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Abstract

This work estimates the impact of Private Credit to the private sector and Liquid Liabilities (as measures of financial development) on economic growth, capital growth and productivity growth for different regions. Estimations are conducted with a panel database of 78 countries and 35 years using GMM system estimator method for dynamic panel data, correcting by Windmeijer (2005) robust errors and using fewer and relevant instruments compared to the established procedure in the literature of financial development and economic growth. We consider four geographical regions, Latin Amerca, Europe and North America, Asia and Africa. The results with this new methodology, that improves the inference over the usual one used in the literature , suggest a significant effect of financial development in economic growth for the entire panel (for the measue of Liquid Liabilities) and Latin America. We find no evidence of an effect of our financial development measures over physical capital accumulation but there is a positive effect of financial development, measure by liquidity, over total factor productivity growth. The effect of financial development over economic growth is greater in the less developed regions.

JEL Classification: O1, O4, G2

Keywords: Financial development, economic development, productivity growth, capital growth, financial intermediation, economic growth.

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1 Introduction

The vast majority of theoretical and empirical evidence recollected and analyzed in Levine (2005) suggest that financial development contributes to improve economic growth in the long run. However, the role of the financial sector in economic growth has been an important issue of debate among economists.

Authors like Robinson (1952) and Lucas (1988) are skeptical and believe that finance act in response to demands of the real sector. Also, in the collection of studies of Meier and Seers (1984), pioneers of development, financial development is not even suggested as a determinant of economic growth.

On the other hand, Bagehot (1873), Schumpeter (1912), Gurley and Shaw (1955), Goldsmith (1969), McKinnon (1973) and Shaw (1973) believe that financial development can not be left aside as an explanation of economic growth.

Aghion and Howitt (1998) assessed Schumpeter's point of view that financial institutions affect economic growth mainly by productivity growth and technology change by deciding capital allocation among firms but not through changing the savings rate.

Other part of the literature argues that the key factor for economic growth is capital accumulation and that better financial intermediaries influence economic growth through a higher savings rate and by attracting foreign investment. For this subject see King and Levine (1994) and Fry (1995). Then, the literature that supports that financial development affects economic growth does not shown consensus on the transmission mechanism. Our work does not only assess empirically with the most modern methods the relationship between financial development and growth, but also tries to find the sources that lead to this positive relationship and tries to find out the transmission mechanism.

A lot of empirical evidence accounts for a positive relationship between financial development and economic growth in the long run. The seminal empirical work of King and Levine (1993) that includes measures of financial development in standard economic growth regressions found a positive, robust and statistical significant relationship between financial conditions and subsequent economic growth for a cross-section of 80 countries. Beck, Levine, and Loayza (2000) found an economically and statistically significant relationship of financial development over economic growth and productivity growth. Also, they found an ambiguous connection with capital growth and the savings rate.

Levine, Loayza, and Beck (2000), using traditional cross-section methods of instrumental variables and GMM dynamic panel techniques that were novel for that time, find that the exogenous component of financial development is associated in a positive way with economic development.

In 2005, Windmeijer (2005) proved through Monte Carlo simulations that the estimation of asymptotic standard errors in the GMM system estimator in two-steps for panel data were severely downward biased for small finite samples. Thus, the inferences of studies like Levine, Loayza, and Beck (2000), Beck, Levine, and Loayza (2000), Rioja and Valev (2004b) and Rioja and Valev (2004a)[1] are invalid as we will see in our estimations that show this severe bias in usual standard errors in contrast with the robust ones corrected by Windmeijer (2005).

Other problem that we consider is the tendency to use too many instruments that although they can be individually valid, when taken as a group could be invalid in finite samples due to an over-adjustment of the endogenous variables (Roodman (2009)). Furthermore we consider the worries of Clemens and Bazzi (2009)

[1] According to Roodman (2009) many past studies based their inference on one-step estimation errors that are less downward bias than the ones of the two-step method. However, the Windmeijer (2005) correction for robust standard errors for the two-step method is the correct procedure for these kind of estimations.

that estimations of economic growth tend to be invalid when many instruments are used.

These recent developments allow us to make a reevaluation of the impact of financial development on economic growth and its sources.

While exogenous components of financial development continue showing an impact on economic growth it is necessary to understand the determinants of this financial development. The literature on this issue has followed two lines. The first one has analyzed legal systems and regulations and macroeconomic policies as possible explanations for financial development (See Levine (2005)). The other one has gone further trying to understand the forces that determine laws, regulations and institutions that lie beneath financial development studying differences in politics, culture and geographical regions. It is considered that these variables affect financial development (see Engerman and Sokoloff (1997), Acemoglu, Johnson, and Robinson (2001), Beck, Demirguc-Kunt, and Levine (2003) and Easterly and Levine (2003)).

These studies provide rationality to our classification of countries into geographical (and in some way cultural) regions and the estimation of the effects of financial development on economic growth in the different areas of interest. Our results show that there is an important heterogeneity between different regions.

The structure of this work is as follows. Section I is the introduction. In section II and III we provide a thorough analysis of the data, comparing key variables across regions and time. In Section IV we describe the methodology that we use in our estimations. In section V we present our main results with the estimation of the effect of financial development on economic growth and its sources for the whole panel and for the panel divided into regions. We also provide results of tests supporting the validity of our models and questioning the validity of models used in previous literature. In section VI we calculate the effects of an exogenous increase of 10% of Private Credit and Liquid Liabilities for the different regions in our study. Section VII presents the conclusions of this work. Finally, we have five different Appendix. In Appendix A we provide tables and figures for a better understanding of the data we worked with. In Appendix B we provide our main estimations and results in different tables and in Appendix C we provide the impacts of our financial development measures on the growth rate of per capita GDP for the different Latin American countries in our sample. In Appendix D we present additional estimations to check the robustness of our main results. In Appendix E we provide Stata commands of xtabond2 to illustrate how our main estimations were generated.

2 Data Description

The theoretical literature of financial development establishes that financial system influence economic growth by reducing transaction and information costs, and by improving information acquisition by firms, improving firms decisions and risk sharing. However, it is rather difficult to find empirical measures that account for these functions of the financial system. Therefore, we use proxies of financial development, being this one of the limitations of our analysis.

Following the empirical literature, we use two indicators of financial development in a country: Private Credit (PC) and Liquid Liabilities (Lly). The first one is the value of credits by financial intermediaries to the private sector divided by GDP and is the most common measure of financial intermediation. It was used in empirical studies like Goldsmith (1969) and King and Levine (1993). Liquid Liabilities equals liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries) divided by GDP and is a measure usually used like in Beck, Levine, and Loayza (2000) and Levine, Loayza, and Beck (2000) also used this measure and Private Credit. De Gregorio and Guidotti (1995) discuss the convenience of using levels of monetization such as Liquid Liabilities versus using

Private Credit. In spite of preferring Private Credit over Liquid Liabilities, they alert that this measure is not flawless because it can be a weak indicator of financial development in economies that have a significant amount of financial development happening outside the banking system, e.g. in the capital markets. At the same time, the stock of Liquid Liabilities could be small but associated with sophisticated financial markets that allow individuals to save in their real liquid holdings, necessary for a transactional purposes, specially in economies that suffered from high and sustained inflation and as a result experienced a severe demonetization process. This demonetization process could also be caused by specific sovereign risk and by saving in foreign currency.

The dependent variables used in this study are three: economic growth measured as real GDP per capita growth (Growth), capital growth, that is the growth of the real per capita stock of physical capital (Capgrols) and productivity growth defined as the growth of the Solow residual (after taking into account the growth of capital stock and labor working force) (Prod1)[2].

The data consists of a panel containing 78 countries for the 1961-1995 period and it is similar to the one used in Beck, Levine, and Loayza (2000)[3]. The data are non-overlapping averages over 5 year periods resulting in 7 time observations (1961-1965, 1966-1970,...,1991-1995).

The rest of the variables are mainly used for control and have the following explanation.

Initial is defined as real GDP per capita at the start of each period and will appear as a control for convergence of the economic growth rate among countries as in the standard Solow-Swan growth model. Gov is the public consumption or public expenditure divided by GDP, Trade is the commercial openness divided by GDP (defined as Exports plus Imports divided GDP). Inflation is another variable used as control. These last three variables control for macroeconomic policy and stability in each of the countries. For instance, large public expenditures and high inflation tend to affect growth adversely while trade opening tends to affect growth in a positive way. On the other hand, bmp (black market premium) is measured as the coefficient between black market and official exchange rate and is a proxy for commercial, exchange rate and price distortions. Finally, sec is the average years of secondary school of the country's total population and controls for human capital accumulation.

As explained by Beck, Levine, and Loayza (2000), productivity growth is created in the following way. Consider that the production function that generates the data for period t is the following.

$$Y_t = A_t L_t^{1-\alpha} K_t^{\alpha} \tag{1}$$

Y_t is the GDP of the economy, L_t is the labor force, K_t is the capital stock and A_t is a technology parameter in the economy. If we divide by the labor force to obtain per capita variables and take logarithms we have that

$$ln(y_t) = ln(A_t) + \alpha ln(k_t) \tag{2}$$

Because this equation generates the data for any generic period t, it must hold in $t-1$. So we can substract 2 in $t-1$ to (2) to obtain

[2]Another variable that is used in the literature is private savings. It is not used in our study because it belongs to another panel data where time observations are fewer, as is the number of countries in that sample. It also has a different set of explanatory variables than the one used here.

[3]The database was obtained from the World Bank web site. It has suffered from several modifications since Beck, Levine, and Loayza (2000) due to data updates. The final database used in this work is available upon request.

$$[ln(y_t) - ln(y_{t-1})] = [ln(A_t) - ln(A_{t-1})] + \alpha[ln(k_t) - ln(k_t)] \quad (3)$$

We can re-express (3) as

$$\text{Productivity Growth} = \text{Economic Growth} - \alpha\text{Capital Growth} \quad (4)$$

This expression shows us how the data is generated in terms of productivity growth through the Solow residual. We can also calculate from (4) the contribution of each factor to economic growth.

In table 2 we present descriptive statistics of all variables in our study. The data presents great variability in the key variables. For instance, Rwanda is the country with the lowest economic growth in a time period with -10.02%, while Cyprus shows the highest growth rate with 11.11% in one of the considered periods. Bolivia has the lowest capital growth rate with -6.52% and Gambia presents the maximum value for this variable with a growth rate of 18.25%. In terms of productivity growth, Iran is the country with the lowest rate with -10.07% and Cyprus the higher with 10.62% . Looking at the financial development indicators, Zaire was the economy with the least development having values of 0.34% and 4.68% for Private Credit and Liquid Liabilities respectively. On the other hand, Japan had the highest values for these variables with 205.95% and 191.44% respectively.

