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MASTER EN SCIENCES ÉCONOMIQUES

Financial Development, Financial Instability and Economie Growth

FITA YABANA, Florence

Award date:
2015

Awarding institution:
Universite de Namur

Link to publication

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Advanced Master in International and Development Economics

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Financial Development, Financial Instability and Economic Growth

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Project presented as part of the requirements for the award of the Advanced Master in International and Development Economics

Academic year 2014-2015

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Abstract

On the basis of data related to 133 countries collected from 1971 to 2010, and using various estimators [1] specific to cross sectional and panel data, we examined how financial development and financial instability affect economic growth. Explicitly, we investigated the relationship between financial deepening and real per capita Gross Domestic Product (GDP) growth rate as well as share of investment over GDP. Furthermore, we explored the effect of financial instability on the relationship finance-growth. Our cross section results suggest not only a growth enhancing effect of financial development, but also an investment-boosting effect. Financial instability as well as frequency of systemic banking crisis exerts a negative effect on economic growth. Our results proved also that financial instability does not influence significantly the link financial development-economic growth. Financial development, approximated by "private credit to GDP", tends to have a negative and significant effect on growth in the regression analysis applied to the panel data exhibiting the growth-depress of this indicator.

Keywords: Financial Development, Financial Volatility, Economic Growth, Investment, GMM

[1] Simple Ordinary Least Square (OLS), 2 Stage Least Square (2SLS), OLS with fixed effects, Linear dynamic Generalized Method of Moment (GMM)

Introduction

The process of economic growth can be financed by domestic or foreign resources. To avoid different external shocks, many countries focus on domestic financial resources as the main motor to finance country's development. To date, there is growing interest to the role of financial development – which is the well-functioning of the financial system (intermediaries and financial market) through financial intermediation, in particular services provided by financial intermediaries[2] (pooling savings, evaluating projects, managing risk, monitoring managers, and facilitating transactions) – (King and Levine 1993a) in the improvement of the economic development.

Worth notice, there is controversy about the nexus finance-growth among economists. This mainly relates to theoretical disagreements about the role of financial systems in economic growth. . Some authors suggest that financial institutions and markets enhance economic development (Levine 2005) while others are more sceptical about the role of financial system on further economic growth ((Levine (1997) mentions Anand Chandavarkar (1999) and Robert Lucas (1988)). For instance, Robinson (1952) argues that the financial system does not spur economic growth; it rather simply responds to development in the real sector. Despite the fact that disagreements do exist about the role of financial system in economic growth, the prevailing theoretical and empirical view between economists is that financial development is positively related to economic growth. Thereby, financial development seems to hold a very important role in the process of economic growth. The effect of financial development on economic growth can be done via many channels including the physical capital accumulation channel (investment) which is an important channel through which financial development affects economic growth.

Of note, finance is not just about stability (Čihák, et al. 2012). Global economic crises in the 20th century have made macroeconomic instability a key issue in the analysis of economic growth and development (Cariolle and Goujon 2013). Indeed, despite this possible positive finance-growth link, from a certain threshold, financial development can be costly for economic activity in term of financial instability –disturbance in the functioning of financial system for example when the system is not able to collect effectively funds to sponsor productive investments – because of the fact that financial development can generate financial

[2] Financial institutions (banks, life insurance, non-life insurance, pension funds, investment funds…)

instability. The latter being harmful to the real economy. Financial instability could affect not only economic growth, but also the link between financial development and economic activity.

Financial development seems to have direct and positive effect on growth, but also indirect and negative effect via financial instability. This study addresses two fundamental issues:

- Is financial development an engine of real per capita GDP growth and investment? How domestic financial system could raise domestic savings and improve the quantity and quality of investment, important motor of sustainable economic growth?
- How financial instability affects economic growth and investment? Precisely, how financial development affects economic growth and investment, taking into account financial instability?

The study is organized around six parts. After the first and second parts dedicated to the definition and literature review, we present our data and highlight some descriptive statistics in the third part. In the fourth and fifth parts, we proceed to the empirical analysis. Before drawing conclusions, the sixth part is dedicated to the sensitivity analyses in order to check the robustness of the results obtained.

1. Concept of financial development and financial instability

This section defines some concepts. Specifically, it focuses on the concepts of intermediation, financial development and financial instability.

1.1. Financial systems: concept of intermediation

Financial system is a multidimensional and complex concept. It is composed by two main parts: financial institutions (also called financial intermediaries) and financial markets. Thus, there are institutional-based financial and market-based financial systems. Financial intermediaries are composed of monetary financial institutions (such as commercial bank, saving bank) and non-monetary financial institution (such as pension funds, mutual funds, life and non-life insurance…) while financial market system is composed of money market and capital market (stock market and bond market). Financial institutions as well as financial markets interact with ultimate savers (or lenders) and ultimate borrowers (spenders, investors) and produce a set of services which facilitate the transformation of liabilities (deposits of lenders) into assets (loans to borrowers). This process of facilitating the transformation of liabilities into assets is called intermediation. Financial intermediation is seen as the extent to which financial institutions (banks) bring deficit spending units (investors) and surplus spending units (savers) together (Ndebbio 2004). Intermediation through financial institution is referred to indirect financial intermediation as opposed to direct financial intermediation which occurs through financial market.

Levine (2005) presents five functions of financial systems: (a) mobilizing and pooling savings; (b) facilitating the trading, diversification, and management of risk; (c) producing information ex ante about possible investments and allocating capital; (d) monitoring investments and exerting corporate governance after providing finance; and (e) easing the exchange of goods, services, and financial instrument.

These functions are normally provided by all financial systems (especially those in developed countries), but the matter is how well each country's financial system perform these functions. This introduces the concept of financial development.

1.2. Financial development

Financial development can be defined as a well-functioning of the financial system through direct and indirect intermediation. Specially, the well-functioning of the Levine's financial systems functions.

Financial development is not just the development of the banking sector, but the overall development of the financial system: banking sector, non-banking sector and financial markets. The services provided by financial institutions and financial markets are complementary and should be developed simultaneously for a better effect of financial system on real activity. When speaking of financial development, it is important to think about supply side (liabilities) and demand side (assets). If the increase of supply of financial assets is small, it means that financial deepening in the economy is not able to finance the demand side (credit to private sector to GDP for example) and this economy is most likely to be shallow; but if supply is big (deposit money bank assets to GDP for example), it means that financial deepening is likely to finance demand and likely to be high. Developed economies are generally characterized by high financial deepening. In contrast, developing economies are mostly characterized by low financial system. In this sense, financial development means an increase in the supply of financial assets in the economy and the well redistribution of this higher level of available funds in the demands side.

1.3. Financial instability

Financial instability is commonly associated to the notion of disequilibrium. Basically, financial instability is a multidimensional phenomenon that occurs as result of the imbalance of financial system which fails to perform his basic function of intermediation. It affects countries differently according to many factors such as quality of institutions and bank environment among others. Developing countries being more vulnerable to financial shocks than developed countries.

There is a large spectrum of indicators used to capture instability/volatility of macroeconomics variables:

- Standard deviation from the growth of the financial development variable (Loayza and Rancière 2005);
- Standard deviation from the residual of financial development indicator regress on it lagged value with a time trend (AR (1) process with a trend) (Guillaumont and Kangni 2006).

2. Link financial development, financial instability to economic growth

The literature on the link between finance and economic development is large and old. Theoretical approach to finance and growth mentions two channels through which financial development affects "real sector": capital accumulation and technological innovation. (Levine 1997). Indeed, markets frictions (informations costs and transactions costs) stimulated the emergence of financial markets and intermediaries. Each Levine's financial system function may affect economic growth through either capital accumulation, either technological innovation.

Empirically, the relationship has been initially developed by the pioneering works of Schumpeter (1912) who asserted the importance of **financial intermediary services** to **innovation and growth** and concluded the positive impact of financial intermediary development on economic growth. The causal relationship between financial development and economic activity is ambiguous. When focusing on the effects of financial development on economic growth, the literature may be classified into three different schools of thought corresponding to the different results:

i. Financial development fosters economic growth: positive effect of financial development on growth;
ii. Financial development dampens economic growth: negative effect of financial development on growth;
iii. Financial development does not matter: no effect of financial development on economic activity.

In this sense, this section is divided in three sub-sections. The first sub-section presents the papers exploring the determinants of economic growth in a cross countries. The second sub-section concentrates on the link between finance and growth. In the last part, the literature finance-growth including financial instability is reviewed.

2.1. Determinants of economic growth: cross-countries traditional studies of growth

In the last decades, many studies examined the determinants of long run economic growth and investment using cross sectional analysis and having to understand the causes of the income gap between rich and poor countries. Among these studies, we focus on three in particular

among others: Robert J. Barro (1991), Levine and Renelt (1992), finally Easterly and Levine (1997).

The first author used a large number of explanatory variables: (1) initial human capital proxy 1960 school enrolment rate (*result*: positive relationship both with the growth rate of real per capita GDP and the share of physical investment to GDP) (2) initial level of real GDP per capita (*result*: significantly and negatively related to both growth rate of real GDP per capita and ratio of investment to GDP). Indeed, using the Barro words, in neoclassical growth models, a country's per capita growth rate tends to be inversely related to its starting level of income per person. The coefficient estimated of the starting level of income per person capture the so called convergence effect. Thus, ceteris paribus, in theory, a poor country tends to grow faster than rich country. (3) Share of government consumption to GDP (*result*: negative association with GDP growth per capita and investment) (4) political instability (5) Economic system (6) markets distortions.

The second paper (Levine and Renelt 1992) does not aim to estimate a structural growth model or identifies the determinants of growth. It is a pure sensitivity analysis of the past papers. Indeed, the authors examine whether, the conclusion from existing studies on the determinants of economic growth, are robust (or fragile) to small changes in the conditioning set. How much confidence should we have in the conclusion of cross countries growth regressions? By systematically controlling for other variables influencing long run growth, the authors used an Extreme-Bounds Analysis (EBA[3] -linear Ordinary Least Squares-) to test the robustness of coefficients estimated in the cross countries growth regression. They found that a large number of economic indicators are weakly and not robustly correlated with growth and investment. Three variables found to be robustly correlated with growth rate of real per capita GDP: initial secondary school enrolment (positive correlation), share of investment in GDP (positive correlation) and starting GDP per capita (negative correlation). This latter result is in accordance with the result found by Barro (1991) relating to convergence effect. The population growth variable is not robust in the growth regression. There exists also a positive and robust correlation between share of investment and share of trade to GDP.

In their contribution, Easterly and Levine (1994) identified for the right hand side of the cross-country growth regressions explanatory variables such as financial development, logarithm of initial income, educational attainment, black market premium, degree of openness (ratio of

[3] The complete methodology is described in Levine and Renelt (1992)

exports plus imports to GDP), inflation rate and finally government fiscal deficit. Their results are in line with the previous cross countries paper.

2.2. Financial development and long run economic growth

Since the famous work of Schumpeter (1912), many economists question if finance really matters in the economic development process and if Schumpeter might be right. In this section, we present successively some of their papers that argued in favor of Schumpeter's view. Also we present some papers using more recent data, in order to capture the new literature on the finance-growth relationship.

a) Traditional literature: data before 2000

"The level of a country's financial development helps predict its rate of economic growth for the following 10 to 30 years" (King and Levine 1993a). Using a cross sectional analysis (both purely and pooled -average) about 80 countries on the period 1960-1989, systematically control for other variables influencing long term growth, King and Levine (1993), investigate whether higher levels of financial development are significantly and robustly correlated with faster current and later rates of economic growth, physical capital accumulation, and economic efficiency improvements (productivity growth). To measure more precisely functioning of financial system and to maximize information about financial development, they constructed four indicators of financial development: (a) Ratio of liquid liabilities to GDP which measures the size of the formal financial intermediary sector to GDP; (b) Ratio of bank credit divided by bank credit plus central bank domestic assets which assess the importance of commercial banks relative to the central bank; (c) Credit given to nonfinancial private enterprises divided by total credit (excluding credit to banks);and (d) Credit given to nonfinancial private enterprises divided by GDP. They also measured economic growth by three indicators: (a) Real per capita GDP growth rate; (b) Rate of physical capital accumulation; (c) Total productivity growth. Control variables used include: initial income, initial secondary school enrollment rate, ratio of government expenditures to GDP, inflation rate, ratio of exports plus imports to GDP and political stability. While conducting their researchers, they found that financial development is positively and strongly associated with economic growth, physical capital accumulation, and economic efficiency improvements both before and after controlling for numerous country and policy characteristics (control variables). Also, financial development is a good predictor of economic growth, but their results do not prove that financial development causes economic growth.

Levine, Loayza and Beck (2000) evaluated both, whether the exogenous component of financial development (using an Instrumental variable) influences economic growth and whether, cross-country characteristics differences in legal and accounting systems (e.g., creditor rights, contract enforcement, and accounting standards) explain differences in the level of financial development. Using both, cross-sectional instrumental-variable estimator and dynamic panel techniques (GMM), from a sample of 74 countries over the period 1960-1995. Financial development has been measured by three indicators: Liquid liabilities, Commercial-Central Bank and Private Credit. They emphasized that financial development is positively and robustly linked with long-run economic growth.

Beck, Levine and Loayza (2000) in their paper "Finance and the sources of growth" evaluated the empirical relation between the level of financial development and (i) economic growth, (ii) total factor productivity growth, (iii) physical capital accumulation and, (iv) private savings rates. Having extracted the exogenous component of financial intermediary development using a pure cross-country instrumental variable estimator (63 countries are averaged over the period 1960-1995; also using the legal origin of each country as an instrumental variable), they used a panel data technique (GMM panel estimator) that controls for biases associated with simultaneity/omitted variables and unobserved country-specificities effects. They found that there is a robust, positive link between financial development and both real per capita GDP growth and total factor productivity growth. They concluded that their results are consistent with the view that financial development has a causal effect on economic growth.

