Is Financial Development Really Beneficial for Latin American Countries?
Working Paper

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Abstract

In this paper, I analyze the impact of financial development in economic growth (productivity and capital growth), income inequality, and education in Latin America. I use annual observations from a sample of 12 Latin American countries from 1971 to 1998. The measures of financial development used are private credit and bank deposits as a share of GDP. I find that there is a two way causation issue, where financial development is endogenously determined in the growth equation. To address for endogeneity, I use instrumental variables for the measure of financial development, and my results differ significantly from previous empirical work. I find that financial development has no significant effect on GDP per capita growth. In addition, results show that financial development has a positive effect on income inequality and on the percentage of the population that completed secondary education. From the findings based on my empirical work, policies related to the development of the financial sector in Latin American countries should not be considered as a top priority.

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JEL Categories: O16, O15, O54, G20
Key Words: Financial development, Income inequality, Economic growth in Latin America

Revised December 2006

Prepared for the American Economic Association Meetings, January 2007

Acknowledgements: This paper benefited greatly from comments and assistance by Kevin Grier; all his help is greatly appreciated. I also thank Dean Spears for helpful comments and suggestions.

I. Introduction

In spite of being located in a region of the world with abundant natural resources; a vast majority of Latin American countries are classified as developing nations.[1] Economic growth in Latin American countries has not met expectations, regardless of significant institutional reforms and their inherent potential to fare better.[2] High income inequality is a trend that has been observed in Latin America in the last 25 years (Sherman, 2000; De Ferranti et al., 2004).[3] In addition, Latin America's financial sector, in comparison with other regions of the world, is significantly underdeveloped (Garcia Herrero et al., 2002). Therefore, high income inequality and underdeveloped financial systems could be considered as possible causes of poor economic performance of Latin American countries.

In order to discover and understand which policies can be used to promote economic growth in Latin America, I analyze the effect of financial development on economic growth, income inequality, and education in the region. Although there is a vast literature on the analysis of the relationship between financial development and economic growth, few empirical analyses use samples that pool countries that belong to the same group.[4] In my empirical analysis, I use a sample that includes 12 Latin American countries, and I focus on addressing the causality issue between financial development and economic growth. I also estimate the effect of financial development on productivity growth and capital accumulation. Furthermore, I study the effect of

[1] According to the World Bank classification, 9 out of 20 Latin American countries have an income per capita below $2935 dollars per year, 8 have an income per capita between $2936 and $9075 dollars per year, and only 3 have an income per capita above $9075.
[2] Grier & Grier (2006) show that Latin American countries have been reforming but these reforms did not have the expected results on terms of economic growth.
[3] De Ferranti et al. (2004) present a comprehensive study on income inequality in Latin America.
[4] Garcia Herrero et al. (2002) do a cluster analysis in relation to financial development and find that Latin American countries should be in the same cluster. They find that the characteristics of the financial sector in Latin America are different than those in Asia or Eastern Europe. Arestis et al. (2002) show also that the effect of financial development on economic growth varies across countries and that not all countries can be pooled in to the same sample.

financial development on other socio-economic variables such as income inequality and education. Because financial development can have a simultaneous effect on economic growth and income inequality, I estimate the effect of financial development on economic growth and income inequality allowing for contemporaneous cross equation error correlation.[5] The main indicator of financial development used in my analysis is private credit, and I use bank deposits as a measure of financial development for robustness purposes.[6]

To summarize, the main objective of my analysis is to determine the effect of financial development on economic growth, income inequality, and education in Latin America. The rest of the paper is organized as follows. In section II, I present a review of the literature on the effects of financial development and financial development in Latin America. Section III describes the data; section IV outlines the model specification; section V presents the empirical results, and section VI concludes.

II. Effects of Financial Development and Financial Development in Latin America

A. Effects of Financial Development

There is a debate on the relationship between financial development and economic growth. Some argue that financial development causes economic growth and others argue that economic growth causes financial development. Most literature and empirical work agrees with the idea that a developed financial system fosters economic growth. Supporters of this view state that financial development helps to increase economic activity, and they base their argument on Schumpeter's view of financial development as "creative destruction" that allows the formation of new ideas (Rajan & Zingales, 2003). Nonetheless, there are other analyses showing that

[5] This part of the analysis is based on Lundberg's and Squire (2003) work.
[6] Private credit equals the value of credit by financial intermediaries to the private sector divided by GDP. Bank deposits equals demand, time, and savings deposits in deposit money banks as a share of GDP (Beck et al., 2004).

financial development may be the consequence of economic growth because developed economies create the demand for developed financial sectors (Shan et al., 2001; Shan, 2005).

In a literature review on the relationship between financial development and economic growth, Levine (1997) and Demirguc-Kunt (2006) conclude that causality runs from financial development to economic growth. They both present the theories explaining why financial development has a positive effect on economic growth and discuss empirical evidence that supports this argument. According to them, empirical analyses can be classified in three types of data: cross country, panel, and firm/industry. Panel and firm/industry data analyses are superior to cross country data analyses because they allow researchers to incorporate time series techniques and to control better for cross-country heterogeneity.[7]

Using a basic definition, the level of financial development in a country is determined by the access that individuals have to credit and financial services. According to Levine (1997) the primary function of the financial sector is to "facilitate the allocation of resources, across space and time, in an uncertain environment" (p.691). Therefore, the level of development in the financial sector plays a crucial role in the economy because any entrepreneurial and trading activity will depend on it. Furthermore, financial development promotes economic growth because it decreases market frictions that result from imperfect information (Khan & Senhadji, 2000). Financial intermediaries connect savers with investors in an efficient way and allocate resources to profitable projects (Demirguc-Kunt, 2006). Khan and Senhadji (2000) use a cross section sample and a five year average panel of 159 countries during the period of 1960-1999 and show the positive effect financial development has on economic growth. Several empirical analyses that use cross section and panel data find a positive effect of financial development on

[7] Eschenbach (2004), in his survey of the literature, finds that the relationship between financial development and economic growth varies across countries. Rioja and Valev (2004a,b) and Arestis et al. (2004) support Eschenbach's (2004) view on country heterogeneity.

economic growth and are reviewed by Demirguc-Kunt (2006).[8]

Analyses at the firm/industry level also support the argument that financial development is conducive to growth. For example, Rajan and Zingales (1998) argue that financial development is beneficial because it allows firms to have a source of financing at a lower cost and to avoid moral hazard and adverse selection problems. Rajan and Zingales (1998) also show that financial development is beneficial to those industries that rely on external financing.[9] Furthermore, Beck (2002) argues that there is a positive relationship between financial development and exports of manufacturing goods because with a more developed financial system, manufacturing industries have a comparative advantage (manufacturing industries usually depend on external financing). According to Carlin and Mayer (2003), financial development also has an impact on investment in those industries that rely on external financing extensively.[10] Love (2003) finds support to the positive effect of financial development on economic growth in an empirical analysis that uses data from 5000 firms in 36 countries. He argues that financial development reduces the cost of capital, and this allows firms to allocate investment more efficiently.