In table 3 we present the correlations among the variables used. We can see how productivity, and capital growth, private credit, liquid liabilities, initial GDP value, and the measure of human capital are positively correlated with economic growth. The correlation between trade openness and economic growth is positive but nearly zero. Inflation and black market premium are negatively correlated and government consumption is also correlated in this way but with a coefficient near to zero.

Countries are grouped in four regions: Latin America, Europe and North America, Asia and Africa. The classification was initially done taking into account the classification given by the World Bank to each of the countries. It should be taken into consideration that the North America group was merged with the Europe Group given the fact that the former had only 2 countries in the sample (United States and Canada). Due to their relevance in world GDP, it was not an option to leave them aside, so we included them in the group which seemed more homogeneous with these two countries, at least in terms of economic development.. With a similar criterion, Australia and New Zealand were included in the Asia region in our database. Table 1 shows this classification.

In table 4 we can see the improvement of working with panel data instead of cross-section data. The variability that comes from adding temporal data (known as within) is added to the variability between countries in the sample. The T-Bar is the average of the number of time observations for each variable.

In table 5 we present the averages of the main variables for each region over the 7 time period observations. During the whole period under analysis the economies that had larger economic growth in average were the ones from Asia with a 2.83% growth rate, followed by Europe and North America with 2.75%. Then was Latin America with less than half (1.09%) and lastly was Africa with a 0.78% growth rate.

The capital growth rate has the same rankings by region. Values are 4.26%, 3.41%, 1.87%, and 1.74% respectively.

In figure 1 we can see the average financial development across the different regions measured by Private Credit and Liquid Liabilities. The most developed area is Europe and North America with 68.21% of Private Credit and 63.98% of Liquid Liabilities. Is followed by Asia with 37.48% and 45.43% respectively. Latin

America and Africa are the less developed regions in terms of Private Credit (Latin America with 21.6% and Africa with 20.66%) and of Liquid Liabilities (26.62% for Latin America and 35.9% for Africa).

Figure 2 shows the averages of the dependent variables used in our estimations across regions. These are economic growth, capital growth and productivity growth. As said above, Asia has experimented the highest growth rate for these variables followed by Europe and North America, then Latin America and lastly by Africa.

In page 20 and 21, we present tables 6, 7, 8 and 9 that establishes correlations among the main variables divided by regions.

3 The evolution of financial development and economic growth variables

Figure 3 shows the simple correlation between the measures of financial development (in logarithms) and economic growth.

In figure 4 we present the positive correlation between the measures of financial development and growth for the whole panel.

In figure 5 and 6 we present the time evolution of Private Credit and Liquid Liabilities respectively for the different areas under study. The first conclusion is that financial development increased strongly for Asia and in a less strong way for Europe and North America (but this last region started with higher levels of financial development than Asia). On the opposite side, Latin America and Africa started developing their financial system slowly but then stagnated. In spite of having similar performances, these two regions look more alike if we look at Private Credit that if we look at Liquid Liabilities.

In figure 7, 8 and 9 we present the performance in terms of the dependent variables in our study for the four regions analyzed, while figure 10 presents the average economic growth by quartile of financial development (for both Private Credit and Liquid Liabilities).

Within the superior quartile, there are 90 observations from which 61 had an economic growth above average of the entire sample. Among these observations there are countries like Australia, Austria, Canada, Switzerland, Cyprus, France, United Kingdom, Israel, Italy, Japan, Republic of Korea, Malaysia, Netherlands, Norway, Portugal, Sweden, Thailand, United States of America and South Africa. On the other hand, 49 observations of the panel belongs to the lowest quartile and 27 of these observations are countries with below average economic growth. The countries that belong to this group are Algeria, Gambia, Ghana, Guatemala, Guyana, Haiti, India, Sri Lanka, Lesotho, Mexico, Malawi, Nicaragua, Papua New Guinea, Sudan, Sierra Leone, Syria, Trinidad and Tobago and Zaire.

This last illustration shows that the differential (in terms of GDP per capita growth) from going to a superior quartile is greater for the lowest quantile than for any other quartile being here a non-linearity in the relationship between financial development and economic growth.

4 Methodology

To develop our estimations we use GMM techniques for dynamic panel data[4] to control for the possible endogeneity of financial development. That is to say, we want to control our estimations in order to estimate

[4]The method used is fully described in Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998).

the effects of financial development on economic growth and its sources when the first one changes in an exogenous way. Then if we define $y_{i,t}$ as the logarithm of GDP per capita of the country i at period t, the initial equation would be,

$$y_{i,t} = \alpha y_{i,t-1} + \beta' X_{i,t} + \eta_i + \lambda_t + \epsilon_{i,t} \tag{5}$$

where $X_{i,t}$ is the set of independent variables (without taking into account the GDP of the last period) including financial development indicators, η_i captures non-observable specific effects across countries, λ_t captures specific time period effects and $\epsilon_{i,t}$ is an error term. We can rewrite (5) (by substracting $y_{i,t-1}$ on each side) as,

$$y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta' X_{i,t} + \eta_i + \lambda_t + \epsilon_{i,t} \tag{6}$$

that represents the equation we are interested in estimating with $y_{i,t} - y_{i,t-1}$ as the growth rate of GDP per capita.

To eliminate country specific effect, Arellano and Bond (1991) suggest to take first differences of equation (5),

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + (\lambda_t - \lambda_{t-1}) + (\epsilon_{i,t} - \epsilon_{i,t-1}) \tag{7}$$

To estimate this equation instruments are necessary in order to deal with the possible endogeneity of explanatory variables and the problem that by construction the new error term $(\epsilon_{i,t} - \epsilon_{i,t-1})$ is serially correlated with $(y_{i,t-1} - y_{i,t-2})$. Arellano and Bond (1991) proposed to use lags of explanatory variables in levels as instruments to solve the endogeneity problem. Under the assumptions that the error term ϵ is not serially correlated and explanatory variables (X) are weakly exogenous (that is to say, the assumption that explanatory variables are not correlated with future realizations of the error term), the GMM dynamic panel estimator has the following moment conditions.

$$E[y_{i,t-s}(\epsilon_{i,t} - \epsilon_{i,t-1})] = 0 \quad \text{for } s \geq 2; t = 3...T, \tag{8}$$

$$E[X_{i,t-s}(\epsilon_{i,t} - \epsilon_{i,t-1})] = 0 \quad \text{for } s \geq 2; t = 3...T. \tag{9}$$

The GMM estimator with these conditions is referred to as the difference estimator. However, this estimator has several econometric and conceptual shortcomings at the moment of the estimation. First, as we first differentiate the equation, we lose the country specific term. Moreover, if the explanatory variables are persistent over time, this severely affects the asymptotic properties of the difference estimator. Simulation studies have shown that the difference estimation is biased for large samples and has poor precision.

To solve this problems, Blundell and Bond (1998) propose a combination of the difference estimator with a levels estimator to produce an estimation through a system. The inclusion of an equation of the variables in levels, allows us to use information of differences among countries that comes purely from the cross-section part of the sample.

The levels equation uses lags of differences of explanatory variables under two assumptions. First, the error term is not serially correlated. Second, although there can be correlation between levels of explanatory variables and the specific cross-section error term, there must not be correlation between differences of explanatory variables and the error term. This assumptions are reflected through the following stationary properties.

$$E[y_{i,t+p}\eta_i] = E[y_{i,t+q}\eta_i] \quad \text{and} \quad E[X_{i,t+p}\eta_i] = E[X_{i,t+q}\eta_i] \quad \forall p, q \tag{10}$$

The additional moment conditions for the regression in levels are

$$E[(y_{i,t-s} - y_{i,t-s-1})(\eta_i + \epsilon_{i,t})] = 0 \quad \text{for } s = 1 \tag{11}$$

$$E[(X_{i,t-s} - X_{i,t-s-1})(\eta_i + \epsilon_{i,t})] = 0 \quad \text{for } s = 1. \tag{12}$$

Summarizing, the GMM system estimator is obtained by using the moment conditions in (8), (9), (11) and (12). As the difference estimator, this model is estimated using GMM two-step method that produces efficient and consistent coefficients.

The consistency of the GMM system estimator lies upon the assumptions of valid instruments and no autocorrelation between errors. Following Blundell and Bond (1998) we use two tests to check the specification of our models and the validity of the instruments. Firstly, the Hansen test of over-identifying restrictions tests the validity of the instruments. Under the null hypothesis that instruments are exogenous, the test is distributed χ^2 with (J-K) freedom degrees, where J is the number of instruments and K the number of regressors. The second test examines the assumption that there is no serial correlation between error terms. The null hypothesis is that first differences of the error term have no second order autocorrelation[5]. Under this null hypothesis the test is distributed normal standard. Rejecting both null hypothesis would be giving support to the specification of our models.

The GMM system estimator presents some problems when applied to panel data with few cross-section observations. Arellano and Bond (1991) and Blundell and Bond (1998) show that asymptotic errors for the two-step estimator are severely downward-biased and because of this the inference under this method would be inaccurate. These problems worsen when the number of instruments is close to the number of cross-sectional observations of the panel. Furthermore, when the instrument count is high, the Hansen test of validity of the instruments weakens as demonstrated in Roodman (2009) and this, we could be accepting a model as valid when the problem of endogeneity is not being fully solved.

Because of the standard errors bias, we apply the correction suggested by Windmeijer (2005). A large amount of the literature in finance and growth does not apply this correction. Main studies make their inference taking into account the standard errors of the one-step method of estimation that tends to have less biased standard errors.

The second issue to be solved is the problem that implies using large quantities of instruments. The majority of the literature does not report the number of instruments in their estimation but some like Levine, Loayza, and Beck (2000) inform that they use an elevated number of instruments compared to the number of cross-sectional observations. To deal with this issue we apply the techniques suggested by Roodman (2009).

The first one is to use as instruments less lags (for the levels and difference equations) than all the available making that the count of instruments increase only linearly in T (the number of time observations).

The second suggestion (and less used in the literature) is to combine instruments in small subsets. This is the technique called collapsing instruments in blocks and is explained by Roodman (2009). This approach also makes that the count of instruments increase only linearly in T.

The application of these techniques allows us to reduce the number of instruments in our estimations considerably in order to have a more reliable Hansen test about the exogeneity of the instruments.

[5]By construction, the error term probably has first order autocorrelation. We cannot use the error term of the levels equation because this includes the country specific error term, η.

