Capital Account Liberalization and Economic Growth: GMM System Analysis

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Abstract

The aim of this paper is to determine the correlation between capital account liberalization and economic growth. We are particularly interested in a qualitative indicator to measure this process. Our empirical study was conducted on a sample of 60 developed and developing countries covering the period 1984 to 2007. Referring to the dynamic panel model, our econometric results reveal a direct correlation between the capital account liberalization and economic growth which can be either positive or negative due to the sample selection and the study period. This leads us to predict the capital account opening is a sine qua non for initiating economic growth.

Keywords: Capital account liberalization, Economic growth, Dynamic panel data

JEL Classification: F 36, G 15

1. Introduction

Since the work of McKinnon & Shaw (1973), the financial account liberalization appears as an intermediate step to leave the system of full control of capital and a starting point for the sustainable development of the economy. Several studies have shown that capital account liberalization affects economic development and financial development. Moreover the free movement of capital also contributes to the development of financial markets by attracting foreign direct investment and portfolio investment. Following advances in endogenous growth in the early 90s, new approaches supporting the interests of financial liberalization have emerged with the works of Harris et al (1992), King & Levine (1993) Quinn (1997)), Rodrik (1998), Eichengreen & Mussa (1998), Arteta, Eichengreen & Wyplosz (2001), Eichengreen & Leblang (2003), and those of Bekaert et al (2003, 2005).

These works seek to establish further theoretical basis justifying the implementation of the convertibility of capital account, and they have lead to the same conclusion: the capital account should be liberalized in a gradual and cautious manner to ensure its smooth functioning , increase financial savings, initiate productive and profitable investment, pushing innovation and technology transfer and support economic growth. These studies which corroborate the movement of foreign capital without restriction and control have a significant effect on economic growth.

The econometric methodology adopted in this paper is distinguished by the use of panel data. The addition of the individual dimension to the usual time dimension is of major interest for the analysis of chronological series. The recent progress of methods for estimating dynamic panels is indeed more powerful than their analogous on the individual chronological series. This tool helps to increase dramatically the sample size. Thus, our objective in this work is to test the correlation between capital account liberalization and economic growth based on a qualitative indicator of such a process. To do so, the second section of this paper will discuss the theoretical and empirical Interface capital account liberalization, economic growth. The econometric validation will be unveiled in the third section. Our findings will be the subject of the fourth section.

2. Capital account liberalization and economic growth: a synthesis of literature

The theory of openness to the outside by releasing the movement of foreign capital by Ricardo initiated and prolonged by Eichengreen, Henry, Eswar Prasad & Raghuram. Rajan and several others, has enabled developing countries to make *substantial benefits* and consequently, to achieve significant economies of scale and a reallocation of domestic resources, to increase the productivity of capital and labor factors, to acquire new technologies and to

access to economic growth. These countries have also experienced the risks in capital flight and financial imbalance. In this context, Quinn (1997) protects the idea that opening the capital account promotes the economic growth. This point of view was confirmed by Eichengreen & Mussa (1998) by asking "How should liberalization be scheduled and anticipated to ensure that the benefits dominate.

Chin and Ito (2002) developed the empirical relationship between the policy of capital controls and financial development based on bank loans and markets for stock exchanges of securities. Having conducted a review of literature of a much broader set of measures to liberalize capital account and financial development, both authors create a new openness indicator based on measures of exchange restrictions of the IMF, which incorporates the degree of intensity of capital control. The empirical results suggest that the rate of financial development, measured by private credit creation and activity of the stock market is linked to the existence of capital control

Kang-kook & Jayadev (2005) in a document that summarizes the research conducted by Jayadev (2003) and Lee (2003) on the consequences of capital account liberalization on growth by using different indices of liberalization to empirically validate these consequences , arrive to no evidence that liberalization has significant positive effects on growth even in the presence of preconditions typically offered. However, these authors found a persistent negative correlation between the free movement of capital and labor's share of national income, providing some support for the notion that the bargaining power of labor is reduced when capital is more mobile.

