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Financial Development and Capital Flows: The Effect on the Real Exchange Rate

By Ali Lamouchi & Ezzeddine Zouari
University of Sousse, Tunisia

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Financial Development and Capital Flows: The Effect on the Real Exchange Rate

Ali Lamouchi [α] & Ezzeddine Zouari [σ]

Abstract - The object of this paper is to determine the role played by the financial development in the effect of capital flows on real effective exchange rates. Our object is based on the idea that a developed financial market allows a better allocation of resources. Using the methodology of dynamic panel co-integration for 38 developed and developing countries covering the period 1989-2011, the results show that in the long run the development of the financial sector can weaken the appreciation effect of capital flows on real effective exchange rates. Through the calculation of the threshold value, we can conclude that from a certain threshold of the indicators of financial development the capital flows can have a real depreciation effect on exchange rates.

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I. Introduction

Since the Eighties, the flows of capital, in particular in emerging economies, were characterized by more or less high volatility. From 2003, net capital flows to emerging countries increased considerably. The increase in the volume of capital flows showed that the beneficiary countries are unable to manage perfectly this capital. This bad management and allocation of capital flows tend to favor the saving with regard to the investment. The increase in level of saving made reveals that capital flows can be a source of macroeconomic instability and, at the same time it defied the conventional sight that capital flows are always advantageous in terms of the increase in financial resources leading to a greater volume of investment (Mohan and Kapur, 2010). This macroeconomic instability caused by the excessive mobility of the capital, can be expressed by accelerated rates of growth and inflation and in particular by an appreciation of the real effective exchange rate (Combes, Kinda and Plane, 2011). Indeed, the experience of a certain number of countries proved that a real appreciation of exchange rate due to capital flows cannot only discourage the investment, but it can also destabilize macroeconomic management severely, according to Corden (1994). In particular, a broad real appreciation of country's national currency, following an excessive flow of the capital, degrades the competitiveness of the exposed sector and leads to a deterioration of the current account and an increasing vulnerability to the crisis (Reinhart and Rogoff, 2008).

With an aim to protect their economies from the massive volatility of capital flows, and from their repercussions on the rate of real exchange, the careful macroeconomic strategies as the intervention sterilized on the exchange market, the control of capital account and the tight fiscal policy were applied by the majority of countries, in particular the emerging countries. With the exception of some cases, the adoption of these strategies did not contribute the countries to weaken the effects of appreciation of capital flows on real exchange rate (Reinhart and Khan, 1995). The question which arises: are they other policies allowing including the effects of capital flows on real exchange rate?

In our work, we will emphasize the role of financial market development in the relation between the real exchange rate and capital flows. The choice of financial development strategy is explained by the fact that a developed and active financial market allows a better allocation of resources. Indeed, a developed financial sector has a capacity to provide information with moderate cost about the investment opportunities and to create additional incitements to study extensively their potential. Additional information improves the effective distribution of resources and makes it possible to improve the investment. Moreover, the volume of investments, offered in the well-developed financial markets, allows not only to economy to employ its resources effectively but also it is a significant factor in the mobilization of the saving as well as the facilitation of the diversification of risk (Saborowski, 2009).

Considering the importance of a developed financial market in the implementation of a better allocation of external resources (capital flows), it remains to determine with precision the nature of the impact of financial development on the relation between the real exchange rate and capital flows. By supplying a wide range of interesting investments, and by managing the capital flows towards an using more productive, many effective financial markets and institutions can reduce the probability that capital flows are directed towards sectors of which the demand increases without improving the produce's capacity of the economy.

Author α : Department of Economics, Faculty of Economic Sciences and Management, University of Sousse, Tunisia.
E-mail : ali_fsegs@gmail.com
Author σ : Professor, Faculty of Economic Sciences and Management, University of Sousse, Tunisia.
E-mail : zouari.ezz@gmail.com

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Leading capital flows towards productive sectors, an increase in demand of domestic consumption will take place and it can be a deciding factor in the relationship between the relative prices of exchangeable and non-exchangeable goods (this ratio which definite real exchange rate). Through the using the co-integration techniques for non-stationary heterogeneous panel data for 38 developed and developing countries covering the period 1989-2011, the object of our work is to determine the role of financial market development in the long-term relationship between the real exchange rate and financial development.

To answer this question, we should divide our work in three sections. In the first section, an outline of main theoretical and empirical works, which examined the theme of financial development, capital flows and real exchange rate, is presented. The second section is devoted to the definition of variables as well as empirical methodology. Finally, the specification of the model and the presentation of results of estimates and pulled conclusions will be the objects of the third section.

II. Related Literature

Capital flows and their effects on the macroeconomic aggregates (particular on growth and of real exchange rates) were the objects of a significant number of theoretical and empirical works (Ghosh, Goretti, Joshi, Ramakrishnan, Thomas and Zalduendo, 2008; Baqir, Duttagupta, Stuart and Tolosa, 2010 and Berg, Mirzoev, Portillo, Zanna, 2010). If capital flows represent a fundamental factor for the development of an economy by increasing the indicator of economic growth, this will not prevent that they have negative side effects, particularly on the value of national currency, by generating an increase in the relative price ratio of exchangeable and non-exchangeable goods and by consequence an appreciation of real exchange rate.