To check the robustness of the validity of our models, we also use the difference-in-Hansen test that checks the validity of a subset or several subsets of instruments. Basically, it calculates the increase in the Hansen ordinary test when the subset of studied instruments is aggregated into the estimated model. Under the same null hypothesis of exogeneity of the instruments, this test is distributed χ^2 with degrees of freedom equal to the number of instruments of the subset. This test is also weakened by a high number of instruments due to its direct relationship with the original Hansen test. As suggested by Roodman (2009) we start doubting of the validity of our models (or the exogeneity of the instruments) with p-values that cannot reach more than 25% at the time of evaluating the null hypothesis of both statistical tests.

In our estimation, we also add dummy variables that interact with financial development indicators in order to separate the effects for the different regions. The specification for the set of variables that accounts for the effect of financial development is $\beta_0 * FD + \beta_1 FD * EUROPENAM + \beta_2 FD * ASIA + \beta_3 FD * AFRICA$ where EUROPENAM, ASIA, AFRICA are dummy variables that identify the region of the country. With this specification the total effect for Latin America would be β_0, for Europe and North America $(\beta_0 + \beta_1)$, for Asia $(\beta_0 + \beta_2)$ and for Africa $(\beta_0 + \beta_3)$. In the results section, only the total effects are presented.

5 Results

The first estimated results make reference to the relationship of financial development with economic growth and its sources for the whole panel as done by Beck, Levine, and Loayza (2000), but adding the Windmeijer (2005) correction for robust standard errors and using the technique of collapsing instruments to check the validity of the models in a more robust way. Then we present the estimations for the different regions.

In Table 10 we show the different estimations for economic growth. The Hansen and autocorrelation tests show the validity of all estimated models. We can appreciate there is a great difference in doing inference with a considerable amount of instruments and without the Windmeijer (2005) correction which was standard in past studies. Thus, one can conclude (from column 1) that Private Credit has a positive impact of 0.6% on economic growth at a 1% statistical significance without applying any of our corrections, when with the correction for robust standard errors we cannot reject the null hypothesis of no statistical significance (p-value of 0.177). Instead for Liquid Liabilities (in column 3) we have a positive and statistical significance impact of 1.11% applying the Windmeijer (2005) correction.

After performing the mentioned correction we estimate an effect of financial development on economic growth, 0.89% for Private Credit but this effect has no statistical significance and 2.89% for Liquid Liabilities, but with a stronger statistical significance for the second measure used (p-values of 0.280 vs 0.009 respectively) and also more robust exogenous instruments (p-values of Hansen test of 0.154 versus 0.390 respectively).

Some comparisons with previous literature are necessary. In Levine, Loayza, and Beck (2000) the coefficient for private credit is 0.01522, while we have a coefficient of 0.006. On the other hand, for liquid liabilities, they have a 0.02522 coefficient versus 0.011. that was obtained in our estimations. We cannot replicate the results because of changes in the original database. However, this effects suffer a considerable increase when we apply the collapsed instruments method were we obtained 0.0289 for liquid liabilities. This result is somehow consistent with Roodman (2009) results where he goes from an estimation with a high number of instruments to one with collapsed instruments and find an increase in coefficients for financial development.

In table 11 we present the results for the whole panel of the effect of financial development on capital growth. Here we can see that the models with collapsed instruments fail to reject the null hypothesis of the Hansen test of validity of instruments. This is a clear example in which too many instruments (84 in column 1 and column 3 estimations) artificially elevate the Hansen test's p-values, thus failing to separate the exogenous effect of financial development on capital growth.

When considering this problem, we estimate this same effect with the methodology presented in the previous section with a set of explanatory variables that only includes time dummies, the financial development variable, the initial GDP per capita and the average years of secondary schooling in the total population and we find that these models are valid (when considering our validity tests), but we do not find evidence that exogenous increases in financial development causes any impact whatsoever on capital accumulation (this and other estimations concerning the robustness and extensions of our results appear in Appendix D).

In table 12 we estimate the effect of financial development on productivity growth. The model in column 1 suffers of the problem of having too many instruments (compared to cross-sectional observations), and our corrected model of column 2 shows that the model rejects the test of exogenous instruments. Because of this, the only valid model in this table is the one in column 4 that is obtained with the new methodology of collapsed instruments. This model yield the conclusion that Liquid Liabilities has a positive and significant effect on productivity growth at a 10% of statistical significance. Furthermore, the effect is quite important (2.11%). This results support the idea of productivity growth as a transmission channel between financial development and economic growth, our former results reject the hypothesis of capital growth as a transmission channel.

Table 13 presents our main results of the impact of financial development for different geographical regions with the Windmeijer (2005) correction and using collapsed instruments.

The estimations in columns 2 and 5 are not valid because we can reject the null hypothesis of validity and exogeneity of instruments[6]. The other estimations are accepted as valid due to their acceptable performance in terms of the different Hansen tests and autocorrelation test.

In column 1, we have a statistical significant coefficient for Private Credit on economic growth for Latin America at a 10% of significance (p-value=0.065). This relationship is economically important (2.13%) while for the rest of the regions we cannot reject the null hypothesis of these coefficient being equal to zero.

If we analyze the other financial development measure in column 4, we have coefficients statistically significant for Latin America and Africa (p-values=0.037) and also important effects of Liquid Liabilities on economic growth. For Africa the differential effect is 2.93%, while for Latin America is 2.68%. For the other two regions we have coefficients that are not statistically different from zero. This leads us to the conclusion that the Liquid Liabilities measure of financial development has a more important impact for regions than Private Credit.

In column 3 and 6 of this table informs the results for financial development on productivity growth for the different regions. In column 3, the Private Credit coefficient is statistically significant at a 10% but only for Latin America. In the same direction, column 6 shows a significant positive relationship between Liquid Liabilities and productivity growth only for Latin America (p-value=0.063) that makes us conclude that the transmission channel for financial development on economic growth comes through productivity growth for this region.

Finally, we have to mention some facts about the robustness of our results that are presented in Appendix D. As Wachtel and Rousseau (2006) showed, our results are not completely robust to changes in the sample

[6] As in the capital growth regressions for the whole panel, we performed estimations with a reduced set of explanatory variables finding no relationship between financial development and capital growth for any of the regions analyzed. This results are presented in Appendix D.

we use for our estimations. To test robustness we used two methods. In the first one, we use the simple set of control variables with only *initial*, *sec* and time dummy variables in this set. In the second one we perform a series of estimations leaving aside one time period at a time.

For the whole panel we present eight different estimations for each financial development measure to test the robustness of the relationship between financial development and economic growth. For private credit, only half of the estimations have positive and statistically significant coefficient, while in the other four these coefficients are not statistically different from zero at a 90% of confidence. The relationship seems more robust (thus very volatile in terms of coefficient numbers) for liquid liabilities. Here, six of the eight estimations present positive and statistically significant coefficients.

In the estimations for different regions four of the eight estimations present positive and statistically significant coefficients at a 90% of confidence for private credit and in addition, in two of the eight estimations Africa has a positive and statistically meaning coefficient. When we look at liquid liabilities we find a similar robustness. In half of the estimations performed both Latin America and Africa have coefficients both positive and statistically different from zero.

However, an important thing should be noticed in our robustness check. Many of the estimations that presents results that do not confirm the robustness of our main findings have weak Hansen and Hansen-in-difference tests, something that could be showing us more robust results than we first noticed.

6 The estimated impact of financial development on economic growth for regions

Starting from equation (6) that is our estimated equation, we can try to find the impact of exogenous increases in financial development on economic growth. For that purpose, we find the marginal effect,

$$\frac{\partial(y_{i,t} - y_{i,t-1})}{\partial[ln(x_{i,t})]} = \beta_j. \tag{13}$$

where $y_{i,t}$ is the per capita GDP in logarithms and $x_{i,t}$ the financial development variable that is associated with region j and thus we obtain the estimated marginal effect. To try to estimate the impact of an exogenous increase of financial development on economic growth we should approximate (13) with[7]

$$\Delta[y_{i,t} - y_{i,t-1}] = \beta_j \frac{\Delta x_{i,t}}{x_{i,t}} \tag{14}$$

In this way, we can estimate how an exogenous increase in Private Credit or Liquid Liabilities would have affected the annual rate of economic growth of a country in the period of the sample. Table 14 and 15 report the effects of increases in financial development on economic growth for the different regions. However, this does not indicate the key question of how to increase financial development. These tables inform which would had been the effect of an exogenous increase of 10% of financial development on the annual growth rate of the region.

[7]Going from (13) to (14) has its implications because (13) holds for infinitely small changes of $x_{i,t}$. That is why we only estimate effects for exogenous increases of 10% only.

7 Conclusions

This work analyzes the nature of the effect of financial development (measured as credit to the private sector divided by GDP and liquid liabilities divided by GDP) on economic growth (measured as GDP per capita growth) and its sources (measured as total factor productivity growth and capital stock per capita growth).

In our estimations we apply the GMM system estimator. This method is applied in the finance-growth literature because it tries to solve serious econometric problems such as short dynamic panels, fixed effects and the lack of good external instruments. We account for the fact that inferences in previous cited studies has some serious disadvantages due to downward biased standard errors (Windmeijer (2005)) and the use of too many instruments (Roodman (2009)). The danger is using in a mechanic way complicated estimators in econometric softwares without taking into account its risks.

This work adjusts by these last two problems to obtain valid inferences of the effect of financial development on economic growth and its sources, being this one differential aspect of this work with respect to previous literature.

We reexamine this empirical relationship with panel data from 78 countries through 35 years.

Our estimations suggest that financial development contributes to increase economic growth especially in areas like Africa and Latin America, with important postive economic effects and statistically different from zero. We also find that the transmission channel from financial development to economic growth is more likely to be through productivity growth than through capital growth as Schumpeter suggested.

Because we have proven empirically that there is a significant relationship in our data between financial development and economic growth, the challenge lies in finding the best ways to accelerate financial development in order to generate a better working system for the financial system's six key functions: Ex ante production of information about possible investments; Monitoring investments and control the corporate governance; Commercialization, diversification and risk sharing; Pool Savings; Provision of means of exchange to facilitate goods and services' exchange and; Identification of new and more efficient entrepreneurs. The way of doing this calls for another work.

