Financial integration, Volatility and crises

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Abstract

In this paper, we present the root cause of the American financial crisis in 2007. We show that financial integration and capital flow volatility is the factor that creates a climate conducive to the emergence of the crisis in the U.S.A. and led to its spread to the rest of the world. On the theoretical side, we show that capital flows to the United States in recent years had a pro-cyclical character. We show also that this behavior was the root cause of the crisis and even previous crises such as the Mexican crisis in 1994 and the Asian crisis in 1998. Empirically, we use recent panels data to show that financial integration can lead to financial crises by increasing the volatility of capital flows.

Resumen

En este trabajo presentamos la causa raíz de la crisis financiera estadounidense en 2007. Mostramos que la integración financiera y la volatilidad del flujos de capital es el factor que crea un clima propicio para el surgimiento de la crisis en los Estados Unidos y que condujo a su propagación al resto del mundo. En el aspecto teórico, mostramos que los flujos de capital a los Estados Unidos en los últimos años tenían un carácter procíclico. También demostramos que este comportamiento fue la causa de la crisis e incluso de otras anteriores tales como la crisis mexicana de 1994 y la crisis asiática de 1998. Empíricamente, utilizamos los datos recientes de paneles para demostrar que la integración financiera puede llevar a crisis financieras mediante el aumento de la volatilidad de los flujos de capital.

1.- Introduction

During the last decade, the deregulation and liberalization of international capital flows resulted in a considerable development of financial markets. New opportunities have been offered to lenders as well as borrowers thanks to the integration of financial markets and the emergence of new financial instruments. We are witnessing an increasingly rapid flow of international capitals, along with a remarkable shift in their composition towards portfolio investments. These international flows were often volatile and characterized by procyclical nature.

We assume that this increasing integration of financial markets as well as the permanent volatility of capital flows is the main cause of the financial crisis that hit the United States in 2007. We believe that the capital account liberalization has not only encouraged speculative flows characterized by a procyclical behavior, resulting in an overheating period followed by a phase of regression, but has also resulted in the crisis spreading throughout the rest of the world.

We also assume that capital flow volatility and, in particular, the pro-cyclicality of Cross-border flows are the main causes of previous financial crises which hit both developed and developing countries. Examples of such crises are what happened in Mexico in 1994, in Asia in 1998, in Russia in 1998 and the 2007-2009 subprime crisis in the United States.

The first section of this paper will be dedicated to the pro-cyclical nature of foreign capital flows which has been considerably reinforced following the financial integration. In the second section, we will deal with the relation between the financial integration, the pro-cyclicality of capital flows and the outbreak of financial crises. In the third section, we will prove that financial openness is always accompanied by volatile capital flows. As for the fourth section, it will show that volatility of cross-border flows causes an economic repression. The final section suggests some measures to reduce this growing volatility of capital flows.

2.- Capital flow volatility

Several studies show that short-term capital inflows have proved to be pro-cyclical. For instance, a recent study conducted by the World Bank, based on a representative sample of 33 developing countries during the period of 1986-1994, found that such flows rise during periods of high economic growth and decrease during periods of low economic growth   Agénor (2002).

In 1996, 5 Asian countries – Indonesia, Malaysia, Philippines, South Korea and Thailand – received around 93 billion dollars of private net capital flows. In 1997, at the beginning of the Thai baht crisis and its contagion effects, they registered a reversal of $105 billion (the majority of which during the second half of 1997) which was equivalent to about 10 % of their aggregate GDP. Three of these 5 countries (Indonesia, South Korea and Thailand) experienced a deep recession and high rates of joblessness Agénor (2000).

There is evidence from the United States during the 2000's that this phenomenon is not limited to developing countries, and can even affect developed ones. In the United States, foreign capitals were behind 93% of the hyperconsumption which occurred during the 2000's Lim (2008). Investors enabling American households and the government to keep their consumption habits are essentially the Asian countries, (Mainly Japan and China) which place their trade surpluses as treasury bonds and bills issued by financial bodies, as well as all the globe's savers investing their savings in the United States.

