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The Misalignment - Is it a Determinant of the FDI in the Developing Countries?

ABDESSALEM GOUIDER
URECA, University of Sfax, Sfax
Tunisia
RIDHA NOUIRA[1]
UREP, University of Sfax, Sfax
Tunisia

Abstract:

This paper contributes to a current and intense debate among economists concerning the impact that real exchange rate misalignment can have on FDI. To identify the degree of misalignment, a model of Edwards in Panel will be estimated for a sample of 52 developing countries over the period 1980-2010. Once the misalignment values are determined, they will be included in the FDI model. The results prove that the misalignment is a main determinant of the FDI in the developing countries. Indeed, the overvaluation has a negative and significant effect on the FDI while undervaluation does not have a significant effect on it. Finally, a persistent overvaluation in developing countries can slow down the flow of FDI to these countries, whereas the persistent undervaluation stimulates these flows.

Key words: Foreign direct investment, Overvaluation, Undervaluation

JEL Classification: C21; C23; F31; F33

[1] Corresponding author: ridhnou@yahoo.fr

Introduction

During these last years, the attitude to the Foreign Direct Investment (FDI) has changed. The latter became a key factor of economic growth, in the way that several countries have liberalized their economic policy to attract more flows of FDI to increase employment, exports, tax revenue and to benefit from the technological transfer (Blomström and Kokko, 2003). Since the crisis of the debts which started in Mexico in 1982, developing countries seem to need more and more flows of FDI to fill the insufficiency of their clean financial resources. Since then, they have multiplied their economic policies to improve the attractiveness of their territories.

Beyond the traditional factors of the FDI attraction, there is another crucial incentive that has been ignored in literature, namely the misalignement of the real exchange rate. According to Edwards (1989), misalignment refers to the set of "sustained deviations of the real exchange rate observed in relation to the level of the long-term equilibrium." The degree of misalignment leads to imbalances represented by the phenomena of over-or under-evaluation of the real exchange rate which is expressed by losses or gains in competitiveness. The misalignment of the exchange rate appears to be a key determinant of the FDI flows. In fact, an overvalued exchange rate negatively affects the economic competitiveness and can reduce the FDI for domestic goods (raw materials, natural resources....) which become more expensive and discourages foreign investors. Conversely, by improving the competitiveness of domestic products, the undervaluation may attract the FDI. The prices of raw materials and domestic wages may encourage the location of multinationals.

The overvaluation is expected to cause a decrease in the entry of FDI since an overvalued of home currency may restrain foreign investors to obtain for a domestic asset, since such an investment may still be too expensive. However, the

undervaluation is expected to cause an increase of the entry of the FDI since an undervaluation of the home currency produces domestic assets clearly cheap for foreign investors.

The results of the empirical studies which attempted to empirically estimate the relationship between the misalignment of the real exchange rate and the FDI flows haven't been unanimously agreed. Indeed, if Grossmann and al. (2008) were able to show that the undervaluation of the dollar encourages the attraction of the FDI to the United States, then its overvaluation hampers its entry, Hasnat (1998) found no relationship between the two variables. Bénassy-Quéré and al. (2001) found that exchange-rate volatility is detrimental to the foreign direct investment (FDI) and that its impact compares with that of misalignments. One policy implication is that the building of currency blocks could be a way of increasing FDI to emerging countries as a whole. Lee and Min (2011) found that, for Korea, the effect of exchange rate volatility on the FDI is persistent, whereas the misalignment level is only temporary. However, they suggested that multinational firms consider volatility to be more a generic determinant of the foreign investment than misalignment of exchange rate level.

The aim of this paper is to contribute to the debate on the relationship between the misalignment of currencies of the developing countries and the FDI in these countries. To carry out this research, this paper is organized as follows. In the first section, we will discuss the determinants of the FDI in the developing countries. In the second section, we will determine the values of misalignment for a sample of 52 countries over the period 1980-2010. For this reason, a model in Panel of Edwards will be estimated. Finally, a set of econometric models are estimated in order to detect the direction of the relationship between the misalignment of the real exchange rate and the FDI in these developing countries.

1. Determinants of the FDI in the Developing Countries

The objective of this section is to identify the main factors that explain the volume of FDI received by an economy of the developing countries. In fact, the majority of the developing countries try to meet the necessary criteria to attract more foreign capital. However, there is no unified theoretical framework which brings together all the determinants of the FDI. In literature, the attractiveness of the FDI is conditioned not only by economic factors but also by socio-political and institutional factors.

Economic factors are mainly related to the market size, to the degree of openness of the host economy and to the macroeconomic stability.

The domestic market size is considered a key factor in attracting foreign capital (Faustino and Leitao, 2010; Hailu, 2010). Some empirical studies have approximated this variable by the GDP (Billigton, 1999; Moosa 2008), while other studies used the GNP as an approximation of this factor (Metwally, 2004; Schneider and Frey, 1985). In some studies, this variable is approximated by the GDP per capita (Alkinkube, 2003).

In all cases, strong economic growth may encourage the entry of the FDI because it is synonymous with an increase in the national income and domestic demand. This favors the horizontal FDI. Indeed, multinationals seek again new market shares. So, the more economic growth in the host country is important, the greater domestic demand is and the more massive inflows of the FDI will be.

Trade openness is also considered as a major determinant that contributes positively to the FDI (Asiedu, 2002; Fedderke and Romm, 2006). The more liberal economy of the host country will be encouraged the more foreign firms to locate in this country. They will undergo fewer customs taxes and will be more likely to find markets for their products. Besides the market size, Alkinkube (2003) showed that the

decision whether to invest in a developing country also depends on the economic liberalization and the export promotion policies. Several empirical studies have shown a positive relationship between trade openness and the FDI (Chakrabarti, 2001; Asiedu, 2002). Generally, the economic openness is measured by the sum of imports and exports relative to the GDP.

The quality of infrastructure is an indicator of attractiveness of the FDI. Indeed, the establishment of a basic infrastructure (roads, airports, telecommunications ...) may attract foreign investment flows (Asiedu, 2002; Deichmann et al., 2003). The infrastructure is at the origin of productivity gains because it allows the minimization of production costs (costs of communication, transport, etc.). The foreign companies try to exploit cost differences between different locations. This is compatible with the vertical FDI. The quality of infrastructure in the host country is usually determined by the number of telephone lines per thousand people. In some studies, this variable is approximated by the total expenditure of the government on transportation and communication (James, 2008).