Other researchers focused on different groups of countries and found different path of results. Contributing to the literature on the finance-growth nexus across financial development group countries, with a sample of 74 countries over 1960-1995 period, Rioja and Valev (2004) evaluated the relationship between financial development and economic growth depending on the level of financial development of countries ("low", "middle" or "high" region). Using the dynamic panel analysis (GMM), they found that financial development affects economic growth positively only, when the level of country's financial development corresponds at least to the "middle" region (minimum value of the level, necessary to have a positive effect considered as the threshold). They also found a significant positive and large effect on "middle" region, an uncertain effect for "low" level of financial development, and finally a significant positive but lower effect on "high" region. This paper permitted us to observe a diminishing return of financial development on economic activity as countries move from middle to high region.

b) New literature: decreasing return of financial deepening (vanishing effect), data after 2000

Using dynamic panel analysis, Khalil Mhadhbi (2014) analyzed the relationship between financial development and economic growth with a sample of 110 countries over the period from 1973 to 2012. He used three measures of financial development: ratio of liquid liabilities to GDP, private credit to the total credit distributed, private credit divided by GDP. The result show that the effect of financial development varies according to the sample studied and the type of indicator used as proxy of financial development: the variable that reflects the availability level of the banking system has a significant and positive effect on economic growth, on the contrary of the indicator which measures credits by the financial system to the private sector has a significant and negative influence on growth, liquid liabilities seem to depend positively on economic growth in developed countries and negatively for the developing countries.

Rousseau and Wachtel (2011) using both cross sectional and panel data found that the share of private credit to GDP has no statistically significant effect on per capita GDP growth for the regressions including data after 2000. Specifically, the positive relationship finance-growth express in the previous studies is not robust with recent data. The impact of financial deepening on growth is worsening over the time. They considered several scenarios and found that the dampening of the effect of financial deepening on growth is due to financial crises.

Financial crisis and financial instability seem important when studying the link between financial development and economic growth. Moreover, when financial systems perform their functions poorly, they tend to hinder economic growth, curtail economic opportunities, and destabilize economies (Čihák, Demirgüç-Kunt, Feyen, & Levine, 2012).

2.3. Financial development, economic growth and financial instability

As compared to the papers that have measured the link between financial development and economic growth, there are few papers that focus on the simultaneously effect of financial development and financial instability on economic growth. The results obtained in the concerned papers are mitigated, but most researchers agree that this phenomenon has a negative impact on long-term growth and well-being (J. Cariolle 2012). Then, it is clear that financial development and financial instability have inverse effects on real activity. We summarize in this sub-section three papers related to this subject.

Loayza, N., and Rancière, R. (2005) developped a pooled mean group and dynamic fixed effects estimators (GMM) on a sample of countries with annual data from 1960 through 2000 to estimate both in short and long term, the effect of financial development (ratio of domestic private credit to GDP as proxy) on economic growth (growth rate of GDP per capita as proxy). They found a contradictory effect of financial intermediation on economic activity being at short or long term. Positive effects in the long run (mean gain in long term), but the short-run average link appears to be strongly negative. Based on many theoriticals papers, Loayza and Rancière explained that in the short run, financial development is followed by a period of instability which occurs the volatility of banks credit (due to the increase in banks lending) and hence, slows economic activity. In contrast, in long term, no financial crisis and this tends to stabilise economic activity. Financial instability (standard deviation of the growth rate of financial development indicator) and financial crises (number of years that the country has experienced systemic banking crises) can explain the potential negative effect of financial development on economic activity in short run. From this paper, the common view in the literature about the positive effects of financial development on economic growth is mainly in the long term.

Focusing on 121 developing countries, Guillaumont J. S. and Kpodar K. (2006) assessed the link between financial development, financial instability and economic growth using panel data on the period 1966-2000 divided into 7 sub periods of 5 years each. Indeed, they analyzed the relation between financial development and financial instability, and their respectively effects on economic growth. They found a positive association between financial development and his volatility. Also, financial instability tends to affect negatively growth variable. Nevertheless, the net effect (financial development and financial instability simultaneously) remains positive.

EGGOH C. Jude (2008) empirically analyzed the link between financial development and economic growth using cross country and dynamic panel analysis for 71 countries over the period 1960-2004. He found a positive effects of financial development on economic activity both short and long term. Also, financial instability has an effect only at short term, not at long term, this effect of financial instability at short term being negative. To do this, this author used four measures of financial development: Commercial Central bank, Deposit Money Bank assets, ratio of domestic private credit to GDP and finally, ratio of Liquid Liabilities to GDP. For each indicator of financial development, he defined financial instability by the standard deviation of the cyclical component related to this measure of financial development. And then, he regressed economic growth for each financial development both with and without financial

instability variables (others control variables which influence economic growth have been introduced in the models).

3. Financial development, financial instability and economic growth: Descriptive Assessment

Before to highlight the descriptive statistics, we present in the first sub section the data used and how well we computed the variables of interest.

3.1. Data and description of the variables

a) Data

In conducting this study, we constructed two new datasets:

(1) **Cross sectional data** constructed as the arithmetic average of annual observations for 1971-2010 related to 133 developed and developing countries[4] such that there is one observation per country and variable (data in 40 years periods).

(2) **Panel data** corresponding to arithmetic average of annual data over five years (1971-1975, 1976-1980, 1981-1985, 1986-1990, 1991-1995, 1996-2000, 2001-2005, 2006-2010) such that there are 8 observations (maximum) for each of 133 countries (data in 5 years periods).

b) Variables[5]

Dependent Variables

According to the research questions, the simultaneous effect of financial development and financial instability is estimated respectively, on economic growth and on investment. Thus, two dependent variables were used in our study:

(1) Real per capita GDP growth **(growth)**

(2) Share of investment to GDP **(inv)**

Explanatory variables

As is common in the literature, we include in the regression a set of control variables as explanatory variables: logarithm of initial GDP per capita, government expenditure over GDP, trade openness, index of human capital per person, and inflation rate.

The explanatory variables of interest are:

(1) Financial development ;

(2) Financial instability associated to the indicator of financial development;

(3) Frequency of systemic banking crises.

---

[4] List of countries: Appendix 1

[5] Detailed explanation of the variables: Appendix 2

For financial development, to evaluate more accurately the studied phenomenon and to assess the robustness of our results, we retained three traditional indicators of financial development. In particular, indicators related to monetary financial institutions:

- **priv**: Credit to private sectors divided by GDP. This indicator measures the extent to which financial institutions funnel credit to private sectors.

$$\text{priv} = \frac{\text{Private Credit}}{\text{GDP}}$$

- **depth:** Ratio to GDP of liquid liabilities. It measures the overall size of the financial intermediation sector. From thus, this proxy of financial development reflects the economy's liquidity.

$$\text{deph} = \frac{\text{Liquid Liabilities}}{\text{GDP}}$$

- **bank:** Domestic commercial bank assets to total bank assets (commercial bank assets and central bank assets): measures if commercial banking institutions or the central bank is conducting the intermediation. It allows measuring the availability level of the banking system to allocate credit.

$$\text{bank} = \frac{\text{Commercial Bank assets}}{\text{Commercial Bank assets} + \text{Central Bank assets}}$$

Bringing different information on the size of financial institutions, all these ratios measure only one facet of financial development. Indeed, they measure the size ("deph") of the monetary financial institutions (such as banks) without any information on non-monetary (non-bank) financial institutions (including insurances, pensions…). Moreover, they don't give information on financial market (equity markets, bonds markets, derivatives markets, etc.), thus, they may not enable to assess accurately the entire country's financial development. Working on a mix developed-developing countries sample, this restriction of financial development to banking sector development is not only due to the lack of data, but also by the fact that financial market and non-monetary financial institutions are still underdeveloped and even embryonic in many developing country. Furthermore, the traditional practice has been to use the size of the formal financial intermediary sector relative to economic activity to measure financial development (King and Levine 1993a). This study focuses on variables commonly used in the literature as measures of financial development for comparison purposes of results.

3.2. Measurements of the variables

3.2.1. Measurements for cross sectional data

For the pure cross sectional data, for which there is one observation per country for the period 1971-2010, we computed:

(1) **Real per capita GDP growth (growth)** for each country as the simple geometric growth rate.

The specification is the following:

$$\text{growth} = \frac{1}{39}(\text{logGDP}_{\text{last}} - \text{logGDP}_{\text{first}})$$

(2) **Financial instability** for each country as the standard deviation of annual growth rate of financial development variable.

$$FI^x = \sqrt{\frac{1}{39}\sum_{t=1}^{40}(g_t^x - \bar{g}^x)^2}$$

Where FI is the financial instability of financial development, g^x is annual growth rate of financial development indicator, x is an indicator of financial development (priv, deph or bank).

(3) **Number of systemic banking crisis** by summing the banking crisis dummy on the period 1971-2010

$$crisis = \sum_{t=1}^{40}(\text{dum})$$

Where dum is a dummy variable taking the value 1 if the country is facing a banking crisis and 0 otherwise.

3.2.2. Measurements for panel data

For the panel data, for which there are 8 five years periods observations per country, we computed:

(1) **Real per capita GDP growth (growth)** for each country as the geometric rate.

$$\text{growth} = \frac{1}{4}(\text{logGDP}_{\text{last}} - \text{logGDP}_{\text{first}})$$

Where $\text{logGDP}_{\text{last}}$ and $\text{logGDP}_{\text{first}}$ corresponds respectively to the fifth and the first observation for each sub period of 5 years.

(2) **Financial instability as[6]:**

(a) Standard deviation of each sub periods of 5 years of annual growth rate of financial development variable

$$FI_1^x = \sqrt{\frac{1}{4}\sum_{t=1}^{5}(g_t^x - \bar{g}^x)^2}$$

(b) Average absolute value of the residual of the estimation on all the period computed on each sub periods of 5 years of an AR (1) process with a trend[7].

$$FI_2^x = \frac{1}{5}\sum_{t=1}^{5} abs(\varepsilon_t)$$

Where ε_t is the estimated residual of the equation:

$$x_t = a + b * x_{t-1} + c * t + \varepsilon_t.$$

x_t is the financial development indicator (priv, deph or bank) and t is the time trend. This equation is estimated from 1971 to2010 separately for each country.

(3) **Number of systemic banking crisis** by adding up the banking crisis considered as dummy variable for each sub period of five years.

$$crisis = \sum_{t=1}^{5}(dum)$$

Where dum is a dummy variable taking the value 1 if the country is facing a systemic banking crisis and 0 otherwise.

3.3. Descriptive statistic

This section is divided in two sub-sections. After presenting the evolution of world financial development in the first sub-section, the second one is addresses the possible correlation between financial development and economic growth using our country-specific data.

3.3.1. World financial development and financial instability

As shown in figure 1, there is no clear tendency of the evolution of financial development around the world. Nevertheless, this phenomenon, whatever the indicator, is more or less stable in a certain interval. Indeed, the intermediation proceeding by commercial bank scales between 80% and 100%. It means that the economy is more financed by commercial banks than central

[6] For panel data, we used two measures of financial instability

[7] This method to calculate financial instability has been used by Guillaumont & Kangni, 2006.

bank. Remaining lower than liquid liability share, the share of private credit to GDP is around 40% of GDP over the entire period. Private credit share fluctuating between 20% and 40% over the study period.

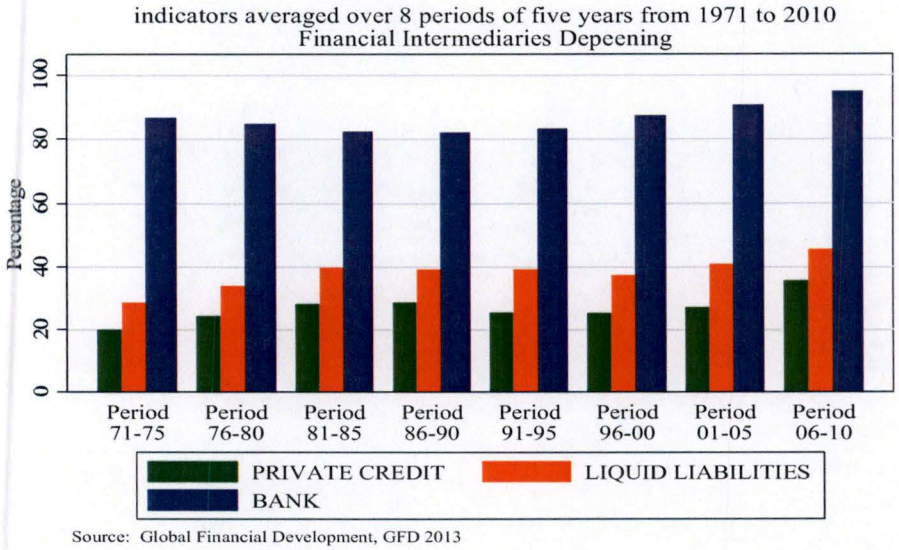


Figure 1- World Financial Development

Figure 2 provides the evolution of financial instability over time. Indicators of financial development present different path of volatility. Liquid liabilities remaining the most volatile compared to the other indicators.

