0.16	0.16	0.02	0.02	0.02	0.02	0.03	0.03
Wald chi2	39.37	39.35	39.33	28.04	29.37	29.50	23.90	23.94	23.94	19.28	25.30	29.49
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes : Robust (standard normal) z statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1.All regressions contain time dummies for the 1980s and 1990s decades.

Table 5 : Misalignment and overvaluation regressions, middle-income countries

	Misalignment regressions (1-4)				Overvaluation regressions (5-8)			
COEFFICIENT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
de jure Fix	5.66**	6.36***			0.156***	0.167***		
	(2.54)	(2.84)			(3.89)	(4.11)		
de jure Interm	-5.12**	-4.91*			-0.054	-0.051		
	(-1.97)	(-1.90)			(-0.80)	(-0.75)		
π	-5.82	-4.74	-4.46	-3.5	-0.160	-0.143	0.01	0.022
	(-0.70)	(-0.57)	(-0.54)	(-0.42)	(-1.35)	(-1.21)	(0.07)	(0.17)
$\widehat{TOT}$	-1.09	1.39	-7.1	-5.39	0.026	0.103	-0.114	-0.055
	(-0.11)	(0.13)	(-0.63)	(-0.46)	(0.12)	(0.43)	(-0.48)	(-0.22)
$\widehat{Open}$	-54.39***	-54.89***	-49.41**	-49.31**	-1.018***	-1.071***	-0.842***	-0.878***
	(-2.97)	(-2.97)	(-2.51)	(-2.47)	(-3.57)	(-3.67)	(-2.85)	(-2.91)
$\widehat{GC}$	9.28	12.46	11.69	15.35	-0.117	-0.048	-0.01	0.077
	(0.85)	(1.15)	(0.97)	(1.27)	(-0.48)	(-0.19)	(-0.01)	(0.30)
de facto Fix			6.61**	7.25**			0.216***	0.222***
			(2.23)	(2.46)			(3.89)	(3.98)
de facto Interm			2.41	2.46			0.097*	0.096*
			(0.86)	(0.88)			(1.82)	(1.80)
Constant	7.36**	6.54**	8.04**	7.57**				
	(2.51)	(2.21)	(2.50)	(2.34)				
Observations	917	895	849	827	917	895	849	827
Number of countries	45	44	40	39				
R2/Pseudo R2	0.09	0.09	0.08	0.08	0.06	0.06	0.06	0.06
Wald chi2	74.01	74.38	61.37	63.63	71.97	71.04	63.91	60.95
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note : see table 4.

Table 6 : Misalignment and overvaluation regressions, high-income countries

	Misalignment regressions (1-4)				Overvaluation regressions (5-8)			
COEFFICIENT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
de jure Fix	3.07***	3.25***			0.248***	0.254***		
	(3.74)	(3.92)			(4.67)	(4.83)		
de jure Interm	2.59***	2.42***			0.191***	0.180***		
	(3.67)	(3.35)			(3.64)	(3.44)		
π	-37.20***		-44.09***		-2.122**		-2.535***	
	(-2.74)		(-3.28)		(-2.54)		(-3.11)	
$\widehat{TOT}$	21.51*	23.84*	22.85**	25.36**	0.882	0.978	0.932	1.072
	(1.86)	(1.95)	(1.99)	(2.06)	(1.30)	(1.39)	(1.33)	(1.48)
$\widehat{Open}$	-66.25***	-64.84***	-66.72***	-64.90***	-4.445***	-4.248***	-4.444***	-4.225***
	(-6.87)	(-6.68)	(-6.98)	(-6.67)	(-5.88)	(-5.74)	(-5.88)	(-5.65)
$\widehat{GC}$	1.41	2.59	0.2	2.06	-0.249	-0.158	-0.302	-0.173
	(0.066)	(0.12)	(0.01)	(0.10)	(-0.23)	(-0.14)	(-0.28)	(-0.16)
de facto Fix			3.95***	3.96***			0.270***	0.266***
			(4.61)	(4.64)			(4.93)	(4.95)
de facto Interm			3.89***	3.43***			0.234***	0.207***
			(5.24)	(4.58)			(4.64)	(4.14)
Constant	-2.54**	-2.71***	-3.76***	-3.52***				
	(-2.57)	(-2.66)	(-3.91)	(-3.56)				
Observations	553	553	553	553	553	553	553	553
Number of countries	23	23	23	23				
R2/Pseudo R2	0.16	0.14	0.18	0.15	0.11	0.10	0.11	0.10
Wald chi2	84.79	79.97	115.27	95.24	56.22	55.25	63.29	54.58
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note : See table 4.