There are several channels through which financial development has been associated with economic growth. For example, it has been stated that financial development promotes productivity growth and capital accumulation (Rioja & Valev, 2004a). By promoting higher productivity growth and capital accumulation, financial development helps less developed

[8] Khan and Senhadji (2000) provide a good literature review on the empirical evidence on the relationship between economic growth and financial development as well.
[9] Rajan and Zingales (1998 and 2003) do a literature review on the positive effects of financial development on economic growth.
[10] Ju and Wei (2004) developed the *Wooden Barrel Theory of International Trade* based on the Chinese proverb – "A wooden barrel may be formed with staffs of uneven length; how much water it can hold depends on its shortest staff". Therefore, under this theory, economic growth will depend on the financial sector if finance constraint is binding. In their analysis, they present a theoretical model that explains how financial development benefits some sectors.

countries (LDCs) to converge (Aghion et al., 2005). Financial development promotes technology transfer because technological knowledge is usually specific and requires intensive amount of capital. Aghion et al. (2005) present the theoretical model and empirical evidence on how financial development helps poor countries to converge.

Furthermore, using theoretical models and empirical evidence, it has been argued that financial development decreases income inequality. Clarke et al. (2003) posit that there is a negative relationship between financial development and income inequality since financial market imperfections promote a more unequal distribution of wealth.[11] It is stated that if the financial sector is underdeveloped, the initial level of inequality will continue because wealthy people will lobby for policies that benefit themselves, while the poor will be unable to augment their wealth because of the imperfections in the financial market (Li et al., 1998). If the financial sector is underdeveloped, there is credit rationing, which makes it nearly impossible for the poor to finance schooling or other investments (Bigsten and Levin, 2001). Under this argument, the underdevelopment of the financial system contributes to the perpetuation of income inequality because human capital is not good collateral, and people with no assets are unable to finance schooling. Based on this particular case, findings suggest that in order to increase the income of the poor it is important to increase the access of the poor to capital through a more developed financial system.

Financial development has not only been considered as pro-growth, but also pro-poor because of its effects on income inequality.[12] Honohan (2004), using data on the infrastructure of the financial sector, shows that there is a negative relationship between financial depth and poverty. In a cross country analysis that includes 52 countries, Beck et al. (2004) show that

[11] Clarke et al. (2003) mention that this argument is based on Banerjee's and Newman (1993), and Galor's and Zeira (1993) work.
[12] Holden & Propenko (2001) present a good literature review on the effects of financial development on poverty.

financial development decreases inequality by increasing the income of the poor. Beck et al. (2004) also find that financial development affects other social indicators such as infant mortality and school enrollment rates. They find that an increase on financial development decreases infant mortality and increases school enrollment.[13]

The literature previously reviewed supports that financial development has a positive effect on economic growth. Nonetheless, it is important to mention that some of the empirical work previously mentioned has taken into consideration that there is a reverse causality issue between financial development and economic growth (Beck et al, 2004; Eschenbach, 2004; Honohan, 2004; Khan & Sehandji, 2000). As stated by Shan et al. (2001), the relationship between financial development and economic growth may be a "chicken or the egg" problem since financial institutions are usually developed in developed countries (DCs) and underdeveloped in LDCs. For example, financial development has been associated with stronger property rights (Acemoglu & Johnson, 2005; Claessens & Laeven, 2002). Since property rights have an impact on asset allocation, stronger property rights improve the access to financing. Because property rights and other institutions are sometimes determined by growth, financial development may just be the result of economic development.

To determine the real effect of financial development on economic growth, two things are required. First, it is necessary to determine whether financial development is endogenously determined in the growth equation. Second, if empirical evidence shows that financial development is determined by economic growth (reverse causality issue), analyses must incorporate techniques that address for this. For example, Khan & Sehandji (2000) argue that financial development is endogenously determined in the growth equation and use an

[13] It has also been argued that financial development reduces child labor through its effect on education (Dehejia & Gatti, 2005).

instrumental variables (IV) approach. To address for the causality issue, Shan (2005) uses a vector auto-regression (VAR) estimation in his analysis. While Khan & Sehandji (2000) use a large sample that includes DCs and LDCs and find a positive effect of financial development on economic growth, Shan (2005) uses a sample that includes 9 developed countries and China and finds that the effect of financial development on economic growth is insignificant. Furthermore, Rioja and Valev (2004b) use a generalized method of moments (GMM) technique and find that the effect of financial development varies across countries. They find that financial development has a positive effect on economic growth only for countries with high and intermediate levels of financial development and no significant effect on those countries with low levels of financial development.[14]

The debates on determining what comes first, financial development or economic growth, and on whether financial development has a positive effect on economic growth are far from being solved. Getting to a consensus is relevant for Latin American countries since they have undergone significant reforms in the financial sector, and it is necessary to determine whether further reforms to this sector are conducive to growth. Furthermore, because Latin America is the most unequal region of the world, it is also important to find out if financial reforms promote a more equal distribution of income in the region. Since it has been argued that educational attainment affects income inequality, it is also important to determine the effects of financial development on education. Using Latin American countries in the analysis is useful because the region is financially underdeveloped, and the financial sectors in these countries share similar characteristics.

[14] Prasad et al. (2003) argue that there is a threshold effect between financial development and economic growth. They argue that countries should integrate their financial sectors carefully by establishing adequate macroeconomic fundamentals and good institutions in order to reach the full benefits of financial development.

B. Financial Development in Latin America

Latin American countries share similar levels of financial development, and this is shown by Garcia Herrero et al. (2002) in their analysis on the current situation of financial development in Latin America. They compare financial development in Latin America with other emerging regions, such as Asia and Eastern Europe, and demonstrate that Latin American countries lag behind with respect to financial depth. They argue that the financial system in Latin America is bank based, and that the stock market is not as significant as it is in other regions.[15]

In the 1990s the average level of credit to the private sector in Latin America was only 28 percent of GDP. This average level of private credit indicates underdevelopment in the financial sector in that region since it was 72 percent for Asia and 43 percent for countries in the Middle East and North Africa. Because the banking sector is small in the majority of the Latin American countries, it is difficult for business to have access to credit. Under these circumstances, the sources of financing are limited in Latin America, firms are not able to grow and expand, and this is reflected in the overall growth rate of the economy (Garcia Herrero et al., 2002). In addition, an underdeveloped financial system promotes higher interest spreads in Latin America, and this decreases investment.[16] Underdevelopment in the financial sector is also due to the fact that depositors have little confidence that their deposits will hold their real value. Additionally, Latin America is one of the regions with the highest credit volatility, which is reflected in the fact that this region has the highest average number of crises per country. Financial underdevelopment has social consequences since it interferes with the supply of credit for individuals and firms (Calvo, 2005).