Klein (2007) demonstrates that the effects of long-term capital account convertibility on economic growth vary systematically across countries. Those with average incomes have a response statistically and economically significant to liberalization during the period 1976 to 1995. However, he finds no empirically significant effect of openness on growth for the case of poor or rich countries. The econometric study is based on three different indicators of liberalization of capital account: the first is qualitative, the second measures the change in the intensity of capital controls, and the third is relating to the release of the stock exchange of securities. These results are consistent with the situation where growth is rapid in countries with scarce capital but with good institutions by accessing most to international financial markets, while this effect is not confirmed for a country relatively rich in capital.

Peter Henry (2OO7) develops a neoclassical growth model to show the theoretical effect of liberalization. He concludes that it is not surprising to find no permanent positive effect of the liberalization of capital markets on growth. However, he finds indeed a transient positive effect, which increases the living standards permanently. Indeed, the opening can be a source of instability, hence the need to develop new types of contracts. Recently, Peter Henry & Diego Sasson (2008) show that following the stock market openness of developing countries to the flow of foreign capital, the rate of average annual growth of real wages in manufacturing increased permanently. Therefore the pre-liberalization period has seen an increased growth rate of labor productivity.

Neumann, Ron. Penler & Altin Tanku (2008) employ a model of variable coefficients in time in accordance with the coefficients of saving-retention model of Feldstein-Horioka, insofar as such coefficients measure the international mobility of capital. The empirical results suggest that the hypothesis of the stability of these coefficients is strongly rejected. On the one hand, the capital was perfectly mobile in a great period in Canada. On the other hand, capital mobility has never been high in the United States. The capital was more mobile in Japan and the United Kingdom in the late 20th century than in the period during and after the war. While it rose in Argentina, Italy and Sweden in the years around 1970. This diversification among countries allows us to draw the conclusion that the international mobility of capital for most countries was not considered monotonically increased during and after the war.

Hervé Boulhol (2009), by supporting the reforms of labor market s on OECD countries, confirms that the capital mobility without restriction reduces the rigidity of labor market and triggers a redistribution of resources. The regulation of labor market tends to sectoral specialization as well as enhancing the quality of hands and the positive rate of job creation. These results are corroborated by Aloi, Leite-monteiri & Lloyd-Braga (2009) through a study on the effect of international capital markets integration in a world where countries differ in their institutions of work market: Countries that have a labor market perfectly competitive while the other is unionized. These authors show that the workers affected by capital mobility would encourage self-sufficiency in the unionized country, and the contrary to the nonunionized one. They also show that, under capital mobility, an increase in the relative bargaining power of unions does not always improve the welfare of workers.

More recently, Bekaet, Harvey & Lundblad (2010) study the bond between financial liberalization (capital account and equity market) and the growth in two components, growth of authorized capital and growth of the total factor productivity. The econometric estimates of a probit-panel of 71 countries between 1980 and 2006 by the OLS by using a rough measurement of capital account liberalization of Quinn reveal that the financial opening affects all the two channels positively but has a greater impact on the productivity of factor than the investment

3. Econometric Study

In the light of the empirical work mentioned above which seek to explore the existence of a correlation between the process of capital account liberalization and economic performance, this section is about validating this relationship empirically on a panel of 60 countries over the period stretching from 1984 to 2003. To do this we first present the econometric model of the dynamic of growth originally proposed by Eichengreen & Leblang (2003), then we propose the method of estimating the dynamic panel model; The last part of this section will be devoted to empirical results and interpretations.

