

FINANCE-GROWTH NEXUS, INCOME LEVELS AND MACROECONOMIC STABILITY: AN EMPIRICAL INVESTIGATION

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Abstract

The purpose of this empirical, experimental paper is to analyze the link between Finance and short-run Growth among three groups of countries divided by income. In particular, following the recent empirical literature, we are interested to observe if the link is always enjoyed and/or if the mechanisms of transmission between finance and growth are different at different stage of development. To obtain more information we introduce a recent measure of macroeconomic stability. The results confirm that we can observe some form of relationships between finance and growth just in developing and developed countries but not in poor countries. Also, the role of macroeconomic stability appears crucial in the "transition path" and we have a suggestion about the different mechanisms of transmission that are working in the three groups.

INTRODUCTION

The link between finance and growth is one of the most important fields of research in economics. In the last two decades, the development of econometric techniques has allowed researchers to answer some questions related to the nature of this link and to correctly evaluate its relationship.

Several studies have offered strong support to the hypothesis that a good financial system offers a basis for a long-term growth (Levine 2004) and consider the absence of the finance-growth link as a result of specific idiosyncratic shocks. Other works, consider the nature of shocks to evaluate correctly the cause and effect of financial changes and suppose that this relationship is not strictly caused by differences between countries (Rousseau and Watchel 2002).

The empirical evidence is quite wide in terms of techniques and results

(Eschembranch 2004) but many consider that the link should be varied if we consider rich or poor countries, because they need different types of financial support. The financial system is always based on "confidence" (Tobin, 1965) and the level of confidence depends on "Macroeconomic Stability".

This paper attempts to offer a new evidence to support the hypothesis that the relationship between finance and growth is different at a different stage of development and also, that the level of Macroeconomic Stability has an impact on the determination of the final effect of finance on growth.

This evidence is offered by the use of Least Square Dummy Variable (henceforth LSDV) estimation and by the introduction of another indicator of stability, namely the "liquidity reserve ratio" of banks.

BRIEF LITERATURE REVIEW

The empirical literature on the link between financial and economic development is vast and there is no single way to classify it. An extensive scrutiny of all aspects that are discussed in the literature is beyond the scope of this paper (see Ang, 2008 for a recent survey). If we consider the evolution of empirical studies and results we can classify the studies on finance and growth from a new viewpoint (as we can see in Perri, 2013):

- Studies that find a strong and robust relationship between finance and growth and go on to find the mechanism of transmission between the financial sector and the economic system.
- Studies that find the link, but that take into account the differences among countries in respect to the different level of economic development and consider the link between finance and growth that is found to vary depending on both the context and through time (long run and short run effects).
- Studies that ignore the link between finance and growth. In these kinds of studies, the effect of finance on growth is caused by other factors (such as macroeconomic stability, the legal system, international trade and degrees of freedom).

The first generation of empirical studies started from the theoretical intuition of Schumpeter (1911). According to this point of view, finance can help growth by the allocation and diversification of savings. Savings go from family to firms via banks (bank based) or via financial markets (market-oriented), in any event, the role of the financial system is to aid the accumulation and allocation of investments. The final effect is an

increase of fixed capital and the growth rate. The financial system from this viewpoint represents the link that closes the circle between savings, investment, and capital in the economic system.

The empirical studies related to this viewpoint use some indicators of financial development and some indicators of economic growth to show that a financial system can be a good predictor of future economic growth. These studies show that some aspects of differences in economic growth can be explained by the differences in financial indicators. In particular, the work of King and Levine (1993) is a cornerstone of this viewpoint. The authors conclude that countries that have a good financial sector have experienced more growth in the subsequent periods.

Similar results are present in Levine and Zervos (1998). In this work, the authors confirm the link between finance and growth after control for the specific differences related to a “country effect”.

Another example of this viewpoint is Rousseau and Sylla (2001) who find a strong correlation between financial factors and economic growth that is consistent with a leading role for finance.