The passion for opening of the capital account, in particular, by developing countries is explained by the significant effects of capital flows on economic growth Gruben and McLeod, 1998; Bosworth and Collins, 1999 and Gheeraert and Mansour, 2005). The partisans of financial liberalization regard the positive effect of capital flows on growth as a crucial advantage of financial integration for the developing countries (Mody and Murshid, 2005 and Mileva, 2008). With the exception of some studies which found ambiguities in the determination of capital flows impact on economic growth, the majority of empirical works showed the existence of positive relations between foreign direct investments (used like an indicator of capital flows) and economic growth. Via the adopting different proxies of capital flows, Bailliu (2000) emphasized, on one hand, the role of private capital movements in the increase of the level of economic growth for 40 developing countries covering the period 1975-1995 and on the other hand, the role played by domestic financial sector development in the definition of the relation between capital flows and economic growth. Using the methodology of dynamic panel data, the results reached show that the positive effects of capital flows (increase of the economic growth) on growth are higher than those on interest rate of credit (consequently, on the level of investment). But this result is valid only for the economies whose financial sector affected a certain degree of development. Bailliu concludes that the positive function which links international capital mobility and economic growth depends considerably on the degree of domestic financial sector development.

The effects of capital flows on real exchange rate depend generally on macroeconomic and financial policies applied by economics beneficiaries of this capital, namely capital account openness, exchange system, prudential measures to control capital and financial development (Mohan and Kapur, 2010).

In certain cases, the appreciation effect sudden of real exchange rate encouraged the countries to adopt prudential measures to limit the degradation of their competitive capacities, in particular the intervention sterilized on exchange market, the control of capital count and the application of a more severe fiscal policy. With exception of some countries, these prudential measures haven't generally succeeded in providing better results in particular when capital inflow is persistent (Kose, Elekdag and Cardarelli, 2009).

Improving the effectiveness of the allocation of resources, Saborowski (2009) shows that the development of the financial sector could weaken the appreciation effect of capital flows. Using the method of GMM-IV to models with dynamic panels for a sample of 84 developed and developing countries covering the period 1990-2006, the results prove that the appreciation of real exchange rate due to the effect of FDI inflows is attenuated when financial and capital markets are more developed and active. One of the implications of these results is that among the dangers' effects related to massive capital flows in emerging economies (macroeconomic instability due to a significant appreciation of real exchange rate) can be moderate partly by developing financial sector depth. In a similar vein, Otker-Robe, Polanski, Topf and Vavra (2007) suggested that, by emphasizing the experiences of developed and developing European countries over the period 1994-2005, the development of a deep and active financial sector can be used to weaken the process linking capital flows and appreciation of real exchange rate.

Making a comparative study, Athukorala and Rajapatirana (2003) showed that the appreciation effect of real exchange rate due to capital flows was stronger in the emerging countries of Latin America than in Asian countries for the period 1985-2000. The explanation of

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the authors was that financial markets in Latin America are more developed compared to those of Asian countries. De la Torre, Gozzi and Schmukler (2007) also confirmed this explanation. Emphasizing the relation between private transfers (in particular, the remittances), financial development and the real exchange rate, Acosta, Baerg and Mandelman (2009) tried to examine the role of financial development in moderation of real exchange rate appreciation caused by private capital flows. The application GMM-IV method for a dynamic panel of 109 developing and transition countries during the period 1990-2003, the results prove that well-developed financial sector is susceptible more effectively to benefit of private transfers as opportunity investment. Also, the authors suggest that private transfers tend to carry out increasing pressures of appreciation on real exchange rate. But this effect will be weaker in the case that country having deeper and more sophisticated financial markets which are able to maintain the competitiveness commercial of economies.

Also, Aghion, Bacchetta and Rogoff (2009) showed the significant role of financial development in the determination of the impact of real exchange rate volatility on the growth rate of productivity.

Others that financial development, some studies tried to examine the role of other policies (control of capital account, financial openness and exchange rate system) in the definition of the relation linking real exchange rate and capital flows. In general, the control of capital tends to reduce the external loans, but it does not have any impact on the total volume of capital flow, except for the IDE. What explains the absence of empirical evidence showing that restrictions on the mobility of capital help to moderate the appreciation of the exchange rate and that they increase the degree of independence of monetary policy. On the contrary, controls of capital can significantly increase the volatility of the exchange rate (Clements and Kamil, 2009). Concerning the financial openness, which is generally associated with a high rate of economic growth, Bekaert, Harvey, Lundblad and Siegel (2010) proved that the effect of financial openness on productivity growth is a permanent effect and that it is more significant than an effect on growth of capital.

According to the authors, these permanent effects are due to the role played by financial openness in the development of the banking sector and stock market and also in the improvement of financial institution's quality. The results show that there is no very evidence for a higher effectiveness of investment after financial liberalization. Using threshold analyses, the authors show that the responses of productivity growth to a liberalization of capital account are significant for countries with a financial developed sector. Another conclusion, determined by Bekaert, Harvey, Lundblad and Siegel, is that the increase in volume of growth caused by financial openness is higher than the reduction in volume of growth caused by the regional and global banking crises. In a more recent study, Huang (2011) has shown that country which wants to open largely its financial market to realize a higher growth and to decrease the financial instability (which represents an inevitable cost of such policy), must reinforce considerably its financial systems to prevent any reason of financial vulnerability.