3.1 The model:

The model to be estimated is a model of dynamic growth originally proposed by Eichengreen & Leblang (2003), of general equation:

$$GROWTH_{it} = f[YPC; SEP; SES; CAL]$$

with i = {1,…., N} ; **t** = {1, …, T}

where GROWTH is the growth of real per capita GDP, while YPC: The log of income per capita, SEP is the log of the primary school enrolment rate, SES is the log of the secondary school enrolment rate, and CAL is our measure of capital account liberalization

3.2. The econometric estimation:

3.2.1 Sample and periods:

Our sample consists of 60 developed and developing countries classified into two groups, member countries of OECD and non OECD countries covering the period 1984-2003.The choice of this classification is explained by the common financial specification of the countries of this organization. Concerning the variable CAL, it is a qualitative indicator based on the index of capital account liberalization “SHARE” manufactured by Klein and Olivei (2008). To do so, we will use the information from the annual publications of "Exchange Arrangements and Exchange Restrictions of IMF (Note 1). From this information, our indicator is considered an indicating variable (dummy) which takes the value 0 if the country still imposes restrictions on its capital account, if the country began opening its capital account during the studied period, "Lib" is equal to the number of years when the control is raised to the total number of years of the study period (20 years for our study), if the economy makes a full liberalization of its account capital "Lib" is set to 1.

Appendix B shows that "Lib" takes into account the temporal dimension, for example, all countries for which (Lib84 = 0; Lib85 = 0.05; Lib86 = 0.1, etc ....) have opened their markets capital in 1984. Countries for which (Lib84 = 0; Lib85 = 0; Lib86 = 0.05; Lib87 = 0.1, etc...) have opened their capital markets in 1985, and so on.

In the general case "Lib" is the country's position in terms of capital account liberalization for the period 1984-2003. The regression covers 60 countries (N = 60 T = 20).

3.2.2 Estimation procedure

Beforehand, we recall that our model is characterized by the presence of a lagged endogenous variable among the set of explanatory variables. Two econometric methods were successively used to estimate dynamic panels: The first is estimation by least ordinary squares with specific effects such a method allows to control the heterogeneity of individuals or countries and therefore the structural and stable in time variables which might have been omitted. However, due to the presence of a lagged endogenous variable in our model the OLS do not allow us to obtain efficient estimators (Sevestre, 2002). This weakness in terms of efficiency of estimators brings us to present the second estimation method called generalized moments method (GMM) which appears as a magic tool for macro-economists because it allows the bringing forth of solutions to the problem of bias of simultaneity, reverse causality and omitted variables (Kpodar, 2007).

There are two variants of GMM estimators in dynamic panel, the GMM estimator in first difference and the GMM in system. The first manufactured initially by Arrelano and Bond (1993) consist in taking for each equation the first difference of the equation to be estimated in order to eliminate the specific effects of countries, and then use the values in a lagged level with one period at the most from the explanatory variables as instruments of these variables at the level of the equation in first difference. The second is based on the first and built by Blundell and Bond (1998). It consists in combining the equations in first difference with that at levels in which predetermined variables are instrumented in the first difference equation by their values at a delayed level by at least one period. However, these predetermined variables are instrumented by their first differences in the level equation (Note 2). Blundell and Bond (1998) showed using the Monte Carlo simulations that in the GMM system is more efficient than that of the first-difference since it gives biased results in finished samples when the instruments are weak. To test the validity

of lagged variables as instruments (Note 3), Arellano and Bond (1991), Arrelano and Bover (1995), Blundell and Bond (1997) suggest the over-identification test of Sargan / Hansen and the test of autocorrelation of Arrelano and Bond whose null hypothesis is the absence of autocorrelation of second order errors of the difference equation

3.3. Empirical Results

Full sample

Referring to the software STATA.10 (Note 4), to estimate our dynamic model via the command xtabond2 (Note 5) (Table 1) estimates in first difference coming from the total sample show a good dynamic model specification. Indeed, the test of over-identification of Hansen (p = 0,438) and of serial autocorrelation of order 2 between residues (0.647) do not reject the null hypothesis of validity of lagged variables in level and in difference as instruments and the hypothesis of absence of autocorrelation of the second order. We accept thus, the specification kept in the model and the validity of all the used instruments. The results also show that the high enrollment rates are beneficial for the economic growth resulting in a positive increase in the income per capita.