[15] Garcia Herrero et al. (2002) mention "the stock market in Latin America is only one fourth of Asia's in terms of capitalization, even after the Asian crisis" (p.23).
[16] The interest rate spread is the difference between the interest rate charged to borrowers and the rate paid to depositors (Calvo, 2005).

Furthermore, using Mexico as an example, Marichal (1997) is able to show that slow growth in the capital markets produced slow economic growth. He argues that in Mexico sources of credit were limited, there was high concentration of the financial market, and that modern financial markets did not start developing until the 1900s. Marichal (1997) observes that other Latin American countries had similar underdeveloped financial sectors.

The underdevelopment of the financial sector in Latin America has been attributed to the strong government intervention in that sector through the 1970s and 1980s.[17] Latin American governments use the banking sector to finance their budget deficits with borrowing and implicit taxation (Mas, 1995). During that time, governments in the region also used the banking sector to subsidize sectoral development projects. Government intervention in the banking sector created a "bias to refinance non-performing loans," and "benefited bad banks and especially bad borrowers" (Mas, 1995; p. 695). Mas (1995) presents an analysis on the financial sector in four Latin American countries (Argentina, Brazil, Nicaragua, and Venezuela) in the 1980s and shows how government intervention in the banking sector created the wrong incentives. In his analysis, he shows how bad bank regulations allowed unprofitable banks to continue raising deposits even if they were insolvent. He notes that policies in the banking sector changed in the 1990s due to bank privatization. The incentives generated by the reforms implemented in the banking sector in the 1990s were more according to a market-based financial system (De la Torre et al., 2006).

Although there have been significant financial reforms in Latin America, according to De la Torre et al. (2006), the reforms have not resulted in high levels of financial development. Financial sectors have moved towards a more market-based system with less government intervention, however, it is noted that there are some areas that require improvement. For example, De la Torre et al. (2006) argued that the undertaken reforms have not increased the

[17] The literature refers to the government intervention in the financial sector as 'financial repression'.

access to credit for the small and medium enterprises (SMEs) in Latin America. They argue that the financial sector has not developed significantly in the region since there are not enough loanable funds available to SMEs and the stock market in the region has shrunk. SMEs are unable to get funds through the stock market, and this depresses their growth. Even though policy in Latin America has focused on standardizing banking operations to make them follow international codes and there is an undergoing financial market liberalization that is comparable to DCs, the financial sector in the region continues to be underdeveloped (De la Torre, 2006).

My analysis contributes to the literature by determining whether financial development causes economic growth and not vice versa in Latin America. There are few region specific empirical studies on the relationship between financial development and economic growth. De Gregorio and Guidotti (1994) do a panel data analysis, using a sample that includes 12 Latin American countries between 1950 and 1985, and find that there is a significant negative relationship between financial development and economic growth in Latin America. My research expands on De Gregorio's and Guidotti (1994) work because it uses more current data, formally tests for endogeneity, and includes other econometric techniques. Furthermore, my paper contributes to the literature by studying not only the effects of financial development on economic growth but also its effects on productivity and capital growth, income inequality, and education in Latin America. Because this analysis determines whether there are trade-offs between financial development and socio-economic indicators, it is relevant for determining whether reforms in the region should focuse on the financial sector.

III. Data

The sample used in this analysis contains 12 Latin American countries.[18] The panel data includes annual observations between 1971 and 1998.[19] The variables included in the analysis are explained on Appendix 1, and Appendix 2 shows a summary statistics of these variables.

In the analysis of the effects of financial development on economic growth, income inequality, and education, there are several groups of indicators. One set is the group of macroeconomic indicators such as growth of GDP per capita, initial level of GDP per capita, investment as a share of GDP, government spending as a share of GDP, inflation, and terms of trade as a percentage of GDP (measure of openness). These macroeconomic indicators were obtained from the Penn World Tables (Heston et al., 2002). The measure of income inequality included in this analysis determines inequality taking into consideration pay inequality and the share of the population on the manufacturing sector.[20] The data on inequality was obtained from the University of Texas Inequality Project (UTIP). A variable that takes into consideration the initial level of inequality (level of inequality in 1971) is also used as a control variable. Variables related to the level of education are used with the purpose to analyze the effect of financial development on school attainment. In relation to the measures of education, I use Barro's and Lee (2000) measures of school attainment such as the percentage of the population that completed primary education and the percentage of the population that completed secondary

[18] The countries included in the sample are: Bolivia, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Panama, El Salvador, Uruguay, and Venezuela. Other Latin American countries were excluded from the sample due to the significant amount of missing observations for several variables. Brazil and Argentina were excluded from this sample because there were several missing observations for the measure of inequality. Nicaragua was not included in the sample due to unreliable observations (investment as a percentage of GDP had a negative sign in one year).

[19] There are also missing observations for certain variables for this sample. Missing observations were filled out using linear interpolation by country. However, after filling in for missing observations, with the linear interpolation method, there are still some missing observations for the inequality variable.

[20] This measure of inequality was obtained from Galbraith and Kum (2004). Galbraith and Kum (2004) use an econometric technique that takes into consideration income inequality and pay inequality to construct this measure of income inequality. This measure can be interpreted as an ordinary Gini index. See Galbraith and Kum (2004) for a complete explanation on how this new measure of inequality is estimated.

education.[21]

To measure financial development in Latin America, I use the database developed by Beck et al. (1999). One of the measures of financial development used in this analysis is the measure of private credit. Private credit measures the activity of financial intermediaries.[22] Private credit is commonly used as a measure of financial development because it measures how much private credit is in the economy as a percentage of GDP (it measures how much private credit is available for individuals and firms). In addition, another measure of financial development, bank deposits, will be considered in the analysis in order to check for the robustness of the results.[23] The bank deposits variable is a measure of demand, time, and saving deposits in deposit money banks as a share of GDP.

Furthermore, since it is argued that developed countries tend to have a more developed financial system, there is the need to use instrumental variables for financial development (Beck et al., 1999). The instrumental variables I use are the earlier year in which there was adoption, revision, or major amendment to the current constitution, number of official languages, and country area. These instrumental variables can reasonably be assumed to be exogenous, since it can be inferred that they were determined independently of the level of income of the country.[24] The data used to construct these instrumental variables was obtained from the World Fact Book and Country Reports Organization. It is important to mention that these instrumental variables are different than the ones used in Beck et al. (2004). Beck et al. (2004) use the legal origin of

[21] Barro's and Lee (2000) education variables are in 5 year frequency. I use linear interpolation to adjust these variables to annual observations.
[22] Beck et al. (1999) do a literature review and cite several papers that use private credit as indicator of financial development.
[23] Bank deposit is also a good indicator of the activity of financial intermediaries according to Beck et al. (1999).
[24] Results do not change significantly when I add other instruments such as year of independence and the percentage of the population that live in urban areas. I restrict my set of instruments to the number of official languages, year of constitution, and area of the country because these three instruments can be assumed to be exogenous with more certainty.

countries and the religious composition as instrumental variables. Since religion and legal origins are largely homogenous in Latin America, these instrumental variables are not useful.[25]

IV. Model Specification

The effect of financial development in Latin America is analyzed in four dimensions: economic growth, productivity and capital growth, inequality, and education.