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8 Appendix A

Table 1: Region Classification

Latin America	Europe	Asia	Africa
Argentina	Austria	Australia	Algeria
Bolivia	Belgium	India	Central African Republic
Brazil	Canada	Indonesia	Cameroon
Chile	Cyprus	Iran	Congo
Colombia	Denmark	Israel	Egypt
Costa Rica	Finland	Japan	Gambia
Dominican Republic	France	Malaysia	Ghana
Ecuador	Germany	Nepal	Kenya
El Salvador	Greece	New Zealand	Lesotho
Guatemala	Ireland	Pakistan	Malawi
Guyana	Italy	Papua New Guinea	Malta
Haiti	Netherlands	Philippines	Mauritius
Honduras	Norway	Sri Lanka	Niger
Jamaica	Portugal	Syrian Arab Rep.	Rwanda
Mexico	Spain	Thailand	Senegal
Nicaragua	Sweden		Sierra Leone
Panama	Switzerland		South Africa
Paraguay	United States		Sudan
Peru	United Kingdom		Togo
Trinidad and Tobago			Zaire
Uruguay			Zimbawe
Venezuela			

Table 2: Descriptive Statistics

Stats	Growth	Prod1	Capgrols	Privo	Lly	Initial	Gov	Trade	Inflation	Bmp	Sec
Mean	0.0177	0.0099	0.0271	0.367	0.4246	3745.30	0.1481	0.5996	0.1568	0.6777	1.1217
Max	0.1111	0.1062	0.1825	2.0595	1.9144	20134.81	0.4497	3.1452	3.4466	109.91	5.15
Min	-0.1002	-0.1007	-0.0652	0.0034	0.0468	107.5	0.0406	0.0929	-0.0305	-0.0535	0
Sd	0.0293	0.0252	0.0341	0.3247	0.2819	4715.87	0.0596	0.4072	0.3218	5.4248	0.9552
N	526	515	534	511	511	525	523	527	514	520	531

Table 3: Correlations

441 Obs	Growth	Prod1	Capgrols	Privo	Lly	Initial	Gov	Trade	Inflation	Bmp	Sec
Growth	1										
Prod1	0.9385	1									
Capgrols	0.5444	0.2212	1								
Privo	0.1742	0.1452	0.1392	1							
Lly	0.1923	0.1613	0.1514	0.8328	1						
Initial	0.1081	0.1159	0.0236	0.7679	0.6080	1					
Gov	-0.0438	-0.0253	-0.0623	0.2188	0.2468	0.4161	1				
Trade	0.0142	0.0146	0.0046	0.0391	0.1278	-0.0094	0.2680	1			
Inflation	-0.2703	-0.2227	-0.2223	-0.2193	-0.2192	-0.1555	-0.0343	-0.1826	1		
Bmp	-0.1877	-0.1724	-0.1114	-0.0789	-0.0193	-0.0761	0.0983	-0.0708	0.5324	1	
Sec	0.1205	0.1492	-0.0223	0.6356	0.5106	0.7268	0.2823	0.0475	-0.0570	-0.0564	1

Table 4: Within and Between Standard Deviation

Variable	Between/Within	SD	Observations
Growth	Between	0.0184	N=78
	Within	0.0235	T-Bar=6.74
Capgrols	Between	0.0218	N=78
	Within	0.0263	T-Bar=6.84
Prod1	Between	0.0148	N=78
	Within	0.0212	T-Bar=6.60
Privo	Between	0.2852	N=78
	Within	0.1487	T-Bar=6.55
Lly	Between	0.2533	N=78
	Within	0.1157	T-Bar=6.55

Table 5: Averages of the main variables across regions

Variable	Latin America	Europe and North America	Asia	Africa
Growth	0.0109	0.0275	0.0283	0.0078
Capgrols	0.0187	0.0341	0.0426	0.0174
	(50.46%)[7]	(36.73%)[7]	(45.23%)[7]	(60.16%)[7]
Prod1	0.0054	0.0174	0.0155	0.0031
	(49.54%)[7]	(63.27%)[7]	(54.77%)[7]	(39.85%)[7]
Privo	0.216	0.6821	0.3748	0.2066
Lly	0.2662	0.6398	0.4543	0.359

Table 6: Correlations for Latin America

441 Obs	Growth	Capgrols	Prod1	Privo	Lly
Growth	1				
Capgrols	0.4698	1			
Prod1	0.9514	0.1751	1		
Privo	-0.0856	-0.0614	-0.0741	1	
Lly	-0.2625	-0.2239	-0.2146	0.6510	1

[7]Between parenthesis we present the contribution of each factor to economic growth for every region. This percentages were obtained setting $\alpha = 0.3$. However, due to approximations issues or due to some missing values, this number could not be exact. For instance, for Latin America, $0.0109 = 0.2941(0.0187) + 0.0054$.

Table 7: Correlations for Europe and North America

441 Obs	Growth	Capgrols	Prod1	Privo	Lly
Growth	1				
Capgrols	0.5298	1			
Prod1	0.9386	0.2046	1		
Privo	-0.4044	-0.3425	-0.3274	1	
Lly	-0.2157	-0.1362	-0.1935	0.6895	1

Table 8: Correlations for Asia

441 Obs	Growth	Capgrols	Prod1	Privo	Lly
Growth	1				
Capgrols	0.5011	1			
Prod1	0.9201	0.1221	1		
Privo	0.2211	0.2392	0.1453	1	
Lly	0.1180	0.0875	0.0958	0.9027	1

Table 9: Correlations for Africa

441 Obs	Growth	Capgrols	Prod1	Privo	Lly
Growth	1				
Capgrols	0.4501	1			
Prod1	0.9387	0.1146	1		
Privo	0.1378	0.0978	0.1155	1	
Lly	0.4291	0.2333	0.3873	0.5499	1