Developing countries hold a surprisingly significant proportion of the U.S. debts. At the end of 2004, the value of all the developing countries' foreign reserves amounted to 1592 billion dollars (Jeffrey et al., 2005). Around 70% of these reserves are invested in U.S. dollar-denominated assets, either in the United States or in Euro-dollar markets (Toussaint, 2005). 50 % of these reserves (the equivalent of $775 billion) belonged to Eastern Asia at the end of 2004, and around 80% are held by China. The figures of 2006 show that the U.S public debt (excluding intra-governmental debt) is estimated at $5000 billion, 44% of which ($2200 billion) is financed by foreigners, and 64% of these 2200 billion are held by Foreign Central Banks. Countries holding a large part of the U.S. public debt are Japan ($612 billion) and China ($420 billion). Also, the private sector depends on external financial resources; 27% of the amount of bonds issued by enterprises in 2006 is financed by the rest of the world.

The strong mobilization of foreign capital flows toward the United States accompanied the expansion phase which preceded the U.S crisis. One of the reasons behind cross-border capital flows is the U.S current deficit which reached very high levels at the early 2000's. When the 2007 subprime crisis occurred , a large part of these capital flows has been reversed as shown in the figure below. This capital flow pro-cylicality observed during the 2000's also affected other developed countries. The next figure shows the pro-cyclical nature of these capital flows towards developed countries, where the increase of foreign investments, mainly in the United States, was accompanied by an economic expansion phase, preceding the crisis.
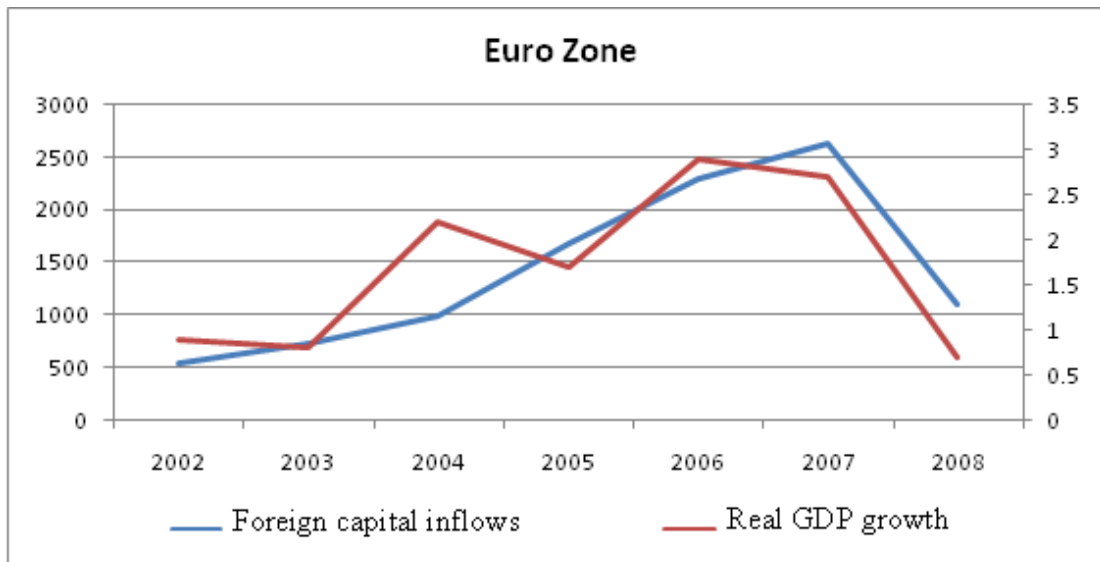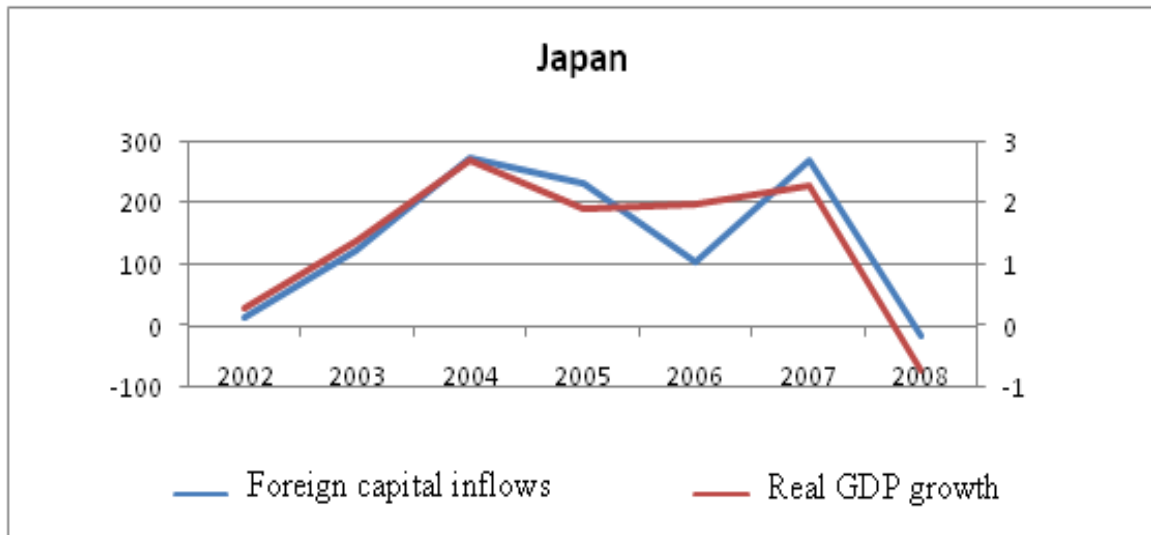
Figure 1 : Evolution of foreign capital inflows and of economic growth in developed countries[2]
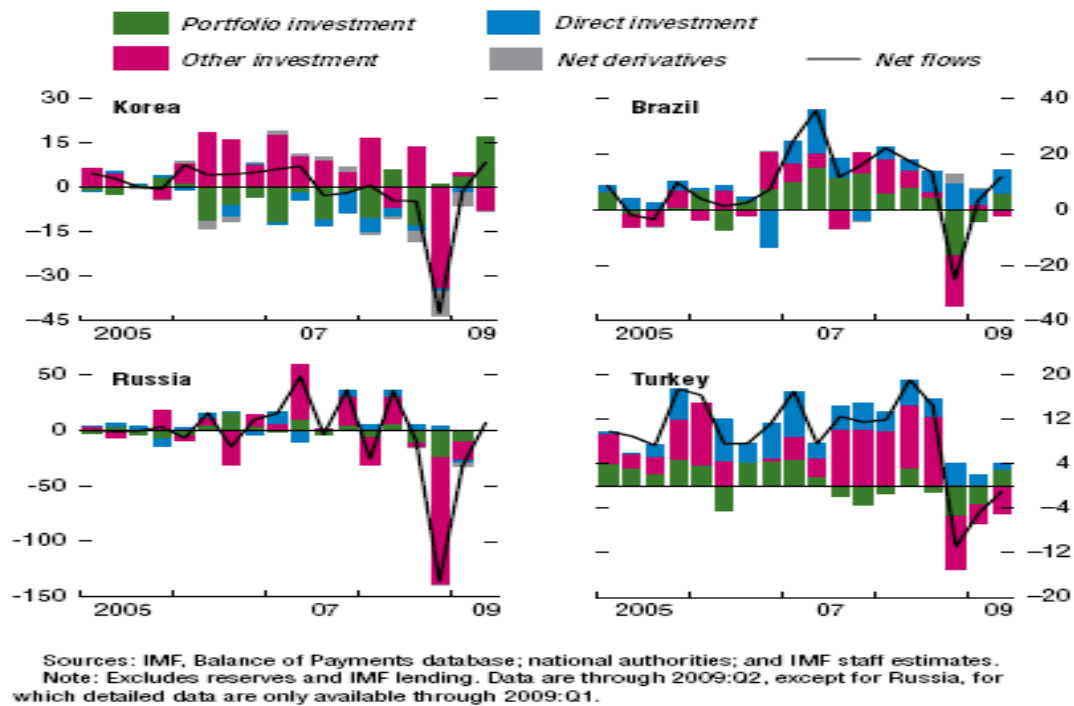