To determine the effect of financial development on economic growth, I use a model that is similar to the model tested by Khan and Senhadji (2000):

$$Y_{it} = \beta_0 + \beta_1 FD_{it} + \beta_2 CV_{it} + e_{it} \qquad (1)$$

In this model, the dependent variable is the rate of economic growth of the country (growth of GDP per capita), the independent variable FD is the measure of financial development, and CV is a set of control variables. I use panel data, where the i subscript represents the country and the t subscript represents the year. The control variables for equation 1 are investment as share of GDP, the log of population (first difference), the log of terms of trade (first difference), the percentage of the population that completed primary education, and the log of the initial level of income per capita. The Khan and Senhadji (2000) model is modified by adding education as a control variable.[26]

In the analysis of the effect of financial development on economic growth, I go further into analyzing the effects of financial development on productivity and capital growth. Following Rioja's and Valev (2004a) growth accounting methodology, I estimate productivity growth as follows:

Productivity growth = Output Growth per capita – 0.3*Capital Growth per capita

[25] In Latin America the vast majority of countries have Catholicism as a main religion and civil law as a legal origin.
[26] Education is included in this equation since Mankiw et al. (1992) have shown the importance of the accumulation of human capital on economic growth.

The model I use to test for the effects of financial development on productivity and capital growth is similar to the model specified in equation 1. In this regression the dependent variable is either productivity or capital growth for country i in year t. The control variables are the log of initial GDP per capita, the log of government expenditure, the log of openness to trade, the log of price, and the log of the percentage of the population that completed secondary education.[27] Only in this part of the analysis, I use data observations from 1972 to 1998 (annual data), and the sample includes the same 12 countries mentioned before. Appendix 3 shows the summary statistics for the variables used in this section. When taking into consideration the effect of financial development on productivity and capital growth, I use the full sample first. Later, I will divide the sample according to income per capita level in two groups: upper middle and lower middle countries.[28]

In the analysis of the effect of financial development on income inequality, I test two models. The first model is related to Clarke's et al. (2003) model:

$$\log(Inequality_{it}) = \alpha_0 + \alpha_1 FD_{it} + \alpha_2 CV_{it} + e_{it} \qquad (2)$$

In equation 2 the dependent variable is the log of the measure of inequality, FD is a measure of financial development, and CV is a set of control variables. The control variables for equation 2 are the log of initial real per capita GDP, inflation rate, government consumption, and primary education (for country i, at year t).[29]

The second model I use to test the relationship of financial development and inequality is

[27] Where openness to trade is measured as the terms of trade measure provided by Heston et al. (2002).
[28] Lower middle income: countries with GNI per capita between $736 and $2,935: Bolivia, Colombia, Ecuador, El Salvador, and Guatemala, and Honduras. Upper middle income: countries with GNI per capita between $2936 and $9,075: Chile, Costa Rica, Mexico, Panama, Uruguay, and Venezuela. This country classification is based on the World Bank country classification (GNI per capita in 2002). Source: http://www.worldbank.org/data/aboutdata
[29] The model empirically tested here is a little different than Clarke et al. (2003) since it includes education and does not include ethnic fractionalization and expropriation risk measures as control variables. Education is included based on Chiu's (1998) argument about human capital having an impact on the level of inequality.

based on Beck's et al. (2004) work:

$$Inequality_{it} / stddev = \alpha_0 + \alpha_1 FD_{it} + \alpha_2 CV_{it} + e_{it} \qquad (3)$$

In equation 3, the measure of inequality is divided by the standard deviation and regressed on the measure of financial development, and a set of control variables. The control variables used in this regression are the growth of GDP per capita and the initial value of inequality.

In the analysis of the effect of financial development on education, I follow the same model used in equation 3, where the dependent variable will be education (primary or secondary level) and the control variables will be GDP per capita growth and the initial value of education.

Furthermore, I use the Granger Causality test in order to determine whether financial development is endogenously determined in the growth and inequality equations.[30] If this test shows that financial development is indeed endogenous, I will estimate the equations previously mentioned using instrumental variables. The instrumental variables I use are the earlier year in which there was adoption, revision, or major amendment to the current constitution, number of official languages, and country area. The next equation shows the financial development indicator regressed on the instruments mentioned before:

$$FD_{it} = \lambda_0 + \lambda_1 language_i + \lambda_2 year\_constitution_i + \lambda_3 area_i + \varepsilon_{it} \qquad (4)$$

The methods of estimation considered in the analysis, before including the instrumental variables, will be Ordinary Least Squares (OLS) and Generalized Least Squares (GLS). Since this analysis includes observations for different countries, it is expected that there is heteroscedasticity. For this reason, the results obtained from the GLS estimation must be more reliable because this estimation transforms the equations in order to ensure that the error vector

[30] Beck et al. (2004) argue that rich countries tend to have developed financial systems. Khan et al. (2000) and also address this issue including a 2SLS estimate. Clarke et al. (2003) address the issue of financial development being endogenously determined with inequality by using a 2SLS as well.

has a scalar variance-covariance matrix. Furthermore, if the Granger Causality test shows that there is endogeneity, the Two-Stage Least Squares (2SLS) and General Method of Moments (GMM) will be included in the analysis.

According to Lundberg and Squire (2003), financial development could have a simultaneous effect on economic growth and income inequality. In order to address for this problem, I take into consideration contemporaneous cross equation error correlation. Therefore, a Seemingly Unrelated Estimator (SUR) that estimates equations 1 and 2 (and equations 1 and 3) will be considered in this analysis as well.[31] I will also use a Three Stage Least Squares Estimator (3SLS) in this part of the analysis in order to address for endogeneity and to take into account cross equation error correlation.

V. Results

1. Financial Development and Economic Growth

1.1 OLS and GLS Estimation

In the analysis of financial development effect on economic growth, Table 1 shows that private credit has a significant negative effect on the growth of GDP per capita at the 5 percent level when I use OLS and GLS estimations.[32] This finding goes according to De Gregorio and Guidotti's (1995).

1.2 Granger Causality Test

Although results in Table 1 show that financial development has a significant negative coefficient with the OLS and GLS estimations, the literature suggests that developed countries tend to have developed financial sectors. Therefore, financial development can be endogenously

[31] The SUR estimator will allow for the possibility that a shock affects GDP growth and income inequality at the same time.
[32] I use a 5 percent level of significance in all cases.

determined in the growth equation. For this reason, I use the Granger Causality test to determine whether there is a causality problem between financial development and economic growth.

For the Granger causality test, the growth of GDP per capita is regressed in four lags of the growth of GDP per capita and four lags of the measure of financial development (private credit). In addition, the measure of financial development is regressed on four lags of the growth of GDP per capita and four lags of private credit. In Table 2, column 1 shows the first regression, where the F test on the coefficients of the lags of private credit shows that I reject the null hypothesis that private credit does not cause growth of GDP per capita. In Table 2, column 2, shows that I reject the null hypothesis that growth of GDP per capita does not granger cause private credit. Therefore, based on this test, there is a two-way causation problem in the analysis of the effect of financial development on economic growth.