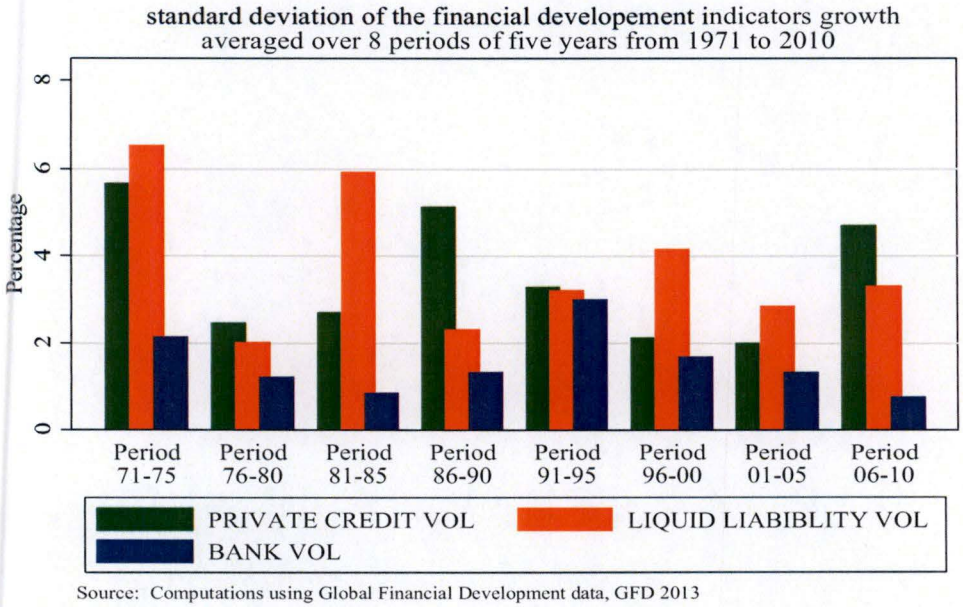


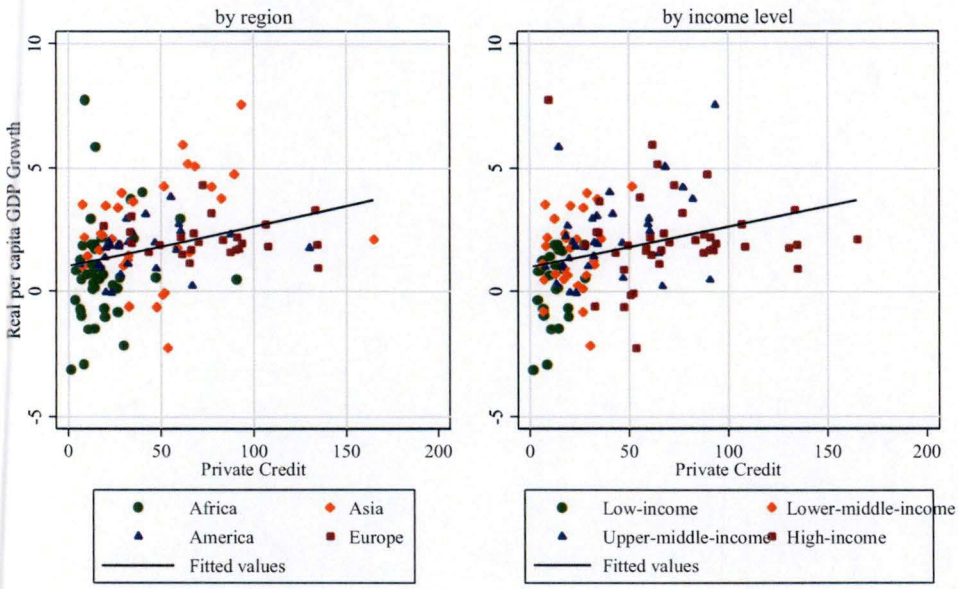
Figure 2- World Financial Instability

3.3.2. Financial Development and Economic Growth: Correlation assessment

Figure 3, 4 and 5 present both by region and income group economies, the relationship between real per capita GDP growth and each of financial development indicators.

As highlighted in the scatter plot in figure 3 (left and right side), there is a positive relationship between private credit and economic growth. Countries with higher levels of "private credit" tend to enjoy faster growth rates over the 1971-2010 period than countries with lower levels of financial institution development. Another interesting observation is that financial development tends to increase with the level of development. African countries being in the bottom of the scale and mix Asian (China, Japan...) and European countries at the top. In general, by levels of income and by region, developing economy (mostly central African low income countries) financial system tends to be much less deep than the others countries around the world.

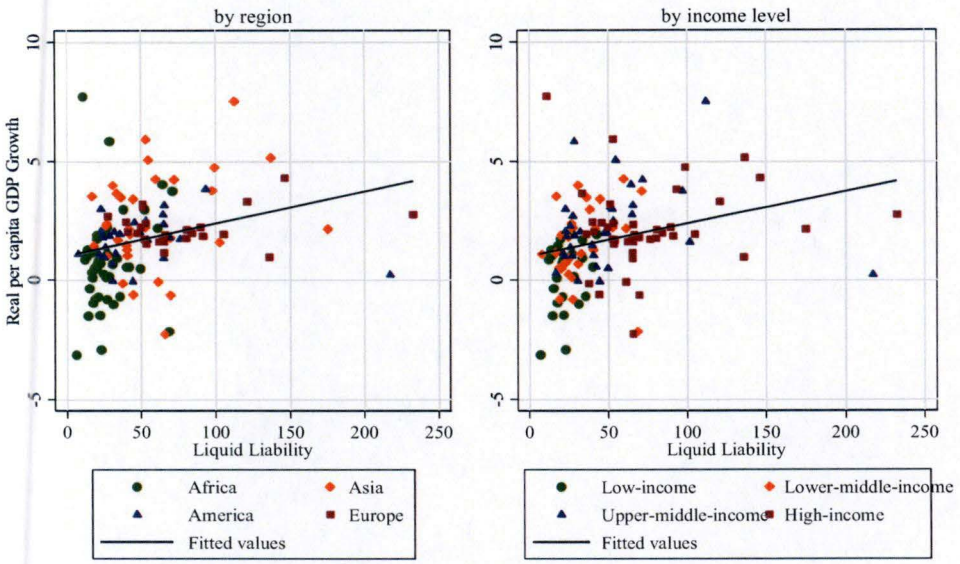
In accordance with the literature, figure 3 illustrates then the **possible double causality financial development and economic growth**.



Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development
Average 1971-2010

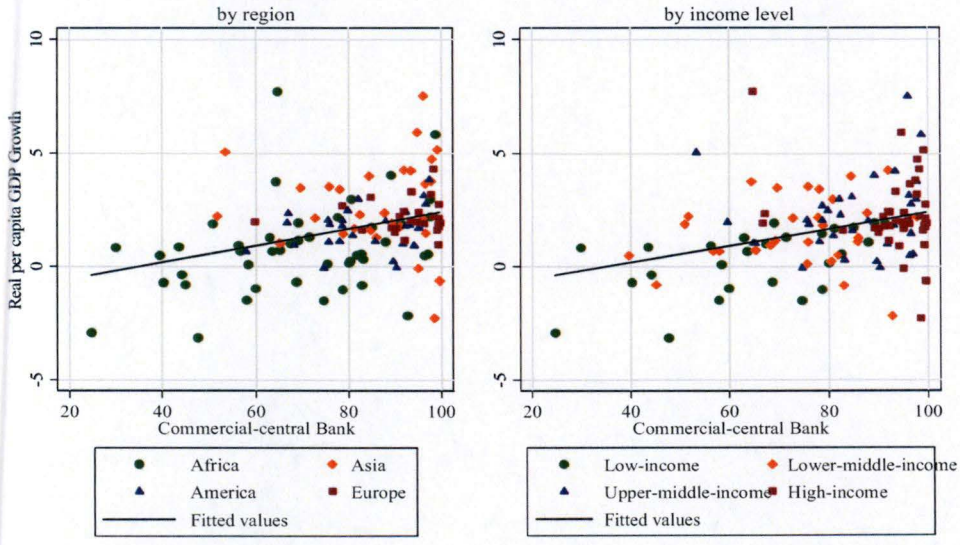
Figure 3- Private Credit and real per capita GDP growth (region and group)

Figure 4 and 5 show a broadly similar result than previously: positive correlation between financial development and economic growth. The higher the country's income level, the better the size of the banking sector.



Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development
Average 1971-2010

Figure 4- Liquid liability and real per capita GDP growth (region and group)



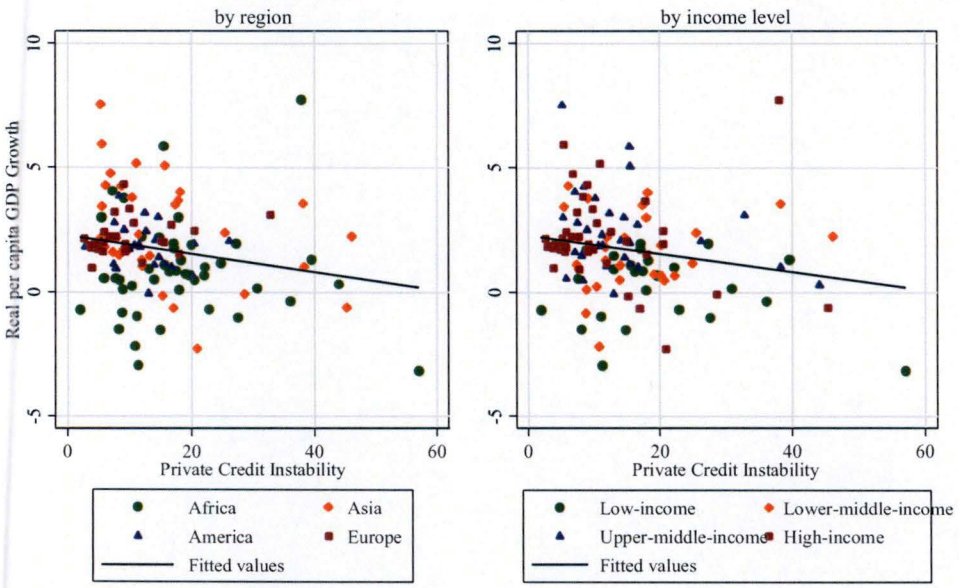
Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development
Average 1971-2010

Figure 5- Commercial-Central Bank and real per capita GDP growth (region and group)

3.3.3. Financial Instability and Economic Growth: Descriptive assessment

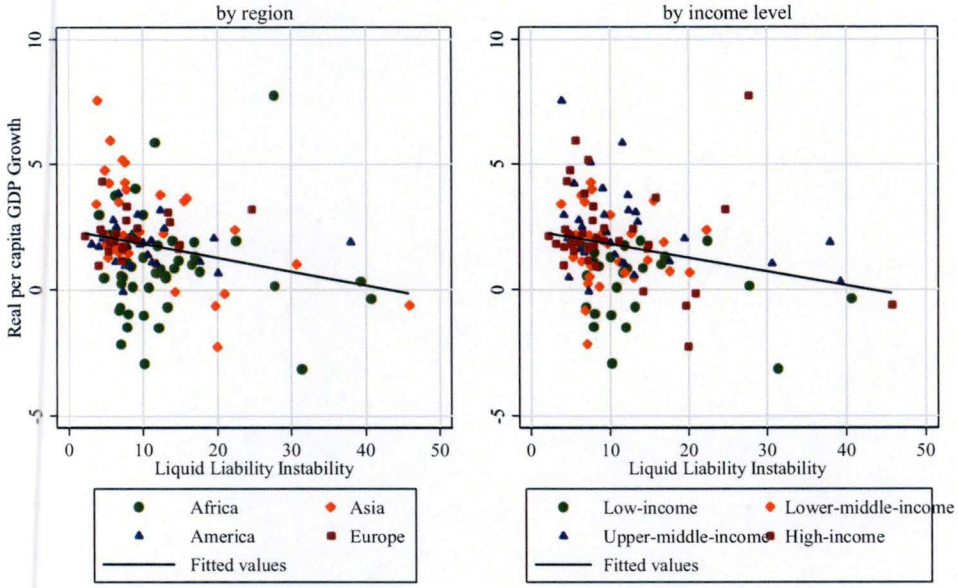
In figures 6 ("private credit"), 7 ("liquid liability") and 9 ("commercial-central bank"), there is successively by region and by income level, a negative relationship between our measure of financial instability and real per capita GDP growth.

For instance, in figure 6, countries with higher levels of "private credit instability" tend to face a decreasing growth rates tendency over the 1971-2010 period than countries with relatively lower levels of financial instability. However, there is no clear comparable tendency between the income group countries, highlighting then a huge differences across countries. Indeed, some high income countries suffer from financial instability and some low income countries are also affected by this phenomenon. The level of economic development seems not to affect directly financial instability. Nevertheless, without being very clear, it seems that high financial development can be associated with high financial instability.



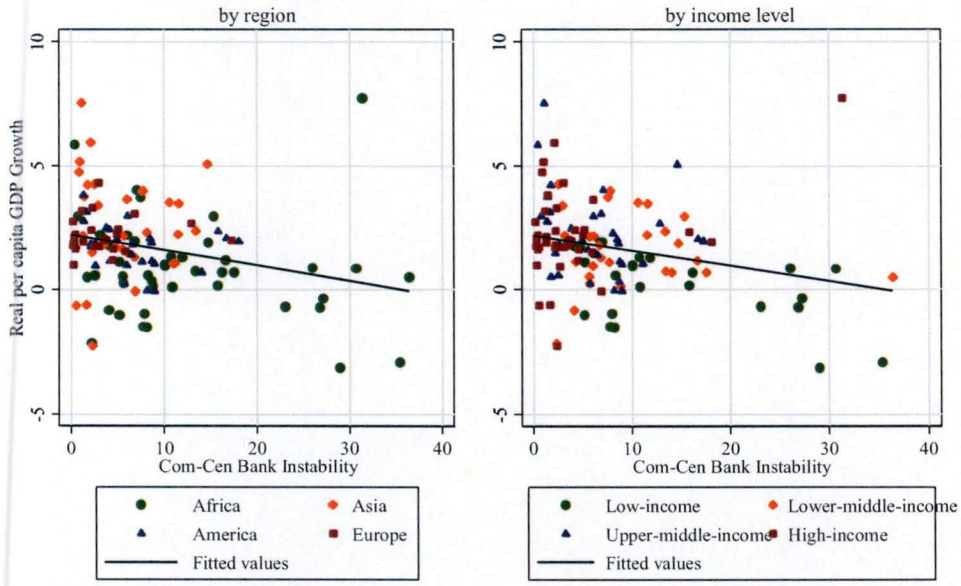
Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development
Average 1971-2010

Figure 6- Instability of Private Credit and economic growth (region and income group)



Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development
Average 1971-2010

Figure 7-Instability of Liquid liabilities and economic growth (region and income group)



Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development
Average 1971-2010

Figure 8- Instability of commercial Central Bank and economic growth (region and income group)

By and large, the graphics presented in the two previous subsections show not only a positive relationship (just correlation not causality) between financial development and economic growth, but also a negative correlation between the various financial development variables and economic growth. In all the cases, financial system especially banking sector in African developing countries seems very low compare to others countries. By focusing across income groups countries, lower income level countries have lower financial development indicators and higher income level have the greatest financial development indicators. This result is in line with the view that financial deepening tends to increase from low to high income countries (Levine, Loayza and Beck (2000)) (another illustration, Appendix).