United States

Great Britain

Sources: Calculations based on IMF statistics (WEO (2009))

The above figures clearly show the pro-cyclical nature of capital flows towards developing countries. The U.S. subprime crisis was preceded by a macroeconomic stability at the international level, which led to a quick expansion of the economic activity. Indeed, the international economic scene was marked by a general decline owing to, among others, anti-inflationary policies adopted in industrialized countries as well as the emerging economies' rapid development, in a context of globalization, resulting in a real decrease in the price of manufactured goods. The remarkable stability which characterized developed countries' economies, including the U.S. economy, represented a favorable ground for the increase of liquidity and profitable investment opportunities.

At the same time, disinflation was accompanied by a decrease in long-term interest rates, which were kept at a low level thanks to the abundance of capital flows emanating from emerging

countries towards developed ones. After the crisis, developed countries knew a sudden deceleration in net capital inflows. As shown in the figures below, this effect spread to emerging countries which sometimes suffered foreign-capital flight, too, highliting the pro-cyclical nature of foreign capital flows.

Figure 2: Capital flow volatility in emerging countries

Sources: IMF, Balance of Payments database; national authorities; and IMF staff estimates.
Note: Excludes reserves and IMF lending. Data are through 2009:Q2, except for Russia, for which detailed data are only available through 2009:Q1.

3.- Financial integration, capital flow volatility and growth: Theoretical analysis

3a) Financial integartion and capital flow integartion

Studies made on the 90's crises such as Sachs, Tornell and Velasco (1996) show that crises were preceded by excessive capital inflows which, in turn, encourage a large expansion of domestic credit and speculative bubbles in financial markets. Other studies such as Kaminsky and Reinhart (1999) and Demirguc-Kunt and Detragiache (1999) show that these financial crises were preceded by financial liberalization.

3b) Capital flow volatility and growth

Capital flow volatility has a negative impact on host economies**.** This makes access to international markets of capitals for these countries asymmetric, i.e. these countries can benefit from the financial integration only during expansion periods. During periods of recession, they cannot get loans from abroad. These countries will not be able to keep their constant level of consumption and may sometimes suffer a macroeconomic volatility.

During periods of economic expansion, short-term capital inflowS can push consumption and expenditure to unsustainable levels and compel the government to over-adjust economy in case of unexpected reversal of capital flows. This phenomenon, was well observed in Latin American countries and countries of South-East Asia during the 90's and The United States during the 2000's. During the initial phase, which was marked by economic growth, the economy witnessed significant foreign capital inflows attracted by the opportunities that it provides. In Mexico, and later in Brazil, these flows contributed to financing government's deficits and consumption. In Asia, however, foreign funds supported the already increasing domestic savings, causing, thanks to the domestic credit dynamism, a significant increase in investment rates.

In the south-east Asia , investment rates and the annual growth rates of credits exceed 30% and 15% respectively, before the outbreak of the 1998 crisis. The result of this is the creation of speculative bubbles and an increase in asset prices. In this situation, and in the presence of a fixed exchange rate regime, local banks were unable to increase their interest rates to stop the domestic demand for fear of attracting additional external capital flows.