Table 7 : Misalignment regressions, low-income countries

	Misalignment regressions					
COEFFICIENT	(1)	(2a)	(2b)	(3)	(4a)	(4b)
de jure Fix	5.37**					
	(2.13)					
de jure Interm	15.78*	15.70*	15.70*			
	(1.81)	(1.80)	(1.80)			
π	40.49**	42.3**	42.25**	52.72**	59.17***	59.21***
	(2.21)	(2.28)	(2.27)	(2.58)	(2.79)	(2.79)
$\widetilde{TOT}$	34.53**	34.48**	34.43**	42.34**	41.09**	41.04**
	(2.42)	(2.42)	(2.41)	(2.45)	(2.42)	(2.41)
$\widetilde{Open}$	-92.86***	-93.01***	-93.01***	-109.48***	-109.26***	-109.31***
	(-3.36)	(-3.37)	(-3.37)	(-3.41)	(-3.44)	(-3.44)
$\widetilde{GC}$	1.56	1.41	1.40	4.90	3.53	3.44
	(0.13)	(0.12)	(0.12)	(0.37)	(0.27)	(0.26)
FD	-2.10	-2.26	-2.31	-4.72***	-4.83***	-4.95***
	(-1.38)	(-1.45)	(-1.46)	(-2.74)	(-2.80)	(-2.82)
CFA		6.85**			9.32***	
		(2.59)			(2.63)	
UMOA			7.33***			10.18***
			(2.65)			(2.73)
CMAC			5.73*			7.44**
			(1.96)			(2.05)
de jure NonCFA		4.18	4.18			
		(1.51)	(1.51)			
de facto Fix				5.32*		
				(1.79)		
de facto Interm				9.27***	10.45***	10.56***
				(3.01)	(2.98)	(2.99)
de facto NonCFA					-2.53	-2.45
					(-0.57)	(-0.55)
Constant	-4.09	-3.44	-3.33	5.35	6.54	6.76
	(-0.77)	(-0.64)	(-0.61)	(1.10)	(1.34)	(1.37)

Note : see table 4.

Table 8 : Misalignment regressions, middle-income countries

	Misalignment regressions (1-4)			
COEFFICIENT	(1)	(2)	(3)	(4)
de jure Fix	5.97***	6.74***		
	(2.75)	(3.06)		
de jure Interm	-2.88	-2.51		
	(-1.00)	(-0.87)		
π	-8.29	-7.72	-6.43	-6.04
	(-1.13)	(-1.05)	(-0.77)	(-0.71)
$\widetilde{TOT}$	-3.21	-0.69	-8.94	-7.19
	(-0.31)	(-0.06)	(-0.79)	(-0.61)
$\widetilde{Open}$	-52.90***	-53.51***	-48.72**	-48.81**
	(-2.92)	(-2.94)	(-2.52)	(-2.50)
$\widetilde{GC}$	8.00	11.33	10.46	14.33
	(0.74)	(1.07)	(0.88)	(1.22)
FD	-1.58	-1.91	-2.01	-2.42
	(-0.67)	(-0.80)	(-0.80)	(-0.93)
de facto Fix			7.14**	8.05***
			(2.49)	(2.82)
de facto Interm			2.37	2.37
			(0.85)	(0.85)
Constant	10.98	11.15	13.25	14.00
	(1.48)	(1.48)	(1.44)	(1.49)