1.3 2SLS and GMM estimation

The Granger causality test shows that the measure of financial development, private credit, is determined endogenously. Therefore, it is important to use 2SLS and GMM estimation using the appropriate instruments mentioned before (number of languages, year of constitution, and area) to estimate the real effect of financial development on economic growth. In Table 3, column 1 shows the coefficients of this regression using the 2SLS, and column 2 shows the GMM estimators (where the GMM estimation uses a white cross section instruments weighting matrix). In both cases, I find that private credit has no significant effect on the growth of GDP per capita. The instruments used in this analysis are indeed good instruments because they are correlated to the measure of private credit and they pass the over-identifying restrictions test (see Table 4). Therefore, these estimations show that once we account for endogeneity, financial development has no significant effect on economic growth in Latin America. This result

contradicts De Gregorio's and Guidotti (1995) results.

2. Financial Development and Productivity and Capital Growth

In the analysis of the relationship between financial development and economic growth, it is important to mention that the results obtained in this paper differ significantly to other empirical work. When I address for the issue of endogeneity (using 2SLS and GMM estimators, Table 3), I find that financial development has no significant effect on economic growth. This finding is puzzling. Neoclassical growth theory holds that growth can be derived by factor accumulation or total factor productivity growth. Perhaps the puzzle would be resolved if financial development impacted these variables differently. In this part of the analysis, based on Rioja's and Valev (2004a,b) and using the GLS estimation, I first estimate the effect of financial development on productivity and capital growth for the full sample (12 countries) and then for the sample divided in two groups (upper middle and lower middle income countries).[33] In Table 5, columns 1 and 2 show the results obtained for the full sample. For the full sample, private credit has no significant effect on productivity or capital growth. This result differs from Rioja's and Valev (2004a) result, since they find that private credit has a positive effect on productivity and capital growth for the full sample.

Furthermore, when I split the sample in two groups, upper middle and lower middle income countries, results will differ significantly. Table 6 shows the results obtained when I use the GLS estimation for the upper middle income countries. In Table 6, I find that private credit has a significant positive effect on productivity growth and no significant effect on capital growth at the 5 percent level for the upper middle income countries (columns 1 and 2). In Table 7, columns 1 and 2 show the coefficients obtained for the lower middle income countries using

[33] The observations used in this part of the analysis are from 1972 to 1998, see Appendix 3 for summary statistics.

the GLS estimation. The financial development coefficients in this case are different than the ones obtained for the upper middle income group. At the 5 percent level, I find that for the lower middle income group, financial development has no significant effect on productivity or capital growth. The results obtained here support the argument that financial development is beneficial only to those countries that are more developed.

The results obtained from studying the effect of financial development on productivity and capital growth can be helpful in order to explain some of the results obtained before in the growth equation. Based on the effect of financial development on productivity and capital growth, there is one main finding (see Table 8 for a summary of the results obtained in this section). Since financial development has no significant effect on productivity or capital growth in lower middle income countries, this could explain why it is found in this analysis that financial development has no significant effect on economic growth for the full sample.

3. Financial Development and Income Inequality

3.1 OLS and GLS Estimation

In order to determine the usefulness of policies related to developing the financial sector in Latin America, it is important to determine the effect of financial development on income inequality. Since income inequality in Latin America is high, and this high income inequality has been associated with low economic growth, it will be convenient to determine whether financial development increases or decreases income inequality.[34] Table 9 shows the results obtained for both inequality regressions mentioned previously (equations 2 and 3). When using

[34] De Ferranti et al. (2004) argue that income inequality has been high in Latin America and that high income inequality may explain underdevelopment in the region. Additionally, on the negative relationship between income inequality and economic growth see Person and Tabellini (1994), Benabou (2000), Fishman and Simhon (2002), Siebert (1998), and Barro (1999).

Clarke's et al. (2003) model in the analysis of the relationship between financial development and inequality, the OLS coefficients show that private credit has no significant effect on inequality. On the other hand, when using the other model specification, from Beck et al. (2004), the OLS coefficients show that private credit has a significant positive effect on income inequality. Furthermore, when using the GLS estimator in both model specifications, I find that private credit has a significant positive effect on income inequality. This finding implies that as financial development increases, income inequality increases as well. Since Beck's et al. (2004) model specification has a greater R-squared and a higher F statistic than Clarke's et al. (2003) model specification, the following analysis will focus on Beck's et al. (2003) model specification (model from equation 3).

3.2 The Granger Causality

Not only has it been argued that there is a causality problem between financial development and economic growth, but also between financial development and income inequality (Clarke et al., 2003). Therefore, it is important to determine whether private credit is endogenously determined in this equation.

The Granger causality test in this case is very similar to the one performed before. The difference in this section is that the measure of inequality will be regressed on four lags of the measure of inequality (where the Gini coefficient is divided by the standard deviation) and four lags of private credit. Private credit will also be regressed on four lags of Beck's et al. (2004) measure of inequality and four lags of private credit (Table 10). From the F test, it can be seen that we fail to reject, at the 5 percent level, the hypothesis that inequality does not cause private credit and the hypothesis that private credit does not cause inequality. Therefore, there is not a causality issue between financial development and income inequality and there is no need to

include the 2SLS and GMM estimations in this part of the analysis. Based on the Granger causality test, the OLS and GLS coefficients are efficient and it can be concluded that financial development promotes more income inequality in Latin America

4. Financial Development and Education

Since education is an area that needs to be improved in Latin America, and it has been argued that an increase on education decreases income inequality, it is important to determine whether policies that promote financial development will have a positive impact on education. In this section, the measures used for education are the percentage of the population that completed primary and secondary education. I use two different dependent variables related to education separately and private credit is used as a measure of financial development. The model specification followed in this section is the one suggested by Beck et al. (2004).

Using the OLS model, in Table 11, column 1 shows that financial development has no significant effect on the percentage of the population that completed primary education. On the other hand, in Table 11, column 2 shows that financial development has a positive significant effect on the percentage of the population that completed secondary education. In Table 11, columns 3 and 4 show the GLS estimates. Results obtained with the GLS estimator are the same as the results obtained with the OLS estimator. Thus, financial development has a significant positive impact on the percentage of the population that completed secondary education but no significant effect on the percentage of the population that completed primary education.