Macroeconomic stability: This variable is usually approximated by the inflation rate. A high inflation rate is synonymous with the national currency depreciation and thus a loss in terms of consumer purchasing power means a decline in the domestic demand. Inflation is then negatively related to the FDI (Woodward and Rolfe, 1993; Addison and Heshmati, 2003).

Financial development has a positive effect on the entry of the FDI (Deichmann, Karidis and Sayek, 2003). A solid financial system can facilitate the transfer of technology. It can also contribute to the realization of sustainable economic growth. This variable is approximated by the share of private credit in the GDP (James, 2008).

The institutional and socio-political factors refer to the political stability, governance and quality of institutions.

Several empirical studies have shown that inefficient institutions discourage the entry of the FDI (Gastanaga et al., 1998; Asiedu and Villamil, 2000). In addition, the bad governance can produce corruption and bureaucracy. Wei (2000) studied the impact of corruption on the flows of the FDI in 45 host countries. He found a negative relationship between the level of corruption and the entry of the FDI in the host country. Thus, political instability, corruption and bureaucracy create an unfavorable environment to foreign investment because the violation of the law affects the attractiveness of territory, reduces confidence and increases the uncertainty about the potential benefits of this investment.

The continuous search of natural resources remains a fundamental incentive for the FDI entry and explains the important part of foreign capital in the developing countries. It is recognized that the country»s endowments of production factors (natural resources, labor and capital) can affect the attractiveness of the FDI. In this context, Aseidu (2002), and Dupasquier Osajwe (2006) showed that natural resources in the African countries attract more foreign investments.

2. Misalignment and FDI

Misalignment can have positive or negative implications on the flows of foreign direct investments. Indeed, the undervaluation of the currency can stimulate the production of the exportable goods which are more competitive on the international market. This undervaluation could attract the foreign investments either because it values them, or because it reduces the cost of the production factors and increases, as a consequence, the profitability of the investments in the country. In this case, the currency undervaluation of the developing countries should increase the entry of the flows of the FDI in these countries. However, the currency overvaluation makes national products

less competitive on the international markets and, as a consequence, hinders the export of these goods. Moreover, the overvaluation increases the cost of the investment through the enrichment of the production factors (construction, machines, transportation equipment…). Thus, the currency overvaluation of the developing countries should discourage foreign investors to invest in these countries. Therefore, the impact of the misalignment of the real exchange rate on the foreign direct investments depends on its nature. In reality, an undervaluation of the currency should increase the FDI, while an overvaluation should decrease it.

Very few studies took into account the role played by the misalignment in the attraction of the FDI. Among these studies we cite the work of Soydemir and Grossmann (2006). These two authors found a negative relation between the deviation of the real exchange rate observed by its level of PPA and the FDI incomers in the United States. In 1998, Hasnat found no relation between the misalignment (calculated as the difference between the observed rate and the rate of balance of Purchasing Power Parity (PPA)) and the flows of the FDI. By contrast, Grossmann and al. (2008) could show the sensibility of the FDI flows in the values of overvaluation and the undervaluation of the US dollar. In fact, they showed that the undervaluation of the dollar encourages the entry of the FDI in the United States, while its overvaluation hinders it. All these studies focused on the impact of the misalignment on the FDI in the developed countries. For the developing countries, Bénassy-Quéré and al. (2001) found that exchange-rate misalignment is detrimental to foreign direct investment (FDI) to emerging countries as a whole. Lee and Min (2011) found that, for the Korea, the effect of exchange rate misalignment on FDI is temporary.

In this paper, in addition to the misalignment of a currency, the timing and the persistence of the misalignment (overvalued or undervalued currency) might play an important

role in analyzing the relationship between exchange rates and FDI flows and that the omission of timing and the overvaluation persistence in previous papers may cause the inconclusive results.

In this section, we shall try to calculate the degree of misalignment of the currencies of a sample of 52 developing countries over the period 1980-2010. Then, we will determine the impact of misalignment on the flows of the FDI in the developing countries. So, we will introduce the variable "misalignment" into the models of the FDI and we determine the signification of the latter.

2.1 The misalignment of the real exchange rate

- *The economic model:*

Over the last 30 years, the economic literature on the exchange rate has developed in a way that allowed determining the influence of a limited range of variables affecting the long run real value of a currency (e.g. Williamson, 1994; Edwards, 1998). These variables, called the ««fundamentals»«, include not only external factors (e.g. the international terms of trade) but also internal factors (e.g. government expenditure). The impact of these determinants can be estimated through an econometric regression and are used to calculate the Equilibrium Real Effective Exchange Rate (EREER) as well as the potential accompanying misalignment of the actual rate. Practically, the Real Effective Exchange Rate (REER) is decomposed into the EREER and misalignment. Edwards (1988) was the first to propose an approach that makes it possible to distinguish between the two sources of REER variations. The latter is regressed on external and domestic ««fundamentals»« variables, which bring about changes in the EREER if sustained over a long time period and do not create misalignment, unless the price adjustment is extremely sluggish. Much of the literature has dealt with the advanced economies. “However, developing

countries typically face different sets of structure issues, and a more limited availability of data. Edwards (1986, 1989a, 1994) made a seminal attempt to build an equilibrium exchange rate model specifically tailored to developing countries"[2]. This model was adopted by several authors such as Mongardini (1998), Domaç and Shabsigh (1999), Nouira and al. (2011), Nouira and Sekkat (2012) … In literature, the fundamental variables which can act on the internal and external balance are multiple. In this paper, six are retained namely:

- The bias of productivity (or the Balassa-Samuelson effect) (*Balassa*)
- The terms of international trade (TOT)
- The degree of openness (Open)
- The government consumption (Gov)
- The debt services (*Debtser*)
- The net capital inflow (*Capinf*)

So Edward»s model can be represented under the following shape:

$$REER = f(Balassa, TOT, Open, Gov, Debtser, Capinf) \quad (1)$$

- *The econometric analyses :*

In this work, we will estimate the Edwards» model in panel for a sample of 52 developing countries (Appendix A) over the period 1980-2010. The sample is determined according to the availability of data with the major source of information we used (e.g., the World Development indicators of the World Bank). The endogenous variable of this model is the index of the real effective exchange rate (REER) calculated by considering 10 main importing countries. An increase of this