This conclusion is further supported by Harrison, Sussman and Zeira (1999) who find a feedback effect between the real and the financial sector that helps to explain international differences in output per capita. This is an example of “reverse causation” explained by the famous words of J. Robinson (1952), “firms lead finance follows”. This problem is particularly difficult to solve and most researchers have sought to develop methods to avoid it (La Porta et al 1999, Rajan and Zingales 1998).

Luintel and Khan (1999) identified as long-run financial depth and the output relationship linking financial and economic development. They also find a negative contemporaneous correlation between the level of financial development (depth) and growth in per capita income in 7 out of 10 countries and a strong positive correlation between the levels of financial depth and per capita output in all sample countries. Beck, Levine and Loayza (2000) confirm an economically large and statistically significant relationship between financial development and both real per capita GDP growth and total factor productivity growth.

In their study, the positive link between financial intermediary development and both physical capital accumulation and private savings rates is, however ambiguous since it is not robust to alterations in estimation techniques and to measure of financial intermediary development.

The evolution of the empirical literature (in terms of methodology and availability of data) has had a strong impact in respect of a range of results (Eschenbanch 2004). There are several plausible reasons for this variety.

First of all, the differences in a long run relationship and short-run dynamics in the finance and growth nexus was explained by Fisman and Love (2003) and Loayza and Ranciere (2002). The latter find that a positive long-run relationship between financial intermediation and output growth coexists with a, mostly, negative short-run relationship.

Secondly, new techniques have shown the possibility of non-linearity in the relationship. This fact was not picked up as significant by standard estimation techniques. Deidda and Fattouh (2002) with a threshold regression find a positive

relationship between the level of financial depth and economic growth in countries with high income per capita, but no significant relationship for lower-income countries, which is consistent with the nonmonotonic relationship implied in the model. The same result was found in the same period by Rioja and Valev (2003) and Favara (2004). In particular, Favara (2004) shows that if we analyze different groups of countries (by income) the link between finance and growth is variable with respect to the development phase. These authors also show that the use of different econometric techniques can lead to different results.

Some questions remain open in this literature. For instance, if the link depends on the particular characteristics of the economic system, is it possible to find them? When we identify common characteristics of countries in which finance has a positive role in the growth, can we synthesize these characteristics into a single indicator?

Rousseau and Watchel (2002) following the intuition of Minsky (1977, 1982) and using threshold regression, focus their attention on "macroeconomic stability". If one country is stable, then there is a relative investment prospect and savers can decide about what investment forms there should be with respect to the expected returns. In stable countries, it is simple to transform savings into an investment with the help of banks or markets. If the degree of "stability" declines the elasticity of substitution between various forms of investment, the link between finance and growth can disappear (for a certain "critical value" of stability). In this case, we can indirectly explain why rich countries demonstrate this link, not because they are rich but because they are stable.

Rousseau and Watchel (2002) used the inflation rate as an indicator of stability and conclude that a country can be considered “stable” if the inflation rate is lower than 15% per year.

One possible element of criticism in respect of this approach is the effective mean rate of inflation because we can suppose that inflation is not only an effect of instability but in fact can be a cause of it. For these reasons, Perri (2013) used another indicator of Macroeconomic Stability as a threshold variable, the bank liquidity reserve ratio.

The author has supposed that an increasing value of liquidity in the banking system is a proxy of uncertainty in the macroeconomic behavior. In this work, the author concludes that the link between finance and growth is present only in “stable countries” with a bank liquid reserve rate lower than 9,5%. Interesting is the comparisons between groups, “stable countries” appear to be a sub-sample of “rich countries”.

We end this brief survey by focusing on some key points at this stage of the finance-growth empirical literature.

The first is that the relationship between finance and growth is not linear if we analyze it by international comparison [Deidda and Fattouh (2002), Rioja and Valev (2003) and Favara (2004)], this empirical result is in agreement with the intuition of Rybczynsky (1988). Countries at different stages of development need different types (and amount) of financial services.