The question which arises now is how financial development affects economic growth considering each income group. We present in the following sub-section the correlation between financial development and economic growth for each income group.

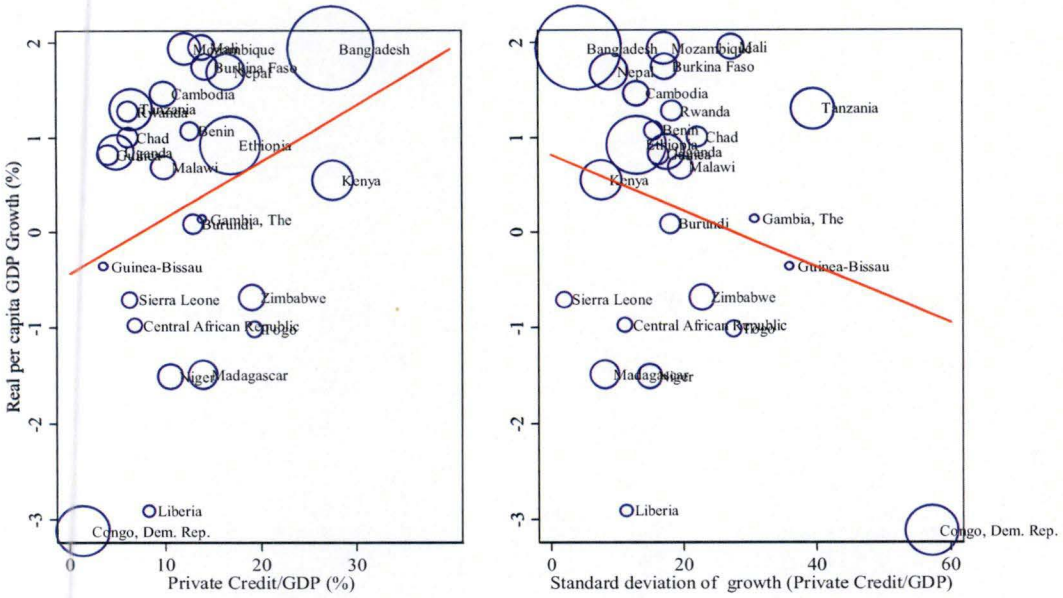
3.3.4. Trends of private credit by income group countries

The below illustrations (figure 9 through 12) present the statistical link between financial development and growth (left side) and between financial instability and economic activity (right side) for each income country group. Data have been weighted by the size of population.

a. Low income countries

Figure 9 expresses a positive relationship between the share of private credit and real per capita GDP growth rate for low income countries. Also, a negative correlation between financial development and growth for the same group.

In average, Bangladesh which is the biggest country (population size and growth rate) presents a higher share of private credit to GDP than the other countries of the group. Kenya is also well scored. Democratic Republic of Congo presenting a low average GDP per capita growth rate presents also an insignificant share of private credit to production. It is equally interesting to notice that we now have an inverse relationship as compared to the first one, and Bangladesh and Democratic Republic of Congo being always at the top and bottom but in the left and right side. Indeed, there is a large divergence across low income countries. This descriptive statistic expresses a negative correlation between financial instability and economic activity for the group of low income countries.



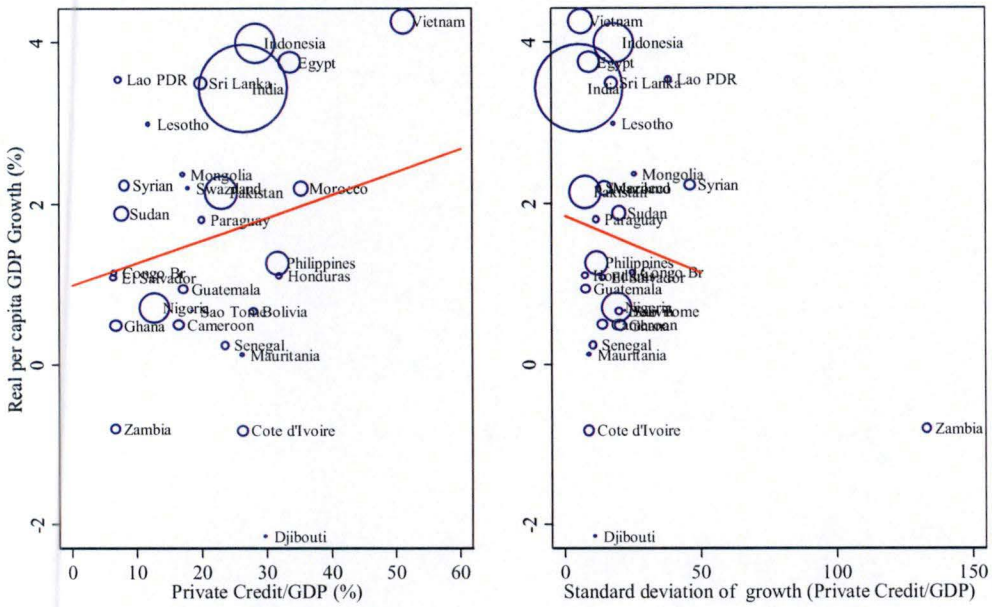
Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development
26 countries: classification World Bank
weight: size of the population

Figure 9- Financial Development, Financial Instability and Economic Growth: Low Income Countries: Data Average 1971-2010

b. Lower middle income countries

When focussing on lower middle income countries (figure 10), results are similar: mostly positive relationship "private credit"-economic growth and negative relationship financial instability- economic growth. Nevertheless, the result is little bit mitigate. Some countries like Djibouti and Cote d'Ivoire present a relatively higher level of private credit, with in average, a low rate of growth. Zambia seems to be an outlier in term of financial instability. This suggests a big divergence in this sub group. Vietnam is also a remarkable case. Since the Economic Renovation Policy (DoiMoi) initialized in December 1986 Vietnam's per capita growth rate has an increasing tendency and positive value with 4.9%[8] average growth on the period 1986-2013, hence its successful accession in the group of low middle income countries since end 2010.

[8]Computation using World Bank/WDI, 2015

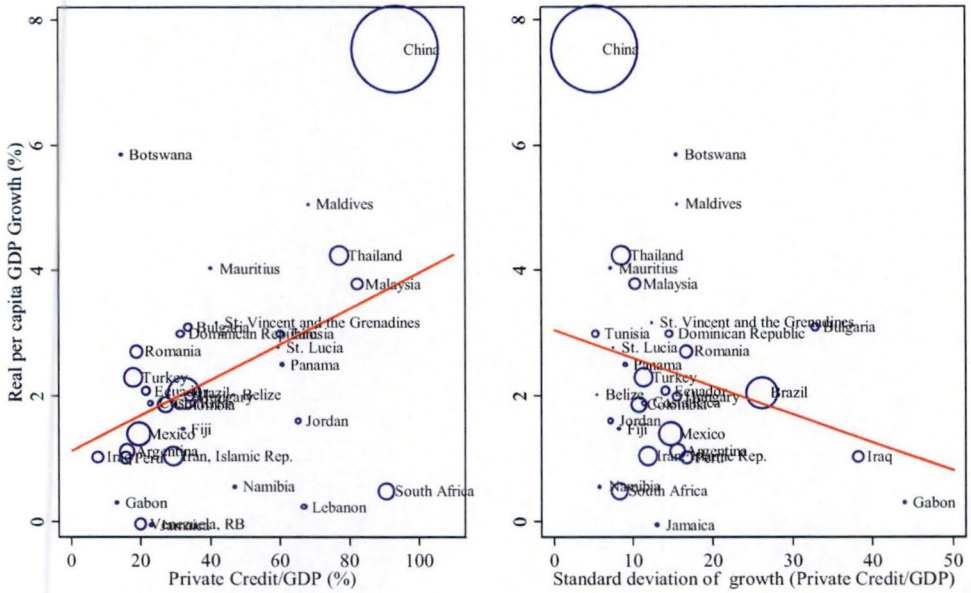


Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development, Data Average 1971-2010
29 countries: classification World Bank
weight: size of the population

Figure 10- Financial Development, Financial Instability and Economic Growth: Lower Middle Income Countries: Data Average 1971-2010

c. Upper middle income countries

The positive and negative correlations observed previously between the variables are again stressed in figure 11. China exhibits a relatively great "private credit" depth, as one would expect. Gabon (Central Africa) presenting in average a lower level of "private credit" and economic growth rate, exhibits also the highest volatility.

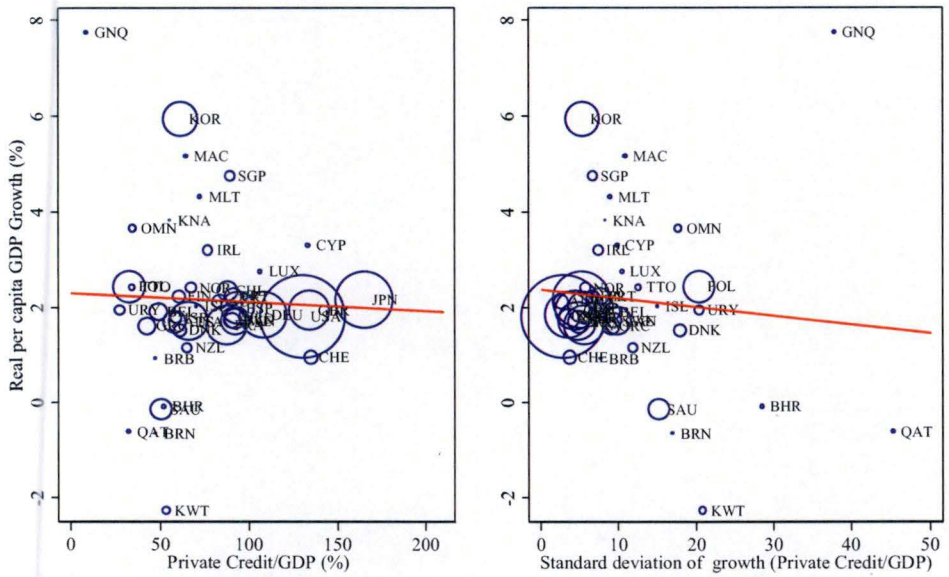


Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development, Data Average 1971-2010
33 countries: classification World Bank
weight: size of the population

Figure 11- Financial Development, Financial Instability and Economic Growth: Upper middle Income Countries: Data Average 1971-2010

d. High income countries

The result observed across low income countries (positive link finance–growth) is insignificant and not clear across high income group (figure 12). For most large (in term of population) high income countries, the magnitude of the correlation between financial development and economic growth ("private credit") seems very small. There is no descriptive evidence to think that private credit (or "private credit" instability) influences economic activity for the group of high income countries.



Data sources: Penn World Table (7.1 and 8.0 versions)
Global Financial Development, Data Average 1971-2010
45 countries: classification World Bank
weight: size of the population

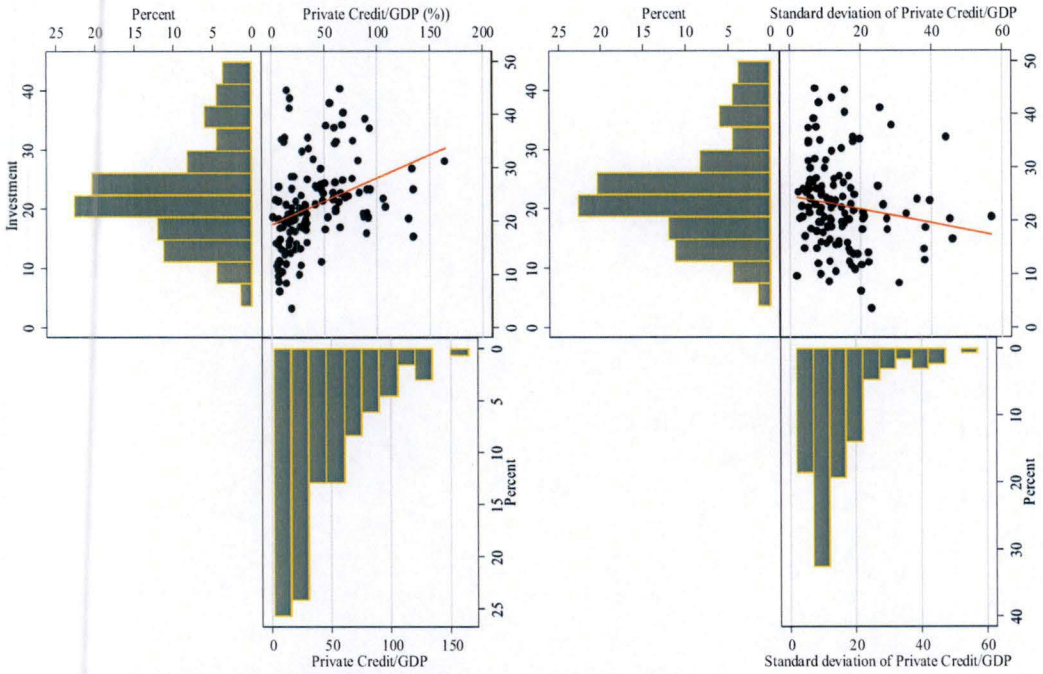
Figure 12- Financial Development, Financial Instability and Economic Growth: Higher Income Countries: Data Average 1971-2010

The previous subsection shows a decreasing return of financial development measured by "private credit" from low to high income countries. This result is in line with the view that there is a diminishing return of financial development on economic activity as countries move from middle to high region (**Rioja and Neven Valev, 2004b**; **Panizza, 2014** mentions Masten et al. (2008) and Arcand et al. (2012)). The novelty here is that, financial instability seems also to have a diminishing effect moving from low to high incomes countries.