In the United States, this flow of fresh money contributed to the creation of the U.S. housing bubble. High levels of liquidity encouraged the American banks to recklessly grant loans that were used to finance investments in immovable property. This behavior led to a significant rise in prices. In addition, loans were not secured on borrowers' wages, but on an anticipation of the increased value of assets acquired with borrowed money. This mechanism has naturally led to some excesses. Banks not only granted loans to insolvent households (the famous subprimes) but also backed loans for consumption on the rise in the value of assets. In fact, what is described today as "subprimes" were only possible due to entirely irrational belief amongst the banking community, that the value of immovable property would keep increasing uninterruptedly, and that the American economy would be always able to channel towards it more capitals to support the rise in prices. Also, the system was doomed to explode once the prices would start to fall.

During the second phase, known as the decline phase, some negative signs were detected: the increase in consumption and demand widens the current deficit, growth deceleration, the asset price bubbles, the high stock of exchange reserves makes it possible to maintain investors'

confidence in the domestic economy. Over time, the situation becomes more critical while investors react through reducing loans maturities and adopting greater selectivity. The situation remains as such until a shock occurs (political event, late awareness of the seriousness of the situation, collapse of house prices, contagion effect…) which triggers the crisis. The sudden interruption of external financing and massive capital outflow observed during the recent crises cause liquidity drying up and bankruptcy of several financial institutions. The drop in international funding during and after the crisis also contributes to reinforcing and extending the adjustment period. Thus, it will be impossible to revive exports and restart economic activity while capitals and credits financing and reviving production of exportable goods are not available.

Countries of south-east Asia have suffered from the decrease in capital flows during and after the crisis: These countries couldn't avoid the decline of exports. Brazilian exports have also been affected by the drop in external funding since the strong depreciation of the Real. It took 9 months to detect the first signs of the recovery of Brazilian exports Icard (1999). The dramatic fall in asset prices during the crisis contributed to extending and aggravating the adjustment phase. In most Asiatic countries affected by the crisis, the price in dollar of assets decreased at the beginning of September 1998 by about 50 % of their highs of 1997   Icard(1999).

In the United States, the bankruptcy of banking institutions, in particular, Lehman Brothers, the fourth U.S. investment bank, on September, 15, 2008, caused a liquidity drying up and a confidence crisis that affected the international financial market. Credit institutions expressed concerns and refused to grant loans to other financial institutions or corporations. Banks which accepted to give loans imposed high interest rates to cover the credit risk. There was no money in circulation and the economy started to suffer.

The crisis quickly went beyond the financial sector to reach the real economy. The Bankruptcy of both households and corporates as well as the losses registered in the stock exchange markets, had a perceptible bad impact on jobs and revenues in the United States. In addition, the liquidity crisis affecting the United States, then, very quickly, the entire world, reached the economic actors in each country of the world.

By exacerbating the position of both developed and developing countries through its impact on the economic cycle of indebted countries, and through additional depressive effect exerted during the adjustment phase, volatility of cross-border capital flows represents one of the causes of the crises that hit several countries in recent years.

4.- Financial integration and capital flow volatility: an empirical analysis

Theoretical studies as well as facts established in several developed and developing countries show that the financial integration is usually accompanied by a strong volatility of capital flows, mainly due to the pro-cyclical nature of cross-border flows. In this section, we will try to check this relation between the financial integration and capital flow volatility using panel data. In what follows, we present the model used later in our study, as well as the theoretical relationship between control variables and the macroeconomic variable. Then, we present the econometric methodology and results.