[2]Spatotafor N., and Stavrev E., (2003). "The equilibrium Real Exchange Rate in a commodity Exporting country: The cas of Russia", IMF working paper WP/03/93

rate implies an appreciation of the REER. It is necessary to note that, with the exception of capital inflows of which the sign is uncertain, these variables are expressed in logarithm. Therefore, the empirical model to be estimated is the following:

$$Log(REER) = \alpha_0 + \alpha_1 \text{Log}(Balassa) + \alpha_2 \text{Log}(Open) + \alpha_3 \text{Log}(Gov) + \alpha_4(Capinf) + \alpha_5 \text{Log}(Debtser) + \alpha_6 \text{Log}(TOT) + \varepsilon \quad (2)$$

Before the estimation of model (2), a stationarity test on the variables of the model is requested. To examine the stationarity, we use a Pesaran (2007) test. This test presents a new and simple procedure for testing unit roots in dynamic panels subject to (possibly) cross sectionally dependent as well as serially correlated errors. This test is built on the well-known augmented Dickey-Fuller regressions. Practically, we consider yit pertaining to the individual i at time t. Run the regression:

$$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \gamma_i \bar{y}_{t-1} + \delta_i \Delta \bar{y}_t + \vartheta_{it} \quad (3)$$

and take the calculated Student statistics of ρ_i ; t_i. Where $\bar{y}_t$ is the average of y_{it} over all the individuals at time t. The statistic

$$CIPS\,(N,T) = \frac{1}{N}\sum_{i=1}^{N} t_i\,(N,T) \quad (4)$$

is used to test for stationarity. The critical values of the CIPS test can be computed by stochastic simulation for any fixed T > 3. We follow Pesaran (2007) and simulate the critical values using the Monte Carlo approach. The results of the test applied to our sample are presented in Appendix C. The tests reveal that all the variables are I (1). Hence, if we find a relationship between the variables that gives stationary residuals, these variables will be considered as cointegrated.

The best-known cointegration tests are due to Pedroni (2004). The results of the cointegration tests applied to Equation (2) are presented in Appendix C. Two tests suggest that the variables are cointegrated but two others suggest the reverse. We concluded that the variables are cointegrated. We follow Pedroni (2004) who being faced with the same type of results concluded that the variables are cointegrated (See also Barisone et al., 2006).

Although the variables are cointegrated, the Within estimates of the parameter are convergent but not efficient (Kao, Chiang and Chen, 1999). Two methods are available to get efficient estimates of the parameters. One, labeled dynamic OLS (DOLS), was developed by Kao and Chiang (1998) and consists of adding to the cointegration equation lags of the explanatory variables in order to clean the error term from any autocorrelation and heteroskedasticity. The other, called Fully Modified OLS (FMOLS), was proposed by Pedroni (2000) and is a bit complicated to explain in a non-technical way. Roughly explained, it consists of running an OLS estimate of the cointegration equation and using the residuals to compute their variance-covariance matrix. This is then used to perform a sort of GLS on the cointegration equation. The objective of this estimator is to eliminate the bias of the Within estimator. The FMOLS expression is:

$$\hat{\beta}_{FM} = \left[\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it}-\bar{x}_i)(x_{it}-\bar{x}_i)'\right]^{-1}\left[\sum_{i=1}^{N}\left(\sum_{t=1}^{T}(x_{it}-\bar{x}_i)\hat{y}_{it}^{+}-T\,\hat{\Delta}_{\eta\mu}^{+}\right)\right] \quad (5)$$

The FMOLS method is applied to Equation 2 and the results are presented in Table I. The overall quality of it is good.

Table I: Estimation Results of Equation (2)

Variables	FMOLS
Capital Inflow / GDP	0.00
	6.9* **
Openness	-0.42
	17.1* **
Balassa Samuelson	0.28
	8.30* **
Debt Services	-0.07
	-8.9* **
Government Consumption / GDP	0.03
	3.31 **
Terms of Trade	0.13
	6.53* **
A-R^2	0.52

t-statistics are in bold

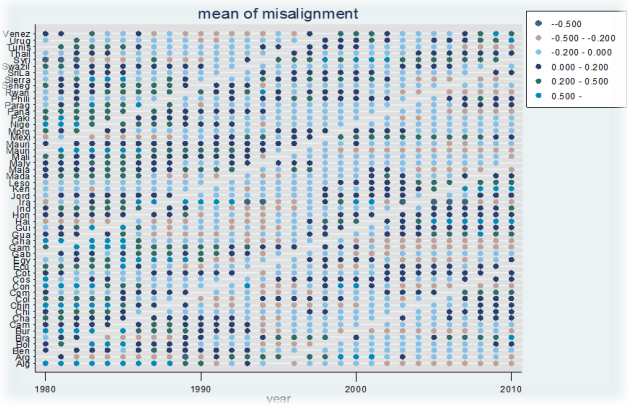
* Significant at 10%, ** Significant at 5%, *** Significant at 1%

Using the coefficients in Table I, we can compute the extent of the *REER* misalignment for the developing countries. We have to recall, however, that misalignment refers to the difference between the *REER* and its equilibrium level, the *EREER*. The latter is given by the fitted values using the estimates together in Table I and the long-run values of the explanatory variables. To get such long-run values, we use the Hodrik-Precsott filter to separate the permanent and temporary components of each variable.

We define misalignment as:

$$Mis = (REER / EREER) - 1 \quad (6)$$

the positive values of which correspond to overvaluations.

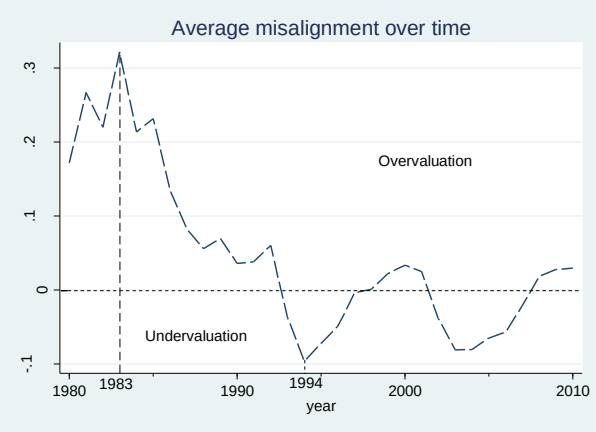


Figs I: Mean of the misalignment in the developing countries

Figs. I present, the exchange rate misalignment during the periods 1980-2010. This period was characterized by light exchange rate overvaluation (0% ; 20%) and light undervaluation (-20% ; 0%). The figure shows that, in general, the percentage of years during which exchange rate were undervalued is higher during the 1991–2010 than during 1980–1990.