The results of studies presented above show the importance of some economic policies in the definition of capital flows impact on macroeconomic aggregates for a country. While summarizing, macroeconomic implications of capital flows, in particular in terms of effect on real exchange rate, depends considerably of financial openness, financial development and exchange regime applied. In general, there is a consensus among several studies on the role of financial development in the attenuation of the effect of real exchange rate appreciation due to capital flows (Athukorala and Rajapatirana, 2003; Otker-Robe, Polanski, Topf and Vavra, 2007; De la Torre, Gozzi and Schmukler, 2007; Acosta, Baerg and Mandelman, 2009 and Saborowski, 2009).

For developed and developing countries, to have a developed and active financial market is a project which required time and which its role will be clearer in the long run rather than in the short run. During our work, we will try to determine the nature of the role played by financial development in long-term relationship between capital flows and real exchange rate for a heterogeneous panel of developed and developing countries.

III. Empirical Evidence

Our study is elaborate on annual data covering period 1989-2011 for a heterogeneous panel of 38 developed and developing countries. The choice of countries retained in our work was founded on criterion of data availability for variables in definite period.

a) Presentation of Data

Dependent variable in our work is real effective exchange rate (REER). We employ an index of the real effective exchange rate based on consumer price index like a measurement of REER (calculated by author). In our study, an increase of the real effective exchange rate implies a real appreciation of the currency. Basing on the theoretical literature and in particular on the empirical literature of determinants of REER, the fundamental variables affecting REER, and which will be retained in this work, are terms of exchange (TOT), productivity (PROD), commercial openness (OUV) and monetary excess (MONEY). The dependent variable and fundamental determinants are expressed in logarithm.

Concerning the macroeconomic fundamentals, terms of trade (TOT measured like the rapport between unit values of exports and those of imports) have

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theoretically a contradictory impact on the equilibrium real exchange rate. This contradiction is explained by the nature of effects (income effect and substitution effect) which can dominate and operate the shocks of terms of trade. In the event of improvement in terms of trade associated with the rise of export prices, the income effect is expressed by an increase in income which as has consequence an increase in demand of goods, in particular, non-exchangeable if it is supposed that prices of imported goods are fixed. The increase in demand will cause later the rise of prices of non-exchangeable goods leading to the appreciation of real exchange rate. On the other hand, if the substitution effect dominates, the improvement in terms of trade, operated by the rise of export prices, results in the increase of supply of non-exchangeable goods favoring the decrease of their prices in order to absorb the surplus of supply. The decline of non-exchangeable goods prices has as repercussion a depreciation of real exchange rate.

Commercial Openness (Ouv): The variable openness (measured as the sum of imports and exports expressed as a percent GDP) acts as a proxy for commercial policy and it will tend to decrease exchangeable goods prices while minimizing or by avoiding the taxation of imports or the subventions on exports. This reduction in prices of exchangeable goods will have as a consequence a real depreciation of the exchange rate.

Productivity (Prod): productivity or also technological progress (PROD defined as domestic GDP per capita over the weighted average of GDP per capita of the principal trade partners) has for an object to hold in consideration the Balassa-Samuelson effect. According to this effect, the increase of productivity gains, which proves more concentrated in exposed sector, increases the wages in two exposed and sheltered sectors. Consequently, the demand of non-exchangeable goods increases, which increases the prices in non-tradable sector, while the prices of the exchangeable goods are approximated by world prices, this fact leads to a real appreciation of the exchange rate.

Monetary excess (MONEY measured by the ratio money over GDP) is an indicator of monetary policy. The rise of money results in increase of non-tradable goods demand and consequently in their prices, implying an appreciation of real exchange rate.
Concerning our variable of interest, several proxies exist for capital flows. During our analysis, we will use two indices as measures of capital flows: foreign direct investments (FDI) and the net foreign assets (NFA), both are expressed as a percentage of GDP. Generally, an increase of capital flows results in an increase of non-tradable prices, of this fact conducting to the appreciation of real exchange rate.

For measures of the variable financial sector development, there are several index of which most widespread are private credits provided by banks and other financial institutions as a share of GDP (this index measures precisely the activity of the money market), liquidity liabilities as a percentage of GDP (it is an indicator of financial market) and deposit money bank assets as a percent of GDP. In our work, we will adopt the three indicators in an alternative way to give more robustness to our conclusions and we will particularly be interested in private credit over GDP as a proxy of financial development for only reason is that the liquidity liabilities could not be strongly related to provision of financial services such as risk management and information treatment (King and Levine, 1993 and Saborowski, 2009).

b) Estimation Method

In the wake to determine the long-term effect of capital flows on real effective exchange rate by taking into account the level of financial development for developed and developing countries, the dynamic panel co-integration (error correction model, ECM) will be our technique of the estimate. The application of such technique requires that the variables should be integrated in order 1 (I(1)) and that it exists a long-term relation of co-integration between the variables of the model.