3.3.5. Financial development (Private Credit), financial instability and investment

The mix histogram and scatter plot in Figure 13 illustrates the relationship between financial development (share of private credit to GDP), financial instability and investment on the period 1971-2010. As expressed in the case of economic growth, we found a positive correlation between investment share and "private credit" indicator. Nevertheless, the distributions of the financial development and financial instability[9] appear to be similar.

[9] Second line of figure 13.



Data sources: Penn World Table (PWT) & Global Financial Development (GFD)
Croos section data averaged over the period 1971-2010
GFD 2013
PWT 7.1 & 8.0
Zambia has been removed from the sample

Figure 13- Financial Development, Financial Instability and Investment

4. Financial Development, Financial Instability and Economic Growth: Cross sectional Estimators

As discussed in the previous sections, there are numerous papers that focused on the relationship between finance and growth. To evaluate the causal link between financial development and financial instability on economic activity, we used three different econometric techniques: simple OLS, OLS with country fixed effect and dynamic[10] linear GMM. The first model is related to pure cross sectional data and the two others to panel data.

Thus, to be in line with the traditional cross sectional analysis, we estimated in this part the results using simple OLS regressions. In the next part, the findings associated to panel data are presented.

4.1. Model specification

The basic cross sectional regression takes this form:

$$Y_i = \alpha + \beta Finance_i + \mu Finance_ins_i + \gamma^i X_i + \varepsilon_i, \qquad (I)$$

Where **Y** is either per capita GDP growth, share of investment to GDP; **Finance** is "private credit", "liquid liability", or "commercial-Central Bank", **Finance_ins** represents our pure financial instability or crisis variable, **X** is matrix of controls variables, ε is the error term which is supposed to be independent and identically distributed (iid) and the subscripts **i** stands for the cross sectional unit.

We successively estimated equation (I) with and without **Finance_ins** variable. Thus, each financial development indicator (03) is related to two regressions such that there are 6 regressions (3x2) for each dependant variable.

4.2. Univariate and bivariate statistics

Before to go through the estimations, we explored our data in univariate and bivariate sense.

4.2.1. Univariate statistics

Table 1 provides the univariate statistics using cross sectional data. There is a huge variation across countries in Private Credit and Liquid Liabilities. Private Credit share is ranging from the lowest 1.34% in Democratic Republic of Congo (formerly *Zaire*) to highest 164.66% in Japan. Liquid liability has its lowest value (6.27%) also in *Zaire* and its highest value

[10] By including logarithm of initial income as explanatory variable, growth regression become dynamic in nature (Beck, Levine and Loayza 2000)

(232.06%) in Luxembourg. Commercial-Central Bank, by definition ranging from 0 to 100 percent, varies from 24.57% (Liberia) to 99.82% (Lithuania). It is worth to notice that the countries exhibiting the lowest and highest values of these financial development variables belong respectively to the group of low and high income countries. Like financial development variables, economic growth and investment show large and significant variation across countries. China GDP per capita over the period 1971-2010 is 7.74% and corresponds to the highest value in our sample of countries. In the bottom of economic growth scaling, Zaire exhibits a negative average value of -3.12%. Jordan presents the highest rate of investment (44.84%), in contrast, Zimbabwe has the lowest value with 3.71%. A large divergence is also observed across countries regarding the financial instability variables. Indeed, Private credit volatility is most drastic in Zambia and occurs the least in Sierra Leone. Austria is less volatile in term of liquid liabilities (2.13%) and Qatar is the most volatile (45.73%). Over the 40 years 1971-2010, Argentina and Ecuador have experienced in total 10 years of systemic banking crises which corresponds to the maximum number of crisis in our sample of 133 countries. In saying this, it is not related to the severity of the crisis, just the occurrences of banking crisis.

Table 1: Cross section: Univariate statistics, 1971-2010

Variable	Mean	Std. Dev.	Min	Max
Economic Growth	1.681513	1.791673	-3.120925	7.740949
Investment	22.88	8.40295	3.711479	44.83827
Private Credit	40.62774	33.32982	1.340054	164.6593
Liquid Liabilities	49.24858	37.20796	6.269149	232.0608
Commercial-Central Bank	81.17678	16.88023	24.57195	99.81535
Private Credit Instability	15.55147	14.41445	1.934644	132.8817
Liquid Liabilities Instability	11.27053	7.854242	2.13096	45.73716
Commercial-Central Bank Instability	7.731739	7.747174	0.101693	36.34988
Crisis	2.759398	2.651901	0	10

4.2.2. Bivariate statistics[11]

The correlation observed in the descriptive analysis, is now significantly precise in table 2 which provides the bivariate statistics. Both "private credit", "liquid liability" and "commercial-central bank" are positively and significantly correlated to economic growth. The correlation coefficients of these indicators are more or less in the same range. Regarding financial instability, as expected, whatever the financial instability indicator, it is significantly and negatively correlated to economic growth at the cut off of 5%. Notably, in the same sense

[11] Figure of correlation is provided in Appendix: Supplemental figure 3

than pure financial instability variable, the number of systemic banking crisis is statistically correlated to economic growth (negative correlation). Here again, it is not an issue of causality, we just highlight the correlation between our variables of interest.

Table 2: pair-wise correlation table: cross country data (1971-2010)

	Economic growth	Private Credit	Liquid Liability	Commercial-Central Bank	Instability Private Credit	Instability Liquid liability	Instability Commercial-Central	Number of crisis
Economic growth	**1**							
Private Credit	**0.3086***	1						
Liquid Liability	**0.2866***	0.7825*	1					
Commercial-Central Bank	**0.3479***	0.5911*	0.4967*	1				
Instability Private Credit	**-0.2306***	-0.4174*	-0.3374*	-0.4002*	1			
Instability Liquid liability	**-0.2483***	-0.3676*	-0.3530*	-0.2622*	0.5702*	1		
Instability Commercial-Central	**-0.2858***	-0.5490*	-0.4613*	-0.8743*	0.4734*	0.3713*	1	
Number of crisis	**-0.2200***	-0.0201	-0.088	-0.102	0.0446	0.0238	0.1605	1

Note: * significant at 5%

4.3. Regression Results

This sub-section presents the results using successively economic growth and investment as dependant variable.

4.3.1. Real per capita GDP growth regression: cross sectional data

Table 3 reports the results for six (06) regressions using simple OLS estimations. The results indicate a positive and strong effect of financial development on economic activity whatever the indicator of financial development. All the coefficients of the three indicators ("Private Credit", "Liquid Liabilities" and "Commercial-Central Bank") are statistically significant at the cut off of 1% (Columns 1, 3 and 5). This result favours the growth-enhancing view of financial intermediation supported by Shumpeter (1912). Since all the variables have been included without any transformation, the coefficients estimated represent the marginal effects. Precisely, ceteris paribus, when the share of private credit increases by 1 unit, the real per capita GDP growth rate is expected to increase by around 0.017 unit in average (column 1). Similarly, everything else being constant, a 1 additional unit of the share of "liquid liabilities" would increase economic growth rate by around 0.016 unit (column 3). More intermediation is conducted by the country's commercial banks, better is for the economy's real activity. Indeed, the marginal effect of "commercial-central bank" variable on real per capita GDP growth rate is 0.04 (column 5).

When taking into account financial instability (columns 2, 4 and 6), the coefficients of "private credit" and "commercial-central bank" are negative. But, only this latter is statistically significant. Moreover, the coefficient of financial development (whatever the indicator which measures financial development) does not vary too much, except for "commercial-central bank" for which the coefficient is insignificant. For "private credit" and "liquid liability", the marginal effect of financial development on economic growth remains almost the same (from 0.0178 to 0.0174; from 0.0167 to 0.0177) when taking into account financial instability.

In sum, financial instability affects negatively (but not strongly) economic growth and considering financial instability does not affect statistically the link finance-growth. This result is in accordance with those found by **Loayza & Rancière (2005).**

It is also worth interesting to notice that the coefficients of the control variables have the expected signs: negative and significant growth effect of "initial income per capita" (so-called conditional convergence effect), "government consumption" and "inflation rate"; positive and significant effect of "human capital index", and "openness to trade".

Table 3: Financial intermediation, Financial instability and Economic Growth: Cross Country OLS estimations

Dependant variable: Real per capita GDP growth (%), 1971-2010

All the variables have been included in level without any transformation.

	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita (log)	-0.927***	-0.920***	-0.905***	-0.939***	-0.951***	-0.949***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human Capital Index	1.798***	1.789***	1.962***	2.038***	1.983***	2.059***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Openess to trade	0.00817***	0.00807***	0.00437	0.00395	0.00752**	0.00790**
	(0.004)	(0.004)	(0.232)	(0.316)	(0.024)	(0.014)
Government Expenditure	-0.0614**	-0.0612**	-0.0528*	-0.0555**	-0.0609***	-0.0570**
	(0.025)	(0.035)	(0.051)	(0.047)	(0.009)	(0.017)
Inflation Rate	-0.00309*	-0.00298*	-0.00320**	-0.00350**	-0.00267*	-0.00204
	(0.056)	(0.069)	(0.034)	(0.024)	(0.052)	(0.112)
Private Credit	0.0178***	0.0174***				
	(0.001)	(0.004)				
Instability of Private Credit		-0.00326				
		(0.692)				
Liquid Liabilities			0.0167***	0.0177**		
			(0.008)	(0.011)		
Instability of Liquid Liabilities				0.0129		
				(0.383)		
Commercial-Central Bank					0.0401***	0.00974
					(0.001)	(0.601)
Instability of Commercial-Central Bank						-0.0733**
						(0.024)
Constant	5.118***	5.155***	4.665***	4.677***	2.425***	5.162***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.003)
R^2	0.485	0.481	0.487	0.484	0.502	0.522
Adjusted R^2	0.456	0.447	0.458	0.450	0.474	0.490
Skewness/Kutosis p-value[12]	0.1891	0.2105	0.2737	0.3290	0.0644	0.1929
Observations	114	112	114	112	113	113

Notes: *p*-values in parentheses, $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Skewness/Kutosis p-value: test of normality based on skewness and kurtosis. Null Hypothesis: All the residuals follow a normal distribution function.

Our data does not suffer from stationnarity problem since it is not a time variant data.

[12] Running an OLS model, the residuals of the regressions are assumed following a normal distribution. Thus, we perform one specific test of normality, namely Skewness/Kurtosis test. Furthermore, we added in the appendix a figure where for each regression contained in table , both histogram of residuals, normal density and kernel density have been overlaid in order to illustrate graphically the fact that ours OLS estimators are not bias (especially the bias due to the fact that the residuals are not normal).

Figure 14 illustrates the relationship between GDP per capita growth rate and inflation rate over the period 1971-2010. Since Brazil, Peru, Bolivia and Congo Zaire are outliers, we removed these countries and re-did the cross section estimation. The results are similar than those presented in the previous table 3 results[13].

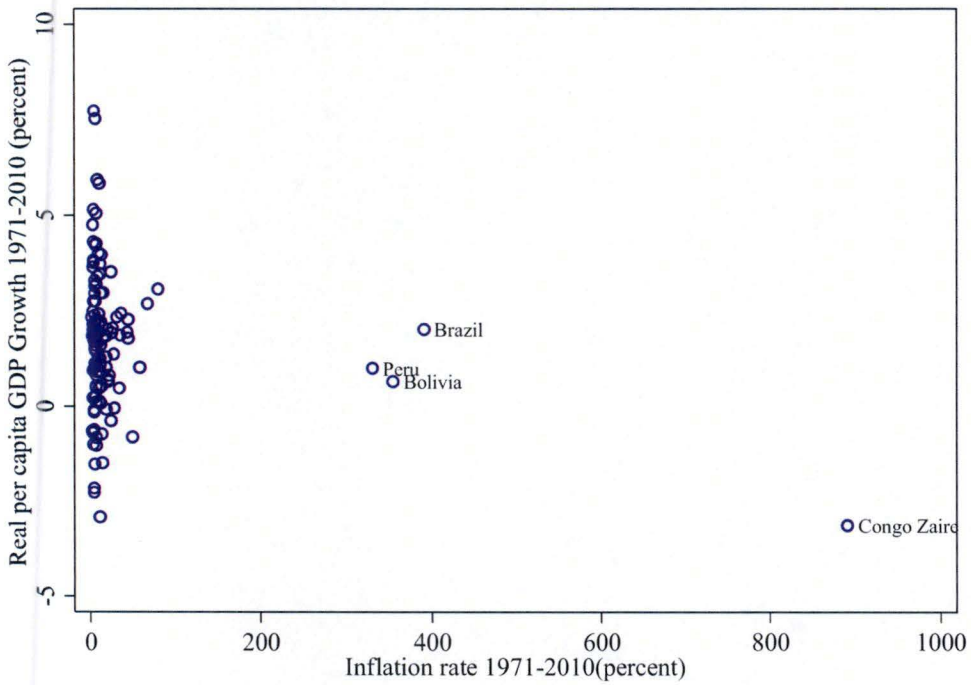


Figure 14- scatter plot real per capita GDP growth rate vs inflation

4.3.2. Investment Regression: cross sectional data

Table 4 summarizes the results of the effect of financial development on investment. The findings show a positive and robust effect of financial development on investment share. Indeed, ceteris paribus, a 1% increase in either "private credit", "liquid liability" or "commercial-central bank" leads to an increase of investment share (columns 1, 3 and 5) by around 2.9, 2.9 and 10.8 units respectively.