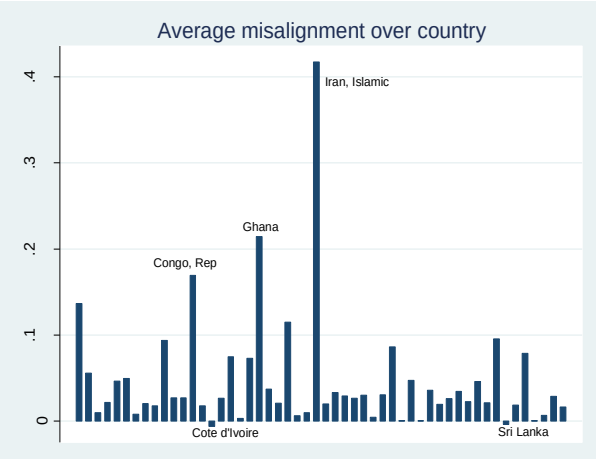
By making the average of misalignments, every year, for all the developing countries of our sample (Figs 2), we can notice that, on average, the currencies of the developing countries are overvalued between 1980-1992.

The maximal value of overvaluation was affected in 1983. However, between 1992-2007, the currencies of these developing countries were undervalued, with the exception of period 1998-2002. The maximal value of the undervaluation was affected in 1994. At the end of the period of our study, the currencies of the developing countries tended to be overvalued again.



Figs II: Average misalignment over Time

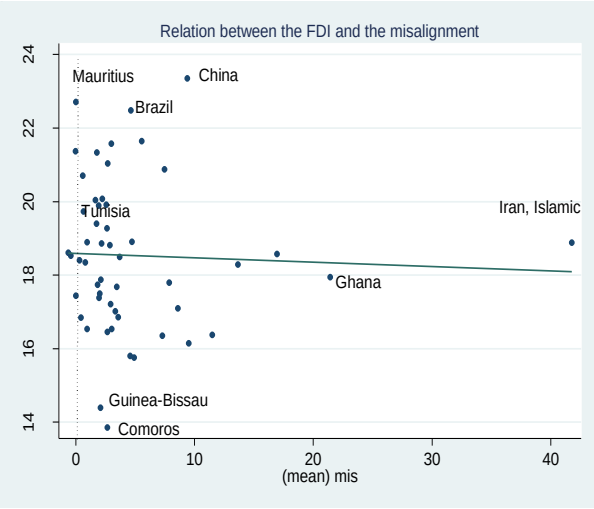
The determination of the average of misalignment for every country, over a whole period, (Figs III) shows that, with the exception of the Cote d'Ivoire, Sri Lanka, Thailand and Morocco, all the currencies of the developing countries of our sample were overvalued, on average, over the period 1980-2010. Islamic Iran had the maximal value with a percentage of overvaluation of more than 40%, followed by Ghana with a 21% then Congo with a percentage of 16 %.



Figs III: Average misalignment over country

2.2 Empirical Relation between the misalignment and the FDI

Ignored in the majority of the empirical studies, misalignment can be an incentive determinant of the FDI. By representing the FDI according to the misalignment for all the countries of the sample (Figs IV), we can notice the existence of an inverse relation between the FDI and misalignment. The countries which have an important value of the FDI are those which have a weak average value of misalignment such as Brazil, China, Mauritius.



Figs IV: The relationship between the FDI and the misalignment

To determine empirically the relation between misalignment and the flows of the FDI of the developing countries, five specifications were estimated. Every time, we introduce a new determinant of the FDI in the estimated equation in order to determine the effect of the new variable on the significativity of the coefficients of the other determinants. The foreign direct investment data used in this study are obtained from the World Development indicators of the World Bank. This variable is defined as the Foreign Direct investment inflow in current US$.

To estimate theses specifications, we must take account of possible endogeneity of the explanatory variable. Indeed, the endogeneity problem comes from several ways. For example, the FDI may affect the misalignment simultaneously. In fact, misalignment is defined as a function, among the determinants of REER, the terms of international trade (TOT) and the net capital inflow(Capinf). These two variables could be affected by FDI flow or stock. Thus the misalignment could be a function of existing FDI or FDI flow. We use two estimators: the two-stage least-squares (2SLS) and the GMM with the lagged dependent and explanatory variables as instruments. The test of overidentifying restrictions is used to check the validity of the estimates.

For all specifications, the period of the study covers the period of 1980-2010, with the exception of the fifth specification where the period of the study is 1984-2010. The sample of countries varies from one specification to another depending on the availability of the data.

Regarding to the first specification, we estimate the FDI model for a sample of 50 developing countries (Appendix B). In this specification, we will retain the following determinants:

• *Degree of opening*: this variable measures the degree of economic opening of the host country. It is defined as the sum of exports and imports relative to the GDP.

• *Telephone Line*: This variable approximates the degree of development of the country's infrastructure. It measures the number of telephone lines per a thousand inhabitants.

• *GDP Per capita*: This is an indicator of the wealth of the resident of the host country and then demand effectiveness. The expected sign of the corresponding coefficient is positive.

• *Primary School*: We follow the literature in using as a human capital indicator the primary school enrolment ratio.

These variables are from the World Development Indicators published by the World Bank.

In the second specification, we will add the variable "*Domestic credit*" which approximates the degree of financial development of the country. It is measured as the ratio of the private credit to the GDP. This specification is estimated for a sample of 49 developing countries (Appendix B).

In the third specification, the variable "*Investment*" is considered as a determinant of the FDI. This variable informs about the degree of the country industrialization. It is approximated by the gross formation of fixed capital. This specification is estimated for a sample of 47 countries (Appendix B).

In the fourth specification, we will take into account the variable "*Inflation*" as an approximation of the economic and political stability of the country.