The first step of this econometric method consists to check if the data are non-stationary and to deduce that the variables are I(1). Various tests of unit roots for panel data exist in the econometric literature. We limit for two tests; test of Maddala and Wu (1999) and test of Pesaran (2007). Concerning the first, it is a test of the first generation. It proposes as assumptions the heterogeneity in autoregressive coefficient (AR) of the Dickey-Fuller regression and cross-section independence in the data. Whereas the test of Pesaran, which belongs to the second generation of unit root tests, supposes the cross-section dependent to the panel data and, as Maddala and WU, it takes into account the heterogeneity of autoregressive coefficients (AR) of the Dickey-Fuller regression.

After having checked that whole of variables are I (1), the second step allows to test the existence of a long-term relationship between the various variables components model to be estimated. Among the tests of co-integration in panel data, we find the test of Pedroni (2001) and the test of Kao. The limit of the test of Pedroni is that it cannot test the co-integration, more than seven variables. For this reason, we adopted the test of Kao.

If the tests of co-integration confirm that there is a long-term relationship between the variables, the last step consists to estimate this relation. Knowing that there are several techniques, on the one hand, the estimate method of a long-term relation of co-integration

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in panel data depends strongly on the treated question. Within the framework of our work, the fact that we expect that the long-term movements of the REER and their macroeconomic determinants are identical for all countries in the sample explains our passion for the PMG estimator (Pooling Mean Group) which supposes the homogeneity of long-term coefficients for all groups (countries), whereas, it supposes short-term heterogeneity. On the other hand, other methods to knowing the MG (Mean Group), it supposes the short-term and in particular the long-term heterogeneity of the coefficients. Contrary to MG, the dynamic fixed effects estimator (DFE) supposes the homogeneity in the short-term and in the long-term of coefficients. As the short-term behaviors of the REER are likely to be influenced by the specific characteristics of countries, the DFE estimator does not seem adequate. To justify our choice, the test of Hausman will be carried out during our estimates.

Analytically, the PMG estimator derives from the estimate of the error correction equation:

$$\Delta y_{it} = \emptyset_i y_{i,t-1} + \beta_i X_{it} + \sum_{j=1}^{p-1} \varphi_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \theta_{ij} \Delta X_{i,t-j} + \alpha_i + \varepsilon_{it} \quad (1)$$

Where $y_{i,t}$ is the dependent variable. X_{it} is the matrix of regressors. α_i is the fixed effects. φ_{ij} and θ_{ij} are respectively the coefficients on the lagged first-differences of the dependent variable and the independent variables. β_i is the matrix of coefficients of the independent variables. $\emptyset_i$ is the error-correction term represents the speed of adjustment. If $\emptyset_i$ is significantly negative, then there is a long term relationship between the dependent variable and the explanatory variables.

IV. Specification of Model and Estimation Results

In order to specify and estimate our model, the conditions of non-stationnarity of data and the existence of a relation of co-integration must be validated. In the continuation of our empirical work, the various tests and estimates will be carried out for the total sample and the two sub-samples of the country as they were defined above.

a) Specification of Model

The results of the unit root tests are presented in table 1 below. It arises from the reading of the table that the null hypothesis of non-stationnarity is not rejected at the 5% significance level for the real exchange rate, and for its explanatory variables in different country's groups. This conclusion is checked for the all specifications which introduces the individual specific-effects (which refer to the constant, C), and for that which includes both the individual specific-effects and an individual linear trend (which corresponds to the trend, T). In the case of developed countries, Maddala and Wu test with constant allows that all variables are non-stationary, except the FDI which are non-stationary only at the 1% level of significance. Whereas, including both constant and trend to the test of unit root, variables FDI and TOT are non-stationary only at the 1% level and the other variables are non-stationary at the three significance level.

Table 1 : Results of Maddala and Wu (1999) and Pesaran CIPS (2007) panel unit root tests

Variables	Developed Countries				Developing countries				Total Sample			
	1st Generation Test Maddala and Wu MW(1999)		2nd Generation Test Pesaran CPIS (2007)		1st Generation Test Maddala and Wu MW(1999)		2nd Generation Test Pesaran CPIS (2007)		1st Generation Test Maddala and Wu MW(1999)		2nd Generation Test Pesaran CPIS (2007)	
	C	C + T	C	C + T	C	C + T	C	C + T	C	C + T	C	C + T
REER	0.124	0.144	0.023**	0.004*	0.488	0.665	0.934	0.649	0.581	0.021**	0.213	0.335
TOT	0.337	0.017**	0.820	0.410	0.229	0.038**	0.060**	0.002*	0.006*	0.000*	0.218	0.003*
PROD	0.958	0.968	0.788	0.560	0.999	0.912	0.553	0.629	0.042**	0.315	0.999	0.989
OUV	0.699	0.171	0.035**	0.827	0.818	0.637	0.164	0.963	0.014**	0.921	0.858	0.348
Money	0.810	0.386	0.130	0.365	0.819	0.229	0.247	0.184	0.045**	0.069**	0.907	0.246
NFA	0.914	0.727	1.000	0.947	0.039**	0.861	0.993	0.916	1.000	0.998	0.296	0.895
FDI	0.040**	0.017**	0.022**	0.367	0.114	0.368	0.004**	0.372	0.101	0.877	0.022**	0.042**

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Private credits	0.952	0.774	0.104	0.029**	0.646	0.809	1.000	1.000	0.047**	0.887	0.922	0.886
Liqliab	0.939	0.795	0.160	0.097***	0.119	0.181	0.182	0.804	0.003*	0.374	0.525	0.451
Dep money	0.856	0.840	0.013**	0.015**	0.769	0.914	0.998	0.978	0.012**	0.377	0.906	0.958

***, ** and * corresponds respectively to the rejection of null hypothesis at 10%, 5% and 1%. The values presented in this table correspond to p-values. C and T refer respectively to constant and trend.