Table 9 : Misalignment regressions, high-income countries

COEFFICIENT	(1)	(2)	(3)	(4)
de jure Fix	2.75***	3.07***		
	(3.34)	(3.64)		
de jure Interm	1.92***	1.92**		
	(2.65)	(2.53)		
π	-46.36***		-52.73***	
	(-3.47)		(-3.93)	
$\widehat{TOT}$	21.98*	24.61*	23.77**	26.33**
	(1.87)	(1.95)	(2.03)	(2.05)
$\widehat{Open}$	-69.34***	-67.26***	-69.75***	-67.15***
	(-7.21)	(-6.91)	(-7.29)	(-6.85)
$\widehat{GC}$	-2.72	-0.23	-3.76	-0.37
	(-0.13)	(-0.01)	(-0.18)	(-0.02)
FD	-2.44***	-1.69**	-2.19***	-1.34*
	(-3.25)	(-2.20)	(-3.03)	(-1.83)
de facto Fix			3.02***	3.32***
			(3.52)	(3.90)
de facto Interm			3.53***	3.16***
			(4.77)	(4.14)
Constant	7.62**	4.35	5.57*	2.29
	(2.33)	(1.29)	(1.80)	(0.72)

Appendix A : List of countries

Low income countries : Bangladesh, Benin, Burkina Faso, Burundi, Cameroon, Republic of Congo, Comoros, Côte d'Ivoire, Ghana, Gambia, Guinea-Bissau, Haiti, Indonesia, India, Kenya, Lesotho, Madagascar, Mali, Mozambique, Mauritania, Malawi, Niger, Nigeria, Nicaragua, Pakistan, Papua New Guinea, Rwanda, Senegal, Sierra Leone, Chad, Togo, Tanzania, Uganda, Zambia, Zimbabwe.

Middle income countries: Argentina, Antigua and Barbuda, Bolivia, Brazil, Botswana, Chile, Colombia, Cape Verde, Costa Rica, Dominica, Dominican Republic, Algeria, Ecuador, Egypt, Fiji, Gabon, Guatemala, Guyana, Honduras, Iran, Jordan, St. Kitts and Nevis, Sri Lanka, Morocco, Mexico, Mauritius, Malaysia, Panama, Peru, Philippines, Paraguay, El Salvador, Suriname, Swaziland, Seychelles, Syrian Arab Republic, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, St. Vincent and Grenadines, Venezuela, Vanuatu, South Africa.
High income countries : Australia, Austria, Belgium, Canada, Switzerland, Cyprus, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Japan, Korea, Netherlands, Norway, New Zealand, Portugal, Sweden, United States.

CFA franc zone countries : The exchange parity of the CFA franc is fixed at 1 euro for 655,955 CFA francs. The CFA franc zone is composed of two groups of countries. The west African bloc includes Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo. Guinea-Bissau has joined the CFA zone on may 2nd, 1997. Mali exit the zone on July 1962 and re-integrated it on June 1st, 1984. The central African group includes Cameroon, Central African Republic, Chad, Republic of Congo, Gabon and Equatorial Guinea. Equatorial Guinea has joined the zone on august 27, 1984. Madagascar and Mauritania exit the zone in 1973.

Appendix B : Data

Variable	Definition	Source
Real exchange rate (RER)	See text	CERDI
Devaluation (Deval)	See text	CERDI
Terms of trade (TOT)	(Log) exports as capacity to import, constant local currency.	WDI 2003 and 2005
External financial flows (FF)	(Log) gross private capital flows as % of GDP in middle and high income countries. In low income countries, ratio of the sum of net income from abroad (in current US dollars) and aid (in current US dollars) to GDP (in current US dollars), in %.	WDI 2003 and 2005
Productivity growth (PROD)	Growth rate (in %) of constant US dollars GDP per labour unit. The data of economically active population is taken from the series "*labor force, total*".	WDI 2003 and 2005
Trade openness (Open)	(Log) ratio of the sum of exports and imports to GDP, in %.	WDI 2003 and 2005
Government consumption (GC)	(Log) Government consumption spending as % of GDP.	WDI 2003 and 2005
Monetary policy (*MP*)	Excess growth rate of money stock (M1) in current local currency over the previous year's growth rate of current local currency GDP, in %.	WDI 2003 and 2005
Inflation (π)	Deviation of the inflation rate from its sample yearly average.	WDI 2003 and 2005
Financial development (FD)	(Log) Ratio of credit to the domestic private sector by domestic banks to GDP, in %.	WDI 2003 and 2005