4a) The Model

The selected model relates a measure of capital flows to an indicator of international financial integration and control variables such as inflation rate, the real income per capita and financial development. The economic theory suggests that these variables can affect financial flow volatility. Capital flow volatility (VOL) , is measured by the standard deviation of capital inflows (sum of foreign direct investments and portfolio investments, to GDP). The indicator of international financial integration (LIB) is equal to the sum of capital inflows and outflows (FDI and portfolio investment) to GDP. The real per capita income (REV) is measured by the logarithm of real GDP per capita of 1980 . This variable is measured as an indicator of economic development and the quality of institutions[3]. All theoretical studies state that good measures of prudential supervision and regulation should reduce the vulnerability of banks to an unexpected reversal of capital flows and avoid a massive capital outflow.

The expected sign of this indicator is, therefore, negative. The financial development is equal to the credit ratio in private sector to GDP. Capital flow volatility is characterized by an unexpected stop of capital inflows. This leads to a significant reduction in financial resources that finance growth and development. The impact of unexpected reversal of capital inflows on the financial sector should certainly depend on its ability to manage the adverse effects of capital outflows, and consequently, on the degree of financial development before impact. For example, the bank can reduce the damage may affect its assets after rising interest rates due to massive capital outflows if it has a good quality-loan portfolio frome the outset . This means that the majority

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[3]We assume that in countries with a real per capita income relatively high, the institutions are sufficiently developed. In other words, the higher real income per capita, the more institutions are developed.

of bank customers should be able to generate the necessary liquidity in order to settle their obligations when due, which means that the ratio of non-performing loans to total loans is low. Similarly, the effect of the depreciation of the national currency on the bank's balance sheet will be weak if it hedges against currency risk.

Good banking institutions must gain the confidence of their customers. Customers who trust their banks will not withdraw their funds from banks if unfavorable financial conditions occur at the international level. The presence of a sound financial system reduces the risk aversion of foreign investors and, consequently, the risk of capital flight.

The inflation rate (INF) is an indicator of macroeconomic instability. Evidence from developing and developed countries show that capital outflow is often preceded by a price rise phase . An increase in inflation rises the real exchange rate. An over-valued exchange rate increases the fear of national currency depreciation in the future, which may lead to a decline in assets held by foreign investors. To avoid loss of wealth, foreign investors decide to acquire their funds and buy assets abroad, resulting in a reversal of capital flows.

4b) Methodology

Problems of heteroscedasticity and correlation led us to estimate the growth model by the method of generalized least squares (GLS). We conducted the first specification tests of Breusch and Pagan (1980) and Hausman (1978). Whenever we have estimated the model, we tested the hypotheses of homoskedasticity and correlation. However, we still found the presence of heteroscedasticity and sometimes problems of correlation and / or autocorrelation. Thus, we were led to estimate the model using the GLS method using the xtgls Stata command.

4c) Econometric results

Our analysis covers a sample of 21 industrialized and developing countries[4]. The study period is 1980 - 2010. Data are collected from FMI's « International Financial Statistics » and « World Economic Outlook Database » , and World Bank's « World Development Indicators ». Estimation of the model using the MCG method gives the following result :

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[4]Our sample includes: Canada, France, Japan, Great Britain, theUnited States, Italy, Germany, Spain, Sweden, Indonesia, Thailand, Korea, Philippines, China, Singapore, Argentina, Brazil, exico,Colombia, Venezuela and Chile.

$$\text{VOL} = 2.867 + 2.453 \text{ LIB} + 0.632 \text{ INF} - 5.221 \text{ CREDIT} - 3.534 \text{ REV} \qquad (1)$$
$$(1.45) \quad (7.94) \qquad (6.54) \qquad (-3.35) \qquad (-6.41)$$

We note that all control variables have significant   coefficients and expected signs. This result confirms the   theoretical   assumptions in   this   framework. The indicator of   financial integration has a   significantly positive coefficient. This means that liberalization increases   the volatility   of capital flows. This result confirms our   basic   idea that financial   openness may increase the volatility of capital flows through encouraging inflows which are often pro-cyclical.

The results obtained also suggest that neither developed nor developing countries can escape the pro-cyclical nature of capital flows if it liberalizes the capital account. In what follows, we examine whether this pro-cyclicality may have a negative effect on economic growth.