In the fifth specification, we will introduce the variable "*Political Risk*" as a determinant of the FDI. The quality of political institutions is measured by the political risk index (ICRG). This index is a score of 100 points. It is the sum of 12 indicators relating to the transparency and quality of the administrative system[3]. A high score (between 80 and 100) indicates a low risk, whereas a low score (between 0 and 49.5) indicates a high level of political risk. This index is positively correlated with the FDI. This specification is estimated for a sample of 38 countries (Appendix B) for the period 1984-2010.

We will introduce the variable misalignment that we calculated in the 5 specifications. We do this by checking how much real exchange rate misalignment affects the FDI in this period. Table II recapitulates the results of the estimation of the 5 specifications with the variable misalignment.

[3] The Indicator used to construct this index are given as follows: Stability and sustainability of political power, Economic and social conditions, Investment profile, Internal conflicts, External conflicts, Corruption, Implication of military power in politics, Implication of religious power in politics, The level and ability to respect the rule of law and State of Law, Ethnic tensions and conflicts, Democratic Responsibility and Engagement of Bureaucracy, Quality of bureaucracy.

The results indicate that all the explanatory variables have consistent pattern of significance and sign across specifications. Indeed, the coefficient of the GDP per capita is significant and positive. The coefficient of infrastructure and Primary School are positive. Here, investors are mainly concerned with the provision of infrastructure and the quality of the human capital. Inflation pressures are associated with less FDI, higher openness and better quality of development of the country's infrastructure (Telephone lines) are associated with more FDI, the quality of political institutions has no impact and the amelioration of the investment is associated with more FDI.

Now, we attempt to study the relationship between the RER misalignment and the foreign direct investment for the main inquiry. With the 2SLS and irrespective of the specification, the coefficient of the exchange rate misalignment has a consistent significantly effect on FDI. Also, with the GMM and irrespective of the specification, the coefficient of the exchange rate misalignment has a consistent significantly effect on FDI. The misalignment affects negatively the FDI in the developing countries. The coefficient of the misalignment variable is negative and statistically significant in all the variants. Given the results of the test of overidentifying restrictions, the GMM estimates are valid.

Table II: The Effect of REER Misalignment on the FDI in the Developing Countries

Variables	GMM					2SLS				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Ln(Open)	0.38	0.47	0.4	0.54	0.56	0.58	0.54	0.51	0.6	0.6
	3.48	***4.11***	***3.67***	***4.42***	***3.52***	***6.59***	***6.3***	***7.02***	***6.03***	***6.12***
Ln (Telephone lines)	0.71	0.63	0.6	0.41	0.48	1.15	1.18	1.03	0.93	0.85
	13.2	***10.9***	***10.7***	***6.65***	***6.8***	***8.85***	***8.26***	***10.1***	***8.7***	***10.2***
GDP per capita	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.03	0.03	0.01
	6.23	***5.96***	***6.67***	***5.93***	***3.8***	***6.26***	***6.12***	***3.5***	***3.41***	***1.69***
Ln(School)	1.02	1.08	1.04	1.84	1.01	0.9	0.96	0.85	1.04	0.81
	4.55	***4.79***	***4.37***	***6.31***	***5.31***	***4.03***	***3.8***	***3.3***	***3.48***	***2.38***
Ln(Domestic credit)	-	0.3	0.21	0.22	0.4	-	0.16	0.22	0.25	0.23
		3.14	***2.22***	***2.2***	***3.61***		***1.74***	***2.42***	***1.98***	***2.1***
Ln (Gross capital formation)	-	-	0.24	0.14	0.2	-	-	0.53	0.51	0.61
			7.5	***3.78***	***4.48***			***6.34***	***5.59***	***6.2***
Ln(Inflation)	-	-	-	-0.13	-0.16	-	-	-	-0.17	-0.16
				-2.85	***-1.9***				***-4.58***	***-4.11***
Ln(Political Risk)	-	-	-	-	0.14	-	-	-	-	0.4
					0.67					***1.68***
Misalignment	-0.32	-0.36	-0.26	-0.39	-0.51	-0.19	-0.18	-0.13	-0.12	-0.37
	-1.82	***-1.93***	***-1.71***	***-2.6***	***-2.26***	***-1.69***	***-1.65***	***-1.73***	***-1.68***	***-2.5***
Number of Countries	50	49	49	42	38	50	49	47	42	38
Number of Observations	1550	1519	1457	1302	1026	1550	1519	1457	1302	1026
Adjusted R^2						0.44	0.45	0.49	0.53	0.52
Test of overidentifying restrictions; P-value	0.29	0.24	0.21	0.18	0.13					

The values below are t-Student. The bold values are the significant coefficients

The effect on the FDI depends on the sign of misalignment as it is about an undervaluation (misalignment is negative) or of an overvaluation (positive misalignment). Overvaluation can discourage foreign investors to invest. However, undervaluation can increase the entry of the flows of FDI. It is thus useful to distinguish between these two variables. For this reason, we created two variables to understand "Overvaluation" and "Undervaluation". The indicator of misalignment is split into two series: one includes observations of undervaluation only, while the other includes observations of overvaluation only. To clarify this, we recoded undervaluation figures to be positive. Our purpose is to test the hypothesis that state that undervaluation boosts growth. The recoding allows an easy interpretation of the coefficient, which should be significantly positive if the hypothesis is not rejected.

Table III summarizes the results of the estimation of the five specifications by introducing the variables "Overvaulation " and "Undervaluation" into the models.

In Table III, the coefficient of overvaluation is negative and significant in all the variants. The coefficient of undervaluation is positive and significant in only for the specifications 2,3,4 and 5 for the 2SLS estimator and non-significant in the other cases.

So, we can conclude that, the negative effect of the misalignment (Table II) is due to the effect of the overvaluation on the FDI. Since the currencies of the developing countries are generally overvalued, this overvaluation leads to an increase in the cost of the investment through the enrichment of the production factors (construction, machines, transportation equipment…). So, the overvaluation has a negative effect on foreign direct investment in the developing countries. This can be at the origin of the modest value of the flows of the FDI into these countries. Since the overvaluation may negatively affect the FDI, specific economic policies are desired to restore the macroeconomic stability. These policies should target the limitation of the overvaluation.