Secondly, the link between finance and growth is not always present, at least in the short run (Loayza and Ranciere 2002 and Favara 2004). Macroeconomic Stability can have a strong impact on the finance-growth link (Rousseau and Watchel, 2002) and can explain why it is

always present in rich and stable countries (Perri, 2013).

Starting from these results the object of this work is to analyse the short-term finance-growth nexus with an LSDV panel regression of a general production function augmented with some indicators of financial development (common in literature, see, for instance, Levine and Zervos, 1998) including a new indicator of macroeconomic stability (introduced by Perri, 2013). To do so, we will carry an experiment divided into two parts. Following the Levine and Zervos (1998) specification, we will see the relationship between finance and growth for all countries of our sample (both developed and developing economies).

After that we divide our sample into three groups of income, High, Medium and Low (see table 5 for the list of countries), to observe if the relationship between financial variables and growth is still the same in the subgroups. In all the specifications we will introduce a new indicator of Macroeconomic Stability, the “liquidity reserve ratio” of banks in order to verify the existence of different impacts in wealth and stability that could affect the mechanism of transmission between financial variables and growth.

MATERIAL AND METHODS

The analysis in this section is based on the work of Levine and Zervos (1998), in particular, and differently of it, we apply LSDV regression with panel data to analyze whether the response of common financial variables is influenced by income and stability effects. To do so, we introduce a new indicator of macroeconomic instability, namely the “bank’s liquidity reserve ratio”. In this type of model the growth rate of GDP (Δy_i) depends on a vector of real variables (

$\Delta \mathbf{x}_i$) and at the same time depends on a vector of financial variables ($\Delta \mathbf{z}_i$).

The model is the following:

$$\Delta y_i = \beta + \beta_1 \Delta K + \beta_2 \Delta L + \delta_1 \Delta capit + \delta_2 \Delta credbank + \delta_3 \Delta reser + \delta_4 \Delta spread + \delta_5 \Delta rint + \delta_6 \Delta gsav + u_i \quad (1)$$

In the model Δy_i is the five-year growth in GDP in the period 1992-2007, whilst $\Delta \mathbf{x}_i$ and $\Delta \mathbf{z}_i$ are the five years growth of real and financial variables. Including real factors in the model, L&Z try to isolate the effects on financial variables to verify the significance of these variables. The estimate of variance is obtained by an estimator that is robust with respect to the homoscedasticity problem. The econometric specification is:

$$\Delta y_i = \beta + \beta_1 \Delta K + \beta_2 \Delta L + \delta_1 \Delta capit + \delta_2 \Delta credbank + \delta_3 \Delta reser + \delta_4 \Delta spread + \delta_5 \Delta rint + \delta_6 \Delta gsav + u_i \quad (2)$$

Where K and L represent two gross measures of the production function, we suppose that gross fixed capital formation (K) and the gross amount of the labour force (L) can capture a good part of the production function effect.

In particular, some authors use other measures of labour supply, but in our opinion, a more sophisticated measure can be wrong if we consider jointly countries with different types of the education system or with heterogeneous job market rules. For this reason, a gross measure of labour supply can be used.

The first two measures of the financial system are related to the literature of "bank-based" and "market-oriented" form of intermediation. We use two standard measures to capture these effects: market capitalization (*capit*) (see

Arestis et al., 2001) and bank credit to the private sector (King and Levine, 1993) (*credbank*), these variables are used in this context to see if these differences between two forms of intermediation is significant for modern economic systems.

Another two standard measure of financial development is the real interest rate (*rint*) and gross domestic saving (*gsav*). In the growth model saving is the most important factor, but in the financial growth context, the effects of variations in savings on growth depend on the efficiency of the financial sector. A high rate of saving does not always determine a high GDP growth rate, it depends on the quality of banking (or market) selection of investment.