For Pesaran test, all variables are also non-stationary except for REER which is stationary introducing constant and deterministic trend to test. Concerning developing countries, the results for the two specifications of Maddala and Wu test prove that all variables are non-stationary for all significance level except the NFA (test with constant) and the TOT (test with constant and trend) are non-stationary only at the 1% level. While, the test of Pesaran indicates that only the variables FDI (test with constant) and TOT (test with constant and trend) are stationary for all significance levels. Carrying out unit root tests for the total sample, the results are almost identical to those found for each group independently. The only difference is that non-stationnarity hypothesis is not rejected for certain variables at weaker significance level (1%) and also variable TOT became stationary according to results of Maddala and Wu test (for the two versions) and of Pesaran test (specification with constant and trend).

Generally, the two tests of unit root show the nonstationnarity for all variables, particularly in the specification including only the individual specific-effects. Consequently, we can conclude that the various variables are integrated in order one (I(1)).

The nonstationarity of variables enables us to test the existence of long-term relationship between real effective exchange rate and the various combinations of explanatory variables. The cointegration tests in panel data of Pedroni (2001) and Kao are carried out. The results will be presented with the estimates of various specifications of REER model. It comes out from these results the presence of cointegration vector for all specifications of REER model.

After having checked the hypothesis of nonstationarity of variables and the presence of a long-term relationship between REER and various combinations of its determinants, the next step consists to estimate our equation at error correction. From the equation (1), the reduced form equation to estimate is as follows (Exception of variables Flow and FD, the other variables are expressed in logarithm):

$$\Delta(reer)_{i,t} = \emptyset_i\left[reer_{i,t-1} - \beta_0 - \beta_1 tot_{i,t} - \beta_2 prod_{i,t} - \beta_3 ouv_{i,t} - \beta_4 money_{i,t} - \beta_5 Flow_{i,t} - \beta_6 FD_{i,t} - \beta_7 (Flow * FD)_{i,t}\right] - \left[\theta_{1i}\Delta(tot)_{i,t} - \theta_{2i}\Delta(prod)_{i,t} - \theta_{3i}\Delta(ouv)_{i,t} - \theta_{4i}\Delta(money)_{i,t} - \theta_{5i}\Delta Flow_{i,t} - \theta_{6i}\Delta FD_{i,t} - \theta_{7i}\Delta(Flow * FD)_{i,t}\right] + \varepsilon_{it} \quad (2)$$

As the PMG estimator supposes the homogeneity of long-term coefficients, that means analytically $\beta_i = \beta$ for all *i = 1, 2, 3..., N.* The matrix *Flow* corresponds to two indicators of capital flows which will be adopted during our work (*FDI and NFA*). Matrix *FD* refers to three proxies of financial development variable (Private credits provided by banks and other financial institutions as a share of GDP, Liquidity liabilities as a percentage of GDP and Deposit money bank assets as a percent of GDP) and the matrix *Flow*FD* presents the term of interaction between the indicator of capital flows and the indicator of financial development. Since we are interested in the evaluation of long-term relationship between *REER* and the various combinations of its determinants only long term coefficients β which will be presented.

b) Estimation Results and Discussion

The object of this sub-section is to determine empirically the role played by the developed financial market in the effect of the capital flows on real effective exchange rate. To be done, we adopted two indicators of capital flows (*FDI* and *NFA*) and three indicators of financial development (private credits, liquidity liabilities and deposit money, all as a percentage of GDP). For each group of countries and for each indicator of financial development, two estimates of the equation (2) are carried out. The first regression corresponds to the use of FDI as index of capital flows whereas, *NFA* is employed as an index of capital flows in the second regression.

Choosing the *private credits* reported to GDP like our first indicator of financial development, the results of the PMG estimates of the equation (2) are recapitulated in table 2 below. The first result which we can draw from this table is that the coefficient of adjustment (corresponds to EC in the table and $\emptyset_i$ in the equation) is at the same time negative and strongly significant for both proxies of capital flows (*FDI* and *NFA*) and also for all samples. This means that there is a long-term relationship between *REER* and its determinants used in each estimate. Moreover, this result enables us to conclude that a potential endogeneity between *REER* and its fundamentals does

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not have an influence on the coefficients of long-term. Consequently, we conclude the absence of omitted variable bias in various estimates carried out and for the three samples of countries. The result and the conclusion are identical by choosing each time one of two other indicators of financial development; *Liquidity liabilities* as a share of GDP (table 3) and *Deposit money* as a percent of GDP (table 4).

Justifying the choice of PMG method, the result of the Hausman test shows that the null hypothesis of homogeneity of long-term coefficients is not rejected, for all significance levels and for all estimations carried out. This result is also checked in tables 3 and 4 (see below) respectively where liquidity liabilities over GDP and deposit money reported to GDP as alternative proxies of financial development. Consequently, we conclude that the PMG estimator is preferred that the MG method which supposes the heterogeneity of coefficients at short and long-term.