Table III: The Separate Effect of *REER* Undervaluation and Overvaluation on the FDI

Variables	GMM					2SLS				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Ln(Open)	0.31	0.46	0.41	0.57	0.53	0.49	0.5	0.52	0.59	0.6
	2.76	***3.73***	***3.47***	***4.44***	***3.24***	***7.1***	***5.98***	***6.39***	***5.4***	***6.06***
Ln (Telephone lines)	0.76	0.66	0.64	0.4	0.46	1.15	1.18	1.02	0.94	0.85
	12.8	***10.73***	***9.96***	***6.08***	***6.28***	***12.5***	***11.2***	***10.8***	***9.87***	***9.47***
GDP per capita	0.1	0.1	0.1	0.1	0.1	0.05	0.05	0.03	0.03	0.01
	5.3	***5.46***	***6.22***	***5.63***	***4.98***	***6.25***	***5.95***	***3.24***	***3.32***	***1.97***
Ln(School)	0.91	0.99	0.91	0.93	0.94	0.97	1.06	0.98	1.1	0.89
	3.74	***3.96***	***3.5***	***3.8***	***3.6***	***3.87***	***4.11***	***3.85***	***3.66***	***2.39***
Ln(Domestic credit)	-	0.27	0.15	0.21	0.46	-	0.15	0.21	0.2	0.19
		2.78	***1.67***	***2.12***	***4.03***		***1.68***	***2.34***	***1.97***	***2.1***
Ln (Gross capital formation)	-	-	0.24	0.13	0.21	-	-	0.56	0.53	0.61
			7.22	***3.43***	***4.55***			***6.53***	***5.74***	***6.25***
Ln(Inflation)	-	-	-	-0.14	-0.12	-	-	-	-0.15	-0.16
				-2.89	***-2.2***				***-3.9***	***-4.07***
Ln(Political Risk)	-	-	-	-	0.08	-	-	-	-	0.48
					0.93					***1.67***
Overvaluation	-0.3	-0.57	-0.49	-0.53	-0.28	-0.25	-0.43	-0.5	-0.3	-0.34
	-2.35	***-2.28***	***-1.87***	***-2.72***	***-1.93***	***-2.55***	***-1.83***	***-2.22***	***-1.93***	***-1.85***
Undervaluation	0.35	0.23	0.29	0.56	0.78	0.57	0.97	1.1	0.75	0.86
	0.57	*0.36*	*0.58*	*0.9*	*1.12*	*1.3*	***1.81***	***3.04***	***1.78***	***1.94***
Number of Countries	50	49	47	42	38	50	49	47	42	38
Number of Observations	1550	1519	1457	1302	1026	1550	1519	1457	1302	1026
Adjusted R2						0.45	0.46	0.48	0.53	0.52
Test of overidentifying restrictions; P-value	0.62	0.6	0.52	0.21	0.18					

The values below are t-Student. The bold values are the significant coefficient

An overvaluation (undervaluation) in the previous years can discourage (encourage) foreign investors from investing in the developing countries. To determine the effect of the undervaluation and overvaluation lagged on the flows of the FDI in the developing countries, we estimated the models of the FDI by adding the variables " Overvauation " and "Undervaluation" lagged two and of one year. Table IV summarizes the results of the estimation of the models with the lagged variables "Overvaluation" and "Undervaluation".

The results in Table IV show that the coefficient of overvaluation lagged two year is negative in all the variants and significant in 8 instances out of 10. Overvaluation has a negative effect on the flows of the FDI incomers in the developing countries. Indeed, a 10 % overvaluation in (t-2) year can decrease the FDI incomers between 6 and 9%. However, the coefficient of undervaluation lagged two year is significant and positive for 6 instances out of 10 specifications. Undervaluation lagged two year can encourage foreign investors to invest in the developing countries. Indeed, a 10% undervaluation can increase the flows of the FDI by at least 8%.

Table IV: The Separate Effect of *REER* Lagged Undervaluation and Overvaluation on the FDI

Variables	GMM					2SLS				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Ln(Open)	0.3	0.47	0.45	0.61	0.55	0.53	0.56	0.54	0.57	0.6
	2.3	***3.57***	***3.53***	***4.41***	***3.16***	***6.9***	***6.11***	***6.5***	***5.9***	*5.7*
Ln (Telephone lines)	0.76	0.66	0.65	0.41	0.51	1.15	1.18	1.04	0.94	0.76
	12.7	***10.4***	***9.7***	***6.03***	***6.35***	***9.08***	***12.9***	***11.2***	***12.6***	***8.83***
GDP per capita	0.11	0.1	0.11	0.11	0.1	0.05	0.05	0.03	0.03	0.01
	5.43	*5.3*	*6.49*	*5.49*	*4.31*	*6.05*	*6.08*	*3.22*	*3.53*	*2.08*
Ln(School)	0.84	0.94	0.86	0.91	0.81	0.95	1.04	0.88	1.11	0.8
	3.12	***3.48***	***3.05***	***5.79***	***3.14***	***3.69***	***3.98***	***3.38***	***3.5***	***2.28***
Ln(Domestic credit)	-	0.24	0.1	0.14	0.44	-	0.21	0.27	0.2	0.21
	-	***2.32***	***1.91***	*1.34*	***2.51***	-	***2.18***	*2.78*	*1.41*	***1.87***
Ln(Gross capital formation)	-	-	0.22	0.2	0.18	-	-	0.5	0.48	0.61
	-	-	***6.45***	***2.96***	***3.92***	-	-	***5.79***	***5.11***	***6.2***
Ln(Inflation)	-	-	-	-0.1	-0.2	-	-	-	-0.15	-0.17
	-	-	-	***-1.93***	***-1.78***	-	-	-	***-3.73***	***-3.98***
Ln(Political Risk)	-	-	-	-	0.24	-	-	-	-	0.62
	-	-	-	-	*0.48*	-	-	-	-	***1.87***
Overvaluation	-0.03	-0.1	-0.02	-0.39	-0.06	-0.02	-0.35	-0.39	-0.09	-0.39
	-1.7	*-0.63*	*-0.74*	*-0.94*	*-0.87*	***-1.69***	*-0.95*	*-1.09*	*-0.85*	*-1.2*
Overvaluation{1}	-0.04	-0.28	-0.08	-0.43	-0.25	-0.04	*-0.09*	-0.07	-0.27	-0.04
	-1.24	*-0.27*	*-0.64*	*-0.98*	*-0.76*	-0.72	*-0.21*	*-0.57*	*-0.86*	*-0.79*
Overvaluation{2}	-0.04	-0.83	*-0.78*	-0.91	-0.81	-0.06	-0.63	-0.6	-0.65	-0.8
	-1.27	***-2.66***	***-2.85***	***-4.03***	***-2.81***	-1.54	***-3.42***	***-3.56***	***-3.9***	***-4.15***
Undervaluation	0.01	0.23	0.07	0.87	0.11	0.45	0.17	0.43	0.62	0.1
	0.61	*0.19*	*0.47*	*1.93*	*0.75*	*0.67*	*0.24*	*0.64*	*0.94*	*0.89*
Undervaluation{1}	0.7	0.21	0.35	0.91	0.56	*0.93*	*0.81*	*0.96*	*1.01*	*0.45*
	0.45	*0.58*	*0.23*	*1.23*	*0.32*	1.18	*0.93*	*1.14*	*1.48*	*0.98*
Undervaluation{2}	1.01	0.2	0.28	0.25	0.89	*1.4*	*0.98*	*0.79*	*0.89*	*1.27*
	1.38	*1.13*	*1.25*	*0.43*	***1.8***	***2.35***	***1.67***	***1.74***	***1.91***	***1.9***
Number of Countries	50	49	47	42	38	50	49	47	42	38
Number of Observations	1550	1519	1457	1302	1026	1550	1519	1457	1302	1026
Adjusted R2						0.46	0.46	0.49	0.55	0.56
Test of overidentifying restrictions; P-value	0.58	0.49	0.32	0.31	0.22					