The interpretation of the real interest rate parameter is more complex because its interpretation is always ambiguous in empirical results (Tsuru, 2000). It represents a measure of profitability of investment, but at the same time, it represents a measure of risk.

To consider a degree of competition in the financial sector, we use the difference between the rate applied to deposits and lending (*spread*) (Mattesini, 1996). We expect that an increase in competition, as a reduction in spread, is related to an increase in GDP growth, but some authors (Mayer, 1988 for instance) argue that in the first stage of development (for countries in economic transformation) strong market power for banks is important to guarantee stability. We use the LSDV estimator for regress the GDP variation with respect to the variation of financial and real variables. Also in this experiment, we use a new indicator for Macroeconomic Stability and consider three sub-sample of countries divided ex-ante by income (based on World Bank criteria, Favara 2004). The focus of these types of splitting is to verify if the

mechanisms of transmission between finance and growth are different in the subgroups and what is the role played by stability. The variable used in this work to represent the macroeconomic stability is the bank's liquidity reserve ratio (*reser*), in the next subsection, we explain briefly the reasons for this choice.

All data was taken from World Development Indicators Database (World Bank 2008), we have analyzed the sample before 2008 to prevent bias due to the effects of the global crisis in our investigation.

All variables are expressed in log form, except those that are expressed by percentage (*rint*, *spread* and *reser*). The difference between the last and the first observation, in the 5 year period, will represent always the variation in absolute terms. We have obtained 11 observations to a country by the use of Rolling Windows technique (similar to Yilmazkuday, 2011). For all the specifications we did the tests that confirmed the good specification of the model (Jarque-Berra, Condition Number, White, Hausman and Swartz). To show that "Rolling Windows" do not affect the estimation we also did a Monte Carlo simulation that confirmed the absence of distortion of our estimator.

Bank's Liquidity Reserve Ratio and Macroeconomic Stability.

Various measures of Macroeconomic Stability proposed in the literature are all affected by some problems. In particular, the inflation rate used by Rousseau and Watchel (2002) (henceforth R&W) can at the same time be the cause and effect of instability. For example, an external shock like reduction of oil supply has a strong effect on the inflation rate for countries that are net oil buyers. This is not a case of variation of

internal stability if we consider the relationship between the internal financial system and internal savers, but inflation is affected. Secondly, inflation tends to be stable for long periods, if we use an R&W classification, a country that has 15.1% inflation rate for one year is unstable, but if this country has the same 15.1% inflation rate for the next 15 years it will be stable.

In this work, we propose another indicator of instability, namely the bank's liquidity reserve ratio. Following the arguments presented in Perri (2013), this value represents a practical measure of risk behavior of internal banks. This indicator varies between two extreme cases. The first represents a system with perfect information and guarantees deposits (like public insurance), in this case, the probability of default is zero and the amount of liquid reserve is also close to zero. The second extreme case is a system with political and social instability, the uncertainty of returns and a high probability of default. In this case, internal banks have to prevent their default risk and to avoid that they increase the liquid reserve ratio (Demirguc-Kunt and Detragiache, 1998). We suppose that bank managers are capable to understand the right level of instability, as they decide the amount of liquidity. Whenever they take wrong decisions the bank's loose profits (if they overestimate the instability, Acharya et al., 2011) or risk failure (if they underestimate the instability). If managers prefer to risk in order to gain higher profits rather than not to risk and have low profits it can cause bank runs because the failure of an important bank determines the failure of the entire financial system (Aikman, 2012). After the shock caused by bank runs the government (or international financial institution) helps the financial system to get rebuilt, but the managers will be changed. This kind of crisis was experienced by many countries

during the period covered by our analysis, but the average of Liquidity Reserve Ratio for a long period is still a good indicator of instability. In particular, Liquidity Reserve Ratio is the only indicator that considers internal or external risk because it is considered as a good measure of the "financial vulnerability" (Gavin and Hausmann, 1996) of the entire macroeconomic system. This indicator is useful to represent macroeconomic stability because it includes a good number of other effects that are very difficult to evaluate such as social and political instability, therefore this rate is determined by banks in competition in the market without constraints.