Figure 1: Financial Development of the four regions

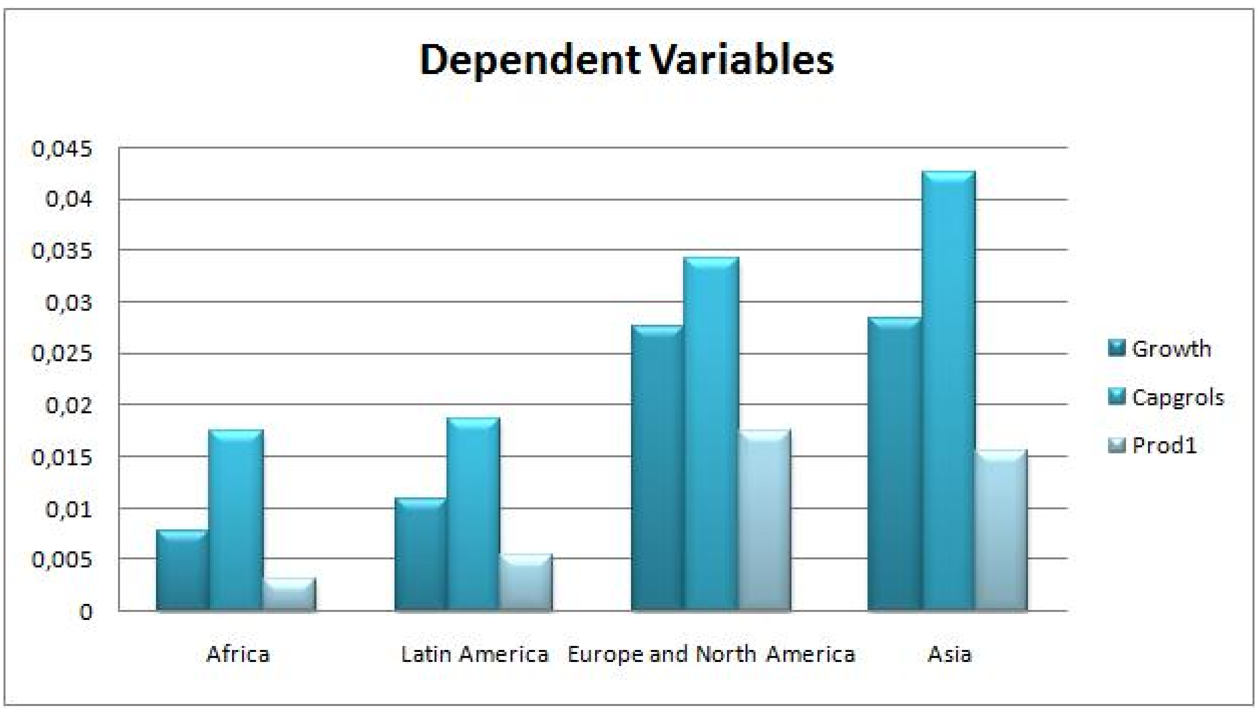

Figure 2: Averages of dependent variables for different regions

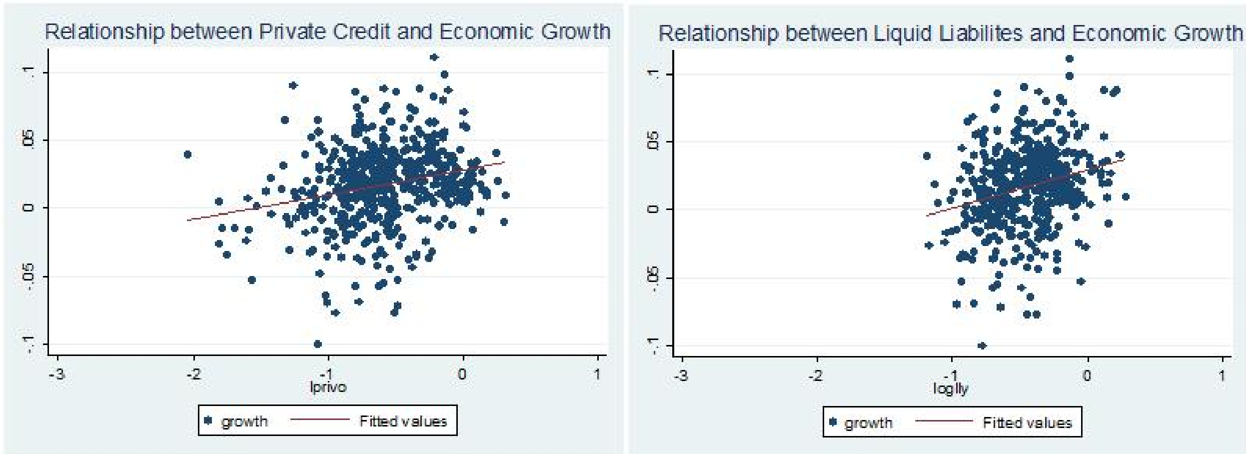

Figure 3: Correlation between financial development and economic growth

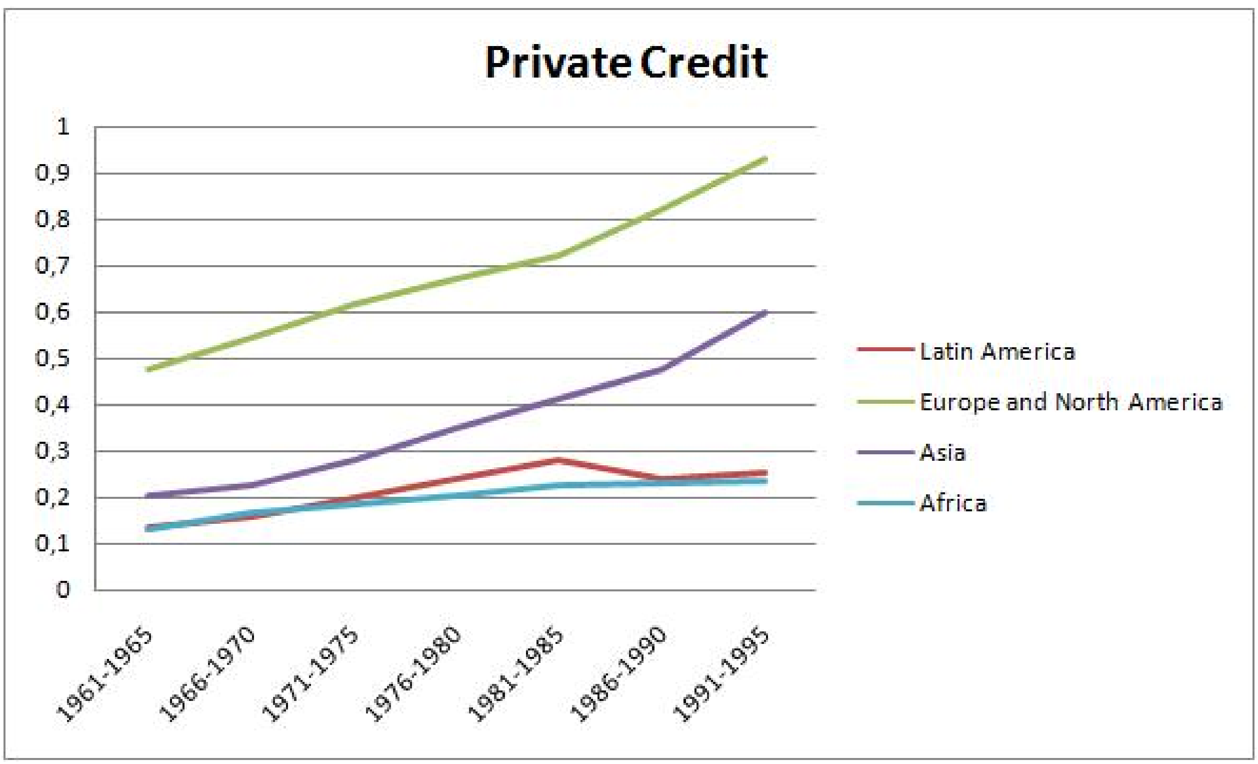

Figure 4: Private Credit through time

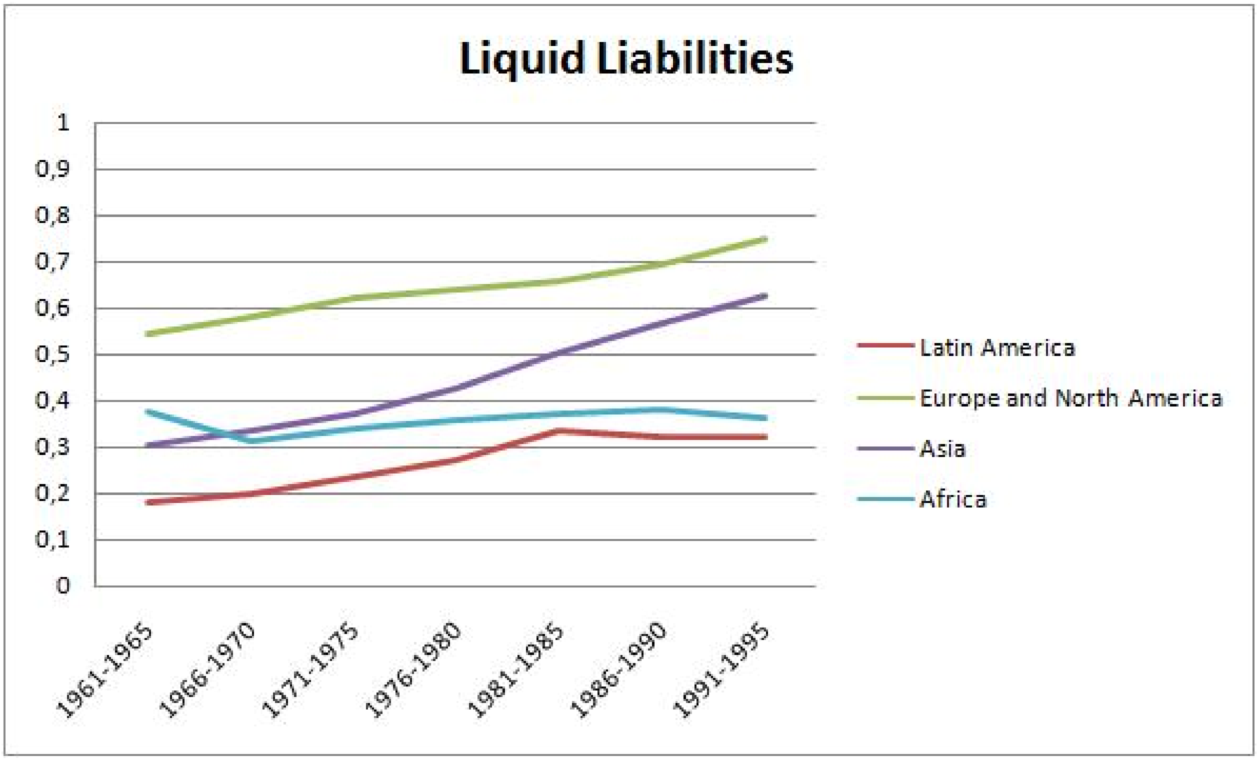

Figure 5: Liquid Liabilities through time

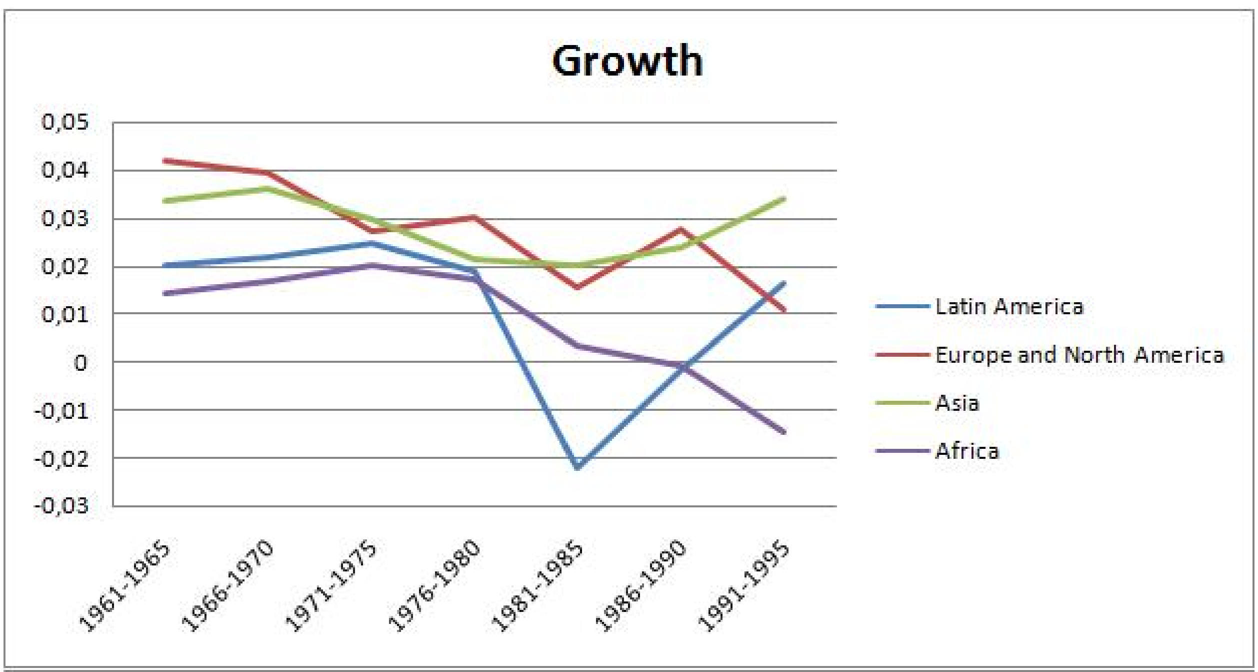

Figure 6: Economic growth through time

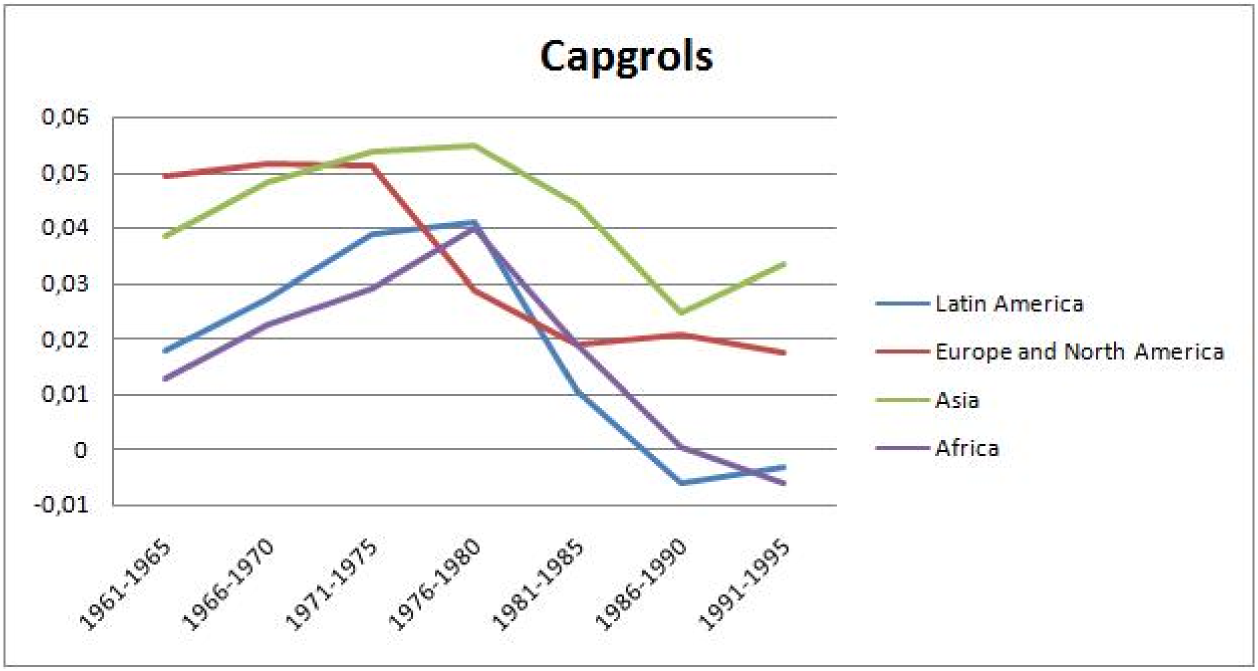

Figure 7: Capital growth through time

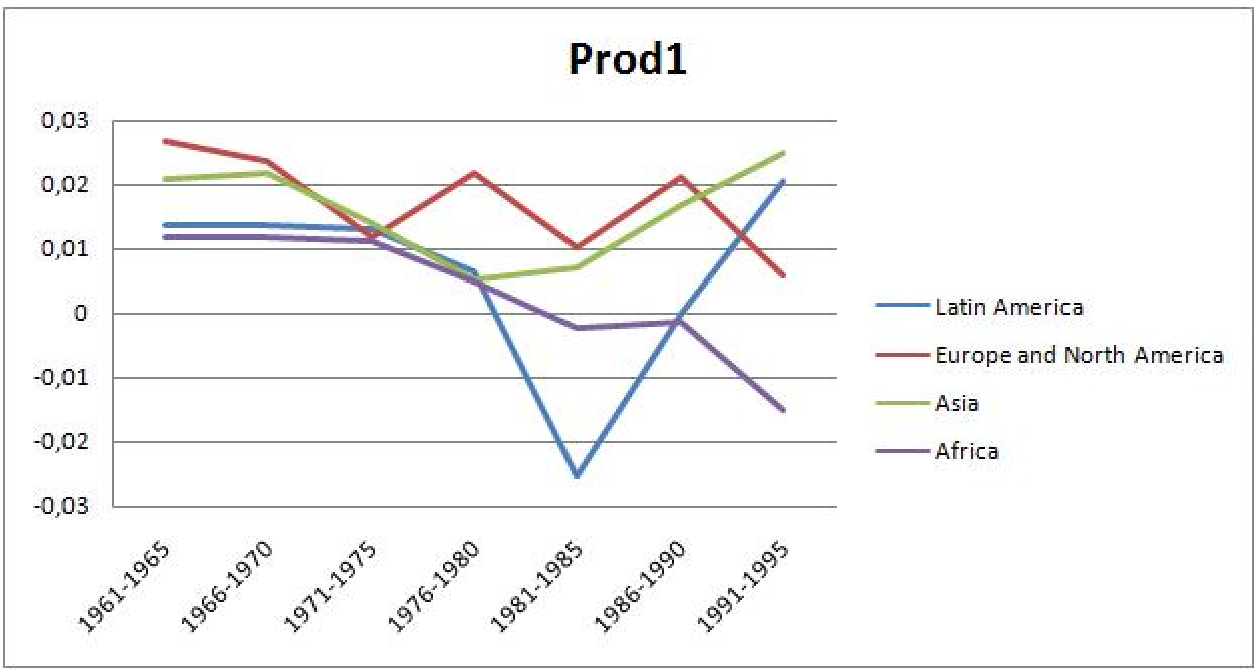

Figure 8: Productivity growth through time

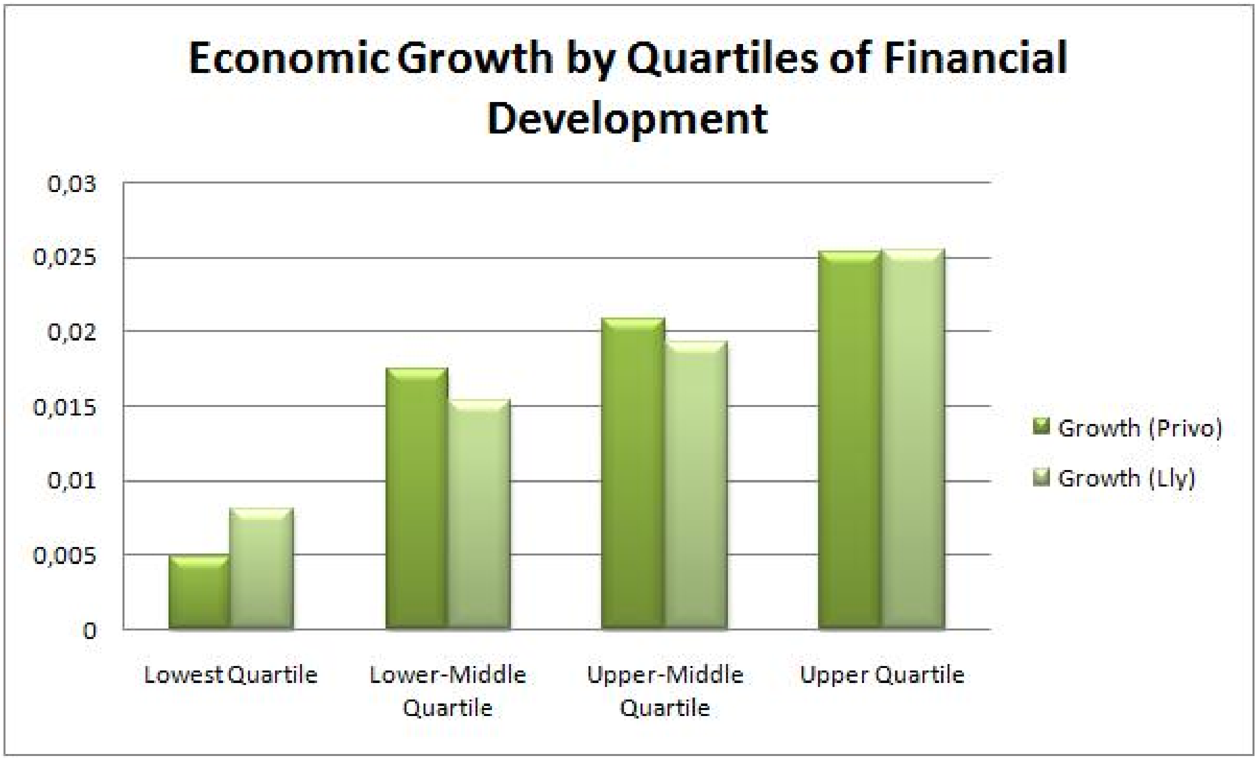

Figure 9: Economic growth by quartile of financial development

9 Appendix B

Table 10: Estimations Results with economic growth as a dependent variable for the whole panel

Variable[8]	Growth (1)	Growth (Collapsed Instruments)(2)	Growth (3)	Growth (Collapsed Instruments)(4)
Privo[9]	0.0064 (0.177) [0.000]	0.0089 (0.311) [0.280]		
Lly[9]			0.0111 (0.040) [0.000]	0.0289 (0.014) [0.009]
Initial[9]	0.015 (0.404) [0.000]	0.0026 (0.489) [0.406]	0.0004 (0.820) [0.286]	-0.0001 (0.998) [0.998]
Trade[9]	0.0047 (0.565) [0.003]	-0.0041 (0.725) [0.704]	0.0032 (0.630) [0.002]	-0.0111 (0.243) [0.181]
Gov[9]	-0.034 (0.765) [0.082]	0.0011 (0.945) [0.939]	-0.0111 (0.298) [0.000]	-0.0030 (0.855) [0.839]
Inflation[10]	-0.0014 (0.931) [0.668]	0.0140 (0.610) [0.486]	0.0017 (0.914) [0.500]	0.0237 (0.273) [0.228]
Bmp[10]	-0.0108 (0.040) [0.000]	-0.0164 (0.026) [0.006]	-0.0151 (0.006) [0.000]	-0.0270 (0.006) [0.001]
Sec	0.0025 (0.519) [0.004]	0.0022 (0.808) [0.766]	0.0032 (0.336) [0.000]	-0.0037 (0.557) [0.505]
Constant	0.0301 (0.168) [0.000]	0.0296 (0.489) [0.405]	0.0203 (0.389) [0.000]	0.0523 (0.192) [0.109]
N. of Instruments	76	20	76	20
Obs	449	449	450	450
Hansen[11]	0.290	0.154	0.226	0.390
Difference-in-Hansen[12]	0.651	0.154	0.450	0.390
Autocorr.[13]	0.663	0.780	0.614	0.824