Examining the results of table 2 for the sample total, regression "I" shows that the coefficients of FDI and of term of interaction between FDI and private credits reported to GDP have opposite signs (positive coefficient and almost null for the variable FDI and negative for the term of interaction). This does imply that a real appreciation of the effective exchange rate due to an increase in capital flows can be attenuated when the volume of private credits as a percent of GDP is rather high. However, this conclusion remains weak as long as both coefficients are statistically not significant. Indeed, the coefficient of the variable FDI is strongly not significant (p-value equal to 0.915). Whereas, the coefficient of the variable term of interaction is not slightly significant since its p-value 0.124 exceeded slightly the significance level of 10%. Using the NFA like an indicator of capital flows, regression "II" shows that this indicator and its term of interaction with private credits as a share of GDP have also coefficients of opposite signs and with values almost null on the one hand and strongly not significant on the other hand. The results found for the NFA confirm those found for the FDI.

To have more significant results and consequently more robust conclusions, we chose to dis-aggregate our sample of countries in two groups according to the level of development of their economies, developed and developing countries. For the group of developed countries, regression "I" shows that all estimated variables are strongly significant at the 1% level, except for the variable term of trade (TOT). Concerning our variables of interest, FDI and term of interaction between FDI and private credits over GDP have coefficients with opposite signs (positive for variable FDI and negative for the variable term of interaction) and also strongly significant at the 1% level.

This result means that a high volume of private credits reported to GDP less extremely returns the appreciation effect of real effective exchange rate due to an increase in FDI flows. The deduced conclusion from regression "I" is strongly confirmed by the results of regression "II" by introducing NFA as an alternative proxy of capital flows. Indeed, the coefficient of the variable NFA has a positive sign and that of term of interaction (NFA* private credits) is negative as well as both coefficients are strongly significant at the 1% level. Compared to those of developed countries, the results of developing countries did not strongly change when NFA is retained as an indicator of capital flows (Table 2, Developing Countries and Regression II).

Table 2 : Financial Development Role in Capital Flows Effects on Real Effective Exchange Rate: Estimations Results of PMG Method

Dependent Variable : Log (REER)						
	Total Sample		Developed Countries		Developing countries	
	I	II	I	II	I	II
EC	-0.2508***	-0.2867***	-0.1743***	-0.1759***	-0.3060***	-0.3287***
	(0.000)	(0.000)	(0.007)	(0.005)	(0.000)	(0.000)
Log(TOT)	0.2325**	0.4434***	0.0022	0.3577**	0.4800***	0.7595***
	(0.012)	(0.000)	(0.990)	(0.030)	(0.000)	(0.000)
Log(PROD)	0.2506***	0.5519***	0.7522***	0.7067***	0.2040***	0.4887***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(OUV)	-0.1545***	-0.4952***	-0.3245***	-0.3610***	-0.1864***	-0.5593***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(MONEY)	-0.0395	-0.0110	-0.3052***	-0.1914***	0.0448	-0.0490
	(0.215)	(0.730)	(0.000)	(0.000)	(0.265)	(0.215)
Private credits	-0.0955***	-0.0880*	0.3479***	0.0522	-0.1138**	-0.3333**
	(0.006)	(0.075)	(0.000)	(0.408)	(0.013)	(0.041)
FDI	0.0006		0.0243***		0.0045	

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	(0.915)		(0.000)		(0.484)	
FDI*private credits	-0.0105		-0.0295***		-0.0112	
	(0.124)		(0.000)		(0.316)	
NFA		0.0003		0.0034***		0.0034**
		(0.684)		(0.004)		(0.040)
NFA*private credits		-0.0002		-0.0058***		-0.0015*
		(0.823)		(0.000)		(0.090)
Hausman Test	0.42	0.33	3.65	1.04	0.32	0.47
	(0.9997)	(0.9999)	(0.8186)	(0.9941)	(0.9999)	(0.9995)
Kao Test of Cointegration	-3.7769***	-3.7190***	-3.2952***	-3.0610***	-2.4819***	-3.1400***
	(0.0001)	(0.0001)	(0.0005)	(0.0011)	(0.0065)	(0.0008)
Threshold of FD proxy	-	-	0.82	0.59	-	2.26
Observations	796	796	393	393	403	403
Number of Countries	38	38	18	18	20	20
Log-Likelihood	1382.27	1371.065	760.9378	757.6281	649.4733	626.7935

***, ** and * corresponds respectively to significance at 1%, 5% and 10% level. EC refers to the error correction term and it corresponds to the symbol $\emptyset_i$ in equation (2). All specifications include a maximum of one lag according to Akaike criterion. Values in parentheses are p-values. For cointegration test of Kao, the null hypothesis is the absence of cointegration. For Hausman test, the null hypothesis is the restriction of the homogeneity of long-term coefficients.

Moreover, the coefficients related to NFA and term of interaction are respectively positive (0.0034) and negative (-0.0015). Whereas, the significance is strong for variable NFA (p-value is equal to 0.040) and it is weak for the variable of term of interaction NFA*private credits (p-value is 0.90). On the contrary, regression I for developing countries shows that, although they kept the same signs as the other regressions, the coefficients of FDI and term of interaction FDI*private credits are not strongly significant. The results found for developing countries show that a financial market is not developed or slightly developed is unable to weaken significantly the real appreciation effect of effective exchange rate following great flows of FDI. The weak results found in the case of developing countries had a greatest influence on no-significance of the results found for total sample, in particular for our variables of interest (two indicators of capital flows and its terms of interaction with the indicator of financial development private credits as a share of GDP).