5.- Effect of pro-cyclicality of capital flows on economic growth

In this section we consider the relationship between the pro-cyclicality   of capital flows and economic growth. In what follows, an outline **is** provided of the model to be estimated and then, we will present the econometric results.

5a) Economic Growth Model

The economic growth model expresses the logarithm of the rate of economic   growth based on an indicator of pro-cyclicality of capital flows, and of control variables such as rates of population growth, the   initial school   enrolment   rates, the initial   real   income per capita[5] and   the rate of investment. Economic theory suggests that these variables can affect the rate of growth.

Procyclicality indicator of capital flows (FLOW) is equal to the sum of capital inflows (foreign direct investment and portfolio   investment) to GDP. The initial real   per   capita   income(REV) , is measured by the logarithm of real gross domestic product per capita in 1980.The introduction of this   variable in the growth   model makes   it   possible   to   test the   conditional   convergence theory. According to this theory, countries with initially a low real income per capita which is far from their steady-state equilibrium**,** tend to grow faster than countries that are close   to their

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[5] These control variables are used in most growth models using data from a *cross* section of countries. They are considered the main determinants of economic growth (Kraay 1998, p.2, Levine et al., 2002, p.9).

equilibrium state. This is due to decreasing rate of return which implies that additional unit of capital generates a much larger output when the initial capital stock is low. According to this condition, a higher capital stock implies that an additional production unit gives a much lower output Agenor (1999).

The initial school enrollment rate, (CAPH91) is equal to the logarithm of enrollment in secondary education in 1991[6]. This measure reflects the initial level of human capital. The endogenous growth theory suggests a positive relationship between human capital and economic growth. Studies by Barro (1991, 1997), Benhabib and Spiegel (1994) and various other researchers suggest that the initial level of education[7] is an important determinant of future growth. Therefore, countries with initially a stock of skilled human capital have a higher growth rate than regions with an unskilled workforce. Generally, a well-educated and trained labour force improves efficiency, increases the intensity with which existing technologies are used and makes technological advances Agénor (2000).

According to the theory of exogenous growth, population growth (POP) can undermine economic growth by impoverishing the economy, and the expected sign of this variable is negative.

The investment rate (INV) is the ratio of gross fixed capital formation to GDP. The expected sign of this variable is positive.

5b) Econometric Results

We use the same sample and the same estimation methodology used previously. The estimation results of the economic growth model are:

$$Y = 1.174 + 3.950 \text{ FLUX} - 0.602 \text{ REV} + 2.253 \text{ CAPH} + 4.191 \text{POP} + 0.631 \text{INV} \qquad (2)$$
$$(3.55) \quad (3.34) \qquad (-6.21) \qquad (2.25) \qquad (1.52) \qquad (5.66)$$

We note that the coefficient of initial real per capita income is significantly negative. This means that countries with initially a very small amount of capital grow faster than countries with

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[6] This rate **corresponds** to the proportion of in-school youth and whose age corresponds to the level of high school compared to the population of the same age. . This approximation has been used by several empirical studies, including Kraay (1998), Quinn (1997), etc.
We did not use school enrollment of 1980 given that the data for this variable are available for all countries of the sample until 1991.

[7] A proxy of human capital.

rich capital . The coefficient of population growth rate is not significant. This result suggests that growth in population has a little impact on economic growth. The indicator of human capital, CAPH, has a significant coefficient and an expected sign. This result suggests that economies with initially a high human capital grow faster than economies with initially less educated workforce . In addition, this result suggested that investment in education determines the future level of economic growth . The investment also has a positive and significant coefficient. This confirms the importance of this variable for growth.