Concerning the effect of financial instability, there is no strong evidence suggesting that financial instability affects the share of investment to GDP. All the coefficients of financial instability are not statistically significant. Nevertheless, the introduction of financial instability in the regressions increase hugely the coefficients of financial development, meaning that the

[13] See Appendix 4.

effect of financial development would be more important in the absence of financial instability. Indeed the effect of "private credit" on investment increase from 2.9 to 3.5 when financial instability is considered. The same interpretations can be done regarding the two other indicators, namely "liquid liability" and "commercial-central bank".

Table 4: Financial intermediation, Financial instability and Investment: Cross country OLS estimations

Dependant variable: Share of Investment to GDP (%), 1971-2010

Log means the variable has been log transformed

	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita (log)	-2.210**	-2.439***	-1.966**	-2.352**	-2.187***	-2.150**
	(0.010)	(0.005)	(0.022)	(0.012)	(0.010)	(0.012)
Human Capital Index	3.446*	3.562*	4.400**	4.947**	4.424***	4.244**
	(0.058)	(0.052)	(0.013)	(0.010)	(0.010)	(0.019)
Openess to trade (log)	4.310***	4.318***	4.012***	3.805***	4.313***	4.287***
	(0.000)	(0.000)	(0.003)	(0.006)	(0.001)	(0.001)
Government Expenditure (log)	3.974*	3.580	3.946*	3.846*	4.421**	4.373**
	(0.060)	(0.117)	(0.060)	(0.071)	(0.035)	(0.036)
Private Credit (log)	2.914**	3.581***				
	(0.010)	(0.005)				
Instability of Private Credit		0.0470				
		(0.381)				
Liquid Liabilities (log)			2.906*	3.592**		
			(0.060)	(0.025)		
Instability of Liquid Liabilities				0.0881		
				(0.465)		
Commercial-Central Bank (log)					10.89***	15.87*
					(0.000)	(0.055)
Instability of Commercial-Central Bank						0.178
						(0.506)
Constant	-4.599	-4.923	-8.190	-8.589	-45.99***	-68.81*
	(0.441)	(0.407)	(0.175)	(0.155)	(0.000)	(0.062)
R^2	0.302	0.311	0.280	0.287	0.324	0.329
Adjusted R^2	0.270	0.272	0.247	0.247	0.293	0.292
Skewness/Kurtosis p-value	0.0724	0.2236	0.1082	0.3772	0.1105	0.4515
Observations	115	113	115	113	114	114

Notes: *p*-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Skewness/Kutosis p-value: test of normality based on skewness and kurtosis. Ho: Residuals are normal.

5. Financial Development, Financial Instability and Economic Growth: Panel Procedures

In this section, we explore eight five-year data in order to assess the causal link between financial development and growth. To do this, we used two econometric methods: fixed effects OLS and System GMM. Fixed effect OLS allowed us to control for possible omission biases due to the heterogeneity between countries. The second method controls for not only the heterogeneity bias, but also the possible endogeneity of the financial development. This methodology were used to control for both time invariant and country specific fixed effects. Therefore, panel data estimations have several advantages over purely cross sectional estimations.

5.1. Model specification

The basic panel data regression takes this form:

$$Y_{it} = \alpha + \beta Finance_{it} + \mu Finance_ins_{it} + \gamma^{it} X_{it} + \varepsilon_{it}, \quad \text{(II)}$$

Where the subscripts **i** and t stand respectively for the cross sectional unit and for the time period; **Y** is either real per capita GDP growth rate or share of investment to GDP; **Finance** represents either "private credit", "liquid liabilities", or "commercial-central bank"; **Finance_ins** is financial instability variable or systemic banking crisis; **X** is the matrix of other explanatory variables related to economic growth and ε is the error term.

5.2. Regressions Results

5.2.1. Estimations using fixed effects

The various estimations of the impact of financial development on growth are recorded in table 5. Our findings suggest a positive and significant marginal effect of "commercial-central bank" (column 7), positive and not significant impact of "liquid liability" (column 4). In turn, "private credit" has a significant retarding influence on economic growth (column 1). Everything else remaining constant, 1 additional unit of "private credit" leads to a decrease of real per capita GDP growth rate by 0.017 units. This outcome is not in accordance with the growth-enhancing influence of financial development. Several reasons are advocated concerning this negative effect: multiple financial innovation that are created outside the banking system ((Khalil Mhadhbi 2014), inflation (Rousseau and Wachtel (2002)), small financial sectors (Rioja and Valev (2004)), sample and period studied (Rousseau and Wachtel (2002)). For these last point, the new literature about the link finance-growth stresses that there is a diminishing return of

financial development over time and income group countries. Having used both recent data and large number of high income countries in this study, the negative growth-effect of "private credit" is in accordance with this last literature.

In assessing the effect of financial instability in the various regressions, financial instability has a significant negative coefficient in most the cases (mostly for financial instability derived from the residuals of an AR (1) process). As in the cross section regression, financial instability does not affect too much the relationship finance-growth. Financial instability seems not to matter. The coefficients of financial development before and after having integrated the financial instability variables are statistically and significantly similar both for "private credit" and "commercial-central bank".

Regarding the control variables, our results are consistent with the usual literature on the determinants of economic growth.

Table 5: Financial intermediation, Financial instability and Economic Growth: panel data Fixed effects model

Dependant variable: Real per capita GDP growth, eight sub periods of five years,

Instability 1: Standard deviation on each sub periods of 5 years of annual growth rate of financial development variable.

Instability2: Arithmetic average computed on each sub periods of 5 years of the absolute value of the residual of an AR (1) process with a trend.

All the variables have been included in level without any transformation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Initial Income per capita (log)	-5.135*** (0.000)	-5.021*** (0.000)	-5.254*** (0.000)	-5.713*** (0.000)	-5.546*** (0.000)	-5.805*** (0.000)	-5.943*** (0.000)	-6.236*** (0.000)	-6.128*** (0.000)
Human Capital Index	3.203*** (0.000)	3.105*** (0.000)	3.249*** (0.000)	3.069*** (0.000)	2.976*** (0.000)	3.128*** (0.000)	2.679*** (0.000)	3.245*** (0.000)	2.649*** (0.000)
Openess to trade	0.0327*** (0.000)	0.0314*** (0.000)	0.0319*** (0.000)	0.0285*** (0.000)	0.0259*** (0.000)	0.0280*** (0.000)	0.0271*** (0.000)	0.0330*** (0.000)	0.0272*** (0.000)
Government Expenditure	-0.0169 (0.609)	-0.0151 (0.656)	-0.0142 (0.667)	-0.0174 (0.614)	-0.0154 (0.651)	-0.0170 (0.619)	-0.0165 (0.621)	-0.0225 (0.500)	-0.0250 (0.466)
Inflation Rate	-0.00170*** (0.000)	-0.00157*** (0.000)	-0.00165*** (0.000)	-0.00166*** (0.000)	-0.00163*** (0.000)	-0.00159*** (0.000)	-0.00222*** (0.003)	-0.00205*** (0.004)	-0.00190** (0.010)
Private Credit	-0.0171*** (0.002)	-0.0176*** (0.002)	-0.00771 (0.214)						
Instability of Private Credit (1)		-0.0139* (0.076)							
Instability of Private Credit (2)			-0.149*** (0.000)						
Liquid Liabilities				0.00261 (0.703)	0.00151 (0.823)	0.0103 (0.150)			
Instability of Liquid Liabilities (1)					-0.0173 (0.146)				
Instability of Liquid Liabilities (2)						-0.209*** (0.001)			
Commercial-Central Bank							0.0553*** (0.000)	0.0473*** (0.000)	0.0538*** (0.000)
Instability of Commercial-Central Bank (1)								-0.00439 (0.822)	
Instability of Commercial-Central Bank (2)									-0.114** (0.048)
Constant	37.41*** (0.000)	36.90*** (0.000)	38.33*** (0.000)	42.07*** (0.000)	41.20*** (0.000)	42.91*** (0.000)	40.29*** (0.000)	41.88*** (0.000)	42.51*** (0.000)
R^2	0.431	0.442	0.439	0.416	0.433	0.431	0.418	0.448	0.420
Adjusted R^2	0.320	0.332	0.330	0.302	0.322	0.321	0.302	0.333	0.302
Hausman test-p value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	740	722	733	737	720	729	723	699	713

Notes: p-values in parentheses, $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Hausman test-p value: Hausman's specification test to choice between random effects and fixed effects model (Ho: Random effects model is efficient). The performed Hausman test suggest a fixed effect model.

Our data does not suffer from stationnarity problem since it is just 8 periods time variant. .

5.2.2. Estimations using Dynamic System GMM

As previously, table 6 provides the findings, using a system GMM methodology, of the causal link financial development and economic growth.

The econometric specification tests presented support the robustness of the results. In all GMM, both Sargan and Hansen test confirm the validity of the instruments chosen. The test results are satisfactory and indicate that the residuals of all the regressions are not partially auto correlated up to order 2. We do not have to check for autocorrelation up to 1, because by definition of the GMM, the residuals are AR (1).

Our keys findings are similar to those obtained when using fixed effects estimations: negative and significant effect of "private credit", positive and not significant effect of "liquid liability", positive and significant effect of "commercial central bank".

Financial instability tends to have a significant and negative impact on economic growth rate. But, this negative impact of financial instability does not dampen too much the relationship financial development-economic growth. All the controls variables are as expected.

Table 6: Financial intermediation, Financial instability and Economic Growth: System GMM estimators.

Dependant variable: Real per capita GDP growth, eight sub periods of five years, **Instability1and Instability 2 same as in table 5**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Initial Income per capita (log)	-1.448	-1.326	-0.146	-1.939*	-1.679*	-1.477**	-3.034**	-2.616***	-2.833***
	(0.187)	(0.130)	(0.845)	(0.063)	(0.093)	(0.026)	(0.017)	(0.006)	(0.005)
Human Capital Index	6.167***	5.780***	3.758***	5.462***	4.387***	4.553***	5.301***	5.547***	5.045***
	(0.001)	(0.000)	(0.005)	(0.000)	(0.001)	(0.001)	(0.009)	(0.001)	(0.000)
Openess to trade (log)	1.953*	1.586	1.307	1.989*	1.460	1.337	1.153	0.773	1.165
	(0.071)	(0.120)	(0.174)	(0.075)	(0.204)	(0.207)	(0.217)	(0.390)	(0.176)
Government Expenditure (log)	-0.914	-1.155	-1.519	-1.340	-1.331	-1.661	0.998	0.690	0.769
	(0.726)	(0.617)	(0.544)	(0.525)	(0.588)	(0.447)	(0.708)	(0.788)	(0.797)
Inflation Rate (log(var+1))	-1.689	-0.981	-1.721	-0.846	-0.551	-0.922	-0.877	0.425	0.357
	(0.437)	(0.503)	(0.383)	(0.691)	(0.704)	(0.627)	(0.714)	(0.734)	(0.771)
Private Credit	-0.0210*	-0.0222**	-0.00454						
	(0.072)	(0.034)	(0.684)						
Instability of Private Credit (1)		-0.0241*							
		(0.064)							
Instability of Private Credit (2)			-0.282**						
			(0.011)						
Liquid Liabilities				0.00557	0.00894	0.0149			
				(0.622)	(0.387)	(0.147)			
Instability of Liquid Liabilities (1)					-0.0193				
					(0.270)				
Instability of Liquid Liabilities (2)						-0.204			
						(0.124)			
Commercial-Central Bank							0.0896***	0.0704***	0.0727***
							(0.000)	(0.007)	(0.007)
Instability of Commercial-Central Bank (1)								-0.0113	
								(0.727)	
Instability of Commercial-Central Bank (2)									-0.186**
									(0.043)
Constant	-1.722	0.330	-3.701	3.801	5.730	5.264	2.953	2.561	4.193
	(0.814)	(0.960)	(0.631)	(0.507)	(0.334)	(0.502)	(0.607)	(0.707)	(0.504)
Sargan p-value	3.39e-11	1.01e-08	8.43e-12	7.01e-10	7.55e-10	6.00e-12	4.42e-08	2.07e-09	9.62e-09
Hansen p-value	0.241	0.365	0.313	0.132	0.225	0.118	0.203	0.470	0.386
AR(1) p-value	0.0101	0.00972	0.00825	0.00859	0.00960	0.00612	0.00769	0.00535	0.00276
AR(2) p-value	0.665	0.990	0.871	0.703	0.845	0.725	0.767	0.175	0.146
Observations	740	722	733	737	720	729	723	699	713

Notes: *p-values* in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

AR(2) test of autocorrelation order 2 Arrelano and Boond,

Time periods dummy are included in the regressions

6. Sensitivity analysis

To assess the robustness of our results, we ran the same regression than those presented in the second part using the financial crises (number of years that the country has experienced systemic banking crises) variable as proxy of financial fragility. In theoretical view, banking crisis affecting directly the banking sector, leads to a decline in the real activity. This is due to the major role that plays the banking system in term of intermediation. When a break occurs, banks are not able to collect savings and to finance the most productive investment with the higher return.