[8]In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity.

[9]This variables were included as log(variable)

[10]This variables were included as log(1+variable)

[11]The values indicate p-values under the null hypothesis that instruments are valid

[12]The values indicate p-values under the null hypothesis that instruments are valid for the levels equation

[13]The values indicate p-values under the null hypothesis that errors have no second order serial correlation

Table 11: Estimations Results with capital growth as a dependent variable for the whole panel

Variable[8]	Capgrols (1)	Capgrols (Collapsed Instruments)(2)	Capgrols (3)	Capgrols (Collapsed Instruments)(4)
Privo[9]	0.0027 (0.616) [0.020]	0.0028 (0.793) [0.735]		
Lly[9]			0.0032 (0.703) [0.125]	0.0128 (0.394) [0.235]
Initial[9]	0.0005 (0.815) [0.374]	-0.0049 (0.260) [0.174]	0.0001 (0.948) [0.716]	-0.0058 (0.269) [0.066]
Trade[9]	0.0089 (0.278) [0.000]	-0.0149 (0.592) [0.305]	0.0020 (0.826) [0.265]	-0.0232 (0.425) [0.124]
Gov[9]	-0.0037 (0.818) [0.153]	0.0149 (0.570) [0.402]	-0.0106 (0.466) [0.000]	0.0078 (0.775) [0.644]
Inflation[10]	-0.0065 (0.586) [0.078]	-0.0138 (0.704) [0.508]	-0.0127 (0.357) [0.000]	-0.0204 (0.630) [0.343]
Bmp[10]	-0.0035 (0.573) [0.026]	-0.0170 (0.147) [0.016]	-0.0070 (0.287) [0.000]	-0.0211 (0.187) [0.048]
Sec	0.0024 (0.586) [0.016]	0.0054 (0.611) [0.453]	0.0010 (0.790) [0.267]	0.0017 (0.895) [0.812]
Capgrols (-1)	0.4972 (0.000) [0.000]	0.4408 (0.017) [0.000]	0.5333 (0.000) [0.000]	0.4006 (0.061) [0.001]
Constant	0.0227 (0.471) [0.000]	0.0624 (0.353) [0.130]	0.0040 (0.884) [0.515]	0.0588 (0.355) [0.136]
N. of Instruments	84	22	84	22
Obs	401	401	403	403
Hansen[11]	0.589	0.145	0.344	0.026
Difference-in-Hansen[12]	0.947	0.145	0.779	0.026
Autocorr.[13]	0.271	0.344	0.799	0.738

[8]In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity. We used lagged capital growth as explanatory variable due to a problem of autocorrelation pointed out by Beck, Levine, and Loayza (2000).