The values below are t-Student. The bold values are the significant coefficients

So, for the case of the developing countries, then an appreciating overvalued home currency in the (t-2) period can cause a decrease of inbound FDI. Consequently, for the developing countries, we find a negative relationship between an overvaluation lagged two year and inbound FDI. Also, we find that an increase in inbound FDI in the developing

countries is related positively to a strengthening of an undervalued home currency in the (t-2) period.

The results show that investors are mainly toward countries with undervalued lagged two years. This supports the positive impact of undervaluation and the negative effect of overvaluation on FDI.

To take into account the persistence dimension, we construct two new variables: Persistent Undervaluation (PersistUnder) and Persistent Overvaluation (PersistOver). If during the past five years, the exchange rate was always undervalued (overvalued) "PersistUnder" ("PersistOver") takes as a value of the average undervaluation (overvaluation) in the five years. Otherwise, the variable takes the value 0. Table V summarizes the results of the estimation of the five specifications with variables "PersistOver" and "PersistUnder".

Out of the 10 coefficients pertaining to undervaluation in Tables 5, only five are negative and significant. In contrast, the coefficients pertaining to overvaluation are significant and negative in 9 instances out of 10. Therefore, we can conclude that a continuous undervaluation can positively affect the entry of the FDI into these developing countries. This may be explained by the fact that a persistent undervaluation of home currency leaves domestic assets still a bargain for foreign investors. On the other hand, the overvaluation appears to negatively affect the FDI in the developing countries.

Table V: The Separate Effect of *REER* Persistent Undervaluation and Overvaluation on the FDI

	GMM					2SLS				
Variables	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Ln(Open)	0.35	0.54	0.52	0.6	0.57	0.54	0.57	0.57	0.61	0.6
	3.21	***4.2***	***4.25***	***4.56***	***3.64***	***6.17***	***6.29***	***6.86***	***6.41***	***6.2***
Ln(Telephone lines)	0.73	0.55	0.51	0.36	0.49	1.11	1.03	0.9	0.83	0.81
	8.44	***8.45***	***7.53***	***5.19***	***6.82***	***8.6***	***9.78***	***10.57***	***10.74***	***9.92***
GDP per capita	0.1	0.1	0.09	0.1	0.1	0.05	0.05	0.03	0.03	0.03
	6.04	***5.05***	***5.72***	***5.4***	***4.7***	***6.24***	***6.21***	***3.98***	***3.12***	***3.84***
Ln(School)	0.9	1.33	1.4	1.4	1.1	0.89	0.88	0.59	1.02	1.01
	4.4	***4.93***	***4.98***	***6.21***	***5.3***	***3.57***	***3.16***	***2.09***	***3.08***	***4.91***
Ln(Domestic credit)	-	0.34	0.26	0.16	0.4	-	0.31	0.24	0.18	0.38
		3.61	***2.7***	***1.67***	***3.65***		***1.66***	***1.68***	*1.61*	***2.42***
Ln (Gross capital formation)	-	-	0.23	0.12	0.19	-	-	0.56	0.48	0.57
			6.62	***3.09***	***4.18***			***6.3***	***5.12***	***5.8***
Ln(Inflation)	-	-	-	-0.12	-0.11	-	-	-	-0.19	-0.18
				-2.57	***-1.8***				***-4.81***	***-4.65***
Ln(Political Risk)	-	-	-	-	0.3	-	-	-	-	0.36
					1.6					***1.67***
Persist Over	-0.01	-0.93	-0.8	-1.05	-1.06	-0.02	-0.57	-0.51	-0.53	-0.64
	-1.89	***-3.79***	***-3.29***	***-4.11***	***-3.41***	*-1.56*	***-2.64***	***-2.46***	***-2.94***	***-3.25***
Persist Under	0.5	0.83	0.8	0.75	1.1	1.01	1.1	1.11	1.6	1.6
	0.87	*1.22*	*1.16*	*1.13*	***1.79***	*1.28*	***2.6***	***1.96***	***3.01***	***3.12***
Number of Countries	50	49	47	42	38	50	49	47	42	38
Number of Observations	1550	1519	1457	1302	1026	1550	1519	1457	1302	1026
Adjusted R2						0.4	0.41	0.47	0.51	0.53
Test of overidentifying restrictions; P-value	0.26	0.43	0.37	0.26	0.38					

The values below are t-Student. The bold values are the significant coefficients

4. Conclusion

The deep interest a warded today to foreign direct investment is due to its extremely important role as a factor of economic growth and its positive impact on the economies of the developing countries. The FDI acts as a catalyzer of growth and thus development of the economies of the developing countries. To benefit from it, the developing countries need to improve their political, economic and legal environment. Beyond the traditional factors of the FDI attraction, there is another crucial incentive that has been ignored in the literature, namely the misalignment of the real exchange rate. Indeed, it has positive or negative implications on FDI flows: the undervaluation of the currency can attract foreign direct investment while overvaluation may discourage them.