Table 3 : Liquidity Liabilities as proxy of Financial Development, Capital Flows and Real Effective Exchange Rate: Estimations Results of PMG Method

Dependent Variable : Log (REER)						
	Total Sample		Developed Countries		Developing Countries	
	I	II	I	II	I	II
EC	-0.2199***	-0.2319***	-0.1890***	-0.1844***	-0.2361***	-0.1674**
	(0.000)	(0.000)	(0.001)	(0.003)	(0.000)	(0.010)
Log(TOT)	0.3060**	0.5725***	0.1898	-0.3899**	0.9527***	-0.0655
	(0.031)	(0.000)	(0.349)	(0.028)	(0.000)	(0.813)
Log(PROD)	0.6579***	0.6025***	0.6636	-0.0286	0.4732***	0.6444***
	(0.000)	(0.000)	(0.000)***	(0.782)	(0.000)	(0.000)
Log(OUV)	-0.3817***	-0.4432***	-0.3798***	-0.5375***	-0.1089***	-0.9024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)	(0.000)
Log(MONEY)	-0.1404***	-0.1076***	-0.1923***	0.4971***	0.1770***	-0.1321**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.024)
Liqliab	0.0459	-0.0161	0.1410**	-0.0669	-0.0340	0.0074**
	(0.315)	(0.739)	(0.024)	(0.504)	(0.632)	(0.023)
FDI	0.0032		0.0078***		0.0197***	
	(0.609)		(0.007)		(0.000)	
FDI*Liqliab	-0.0004		-0.0101**		-0.0090	
	(0.950)		(0.014)		(0.329)	

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NFA		0.0030***		0.0083***		0.1508***
		(0.007)		(0.000)		(0.002)
NFA*Liqliab		-0.0055***		-0.0166***		-0.0572***
		(0.000)		(0.000)		(0.000)
Hausman Test	0.51	0.85	0.68	3.86	0.34	3.68
	(0.9994)	(0.9969)	(0.9985)	(0.7959)	(0.9998)	(0.8154)
Kao Test of Cointegration	-3.7541***	-3.6659***	-3.0993***	-3.3530***	-2.5086***	-3.3125***
	(0.0001)	(0.0001)	(0.0010)	(0.0004)	(0.0061)	(0.0005)
Threshold of FD proxy	-	0.55	0.77	0.5	2.19	2.64
Observations	796	796	393	393	403	403
Number of Countries	38	38	18	18	20	20

***, ** and * corresponds respectively to significance at 1%, 5% and 10% level. EC refers to the error correction term and it corresponds to the symbol $\emptyset_i$ in equation (2). All specifications include a maximum of one lag according to Akaike criterion. Values in parentheses are p-values. For cointegration test of Kao, the null hypothesis is the absence of cointegration. For Hausman test, the null hypothesis is the restriction of the homogeneity of long-term coefficients.

On six regressions presented in table 2, only three provided significant results for the indicators of capital flows and their terms of interaction with the private credits as a percent of GDP. In this context, we chose to determine the threshold level of the indicator of financial development for these three regressions.

Applying the method of PMG, the long-term relation between *REER* and its determinants is given by the following equation:

$$\widehat{reer}_{it} = \ddot{\theta}_1 tot_{it} + \ddot{\theta}_2 prod_{it} + \ddot{\theta}_3 ouv_{it} + \ddot{\theta}_4 money_{it} + \ddot{\theta}_5 Flow_{it} + \ddot{\theta}_6 FD_{it} + \ddot{\theta}_7 (Flow * FD)_{it}$$

Analytically, the calculation of a threshold level of financial development ($\widehat{FD}$) is given as:

$$\frac{\partial \widehat{reer}}{\partial Flow} > 0 \quad \leftrightarrow \quad \hat{\ddot{\theta}}_5 + \hat{\ddot{\theta}}_7 FD_{it} > 0 \quad \leftrightarrow \quad FD_{it} > \widehat{FD} = -\frac{\ddot{\theta}_5}{\ddot{\theta}_7}$$

The calculation of a threshold level of private credits provided by banks and other financial institutions as a share of GDP allows determine the level from which capital flows have a depreciation effect on the real effective exchange rate. In the table 2, the calculation of a threshold level of developed countries shows that on a level equal or higher than 0.82 of private credits as a percent of GDP, the flows of FDI have a depreciation effect on the real effective exchange rate. Also with a ratio equal or higher than 0.58 of private credits as a percent of GDP, NFA will have an impact to depreciate real effective exchange rate. While from a level higher than 2.26 of private credits as a percent of GDP, NFA will have a real depreciation effect on the effective exchange rate for developing countries. Comparing threshold levels for the two groups, we notice that threshold level for developing countries is strongly larger than that of developed countries implying that developing countries requires a higher level of private credits provided by banks and other financial institutions as a share of GDP (and consequently a financial market more developed) so that NFA depreciate their real effective rates of exchange.