The indicator of capital flow pro-cyclicality has a positive and significant coefficient. Massive cross-border inflows significantly increase economic growth during the expansion phase. However, a remarkable decline in such flows can cause a drop in growth during the recession. This result confirms our theoretical hypothesis stating that the pro-cyclical nature of capital flows can cause a deceleration in economic growth triggering, thus, an economic crisis.

6.- Solution proposed

With the modernization of financial services, which are now based on sophisticated and rapid communication systems, movements of financial assets have risen significantly. The volume of financial transactions at the international level has been growing exponentially over the past three decades, but this expansion relied, in large part, on speculative transactions. The flow of foreign capital now generate large volumes of foreign exchange transactions in foreign currency, much higher than the net volume of foreign capital actually used in the development of host economies Tobin (2000). However, capital movements, originating from foreign exchange transactions motivated by arbitrage opportunities can grow and even lead to speculative attacks leading to serious currency and liquidity crises , especially when the monetary authorities adopt a fixed exchange rate regime and seek to maintain the parity of their national currency.

The threat posed by the volatility of short-term capital on the economies of developing countries can be tackled in several ways. Chile has managed to put such a system of compulsory unpaid special reserves on certain types of short-term foreign capital that supply bank liabilities. This system allows the government to control the composition of bank deposit accounts and limit exposure to international currencies that can be traded for purely speculative reasons.

Then, the regulation of foreign capital inflows and outflows may take the form of a cross-border tax applied at national level. This system of taxation can be applied to either the capital inflows or outflows, or to both. The goal is to limit the negative externalities associated with capital movements, but the disadvantage of this system lies precisely in its inability to separate ex ante purely speculative capital flows from other types of flows dedicated to financing the economic activity.

This drawback can be solved by applying the tax on international financial transactions proposed by James Tobin (1978). Tobin suggested to implement a tax on all transactions that require conversion from one currency to another in order to temper the speculative behavior of operators and stimulate capital flows to finance long term, more stable and productive investments Zee (2000). It is a tax that does not distinguish between productive flows of speculative flows, but which prevents the movement of short-term foreign capital flows. Its principle is a priori easy to explain, it is to levy a tax of 0.1% to 0.2% on capital movements, which does not have great impact on long-term capital flows, but that may have negative impact on weekly transactions requiring currency conversions Tobin(2000). Despite its simplicity, the Tobin tax is often criticized because it requires to be an internationally agreed uniform tax, applied by each government over its own jurisdiction on all types of cross-border flows of investment. Certain foreign exchange transactions would , thus, be severely reprimanded while they are not related to capital inflows or outflows. The application of the Tobin tax also requires effective coordination at the international level to ensure equal treatment of financial transactions by all monetary authorities.

7.- Conclusion

This work shows that the volatility of capital flows is the main cause of the financial crisis that hit the U.S. in 2007. It also shows that financial integration is the factor that created the climate for the development and intensification of pro-cyclical speculative capital flows.

The reconciliation of the findings during the period preceding the crises which have affected developed countries, including the United States in 2007, and developing countries (Mexico in 1994, Russia in 1998, the countries of South East Asia 1998), shows that capital account liberalization may encourage and increase capital inflows that cause a phase of overheating, characterized by a strong increase in consumption and investment, soaring prices of financial assets and real estate, real appreciation of national currency and a widening current deficit, followed by a phase of repression characterized by bankruptcies of financial institutions, a prolonged decline in economic growth and a sharp decrease in exports.

These observations have been confirmed by the empirical analysis in this framework. The results of the econometric study conducted on a sample of 21 industrialized and developing countries over the 1980- 2010 period, show that financial integration may increase the volatility of capital flows and that the pro-cyclicality of financial flows may reduce economic growth.

This work does not involve financial integration. Instead we still believe that financial openness can stimulate economic growth in host countries provided it is well regulated: a strong attention should be paid to the flow of speculative capitals. It is in the interest of governments to control these flows and reduce their volume because of their destabilizing effect. . We suggest in this context to use the Tobin tax and to apply it at the international level.

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