[9]This variables were included as log(variable)

[10]This variables were included as log(1+variable)

[11]The values indicate p-values under the null hypothesis that instruments are valid

[12]The values indicate p-values under the null hypothesis that instruments are valid for the levels equation

[13]The values indicate p-values under the null hypothesis that errors have no second order serial correlation

Table 12: Estimations Results with productivity growth as a dependent variable for the whole panel

Variable[8]	Prod1 (1)	Prod1 (Collapsed Instruments)(2)	Prod1 (3)	Prod1 (Collapsed Instruments)(4)
Privo[9]	-0.0002 (0.966) [0.829]	0.0041 (0.628) [0.559]		
Lly[9]			0.0045 (0.446) [0.018]	0.0211 (0.058) [0.037]
Initial[9]	0.0012 (0.534) [0.000]	0.0005 (0.867) [0.829]	-0.0001 (0.961) [0.847]	-0.0013 (0.617) [0.125]
Trade[9]	0.0001 (0.993) [0.973]	-0.0078 (0.489) [0.441]	0.0012 (0.876) [0.447]	-0.0109 (0.307) [0.271]
Gov[9]	0.0013 (0.865) [0.485]	-0.0057 (0.691) [0.645]	-0.0063 (0.496) [0.012]	-0.0109 (0.451) [0.884]
Inflation[10]	-0.0043 (0.766) [0.041]	0.0124 (0.603) [0.452]	0.0006 (0.962) [0.813]	0.0252 (0.241) [0.345]
Bmp[10]	-0.0076 (0.073) [0.000]	-0.0125 (0.096) [0.036]	-0.0101 (0.029) [0.000]	-0.0210 (0.016) [0.018]
Sec	0.0041 (0.157) [0.000]	0.0052 (0.511) [0.404]	0.0032 (0.257) [0.000]	-0.0014 (0.807) [0.247]
Constant	0.0144 (0.397) [0.001]	-0.0003 (0.993) [0.991]	0.0108 (0.571) [0.014]	0.0189 (0.560) [0.074]
N. of Instruments	76	20	76	20
Obs	443	443	444	444
Hansen[11]	0.289	0.095	0.205	0.318
Difference-in-Hansen[12]	0.838	0.095	0.614	0.318
Autocorr.[13]	0.449	0.566	0.446	0.684

[8] In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity.

[9] This variables were included as log(variable)

[10] This variables were included as log(1+variable)

[11] The values indicate p-values under the null hypothesis that instruments are valid

[12] The values indicate p-values under the null hypothesis that instruments are valid for the levels equation

[13] The values indicate p-values under the null hypothesis that errors have no second order serial correlation

Table 13: Estimations Results for the different regions

Variable[8]	Growth (1)	Capgrols (2)	Prod1 (3)	Growth (4)	Capgrols (5)	Prod1 (6)
LacPrivo[9]	0.0213 (0.065)	-0.0017 (0.914)	0.0167 (0.053)			
EuropePrivo[9]	-0.0016 (0.910)	0.0007 (0.981)	-0.0003 (0.982)			
AsiaPrivo[9]	0.0070 (0.607)	0.0053 (0.746)	0.0012 (0.927)			
AfricaPrivo[9]	0.0074 (0.450)	0.0038 (0.848)	-0.0039 (0.668)			
LacLly[9]				0.0268 (0.037)	-0.0012 (0.966)	0.0225 (0.063)
EuropeLly[9]				0.0041 (0.884)	0.0310 (0.522)	0.0063 (0.804)
AsiaLly[9]				0.0183 (0.398)	0.0065 (0.818)	0.0147 (0.443)
AfricaLly[9]				0.0293 (0.088)	0.0147 (0.486)	0.0115 (0.446)
Capgrols (-1)		0.5908 (0.000)			0.6342 (0.000)	
Initial[9]	0.0067 (0.112)	0.0033 (0.613)	0.0035 (0.379)	0.0041 (0.373)	0.0017 (0.728)	0.0017 (0.697)
Trade[9]	-0.0194 (0.091)	-0.0340 (0.260)	-0.0239 (0.039)	-0.0202 (0.075)	-0.0239 (0.299)	-0.024 (0.025)
Gov[9]	-0.0339 (0.102)	-0.0383 (0.110)	-0.0254 (0.155)	-0.0506 (0.045)	0.0181 (0.233)	-0.049 (0.047)
Inflation[10]	-0.0390 (0.158)	-0.0398 (0.081)	-0.0323 (0.180)	-0.0310 (0.185)	-0.0310 (0.198)	-0.0353 (0.135)
Bmp[10]	-0.0104 (0.175)	-0.0055 (0.709)	-0.0103 (0.111)	-0.0173 (0.063)	-0.0180 (0.233)	-0.0117 (0.218)
Sec	-0.0077 (0.268)	0.0065 (0.591)	0.032 (0.651)	-0.0128 (0.092)	0.0023 (0.835)	-0.0043 (0.564)
Constant	-0.0563 (0.224)	-0.1033 (0.126)	-0.0587 (0.223)	-0.0682 (0.226)	-0.0367 (0.555)	-0.0839 (0.128)
N. of Instruments	32	35	32	32	35	32
Obs	449	401	443	450	403	444
Hansen[11]	0.452	0.190	0.560	0.421	0.008	0.650
Difference-in-Hansen[12]	0.481	0.179	0.874	0.394	0.003	0.947
Difference-in-Hansen[13]	0.819	0.118	0.798	0.482	0.005	0.940
Autocorr.[14]	0.929	0.689	0.817	0.962	0.990	0.875

Table 14: Effects of an exogenous Private Credit increase of 10%

Region	Mean Growth	Mean Privo	β Growth	F.Growth[15]
Latin America	0.0109	0.2160	0.0213	0.0130
Europe and North America	0.0275	0.6821	0	0.0275
Asia	0.0283	0.3748	0	0.0283
Africa	0.0078	0.2066	0	0.0078
Total	0.0177	0.3670	0	0.0177

Table 15: Effects of an exogenous Liquid Liabilities increase of 10%

Region	Mean Growth	Mean Lly	β Growth	F.Growth[16]
Latin America	0.0109	0.2662	0.0268	0.0136
Europe and North America	0.0275	0.6398	0	0.0275
Asia	0.0283	0.4543	0	0.0283
Africa	0.0078	0.359	0.0293	0.0095
Total	0.0177	0.4246	0.0289	0.0206

[8] In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity. In capital growth regressions we used lagged capital growth as explanatory variable due to a problem of autocorrelation pointed out by Beck, Levine, and Loayza (2000).

[9] This variables were included as log(variable)

[10] This variables were included as log(1+variable)

[11] The values indicate p-values under the null hypothesis that instruments are valid

[12] The values indicate p-values under the null hypothesis that the subsets of instruments that contain control variables except financial development measures are valid for the levels equation

[13] The values indicate p-values under the null hypothesis that the subset of instruments that contain only the financial development measure is valid for the levels equation

[14] The values indicate p-values under the null hypothesis that errors have no second order serial correlation

[15] This column presents annual economic growth rate that the region would have experimented, according to our estimations, if an exogenous increase of 10% of Private Credit would have happened during the period of the sample.

[16] This column presents annual economic growth rate that the region would have experimented, according to our estimations, if an exogenous increase of 10% of Liquid Liabilities would have happened during the period of the sample.

10 Appendix C

Table 16: Effects of an exogenous Private Credit increase of 10% for all Latin American countries

Country	Mean Growth	Mean Privo	β Growth	F.Growth[1]
Argentina	0.0095	0.1568	0.0213	0.0116
Bolivia	0.0074	0.1347	0.0213	0.0095
Brazil	0.0266	0.2781	0.0213	0.0287
Chile	0.0187	0.2781	0.0213	0.0208
Colombia	0.0235	0.2111	0.0213	0.0256
Costa Rica	0.017	0.2171	0.0213	0.0191
Dominican Republic	0.0222	0.1945	0.0213	0.0243
Ecuador	0.0228	0.1795	0.0213	0.0249
El Salvador	0.0021	0.2284	0.0213	0.0042
Guatemala	0.0108	0.1342	0.0213	0.0129
Guyana	0.0038	0.2057	0.0213	0.0059
Haiti	-0.0147	0.0785	0.0213	-0.0126
Honduras	0.0071	0.2426	0.0213	0.0092
Jamaica	0.0089	0.2485	0.0213	0.0110
Mexico	0.0174	0.23	0.0213	0.0195
Nicaragua	-0.0132	0.2588	0.0213	-0.0111
Panama	0.024	0.4107	0.0213	0.0261
Paraguay	0.0198	0.1469	0.0213	0.0219
Peru	0.006	0.1327	0.0213	0.0081
Trinidad and Tobago	0.0131	0.3207	0.0213	0.0152
Uruguay	0.0124	0.2125	0.0213	0.0145
Venezuela	-0.0063	0.3357	0.0213	-0.0042

[1] This column presents annual economic growth rate that the region would have experimented, according to our estimations, if an exogenous increase of 10% of Private Credit would have happened during the period of the sample.

Table 17: Effects of an exogenous Liquid Liabilities increase of 10% for all Latin American countries

Country	Mean Growth	Mean Lly	β Growth	F.Growth[1]
Argentina	0.0095	0.1848	0.0268	0.0122
Bolivia	0.0074	0.1659	0.0268	0.0101
Brazil	0.0266	0.1918	0.0268	0.0293
Chile	0.0187	0.2296	0.0268	0.0214
Colombia	0.0235	0.2228	0.0268	0.0262
Costa Rica	0.017	0.2968	0.0268	0.0197
Dominican Republic	0.0222	0.2068	0.0268	0.0249
Ecuador	0.0228	0.2018	0.0268	0.0255
El Salvador	0.0021	0.2714	0.0268	0.0048
Guatemala	0.0108	0.2042	0.0268	0.0135
Guyana	0.0038	0.5365	0.0268	0.0065
Haiti	-0.0147	0.2296	0.0268	-0.0120
Honduras	0.0071	0.2327	0.0268	0.0098
Jamaica	0.0089	0.3747	0.0268	0.0116
Mexico	0.0174	0.259	0.0268	0.0201
Nicaragua	-0.0132	0.3454	0.0268	-0.0105
Panama	0.024	0.3385	0.0268	0.0267
Paraguay	0.0198	0.1787	0.0268	0.0225
Peru	0.006	0.1846	0.0268	0.0087
Trinidad and Tobago	0.0131	0.3788	0.0268	0.0158
Uruguay	0.0124	0.2956	0.0268	0.0151
Venezuela	-0.0063	0.3725	0.0268	-0.0036

[1] This column presents annual economic growth rate that the region would have experimented, according to our estimations, if an exogenous increase of 10% of Liquid Liabilities would have happened during the period of the sample.