RESULTS

If we observe the results of "All countries" specification (table 1), we have a picture of the world that is not easy to understand. The real factors are significant to explain growth differences (K, L), the degree of concurrence in the credit market (spread) and macroeconomic stability (reser) are also significant. Savings don't explain growth variations and do not matter if the financial system is banking oriented or market-oriented.

In table 2, we have the results of regression for "High-Income Countries". The real factors (K, L) are still significant, but the analysis of the financial factors represents a situation very interesting. Savings promote growth, does not matter again if the system is bank based or market-oriented. The degree of concurrence is weakly significant, but with an unexpected sign. We can suppose that, in a rich country, the concentration of banks represents a positive factor for growth that permits to the banks to reduce costs and increase efficiency in the investment process. The interest rate is positively correlated (weakly) to the

differences in growth, in this case, we can explain this result with the interpretation of interest rate as a "profits proxy". When the interest rate increase it could have two possible reasons: the first, are increasing costs for firms to finance investments (due to monetary policy for instance); the second is that there are more requests of funds to banks to make investments, and then banks augment the interest rate because of the demand pressure. The latter is the interpretation that better explain what happened in the aforementioned period to the rich countries.

In table 3, we have the results of "low-income countries" regression. In this case, we can observe that just the real factors (K, L) explain growth during the considered period. This means that for the poor country we need an improvement of economic behavior before to consider financial factors. Growth is not mediated by the financial sector, we can call it "exogenous growth". The communication between finance and growth is absent and the variations of GDP are determined by other factors captured implicitly by the production function (public expenditure or foreign investments).

In table 4, we have the results from "middle-income countries". In this case stability (reser) is significant with the expected sign, increasing in macroeconomic stability promotes growth at the intermediate level of income. Capital is still significant, but not labour. This result is not strange in a huff. We can suppose that these countries have an abundant level of the labour force, in this case, variations in the labour force could not be a determinant of growth. Differently, the variations in growth are strictly determined by the amount of capital available for workers. Saving is weakly significant, but with the opposite

sign. If we observe that this panel of countries is developing countries, we can explain this result with the role played by consumptions in growth. Saving is important for the long-term growth, this analysis observes a short period of 5 years in which probably saving could be a brake for growth, in developing countries (coherently with Loayza and Ranciere, 2002).

CONCLUSION AND RECOMMENDATIONS

At the end of this experiment, we have obtained some confirmations of previous empirical literature and suggestions for future research. First of all, there is no evidence of the short time relationship between finance and growth in low income and medium income countries. A positive impact of savings in growth appears just in rich countries. Also, in rich countries, a reduction of concurrence in banks is positive for growth. Second, the role of macroeconomic stability is strong in medium income countries, this suggests a possible existence of thresholds in income that divide “stable” and “unstable” countries. Third, in the short run, we can't observe differences between bank oriented and market-oriented financial systems. These results could indicate a path for future research. They have to study small sub-groups of countries, homogeneous for characteristics (stability, geographic, law), to observe if there are threshold effects that explain when, in the growing process, a positive role of finance occurs. Besides, in finance-led countries, we have to investigate if there are different mechanisms of transmissions between finance and growth that could explain why in the short run we have obtained results in contrast with the theory.