For the coefficient of variable of capital account liberalization is equal to (-0222) and is not significant at 5% (t =-0.42, p = -0,674) which corroborates the results of Kang-kook & Jayadev (2005) who do not find any significant and positive relationship of the openness on the growth. This result might be explained by the heterogeneity of the total sample which does not belong to the geographical membership or the groupings or the organizations of countries. This explains the classification of our sample into countries members of OECD and non OECD countries.

OECD Countries

The estimates of the growth model for 21 member countries of the OECD provide a coefficient value of the indicator of free movement of capital equal to 0909, it is significant and positive (p = 0.0047) which supports the hypothesis that capital account liberalization has a positive effect on economic growth. This result was confirmed by (Honig, 2008 and Mukerji (2008). The estimated coefficient of variable of economic development is statistically significant. The significant positivity of YPC means that the sign of this indicator of wealth is parallel with the impact of capital account opening on the rate of growth of GDP for a given country. On the other hand, the primary and secondary school enrolment rate respectively SEP and SES are statistically significant and positive (10,749 and 3780). This shows that the level of Education contributes to the economic growth in OECD countries. An increased rate of SEP by 10% leads to ten points of percentage of additional growth rate.

The Hansen test (p-value = 1) and the test of second-order autocorrelation of Arrelano and Bond (p= 0.2) accept the hypothesis of validity of the used instruments and the absence of autocorrelation of order 2 between residues respectively.

NON- OECD Countries

The estimates coming from the regression of this sub-sample confirm the results of Henry (2007) the negative impact of capital markets convertibility on economic performance. Indeed the estimated value of the coefficient "Lib" is equal to -2.008, it is significant at 5% (p-value = 0.000); Since this indicator represents the dates and location of countries in terms of capital account liberalization for the sub-sample used in this regression relating to 39 non-OECD countries which are mainly developing countries. The significant and negative results reflects a rapid and non gradual of capital account liberalization, which can slow economic growth (most countries in the sample have not experienced good performance during and after the completion of this process). The estimated coefficients for the variables of economic and human development are statistically significant with positive signs. These results reveal that human capital, measured by these two variables allows countries to take advantage of the opening of capital markets. This may be the result of the austerity policies pursued by these countries in particular developing countries to repay their debt. They must make efforts to improve quantitatively and qualitatively this factor in order to assimilate foreign technology and transfer it to the whole economy. For this regression the Hansen test of validity of the instruments is also significant (p-value = 1.000) as well as the test of second order autocorrelation AR (2) (p-value = 0.887) accept the hypothesis of the absence of autocorrelation of order 2 between residues.

Finally the coefficient of the lagged dependent variable is statistically significant, assuming a positive sign for the three regressions (0.2904124, 0.233997, 0.170867, respectively), which corroborates the findings of Eichengreen and Leblang (2002). This reflects that the economic growth recorded in any year depends positively from those of years past. This result indicates certain stability in the time of the dynamic of the growth of the countries and seems reasonable insofar as the dynamics are correlated with the international and domestic situation;

4. Concluding Remarks

This paper seeks to understand the role played by capital account opening in the initiation of economic growth. However, a review of the literature reveals a direct correlation between the capital account liberalization and

economic growth. This correlation can be positive or negative. In fact the diversification of results is due to the sample selection and study period. To do so our empirical investigation is based firstly on the use of a qualitative indicator reflecting the position of the country and its progress after enact and adopt a policy of capital markets convertibility and secondly on a methodology pressed on the econometrics of panel data. Thus we have used an estimation technique that is the most frequently used literature which is namely: the GMM-system founded by Blundell and Blond (1998).Our sample is divided into member and non-member countries of OECD so as to take account of the financial specificities and the development level of the countries.