The objective of this paper is to verify if misalignment of the real exchange rate affects the entry of FDI into developing countries. To do this, five specifications were estimated for a sample of 50 developing countries over the period 1980-2010. The misalignment values, calculated by estimating a model of

Edwards in panel have been introduced in the models of the FDI. The results show, firstly, that misalignment is a major determinant of the FDI in the developing countries. In reality, overvaluation has a negative and significant effect on FDI. Secondly, we demonstrated that the overvaluation and undervaluation delayed by two periods can have a significant effect on the FDI. Delayed overvaluation has a negative effect while delayed undervaluation has a positive effect. Finally, the introduction of the variables "PersistOver" and "PersistUnder" makes as conclude that the persistence of over-or undervaluation has a significant effect on the FDI. In fact, a persistent overvaluation can discourage the FDI inflows to the developing countries whereas a persistent undervaluation encourages it. So, the results support the view that foreign investors are interested in how a currency is overvalued or undervalued.

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Appendix:

Appendix A: Countries in the Sample Used to Compute the EREER

Africa	Latin America	Asia
Algeria	Argentina	China
Benin	Bolivia	Iran
Burkina-Faso	Brazil	Thailand
Cameroon	Columbia	Pakistan
Chad	Costa-Rica	India
Comoros	Ecuador	Philippines
Congo, Rep	Mexico	Malaysia
Cote d»Ivoire	Paraguay	Jordan
Egypt	Venezuela	Syria
Gabon	Haiti	
Gambia	Honduras	
Ghana	Panama	
Guatemala	Uruguay	
Guinea-Bissau	Chile	
Kenya		
Lesotho		
Madagascar		
Malawi		
Mali		
Mauritania		
Mauritius		
Morocco		
Niger		
Panama		
Rwanda		
Senegal		
Sierra-Leone		
Sri Lanka		
Swaziland		

Appendix B: Countries in the Sample Used to estimate the specification 1,2,3,4 and 5

Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
Algeria	Algeria	Algeria	Algeria	Algeria
Argentina	Argentina	Columbia	Argentina	Argentina
Benin	Benin	Benin	Bolivia	Bolivia
Bolivia	Bolivia	Costa-Rica	Brazil	Brazil
Brazil	Brazil	Ecuador	Burkina-Faso	Burkina-Faso
Burkina-Faso	Burkina-Faso	Burkina-Faso	Cameroon	Cameroon
Cameroon	Cameroon	Cameroon	Chad	China

Chad	Chad	Chad	China	Columbia
Chile	Chile	Thailand	Columbia	Congo, Rep
China	China	Pakistan	Congo, Rep	Costa-Rica
Columbia	Columbia	Mexico	Costa-Rica	Cote d»Ivoire
Comoros	Comoros	Comoros	Cote d»Ivoire	Ecuador
Congo, Rep	Congo, Rep	Congo, Rep	Ecuador	Egypt
Costa-Rica	Costa-Rica	Paraguay	Egypt	Gabon
Cote d»Ivoire	Cote d»Ivoire	Cote d»Ivoire	Gabon	Gambia
Ecuador	Ecuador	Venezuela	Gambia	Ghana
Egypt	Egypt	Egypt	Ghana	Guatemala
Gabon	Gabon	Gabon	Guatemala	Honduras
Gambia	Gambia	Gambia	Honduras	India
Ghana	Ghana	Ghana	India	Iran
Guatemala	Guatemala	Guatemala	Iran	Jordan
Honduras	Honduras	Chile	Jordan	Kenya
India	India	Jordan	Kenya	Madagascar
Iran	Iran	India	Lesotho	Malawi
Jordan	Jordan		Madagascar	Malaysia
Kenya	Kenya	Kenya	Malawi	Mexico
Lesotho	Lesotho	Lesotho	Malaysia	Morocco
Madagascar	Madagascar	Madagascar	Mauritius	Niger
Malawi	Malawi	Malawi	Mexico	Pakistan
Malaysia	Malaysia		Morocco	Panama
Mali	Mali	Mali	Niger	Panama
Mauritania	Mauritius	Mauritius	Pakistan	Paraguay
Mauritius	Mexico	Morocco	Panama	Philippines
Mexico	Morocco	Honduras	Panama	Senegal
Morocco	Niger	Niger	Paraguay	Sri Lanka
Niger	Pakistan	Panama	Philippines	Syria
Pakistan	Panama	Malaysia	Senegal	Thailand
Panama	Panama	Senegal	Sri Lanka	Uruguay
Panama	Paraguay	China	Swaziland	
Paraguay	Philippines	Panama	Syria	
Philippines	Rwanda	Syria	Thailand	
Rwanda	Senegal	Sri Lanka	Uruguay	
Senegal	Sierra-Leone	Swaziland		
Sierra-Leone	Sri Lanka	Argentina		
Sri Lanka	Swaziland	Bolivia		
Swaziland	Syria	Brazil		
Thailand	Thailand	Philippines		
Uruguay	Uruguay	Iran		
Venezuela	Venezuela	Uruguay		
Syria				

Appendix C:

Test of the Stationarity of the Variables

Variable	Stationarity in Level	First difference
Capital Inflow / GDP	-1.79	-5.93***
Openness	-2.01	-4.85***
Debt Services	-1.98	-5.39***
Government Consumption / GDP	-1.92	-4.52***
Terms of Trade	-1.53	-5.13***
REER	-2.06	-4.51***
Balassa Samuelson	-1.98	-4.21***
	Critical values: -2.11 (5%) -2.20 (1%)	

** = Significant at 5%, *** = Significant at 1%

Test of Cointegration

Statistics	Calculated value
Panel υ- statistic	-3.9***
Panel ρ- statistic	4.35***
Panel t- statistic	-0.83
Panel ADF statistic	-0.14
	Critical values: 1.65 (5%) 2.33 (1%)

** = Significant at 5%, *** = Significant at 1 %