To appraise accurately the growth-effect of banking crisis, this section is divided into two sub-section presenting the results for each type of data: cross sectional data and panel data.

6.1. Cross sectional results

6.1.1. Financial Development, Crisis and Economic Growth

Three keys outcomes are expressed in table 7:

1. Positive and significant effect of financial development on economic growth;
2. Negative effect of banking crisis. Statistically significant at the 10% level in the "private credit regression";
3. Banking crisis does not matter in the relationship financial development and economic growth.

The results are similar than those obtained in table 3.

Table 7: Financial intermediation, Crisis and Economic growth: Cross country regression using the simple OLS

All the variables have been included in level without any transformation.						
	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita (log)	-0.927***	-0.922***	-0.905***	-0.899***	-0.951***	-0.941***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human Capital Index	1.798***	1.817***	1.962***	1.987***	1.983***	2.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Openess to trade	0.00817***	0.00679**	0.00437	0.00308	0.00752**	0.00670**
	(0.004)	(0.016)	(0.232)	(0.414)	(0.024)	(0.044)
Government Expenditure	-0.0614**	-0.0630**	-0.0528*	-0.0544**	-0.0609***	-0.0618***
	(0.025)	(0.019)	(0.051)	(0.040)	(0.009)	(0.008)
Inflation Rate	-0.00309*	-0.00263*	-0.00320**	-0.00278*	-0.00267*	-0.00242*
	(0.056)	(0.096)	(0.034)	(0.059)	(0.052)	(0.072)
Private Credit	0.0178***	0.0181***				
	(0.001)	(0.001)				
Banking crisis		-0.0785*		-0.0734		-0.0491
		(0.096)		(0.113)		(0.293)
Liquid Liabilities			0.0167***	0.0168***		
			(0.008)	(0.005)		
Commercial-Central Bank					0.0401***	0.0391***
					(0.001)	(0.001)
Constant	5.118***	5.348***	4.665***	4.862***	2.425***	2.574***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.003)
R^2	0.485	0.497	0.487	0.498	0.502	0.507
Adjusted R^2	0.456	0.464	0.458	0.465	0.474	0.474
Skewness/Kutosis p-value	0.1891	0.3298	0.2737	0.4424	0.0644	0.0873
Observations	114	114	114	114	113	113

Notes: p-values in parentheses, $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$
Skewness/Kutosis p-value: test for normality based on skewness and kurtosis. Ho: Residuals are normal.
Our data does not suffer from stationnarity problem since it is not a time variant data.

6.1.2. Financial Development, Crisis and Investment

The results highlighted in table 8 are similar than those obtained when using pure financial instability variable:

1. Positive and significant effect of financial development on investment share;
2. There is no evidence that banking crisis affects investment share;
3. The effect of financial development on investment share is reduced due to banking crisis.

Table 8: Financial intermediation, Crisis and Investment: Cross country regression using the simple OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita (log)	-2.210**	-2.219**	-1.966**	-1.981**	-2.187***	-2.219***
	(0.010)	(0.011)	(0.022)	(0.023)	(0.010)	(0.010)
Human Capital Index	3.446*	3.412*	4.400**	4.345**	4.424***	4.352**
	(0.058)	(0.062)	(0.013)	(0.015)	(0.010)	(0.012)
Openess to trade (log)	4.310***	4.404***	4.012***	4.132***	4.313***	4.547***
	(0.000)	(0.001)	(0.003)	(0.004)	(0.001)	(0.001)
Government Expenditure (log)	3.974*	3.986*	3.946*	3.962*	4.421**	4.453**
	(0.060)	(0.060)	(0.060)	(0.060)	(0.035)	(0.033)
Private Credit (log)	2.914**	2.932**				
	(0.010)	(0.010)				
Banking crisis		0.0585		0.0815		0.148
		(0.824)		(0.760)		(0.556)
Liquid Liabilities (log)			2.906*	2.965*		
			(0.060)	(0.061)		
Commercial-Central Bank (log)					10.89***	11.16***
					(0.000)	(0.000)
Constant	-4.599	-5.093	-8.190	-8.927	-45.99***	-48.19***
	(0.441)	(0.427)	(0.175)	(0.175)	(0.000)	(0.000)
R^2	0.302	0.302	0.280	0.281	0.324	0.326
Adjusted R^2	0.270	0.263	0.247	0.241	0.293	0.288
Skewness/Kurtosis p-value	0.2177	0.2233	0.2998	0.3066	0.3162	0.3157
Observations	115	115	115	115	114	114

Notes: p-values in parentheses, $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$
Skewness/Kutosis p-value: test of normality based on skewness and kurtosis
Ho: Residuals are normal.

6.2. Panel Procedures Results

6.2.1. Financial Development, Crisis and Economic Growth: Fixed effects results

The results obtained in table 9 are similar to those obtained using the instability measures: negative effect of "private credit", positive effect of liquid liability and positive and significant effect of "Commercial-Central Bank". Also, banking crisis exercises a negative and significant effect on growth.

Table 9: Financial intermediation, Crisis and Economic Growth: Fixed Effects OLS

All the variables have been included in level without any transformation.						
	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita (log)	-5.135***	-5.237***	-5.713***	-5.623***	-5.943***	-5.693***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human Capital Index	3.203***	3.209***	3.069***	3.083***	2.679***	2.837***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Openess to trade	0.0327***	0.0313***	0.0285***	0.0271***	0.0271***	0.0276***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Government Expenditure	-0.0169	-0.00227	-0.0174	0.00488	-0.0165	0.00417
	(0.609)	(0.944)	(0.614)	(0.885)	(0.621)	(0.898)
Inflation Rate	-0.00170***	-0.00132***	-0.00166***	-0.00124***	-0.00222***	-0.00211***
	(0.000)	(0.001)	(0.000)	(0.002)	(0.003)	(0.003)
Private Credit	-0.0171***	-0.00859				
	(0.002)	(0.133)				
Banking crisis		-0.586***		-0.664***		-0.616***
		(0.000)		(0.000)		(0.000)
Liquid Liabilities			0.00261	0.00949		
			(0.703)	(0.159)		
Commercial-Central Bank					0.0553***	0.0461***
					(0.000)	(0.000)
Constant	37.41***	37.96***	42.07***	40.90***	40.29***	38.45***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.431	0.457	0.416	0.451	0.418	0.452
Adjusted R^2	0.320	0.351	0.302	0.343	0.302	0.341
Hausman test-p value	0.000	0.000	0.000	0.000	0.000	0.000
Observations	740	740	737	737	723	723

Notes: p-values in parentheses, $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Hausman test-p value: Hausman's specification test to choice between random effects and fixed effects model (Ho: Random effects model is efficient).

Our data does not suffer from stationnarity problem since it is just 8 periods time variant. .

6.2.2. Financial Development, Crisis and Economic Growth: Dynamics GMM estimations

Table 10 reports the results that are in line with the previous: strongly positive effect of financial development "Commercial-Central Bank" on growth. Negative and significant effect of banking crisis on growth.

Table 10: Financial intermediation, Crisis and Economic Growth: GMM estimators

	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita (log)	-1.448	-1.307	-1.939*	-1.848**	-3.034**	-2.085*
	(0.187)	(0.119)	(0.063)	(0.028)	(0.017)	(0.055)
Human Capital Index	6.167***	5.251***	5.462***	4.510***	5.301***	3.583**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.009)	(0.013)
Openess to trade (log)	1.953*	1.287	1.989*	1.152	1.153	0.0854
	(0.071)	(0.242)	(0.075)	(0.309)	(0.217)	(0.918)
Government Expenditure (log)	-0.914	-0.413	-1.340	-0.692	0.998	1.387
	(0.726)	(0.829)	(0.525)	(0.729)	(0.708)	(0.597)
Inflation Rate (log(var+1))	-1.689	-1.026	-0.846	0.122	-0.877	-0.355
	(0.437)	(0.475)	(0.691)	(0.937)	(0.714)	(0.815)
Private Credit	-0.0210*	-0.0116				
	(0.072)	(0.400)				
Banking crisis		-0.596***		-0.738***		-0.659***
		(0.000)		(0.000)		(0.000)
Liquid Liabilities			0.00557	0.0156		
			(0.622)	(0.142)		
Commercial-Central Bank					0.0896***	0.0692**
					(0.000)	(0.010)
Constant	-1.722	-0.205	3.801	5.891	2.953	3.023
	(0.814)	(0.978)	(0.507)	(0.306)	(0.607)	(0.467)
Sargan p-value	3.39e-11	4.08e-10	7.01e-10	1.14e-08	4.42e-08	0.000000896
Hansen p value	0.241	0.222	0.132	0.287	0.203	0.272
AR(1) p-value	0.0101	0.0104	0.00859	0.00906	0.00769	0.00798
AR(2) p-value	0.665	0.606	0.703	0.635	0.767	0.914
Observations	740	740	737	737	723	723

Notes: *p-values* in parentheses $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$
AR(2) test of autocorrelation order 2 Arrelano and Bond,
Time periods dummy are included in the regressions

Conclusion

Growing financial system around the world gives an incentive to study the link financial development and economic growth. Recent researches show a decreasing growth-effect of financial development over time due to financial crisis. Hence our interest in studying the simultaneous effect of financial development and its volatility on economic activity. Precisely, this study aims to appraise the effect of three financial development indicators ("private credit", "liquid liability" and "commercial-central bank") on both economic growth and investment considering financial volatility or banking crisis. Using both cross section and panel data on 133 countries covering the period 1971-2010, our estimations (simple OLS, fixed effect OLS, system GMM) reveal different paths of findings.

Using pure cross sectional regressions, we found that:

1. Positive and significant effect of financial development (whatever the indicator) both on real per capita GDP growth rate and investment share;
2. Negative and significant growth consequences of the volatility of "commercial-central bank";
3. Negative effect of banking crisis on economic growth;
4. No evidence to conclude that financial volatility affects investment;
5. Financial volatility does not matter a lot in the nexus financial development-economic growth: coefficients of financial development after including both financial instability or frequency of systemic banking crisis are similar to those of the regressions excluding financial volatility;
6. Financial instability or systemic banking crisis reduces significantly the positive effect of financial development on investment.

Assessing at the panel data level, we found that:

1. Negative and significant effect of "private credit" on economic growth;
2. "commercial-central bank" and "liquid liability" exert a positive influence on growth.
3. Financial fragility reduces significantly economic growth;
4. Financial fragility does not matter a lot in the relationship finance-growth.

To capture more effectively the effect of financial instability on the link finance and growth, the combination of financial instability and frequency of banking crisis[14] could give more relevant results.

[14] Include in the same regression financial instability and frequency of systemic banking crisis

Acronyms and abbreviations

2SLS:	Two stages Least Square
EBA:	Extreme-Bounds Analysis
GDP:	Gross Domestic Product
GDP:	Gross Domestic Product
GFD:	Global Financial Development
GMM:	General Method of Moments
IMF:	International Monetary Funds
IV:	Instrumental Variable
OLS:	Ordinary Least Square
WB:	World Bank
WDI:	World Development Indicator

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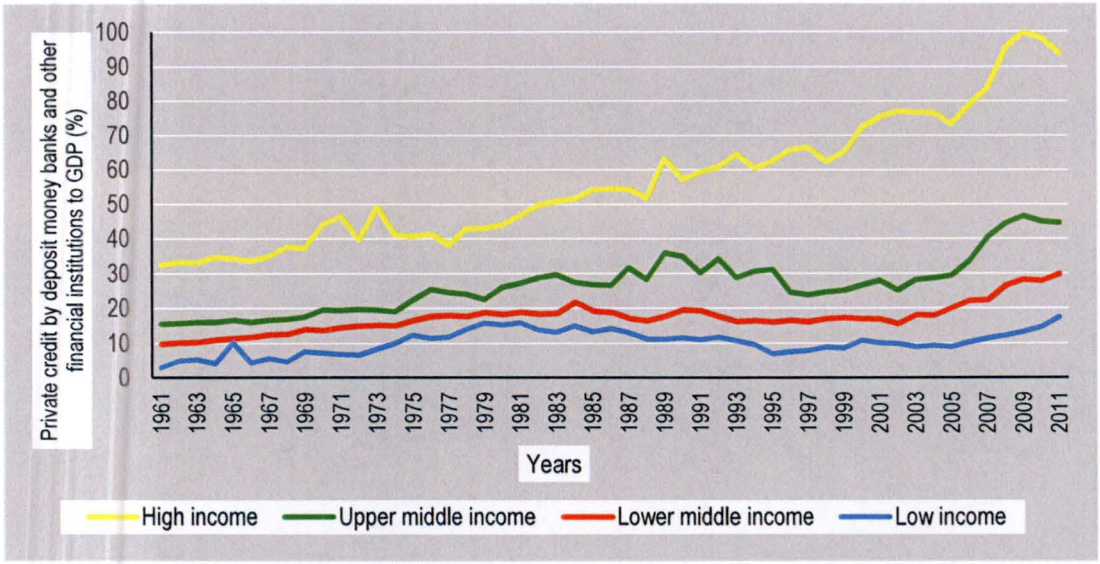
Appendix 1: Countries in the sample