5. Seemingly Unrelated Regressions (SUR) Estimation

Following Lundberg's and Squire (2003) work, the effect of financial development on

economic growth and income inequality is analyzed using SUR estimation. In this part of the analysis, equations 1 and 2 are estimated together in order to determine the effect of private credit on economic growth and on income inequality allowing for cross equation error correlation. Table 12 shows the estimates obtained for private credit using the method of iterative SUR. Using different specifications for the income inequality equation, I obtained the same results with respect to the relationship of GDP per capita growth and private credit before using instrumental variables. The SUR estimation shows that private credit has a significant negative effect on economic growth. In the case of the relationship of income inequality and private credit, results are contradictory. Private credit has no significant effect on income inequality when I use the first model (Clarke's et al., 2003), but a significant positive effect when I use the second model (Beck's et al., 2004). Therefore, arguing that income inequality can be decreased by promoting a development in the financial sector cannot be supported by these results. Based on the results obtained when using Beck et al. (2004) model specification (Table 12, column 2) for the inequality equation, it can be argued that policies that promote financial development in Latin America will decrease economic growth and promote more income inequality.[35]

In addition, it is important to consider the causality problem and use instrumental variables for the measure of financial development. I use the Three-Stage Least Squares (3SLS) estimation because it is the 2SLS version of the SUR estimation. The 3SLS estimates are shown in Table 13. The 3SLS estimates show that at 5 percent level of significance, private credit does not have a significant effect on the growth of GDP per capita in both model specifications. In the case of the impact of private credit on income inequality, results are contradictory again. On one hand, when using the first model specification for inequality (equation 2), private credit has

[35] Beck's et al. (2004) model for income inequality has proven to be better than Clarke's et al. (2001).

an insignificant effect on income inequality (Table 13, column 1). On the other hand, when using the second model specification for inequality (equation 3), private credit has a significant positive effect on income inequality (Table 13, column 2). Therefore, the results obtained from the 3SLS estimation also show that there is no strong evidence supporting the idea that a financial development can benefit Latin American countries by decreasing income inequality.

6. Robustness Checks

The results obtained in the previous sections, using private credit as a measure of financial development, can be summarized in four main points:

a. Financial development is endogenously determined in the growth equation, and once I address for the causality issue, financial development has no significant effect on economic growth in Latin America.
b. Financial development has no significant effect on productivity or capital growth for the full sample. Financial development only has a significant positive effect on productivity growth in upper middle income countries.
c. Financial development has a positive effect on income inequality.
d. Financial development has a positive effect on the percentage of the population that completed secondary education.

Therefore, based on the results obtained in this analysis, there is no evidence that policies that promote financial development have a real effect on economic growth in Latin American countries. Furthermore, results show that policies that promote financial development tend to increase income inequality. Nevertheless, private credit has a significant positive effect on the percentage of the population that completed secondary education, which is the only significant

result that supports the idea that financial development can be beneficial for Latin American countries. I check for the robustness of these results by using another measure of financial development, bank deposits as a share of GDP.

6.1 Financial development and economic growth

Table 14 shows the results obtained when bank deposits is used as a measure of financial development using the OLS, GLS, 2SLS, and GMM estimators. The results obtained here are the same to the results obtained before with private credit as a measure of financial development. The bank deposits variable has a significant negative effect on GDP growth with the OLS and GLS estimators, but an insignificant effect with the 2SLS and GMM estimators. Therefore, when analyzing the relationship of financial development and economic growth, results are robust to different measures of financial development.

6.2 Financial development and productivity and capital growth

When using bank deposit as a measure of financial development in the full sample, I find that bank deposit has no significant effect on productivity and capital growth (Table 6, columns 3 and 4). In addition, bank deposit has no significant effect on productivity and capital growth for the lower middle income countries (Table 7, columns 3 and 4). Therefore, these results show that previous results are robust to a different measure of financial development

6.3 Financial development and income inequality

The results obtained in this section, which are shown in Table 15, are also the same as the results obtained before with private credit as a measure of financial development. When using bank deposit as a measure of financial development and Beck's et al. (2004) model specification, I find that bank deposit has a significant positive effect on income inequality (using the OLS and GLS estimators).

6.4 Financial development and education

In relation to the effect of financial development on education, I find that there is a positive significant relationship between bank deposit and the percentage of the population that completed secondary education when using OLS and GLS estimators (Table 16, columns 2 and 4). Therefore, this shows that the positive effect of financial development on the percentage of the population that complete secondary education is robust.

VI. Conclusions

This analysis reveals that the effects of financial development are different for Latin American countries. I show that there is an endogeneity issue when determining the effect of financial development on economic growth. Once I address for endogeneity, I find that financial development has no significant effect on economic growth in Latin America. Moreover, the analysis of the effect of financial development on productivity and capital growth supports the idea that that 'one size does not fit all'. In the Latin American region, the effect of financial development in upper middle income countries differs from the effect of financial development in middle income countries. The results obtained in this section give support to the idea that there is a causality issue related to financial development, since financial development has a positive impact on productivity only on those Latin American countries that have high GDP per capita.

In relation to the effect of financial development in income inequality, conversely to Clarke's et al. (2003) results, I find that financial development has a significant positive effect on inequality. Li et al. (1998) support this finding by arguing that an unequal society will promote an underdeveloped financial system. For the Latin American case, with the Granger causality

test, it has been shown that the level of inequality does not determine the level of financial development. In addition, Lundberg and Squire (2003) introduced the idea that when financial development is promoted, there is a trade-off between economic growth and income equality. From the 3SLS estimation, using Beck's et al (2003) model specification, I find no evidence for this argument. I find that private credit has no significant effect on the growth of GDP per capita, but a positive significant effect on income inequality.

Nevertheless, financial development has a significant positive effect on the percentage of the population that completed secondary education. This result corroborates Bigsten's and Levine (2001) and Honohan's (2003) results. Honohan (2003) argues that financial depth has a negative effect on the level of poverty because people who live in countries with a more developed financial system have more access to funds that can be used to pay for education, and this helps to decrease poverty. If this is the case, the channel through which financial development decreases poverty is through education. If we focus on the effect of financial development on education, implementing policies that promote the increase of private credit or bank deposits could be beneficial for Latin American countries. According to Bigsten and Levine (2001) an increase on education will promote a decrease on income inequality due to a decrease on liquidity constraints; therefore, the results obtained here suggest that financial development could help to decrease income inequality in Latin America. Based on this argument, I suggest to investigate the sources of financial development more deeply and to determine how these sources relate to improving educational attainment in Latin America.

Another interesting issue for further research on the Latin American region is the effect of developing the stock market on economic growth and income inequality, since it is argued that firms have no significant access to funding through the stock market in Latin America. I also

recommend including in the analysis other measures of financial development related to efficiency in the financial sector, such as overhead costs or concentration of credit.

Although the mystery about the effect of financial development on economic growth and other social indicators is far from being solved, my paper provides empirical evidence supporting one side of the debate. From my empirical work, it can be inferred that the benefits of financial development to the economy may not spread through income distribution, and that there is a causality issue that should be addressed when studying the effects of financial development on economic growth. Results in this analysis also show that once causality is addressed, financial development has no significant effect on economic growth. Nonetheless, I find that the implementation of reforms to the financial sector in Latin America could have a positive effect on education. Before concluding that financial development may be the possible answer to the Latin American development puzzle, policymakers should make sure that the causality issue is addressed correctly. Based on the results obtained in this analysis, it can be concluded that financial development should not be considered as a top priority in Latin American policy-making process and other policies that focus on reducing income inequality and poverty are more relevant.