The empirical results relating to this distribution place us with the studies demonstrating the significant effect of capital account liberalization on growth. Indeed, the regression coming from the member countries of the OECD indicates that this process fosters growth. Thus, these countries have experienced good performance since they have well managed the risk of capital flight. Unlike the regression of sub-sample of non-OECD countries which give a negative value to the coefficient "Lib". This result gives the intension that the country must carry out the politic of opening in a gradual and prudent way. These countries, which are mostly developing countries, have known economic and financial crises during the post-opening period.

Finally, and at the level of the econometric model, the significance of the endogenous delayed variable and all the explicative variables in all three regressions, leads us to conclude that a growth model in panel data captures better the dynamic specification.

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Notes

Note 1. Appropriate information is at the level of line E2 of the table of "Exchange Arrangements and Exchange

Restrictions; E2: restrictions on payments for capital transactions.

Note 2. (Arellano et Bover, 1995) prove that the predetermined and endogenous variables are instrumented by their lagged first differences the most recent with one period. Because of this fact the use of other lagged first differences would engender a redundancy of the conditions of the moment.

Note 3. The choice of lagged variables as instruments is not arbitrary, it differs depending on the nature of explanatory variables:

*The exogenous variables are instrumented by their current values

*The predetermined variables or weakly exogenous are instrumented by their lagged values of at least one period;

*For the endogenous variables, only variables delayed by at least two periods can be valid instruments (Arrelano and Brover, 1995)

Note 4. Only the GMM estimator is programmed on STATA under the command xtabond, however this command does not consider that the dynamic model (the lagged endogenous variable is included as an explanatory variable). The command xtabond2 available on the Internet offers a more attractive alternative. It allows the estimation of dynamic and non-dynamic models as well as with the GMM-system

Note 5. The command xtabond2 postpones by default the statistics of the test of Sargan / Hansen tests and those of auto correlation of the first and second order.

Table 1. CAL and Economic Growth, GMM system Estimation

	Full sample		**OECD countries**		**NON-OECD countries**	
	coefficient	Std. error	coefficient	Std. error	coefficient	Std. error
GROWTH	0.2904	0.0690	0.2339	0.0279	0.1708	0.0093
Growth (-1)	1.2826	0. 6184	-1.5918	0.2646	-1.1976	0.1867
YPC	-6.7508	3.3582	10.7496	6.0388	2.0707	3.5774
SEP	-4.8707	2.4934	-3.7807	1.0296	1.9481	1.3027
SES	-0.2229	0.5276	0.9093	0.3200	-2.0086	0.3694
CAL						
Number of instruments	61		60		61	
Number of observations	1140		399		741	
Number of country	60		21		39	
Fisher test : Prob>F(5.38)	0.0000		0.172		0.007	
Hansen test :Prob> $\chi^2_{(55)}$	0.4380		1.0000		1.0000	
Arellano-Bond test for AR(2)*:prob>z		0.6470	0.200			0.887

This test follows the N(0.1)/H_0

Appendix A: Data Definitions and Sources

Variable	Description	Sources
Growth	In this work we look at growth rates of gross domestic product per capita that is generally used to measure the growth of living standards. According to the economic literature this variable is given by the formula: $$g_{PIBh} = \frac{PIBh_t - PIBh_{t-1}}{PIBh_{t-1}}$$	*World development indicators CD-ROM (2008)*
YPC	The "income per capita" is often used as an indicator of wealth, especially between different countries. It is defined as total personal income for the year divided by the total population for this country. This variable is constructed by dividing the item "Income payments (BOP, current U.S. $) on the total population of each country.	*World development indicators CD-ROM (2008)*
SEP	A measure of human capital For this variable we accept the item "School enrollment, primary (% gross) '	*World development indicators CD-ROM (2008)*
SES	Another measure of human capital. For this variable we accept the item "School enrollment, secondary (% gross)	*World development indicators CD-ROM (2008)*
CAL	The country's position in terms of liberalizing the capital account for the period 1984-2003	*Exchange Arrangements and Exchanges Restrictions of the IMF*