Code	Country	Code	Country	Code	Country	Code	Country	Code	Country
ARG	Argentina	DNK	Denmark	JPN	Japan	NOR	Norway	THA	Thailand
AUS	Australia	DJI	Djibouti	JOR	Jordan	OMN	Oman	TGO	Togo
AUT	Austria	DOM	Dominican Republic	KEN	Kenya	PAK	Pakistan	TTO	Trinidad and Tobago
BHR	Bahrain	ECU	Ecuador	KOR	Korea, Rep.	PAN	Panama	TUN	Tunisia
BGD	Bangladesh	EGY	Egypt, Arab Rep.	KWT	Kuwait	PRY	Paraguay	TUR	Turkey
BRB	Barbados	SLV	El Salvador	LAO	Lao PDR	PER	Peru	UGA	Uganda
BEL	Belgium	GNQ	Equatorial Guinea	LBN	Lebanon	PHL	Philippines	GBR	United Kingdom
BLZ	Belize	ETH	Ethiopia	LSO	Lesotho	POL	Poland	USA	United States
BEN	Benin	FJI	Fiji	LBR	Liberia	PRT	Portugal	URY	Uruguay
BOL	Bolivia	FIN	Finland	LTU	Lithuania	QAT	Qatar	VEN	Venezuela, RB
BWA	Botswana	FRA	France	LUX	Luxembourg	ROM	Romania	VNM	Vietnam
BRA	Brazil	GAB	Gabon	MAC	Macao	RWA	Rwanda	ZMB	Zambia
BRN	Brunei Darussalam	GMB	Gambia, The	MDG	Madagascar	STP	Sao Tome	ZWE	Zimbabwe
BGR	Bulgaria	DEU	Germany	MWI	Malawi	SAU	Saudi Arabia		
BFA	Burkina Faso	GHA	Ghana	MYS	Malaysia	SEN	Senegal		
BDI	Burundi	GRC	Greece	MDV	Maldives	SLE	Sierra Leone		
KHM	Cambodia	GTM	Guatemala	MLI	Mali	SGP	Singapore		
CMR	Cameroon	GIN	Guinea	MLT	Malta	SVK	Slovak Republic		
CAN	Canada	GNB	Guinea-Bissau	MRT	Mauritania	ZAF	South Africa		
CAF	Central Af Republic	HND	Honduras	MUS	Mauritius	ESP	Spain		
TCD	Chad	HUN	Hungary	MEX	Mexico	LKA	Sri Lanka		
CHL	Chile	ISL	Iceland	MNG	Mongolia	KNA	St. Kitts and Nevis		
CHN	China	IND	India	MAR	Morocco	LCA	St. Lucia		
COL	Colombia	IDN	Indonesia	MOZ	Mozambique	VCT	St. Vincent		
ZAR	Congo, Dem. Rep.	IRN	Iran, Islamic Rep.	NAM	Namibia	SDN	Sudan		
COG	Congo, Rep.	IRQ	Iraq	NPL	Nepal	SWZ	Swaziland		
CRI	Costa Rica	IRL	Ireland	NLD	Netherlands	SWE	Sweden		
CIV	Cote d'Ivoire	ISR	Israel	NZL	New Zealand	CHE	Switzerland		
CYP	Cyprus	ITA	Italy	NER	Niger	SYR	Syrian Arab Republic		
CZE	Czech Republic	JAM	Jamaica	NGA	Nigeria	TZA	Tanzania		

Appendix 2: Variables and sources

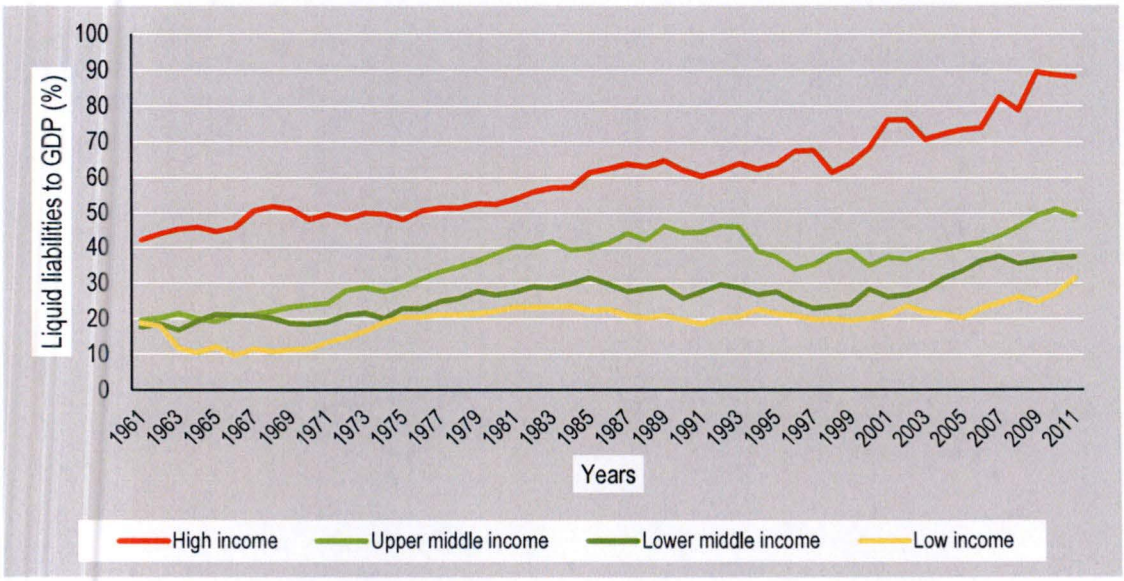
Variable	Definition	Source
growth	Real GDP per capita growth (annual %)	Penn World Table 8.0 (PWT 8.0)
inv	Investment Share of PPP Converted GDP Per Capita at 2005 constant prices	Penn World Table 7.1 (PWT 7.1)
priv	domestic private credit to the real sector by deposit money banks as percentage of local currency GDP	Global Financial Development (GFD)
deph	Liquid liabilities to GDP	Global Financial Development (GFD)
bank	Deposit money bank assets to deposit money bank assets and central bank assets	Global Financial Development (GFD)
open	Openness at 2005 constant prices	Penn World Table 7.1 (PWT 7.1)
inf	Inflation rate, consumer prices	World Development Indicators (WDI) 2015
gov	General government final consumption expenditure (% of GDP)	World Development Indicators (WDI) 2015
hc	Index of human capital per person, based on years of schooling (Barro/Lee, 2012) and returns to education (Psacharopoulos, 1994)	Penn World Table 8.0 (PWT 8.0)
pop_tot	Total Population	World Development Indicator: WDI 2015
crisis	number of years that the country has experienced systemic banking crises	Computation based on the data: Carmen M Reinhart and Kenneth S Rogoff completed by the GFD database (banking crisis dummy).

Appendix 3: Supplemental Figures



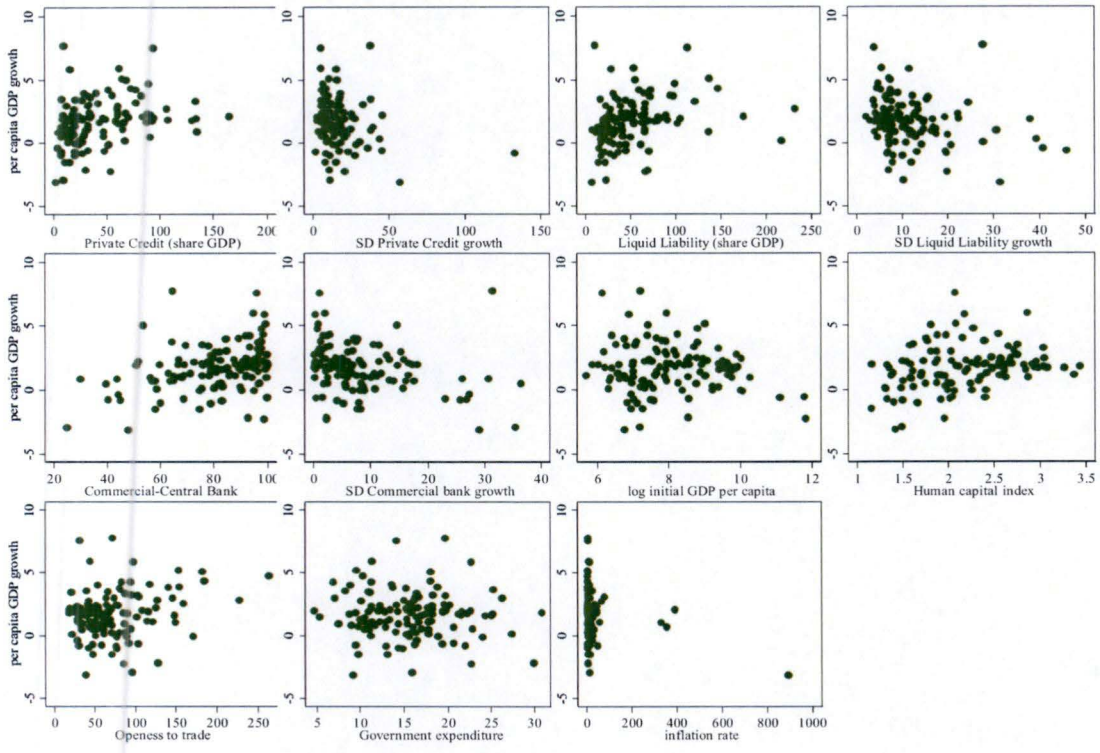
Source: WB/Global Financial Development

Supplemental Figure 1- Private credit across income group countries from 1960 to 2011

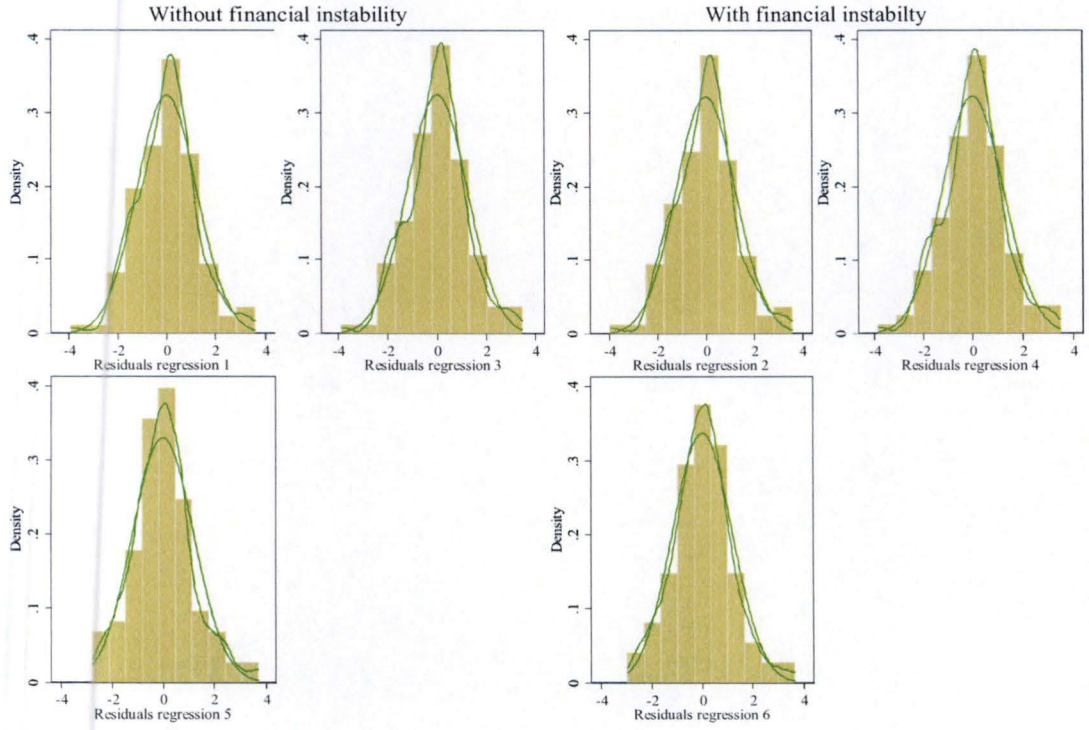


Source: WB/Global Financial Development

Supplemental Figure 2- Liquid liabilities to GDP (%) across income group countries over the period 1960-2011



Supplemental Figure 3- Correlation graphic: Cross country data (correlation with economic growth)



Note: In all these graphs, kernel density and normal density move together.

Supplemental Figure 4- Residuals Regressions in table 3

Appendix 4: Financial intermediation, Financial instability and Economic Growth: Cross Country OLS estimations (Sample of 129 countries: **Brazil, Peru, Bolivia and Congo Zaire removed)**

	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita (log)	-0.936***	-0.917***	-0.911***	-0.943***	-0.951***	-0.943***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human Capital Index	1.657***	1.611***	1.936***	2.010***	1.971***	2.037***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Openess to trade	0.00928***	0.00923***	0.00511	0.00473	0.00833**	0.00883***
	(0.001)	(0.001)	(0.156)	(0.222)	(0.011)	(0.006)
Government Expenditure	-0.0631**	-0.0612**	-0.0547**	-0.0572**	-0.0648***	-0.0606**
	(0.023)	(0.035)	(0.045)	(0.041)	(0.005)	(0.011)
Inflation Rate	0.0120	0.0146*	0.00498	0.00385	0.00561	0.00996
	(0.106)	(0.051)	(0.475)	(0.606)	(0.373)	(0.132)
Private Credit	0.0212***	0.0205***				
	(0.000)	(0.001)				
Instability of Private Credit		-0.00669				
		(0.466)				
Liquid Liabilities			0.0176***	0.0184**		
			(0.008)	(0.011)		
Instability of Liquid Liabilities				0.0120		
				(0.443)		
Commercial-Central Bank					0.0412***	0.00999
					(0.001)	(0.613)
Instability of Commercial-Central Bank						-0.0765**
						(0.021)
Constant	5.090***	5.115***	4.587***	4.610***	2.244**	4.996***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.018)	(0.005)
R^2	0.488	0.485	0.480	0.477	0.490	0.512
Adjusted R^2	0.458	0.449	0.450	0.440	0.460	0.478
Observations	110	108	110	108	109	109

Notes: p-values in parentheses, $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

All the variables have been included in level without any transformation. Our data does not suffer from stationnarity problem since it is not a time variant data.