Table 4 : Deposit Money as a proxy of Financial Development, Capital Flows and Real Effective Exchange Rate

Dependent Variable : Log(REER)						
	Total Sample		Developed Countries		Developing countries	
	I	II	I	II	I	II
EC	-0.2738***	-0.2521***	-0.1773***	-0.1801***	-0.3006***	-0.388***
	(0.000)	(0.000)	(0.008)	(0.006)	(0.000)	(0.000)
Log(TOT)	0.4973***	0.5710***	-0.0429	0.2867*	0.4403***	-0.2369
	(0.000)	(0.000)	(0.788)	(0.082)*	(0.000)	(0.334)
Log(PROD)	0.4667***	0.4433***	0.8234***	0.7342***	0.2204***	0.7007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(OUV)	-0.4594***	-0.5379***	-0.3020***	-0.3789***	-0.2349***	-0.5978***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(MONEY)	-0.0487**	-0.1257***	-0.2780***	-0.1702***	-0.0865***	0.5978***
	(0.044)	(0.000)	(0.000)	(0.000)	(0.005)	(0.000)

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Dep money	-0.0915**	0.1051***	0.2702***	0.01319	-0.1213***	-0.2923
	(0.020)	(0.006)	(0.000)	(0.810)	(0.006)	(0.549)
FDI	0.0094*		0.0229***		0.0011	
	(0.062)		(0.000)		(0.867)	
FDI*Dep money	-0.0037		-0.0250***		-0.0093	
	(0.425)		(0.000)		(0.373)	
NFA		0.0007		0.0039***		0.0209***
		(0.465)		(0.003)		(0.000)
NFA* Dep money		-0.0001		-0.0054***		-0.0214**
		(0.915)		(0.000)		(0.015)
Hausman Test	0.62	0.83	3.24	0.68	0.44	6.71
	(0.9989)	(0.9971)	(0.8621)	(0.9985)	(0.9996)	(0.4594)
Kao Test of Cointegration	-3.7290***	-3.8561***	-3.4149***	-3.2267***	-2.4659***	-3.4028***
	(0.0001)	(0.0001)	(0.0003)	(0.0006)	(0.0068)	(0.0003)
Threshold of FD proxy	-	-	0.916	0.72	-	0.98
Observations	796	796	393	393	403	403
Number of Countries	38	38	18	18	20	20
Log-Likelihood	1388.062	1381.704	766.4731	762.7878	643.2008	633.7525

***, ** and * corresponds respectively to significance at 1%, 5% and 10% level. EC refers to the error correction term and it corresponds to the symbol $\emptyset_i$ in equation (2). All specifications include a maximum of one lag according to Akaike criterion. Values in parentheses are p-values. For cointegration test of Kao, the null hypothesis is the absence of cointegration. For Hausman test, the null hypothesis is the restriction of the homogeneity of long-term coefficients.

Summarizing various results of table 2, two remarks and conclusion can be drawn. The first remark is that the no significance of the indicators of capital flows is explained by the fact that the flows of FDI and NFA for an economy are primarily directed towards the tradable goods sector. Consequently, they will have a weaker effect on the relative price of non-tradable and tradable goods (it is a ratio which define the real effective exchange rate). Another reason which can have a relationship to no significance of both indicators of capital flows in certain regressions is that flows of FDI and NFA are exploited in nonproductive investments (for example the investment in real sector or improvement of infrastructure). The second remark relates to no significance in some estimations of term of interaction between the capital flows proxy and the indicator of financial development. An explanation for this finding is that the indicator used for development of financial market is an indicator slightly fallacious because it can occur in certain cases that a substantial increase in indicator of financial development does not reflect necessarily a great capital flows. Consequently, it's unable to measure the capacity of financial sector to control in an effective way the capital flows, but it can reflect.

V. Conclusion

The volume of capital flows increased considerably in the last decade. This rise encouraged the monetary authorities to seek effective solutions to save the competitive capacity of their economies which can be degraded since a great capital flows appreciates real exchange rate considerably (Dua and Sen, 2006; Lartey, 2007; Sy and Tabarraei, 2010 and Jongwanich, 2010). Basing on the idea that a developed financial sector allows effective allocation of the external resources, we tried to specify the role played by financial development in the determination of capital flow's impact on the real effective exchange rate. To have more significant results and more robust conclusions, we chose to diversify the indicators of capital flows (FDI and NFA) and also the indicators of financial market development (private credits provided by banks and other financial institutions as a share of GDP, liquidity liabilities as a percentage of GDP and deposit money bank assets as a percent of GDP).

Basing on the cointegration techniques for 38developed and developing countries covering period 1989-2011, we tried firstly to check the hypothesis of nonstationnarity of variables by applying two tests of unit root in panel data suggested by Maddala and Wu (1999) and Pesaran (2007). The results showed that all variables are integrated in order one. Secondly, we showed that there is a long-term relationship between real effective exchange rate and explanatory variables, applying the cointegration test of Kao.

The application of the PMG estimator to an error correction model, which describes the behavior of REER according to capital flows and financial development, showed that a developed financial market can weaken

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the appreciation effect of capital flows on real effective exchange rate. Moreover, we calculated the threshold level of financial development which showed that from a certain level of financial sector development capital flows can have a depreciation effect on real effective exchange rate and this threshold level is very higher in developing countries than in developed countries.

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