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Table 1

Growth of GDP per capita regression

Variable	OLS	GLS
Constant	-0.0513	-0.0085
	(-0.5928)	(-0.1003)
Private credit	-0.0646	-0.080
	(-2.62)	(-3.27)
Investment	0.0030	0.0037
	(3.72)	(4.54)
d(log(population))	0.7996	0.4281
	(1.32)	(0.765)
d(log(openness))	0.0301	-0.0087
	(0.7178)	(-0.23)
Prim. education completed	-0.0002	-0.0009
	(-0.3379)	(-1.113)
log(initial GDP per capita)	0.0095	0.005
	(0.8242)	(0.4804)
	R-sqr. = 0.0934	R-sqr. = 0.1622
	F-stat. = 5.44	

The numbers in parenthesis are t-statistics

Table 2

Granger Causality Test

Dependent Variable	Growth of GDP per capita	Private credit
Growth of GDP per cap $_{t-1}$	0.33	0.18
	(6.03)	(5.38)
Growth of GDP per cap $_{t-2}$	0.18	0.01
	(3.01)	(0.29)
Growth of GDP per cap $_{t-3}$	0.03	-0.01
	(0.57)	(-0.28)
Growth of GDP per cap $_{t-4}$	-0.02	-0.01
	(-0.38)	(-0.53)
Private credit $_{t-1}$	-0.13	1.51
	(-1.36)	(24.73)
Private credit $_{t-2}$	0.28	-0.67
	(1.62)	(-6.18)
Private credit $_{t-3}$	-0.17	0.23
	(-1.02)	(2.15)
Private credit $_{t-4}$	0.10	-0.10
	(1.02)	(-1.68)
F-test (Wald test)	F-stat. = 5.67	F-stat. = 10.18
	Prob. = 0.0001	Prob. = 0.0001

The numbers in parenthesis are t-statistics

Table 3

Growth of GDP per capita regression

Instruments: language, year of constitution, and area.

Variable	2SLS	GMM
Constant	-0.1094	-0.2144
	(-1.013)	(-1.41)
Private credit	0.1221	0.2818
	(0.799)	(1.455)
Investment	3.96E-5	-0.002
	(0.015)	(-0.635)
D(log(population))	1.6711	2.072
	(1.738)	(1.867)
D(log(openness))	0.0871	0.08
	(1.345)	(1.235)
Primary education completed	0.0008	0.0002
	(0.669)	(0.15)
Log(initial GDP per cap)	0.0118	0.0265
	(0.926)	(1.45)
	R-sqr. = -0.0706	R-sqr. = -0.3813
	F-stat. = 4.34	J-stat. = 0.3423

The numbers in parenthesis are t-statistics

Table 4

Testing instrumental variables conditions

Private Credit regressed on the instrumental variables

Over-identifying restrictions test

Variable	Private Credit
Constant	0.4014
	(0.384)
Language	-0.0458
	(-2.822)
Year of constitution	-3.04E-5
	(-0.059)
Area	1.03E-8
	(0.64)
Overid. Restrictions Test	R-sqr = 0.033
N*R-sqr = 0.3499	F-stat = 3.73
p-value = 0.8395	Prob(F-stat) = 0.012

The numbers in parenthesis are t-statistics

Table 5

Effects of Financial Development on Productivity and Capital Growth GLS estimation Full sample (upper and middle income countries)

Model I
Dependent variable: productivity growth, Financial development measure: private credit
Model II
Dependent variable: capital growth, Financial development measure: private credit
Model III
Dependent variable: productivity growth, Financial development measure: bank deposit
Model IV
Dependent variable: capital growth, Financial development measure: bank deposit

Variable	Model I	Model II	Model III	Model IV
Constant	0.08	-0.23	0.1023	-0.351
	(0.90)	(-0.80)	(0.941)	(-1.12)
Log(Finc. Dev.)	0.006	-0.019	0.004	-0.03
	(1.05)	(-1.04)	(0.68)	(-1.32)
Log(initial GDP per cap.)	-0.013	0.012	-0.017	0.03
	(-1.20)	(0.39)	(-1.55)	(0.84)
Log (government)	0.007	-0.04	0.006	-0.041
	(0.799)	(-1.21)	(0.713)	(-1.25)
Log(openness)	-0.027	0.03	-0.0292	0.044
	(-3.81)	(1.54)	(-3.79)	(1.80)
Log(price)	0.04	0.04	0.0483	0.035
	(2.87)	(0.92)	(3.31)	(0.781)
Log(secondary education)	-0.02	0.004	-0.0173	0.003
	(-2.51)	(0.18)	(-2.37)	(0.12)
	R-sqr = 0.037	R-sqr = 0.01	R-sqr = 0.033	R-sqr = 0.011

The numbers in parenthesis are t-statistics

Table 6

Effects of Financial Development on Productivity and Capital Growth GLS estimation Upper middle income countries

Model I
Dependent variable: productivity growth, Financial development measure: private credit
Model II
Dependent variable: capital growth, Financial development measure: private credit
Model III
Dependent variable: productivity growth, Financial development measure: bank deposit
Model IV
Dependent variable: capital growth, Financial development measure: bank deposit

Variable	Model I	Model II	Model III	Model IV
Constant	0.17	-1.96	0.36	-3.03
	(0.35)	(-1.04)	(0.674)	(-1.55)
Log(Finc. Dev)	0.019	-0.032	0.024	-0.093
	(2.08)	(-0.985)	(1.85)	(-1.97)
Log(initial GDP per cap.)	-0.022	0.16	-0.046	0.28
	(-0.35)	(0.713)	(-0.706)	(1.17)
Log(government)	0.008	0.0100	-0.0008	0.046
	(0.67)	(0.21)	(-0.059)	(0.88)
Log(openness)	-0.029	0.058	-0.04	0.119
	(-1.41)	(0.782)	(-1.91)	(1.48)
Log(price)	0.05	0.15	0.06	0.107
	(2.17)	(1.94)	(3.06)	(1.42)
Log(secondary education)	-0.02	-0.028	-0.021	-0.034
	(-1.20)	(-0.466)	(-1.15)	(-0.56)
	R-sqr = 0.2339	R-sqr = 0.04	R-sqr = 0.2383	R-sqr = 0.059

The numbers in parenthesis are t-statistics

Table 7

Effects of Financial Development on Productivity and Capital Growth GLS estimation Lower middle income countries

Model I
Dependent variable: productivity growth, Financial development measure: private credit
Model II
Dependent variable: capital growth, Financial development measure: private credit
Model III
Dependent variable: productivity growth, Financial development measure: bank deposit
Model IV
Dependent variable: capital growth, Financial development measure: bank deposit