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Table 1. - All Countries

<i>Panel Regression, LSDV Estimator (Least Square Dummy Variable)</i>	
<i>Variables expressed in log form</i>	
<i>Observations = 836</i>	
<i>t statistics in parentheses</i>	
	Coefficients
<i>capit</i>	-0.013 (-1.00)
<i>credbank</i>	0.616 (0.45)
<i>reser</i>	-1.019 (-1.83)**
<i>spread</i>	-0.723 (-2.21)***
<i>gsav</i>	-1.657 (-1.24)
<i>rint</i>	-0.001 (-0.02)
<i>k</i>	0.703 (9.08)***
<i>l</i>	0.839 (3.14)***
<i>_cons</i>	11.476 (4.75)***

* significant at 10%

** significant at 5%

*** significant at 1%

Table 2- High-Income Countries

<i>Panel Regression, LSDV (Least Square Dummy Variable)</i>	
<i>Variables in log, Dep. Variable GDP</i>	
<i>Observations = 297</i>	
<i>t statistics in parentheses</i>	
	Coefficients
<i>capit</i>	-0.004 (-0.40)
<i>credbank</i>	-1.190 (-0.67)
<i>reser</i>	0.551 (1.10)
<i>spread</i>	1.912 (1.56)*
<i>gsav</i>	0.516 (1.95)**
<i>rint</i>	0.399 (1.71)*
<i>k</i>	1.062 (7.13)***
<i>l</i>	1.083 (1.87)**
<i>_cons</i>	12.493 (3.53)***

* significant at 10%

** significant at 5%

*** significant at 1%

Table 3- Low-Income Countries

<i>Panel Regression, LSDV (Least Square Dummy Variable)</i>	
<i>Variables in log, Dep. Variable GDP</i>	
<i>Observations = 297</i>	
<i>t statistics in parentheses</i>	
	Coefficients
<i>capit</i>	-0.007 (-0.22)
<i>credbank</i>	-0.128 (-0.05)
<i>reser</i>	0.116 (0.08)
<i>spread</i>	0.212 (1.69)*
<i>gsav</i>	-1.440 (-0.90)
<i>rint</i>	0.177 (1.22)
<i>k</i>	0.721 (5.20)***
<i>l</i>	1.025 (2.57)***
<i>_cons</i>	5.318 (1.06)

* significant at 10%

** significant at 5%

*** significant at 1%

Table 4- Medium-Income Countries

<i>Panel Regression, LSDV (Least Square Dummy Variable)</i>	
<i>Variables in log, Dep. Variable GDP</i>	
<i>Observations = 242</i>	
<i>t statistics in parentheses</i>	
	Coefficients
<i>capit</i>	-0.011 (-0.29)
<i>credbank</i>	0.207 (0.84)
<i>reser</i>	-0.261 (-2.36)***
<i>spread</i>	-0.286 (-0.64)
<i>gsav</i>	-0.550 (-1.69)*
<i>rint</i>	0.001 (0.17)
<i>k</i>	0.435 (2.82)***
<i>l</i>	0.357 (0.67)
<i>_cons</i>	17.382 (4.10)***

* significant at 10%

** significant at 5%

*** significant at 1%

Table 5- Countries, GNI per capita (World Bank, 2008)

Low Income GNI per capita lower than 3,975 \$ per year	Medium Income GNI per capita between 3,975 and 12,275 \$ per year	High Income GNI per capita greater than 12,275 \$ per year
Bangladesh	Argentina	Australia
Bolivia	Botswana	Austria
Brazil	Chile	Belgium
Bulgaria	Costa Rica	Canada
China	Croazia	Cyprus
Colombia	Czech Republic	Finland
Cote D'Ivoire	Estonia	France
Equador	Ungheria	Germany
Egypt	Latvia	Greece
Fiji	Lithuania	Iceland
Ghana	Mexico	Ireland
Guatemala	Oman	Israel
India	Panama	Italy
Iran	Poland	Japan
Jamaica	Romania	Korea
Jordan	Russia	Kuwait
Kenya	Slovak Republic	Malta
South Korea	South Africa	Netherlands
Macedonia	Trinidad and Tobago	New Zeland
Marocco	Turkey	Norway
Namibia	Hungary	Portugal
Nigeria	Venezuela	Saudi Arabia
Paraguay		Spain
Perù		Sweden
Sri Lanka		Switzerland
Tunisia		United Kingdom
Ukraine		USA