Appendix B: Relative data with the Lib indicator of CAL

Countries	Partial liberalization	Full liberalization
Algeria	1994	-
Argentina	1976-81/1982-91	1981-82/1991
Australia	1986	1995
Austria	1991	-
Bahrain	1986	1995
Bangladesh	1991-94	1994
Belgium	1986	1995
Bolivia	1986	1995
Brazil	1994-98	1990-94/1998
Canada	1986	1995
Chile	1977-78/1979-98	1998
Colombia	1991-98	1998
Costa Rica	1995	-
Denmark	1988	-
Ecuador	1988	-
Egypt, Arab Rep	1990-91	1991
France	1990	1999
Germany	1986	1995
Ghana(cca)*	-	-
Guatemala	1989	-
Honduras	1993	-
Hong Kong, China(tcal)**	-	1973
India	1991-94	1994
Indonesia	1979-88/1991	1988-91
Italy(1990)	1990	1999
Iran, Islamic Rep(cca)*	-	-
Ireland	1992	-
Israel	1977-79/1987	-
Japan	1986	-
Korea, Rep	1979-98	1998
Malaysia	1973	-
Mexico	1973-91	1991
Morocco	1990	-
Nepal	1990	-
Netherlands	1986	1998
New Zealand	1986	1995
Nicaragua(cca)	-	-
Niger	1995	-
Norway	1995	-
Panama	1986	1995
Paraguay	-	-
Philippines	1976	-
Peru	1973-87/1990-92	1992
Portugal	1993	-
Russian Federation	1986	-
Saudi Arabia	1986	1995
Singapore(tcal)**	1972-78	1978
South Africa	1985	-
Spain	1994	1999
Sri Lanka	1978-94	1994
Sweden	1993	-
Thailand	1994-98	1998
Trinidad and Tobago	1994	-
Tunisia	1993	-
Turkey	1984	1990
United Kingdom	1986	1995
United States	1986	1995
Uruguay	1992	-
Venezuela, RB	1983-96	1973-83/1996
Zimbabwe	-	1994

Source: *Exchange Arrangements and Exchanges Restrictions* of IMF

* *The country still imposes restrictions on the movement of capital*

***The country starts with a full capital account liberalization*

Sub-sample relative to OECD countries
Australia
Austria
Belgium
Canada
Denmark
France
Germany
Italy
Ireland
Japan
Korea, Rep
Mexico
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Turkey
United Kingdom
United States

Sub-sample relative to NON-OECD countries
Algeria
Argentina
Bahrain
Bangladesh
Bolivia
Brazil
Chile
Colombia
Costa Rica
Ecuador
Egypt, Arab Rep
Ghana(cca)
Guatemala
Honduras
Hong Kong, China(tcal)
India
Indonesia
Iran, Islamic Rep(cca)
Israel
Malaysia
Morocco
Nepal
Nicaragua(cca)
Niger
Panama
Paraguay
Philippines
Peru
Russian Federation
Saudi Arabia
Singapore(tcal)
South Africa
Sri Lanka
Thailand
Trinidad and Tobago
Tunisia
Uruguay
Venezuela, RB
Zimbabwe

Appendix C: Syntax used to obtain estimates of GMM system

« **xtabond2 growth l.growth ypc sep ses lib, robust small iv(sep ses) gmm(l.growth ypc, lag(1 .) collapse) gmm(lib, lag(2 .) collapse**) »

- l.growth: represents the level of initial GDP per capita;
- The order xtabond2 and options are entered on one line in the file do.
- The explanatory variables l.growth and ypc are supposed to be predetermined hence the option lag (1.)
- The variable "***Lib***" is assumed to be endogenous which justifies the option lag (2.) for these instruments.
- The option collapse is used to limit the bias through over-instrumentation, given that all the delays of the variables are used as instruments.