11 Appendix D

Table 18: Alternative estimations for invalid instruments' equations

Variable[1]	Capgrols[2] (1)	Capgrols[2] (2)	Prod1[2] (3)	Capgrols[2] (4)	Capgrols[2] (5)
Privo[3]	0.0081 (0.330)		0.0059 (0.329)		
Lly[3]		0.0107 (0.166)			
LacPrivo[3]				-0.0238 (0.145)	
EuropePrivo[3]				-0.0283 (0.250)	
AsiaPrivo[3]				-0.0134 (0.428)	
AfricaPrivo[3]				0.0075 (0.571)	
LacLly[3]					-0.0128 (0.335)
EuropeLly[3]					-0.0214 (0.524)
AsiaLly[3]					-0.0142 (0.381)
AfricaLly[3]					0.0114 (0.316)
N. of Instruments	14	14	12	23	23
Obs	419	420	468	419	420
Hansen[4]	0.628	0.387	0.230	0.283	0.033
Difference-in-Hansen[5]				0.329	0.021
Difference-in-Hansen[6]				0.221	0.034
Autocorr.[7]	0.474	0.640	0.458	0.890	0.816

[1]In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity. In capital growth regressions we used lagged capital growth as explanatory variable due to a problem of autocorrelation pointed out by Beck, Levine, and Loayza (2000).

[2]This equation was estimated under the simple control set of explanatory variables

[3]This variables were included as log(variable)

[4]The values indicate p-values under the null hypothesis that instruments are valid

[5]The values indicate p-values under the null hypothesis that the subsets of instruments that contain control variables except financial development measures are valid for the levels equation

[6]The values indicate p-values under the null hypothesis that the subset of instruments that contain only the financial development measure is valid for the levels equation

[7]The values indicate p-values under the null hypothesis that errors have no second order serial correlation

Table 19: Robustness check for Private Credit

Variable[1]	Growth[2] (1)	Growth[3] (2)	Growth[3] (3)	Growth[3] (4)	Growth[3] (5)	Growth[3] (6)	Growth[3] (7)	Growth[3] (8)
Privo[4]	0.014	0.0069	0.0094	0.0053	0.0116	0.0263	0.0048	0.0081
	(0.099)	(0.368)	(0.305)	(0.433)	(0.291)	(0.103)	(0.725)	(0.403)
N. of Instruments	12	20	20	20	20	20	20	19
Obs	477	407	396	389	378	373	372	379
Hansen[5]	0.304	0.182	0.184	0.347	0.428	0.426	0.176	0.348
Autocorr.[6]	0.875	0.821	0.623	0.648	0.914	0.703	0.837	0.733

Table 20: Robustness check for Liquid Liabilities

Variable[1]	Growth[2] (1)	Growth[3] (2)	Growth[3] (3)	Growth[3] (4)	Growth[3] (5)	Growth[3] (6)	Growth[3] (7)	Growth[3] (8)
Lly[4]	0.0159	0.0284	0.029	0.0182	0.0192	0.0631	0.0165	0.0325
	(0.125)	(0.015)	(0.015)	(0.124)	(0.159)	(0.008)	(0.210)	(0.014)
N. of Instruments	12	20	20	20	20	20	20	19
Obs	477	409	396	389	379	374	373	380
Hansen[5]	0.354	0.413	0.398	0.470	0.537	0.717	0.305	0.403
Autocorr.[6]	0.834	0.845	0.714	0.589	0.892	0.319	0.986	0.416

[1] In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity.

[2] This equation was estimated under the simple control set of explanatory variables

[3] This equations were estimated leaving one time period at a time outside of the sample. For example, equation (2) is the estimation without the 1961-1965 period, equation (3) is without the 1966-1970 period and so on for the rest.

[4] This variable was included as log(variable)

[5] The values indicate p-values under the null hypothesis that instruments are valid

[6] The values indicate p-values under the null hypothesis that errors have no second order serial correlation

Table 21: Robustness check for Private Credit for different regions

Variable[1]	Growth[2] (1)	Growth[3] (2)	Growth[3] (3)	Growth[3] (4)	Growth[3] (5)	Growth[3] (6)	Growth[3] (7)	Growth[3] (8)
LacPrivo[4]	0.0130	0.0171	0.0185	0.0109	0.0221	0.0288	0.0110	-0.0006
	(0.381)	(0.142)	(0.122)	(0.392)	(0.089)	(0.133)	(0.436)	(0.948)
EuropePrivo[4]	-0.0168	-0.0069	-0.0073	-0.0021	0.0045	-0.0049	-0.0154	-0.0121
	(0.510)	(0.640)	(0.690)	(0.914)	(0.852)	(0.858)	(0.659)	(0.523)
AsiaPrivo[4]	0.0098	0.0017	0.0052	0.00002	0.0082	0.0141	0.0025	-0.0117
	(0.567)	(0.900)	(0.708)	(0.999)	(0.609)	(0.485)	(0.914)	(0.290)
AfricaPrivo[4]	0.0136	0.0071	0.0037	0.0082	0.0220	0.0347	-0.0232	0.0016
	(0.286)	(0.493)	(0.690)	(0.605)	(0.046)	(0.006)	(0.494)	(0.858)
N. of Instruments	20	32	32	32	32	32	32	31
Obs	477	407	396	389	378	373	372	379
Hansen[5]	0.099	0.422	0.269	0.132	0.346	0.561	0.365	0.526
Difference-in-Hansen[6]	0.046	0.425	0.507	0.047	0.545	0.327	0.161	0.703
Difference-in-Hansen[7]	0.099	0.809	0.785	0.132	0.560	0.822	0.326	0.557
Autocorr.[8]	0.844	0.981	0.787	0.729	0.920	0.687	0.512	0.842

[1] In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity.

[2] This equation was estimated under the simple control set of explanatory variables

[3] This equations were estimated leaving one time period at a time outside of the sample. For example, equation (2) is the estimation without the 1961-1965 period, equation (3) is without the 1966-1970 period and so on for the rest.

[4] This variable was included as log(variable)

[5] The values indicate p-values under the null hypothesis that instruments are valid

[6] The values indicate p-values under the null hypothesis that the subsets of instruments that contain control variables except financial development measures are valid for the levels equation

[7] The values indicate p-values under the null hypothesis that the subset of instruments that contain only the financial development measure is valid for the levels equation

[8] The values indicate p-values under the null hypothesis that errors have no second order serial correlation

Table 22: Robustness check for Liquid Liabilities for different regions

Variable[1]	Growth[2] (1)	Growth[3] (2)	Growth[3] (3)	Growth[3] (4)	Growth[3] (5)	Growth[3] (6)	Growth[3] (7)	Growth[3] (8)
LacLly[4]	0.0135	0.0250	0.0304	0.0116	0.0173	0.0511	0.0186	0.0064
	(0.194)	(0.044)	(0.035)	(0.339)	(0.179)	(0.008)	(0.164)	(0.582)
EuropeLly[4]	-0.0472	0.0013	0.0044	-0.0112	-0.0145	0.0146	0.0162	-0.0043
	(0.053)	(0.963)	(0.879)	(0.647)	(0.664)	(0.754)	(0.712)	(0.887)
AsiaLly[4]	-0.0032	0.0164	0.0246	0.0011	-0.0020	0.0458	0.0028	-0.0116
	(0.853)	(0.448)	(0.329)	(0.867)	(0.936)	(0.190)	(0.929)	(0.475)
AfricaLly[4]	0.0181	0.0305	0.0360	0.0212	0.0270	0.0549	0.0122	0.0175
	(0.292)	(0.066)	(0.123)	(0.272)	(0.128)	(0.025)	(0.540)	(0.224)
N. of Instruments	20	32	32	32	32	32	32	31
Obs	477	409	396	389	379	374	373	380
Hansen[5]	0.082	0.469	0.198	0.220	0.184	0.570	0.448	0.479
Difference-in-Hansen[6]	0.535	0.439	0.296	0.071	0.292	0.183	0.236	0.337
Difference-in-Hansen[7]	0.082	0.574	0.347	0.369	0.218	0.301	0.473	0.460
Autocorr.[8]	0.797	0.943	0.835	0.677	0.915	0.468	0.912	0.769

[1] In parenthesis we indicate p-values for each coefficient with the Windmeijer (2005) correction and in brackets p-values with no correction. Dummy variables were included to control for specific time effects but those coefficients are not reported for brevity.

[2] This equation was estimated under the simple control set of explanatory variables

[3] This equations were estimated leaving one time period at a time outside of the sample. For example, equation (2) is the estimation without the 1961-1965 period, equation (3) is without the 1966-1970 period and so on for the rest.

[4] This variable was included as log(variable)

[5] The values indicate p-values under the null hypothesis that instruments are valid

[6] The values indicate p-values under the null hypothesis that the subsets of instruments that contain control variables except financial development measures are valid for the levels equation

[7] The values indicate p-values under the null hypothesis that the subset of instruments that contain only the financial development measure is valid for the levels equation

[8] The values indicate p-values under the null hypothesis that errors have no second order serial correlation

12 Appendix E

The software Stata 10 was used to perform our econometric estimations. In order to do this the *xtabond2* package was used. This package was developed by David Roodman and it is available at **http://ideas.repec.org/c/boc/bocode/s435901.html** where instructions and help could be found in order to use this package for Stata 7 and more updated versions.

For the estimations on table 10 with the full instrument set and then the collapsed instruments equations we used the next commands repsectively.

-xtabond2 (y X λ), gmm(X, lag(2 2)) iv(λ) small twostep robust
-xtabond2 (y X λ), gmm(X, lag(2 2) collapse equation(both)) iv(λ) small twostep robust

In this specification, y is our dependent variable, X the set of explanatory variables and λ the set of time dummy variables.

For the estimations on table 13 a slight modification was performed in order to produce instruments that generated valid Hansen tests. In all the estimations in that table we used the next command.

-xtabond2 (y X λ), gmm(X (without FD), lag(1 2) collapse equation(both)) gmm(FD, lag(2 2) collapse equation(both)) iv(λ) small twostep robust

The definitions are the same as the one used above, with the modification that X without FD includes explanatory variables but without the measures of financial development for each region and FD includes the measures of financial development for each region.