Variable	Model I	Model II	Model III	Model IV
Constant	0.60	-0.958	0.73	-0.91
	(1.66)	(-0.99)	(1.95)	(-0.92)
Log(Finc. Dev.)	-0.012	-0.016	-0.021	-0.02
	(-1.26)	(-0.66)	(-1.77)	(-0.68)
Log(initial GDP per cap.)	-0.073	0.13	-0.086	0.13
	(-1.75)	(1.20)	(-2.014)	(1.19)
Log(government)	-0.008	-0.127	-0.015	-0.13
	(-0.34)	(-2.18)	(-0.65)	(-2.2)
Log(openness)	-0.04	0.103	-0.04	0.105
	(-2.19)	(2.14)	(-2.23)	(2.186)
Log(price)	0.028	-0.002	0.019	-0.0123
	(1.08)	(-0.025)	(0.78)	(-0.19)
Log(secondary education)	-0.017	0.065	-0.021	0.062
	(-1.115)	(1.58)	(-1.37)	(1.54)
	R-sqr = 0.1297	R-sqr = 0.0509	R-sqr = 0.14	R-sqr = 0.0516

The numbers in parenthesis are t-statistics

Table 8

Effects of financial development on productivity and capital growth

	Productivity	*Capital*
Full Sample	PC – No Effect BD – No Effect	PC - No Effect BD – No Effect
Upper Middle Income	PC – (+) Effect BD – No Effect	PC – No Effect BD – (-) Effect
Lower Middle Income	PC – No Effect BD – No Effect	PC – No Effect BD – No Effect

PC = Private Credit
BD = Bank Deposits

Table 9

Dependent variable: Income inequality measure

Model I – Based on Clark et al. (2003) model specification

Model II – Based on Beck et al. (2004) model Specification

Variable	OLS - Model I	OLS-Model II	GLS-Model I	GLS-Model II
Constant	3.70	0.026	3.86	-0.03
	(18.09)	(0.180)	(62.96)	(-0.18)
Private credit	0.0583	1.59	0.122	2.23
	(0.89)	(4.24)	(7.31)	(6.09)
Log (initial GDP per cap.)	-0.0047	*	-0.016	*
	(-0.15)		(-1.80)	
Price	-0.0007	*	-0.001	*
	(-1.00)		(-7.54)	
Government	0.004	*	0.0002	*
	(2.55)		(0.524)	
Prim. education completed	-0.0011	*	-0.0009	*
	(-0.58)		(-1.67)	
Growth of GDP per capita	*	-3.69	*	-4.51
		(-3.28)		(-4.85)
Initial ineq./ std dev	*	1.00	*	1.00
		(285.36)		(319.26)
	R-sqr = 0.0262	R-sqr = 0.9960	R-sqr=-0.02	R-sqr=0.996
	F-stat = 1.75	F-stat = 27737		

Table 10

Granger Causality Test

Income inequality adjusted by the standard deviation regressed in 4 lags of income inequality adjusted and 4 lags of private credit

Dependent Variable	Income Inequality	Private Credit
Inequality $_{t-1}$	1.01	-0.007
	(16.81)	(-1.68)
Inequality $_{t-2}$	0.03	0.004
	(0.35)	(0.66)
Inequality $_{t-3}$	-0.07	0.002
	(-0.93)	(0.48)
Inequality $_{t-4}$	0.03	0.0005
	(0.55)	(0.1211)
Private credit $_{t-1}$	-0.49	1.50
	(-0.60)	(24.86)
Private credit $_{t-2}$	2.62	-0.67
	(1.80)	(-6.28)
Private credit $_{t-3}$	-4.03	0.26
	(-2.74)	(2.46)
Private credit $_{t-4}$	1.96	-0.10
	(2.31)	(-1.71)
F-test (Wald test)	F-stat = 1.91	F-stat =2.04
	Prob = 0.10	Prob = 0.08

The numbers in parenthesis are t-statistics

Table 11

Dependent Variables: Primary and Secondary Education completion rates

Model I – Primary Education share as dependent variable (OLS)

Model II – Secondary Education share as dependent variable (OLS)

Model III – Primary Education share as dependent variable (GLS)

Model IV – Secondary Education share as dependent variable (GLS)

Variable	Model I (OLS-prim)	Model II (OLS-sec)	Model III (GLS-prim)	Model IV (GLS-sec)
Constant	4.51	1.63	3.37	1.44
	(7.64)	(5.60)	(10.11)	(9.21)
Private credit	-0.68	9.32	-0.818	7.42
	(-0.51)	(11.03)	(-1.33)	(12.70)
Growth GDP per cap.	3.62	-2.96	-5.80	-1.58
	(1.09)	(-1.49)	(-3.90)	(-1.29)
Initial education	0.734	0.584	0.87	0.697
	(18.47)	(13.47)	(25.79)	(20.21)
	R-sqr = 0.5208	R-sqr = 0.6036	R-sqr = 0.8540	R-sqr = 0.7431
	F-stat = 120	F-stat = 168.54		

The numbers in parenthesis are t-statistics

Table 12

Seemingly Unrelated Regression Estimation

Dependent Variable: *GDP per capita growth*	Model I Clark et al. (2003)	Model II Beck et al. (2004)
Constant	-0.0431	-0.0596
	(-0.504)	(-0.698)
Private credit	-0.0653	-0.0679
	(-2.678)	(-2.784)
Investment	0.0031	0.0031
	(3.852)	(3.914)
D(log(population))	0.709	0.860
	(1.187)	(1.443)
D(log(openness))	0.0294	0.0194
	(0.071)	(0.470)
Prim. edu. completed	-0.0003	-0.0002
	(-0.397)	(-0.242)
Log(initial GDP per cap.)	0.0086	0.0103
	(0.754)	(0.901)
Dependent Variable: *Inequality*		
Constant	3.703	0.090
	(18.251)	(0.617)
Private credit	0.0605	1.589
	(0.934)	(4.25)
Log (initial GDP per cap)	-0.0041	*
	(-0.14)	
Price	-0.0008	*
	(-1.084)	
Government	0.004	*
	(2.596)	
Prim. edu. completed	-0.0011	*
	(-0.588)	
Growth of GDP per cap.	*	-4.745
		(-4.951)
Initial ineq./ std dev.	*	1.002
		(287.68)

The numbers in parenthesis are t-statistics

Table 13

Three-Stage Least Squares

Instruments: language, area, and year of constitution.

Dependent Variable: *GDP per capita growth*	Model I Clark et al. (2003)	Model II Beck et al. (2004)
Constant	-0.107	-0.086
	(-1.05)	(-0.848)
Private credit	0.125	0.1266
	(0.826)	(0.838)
Investment	-2.02E-5	4.83E-6
	(-0.008)	(0.002)
D(log(population))	1.704	1.616
	(1.792)	(1.70)
D(log(openness))	0.088	0.086
	(1.382)	(1.338)
Prim. edu. completed	0.0008	0.0093
	(0.698)	(0.743)
Log(initial GDP per cap.)	0.012	0.009
	(0.954)	(0.743)
Dependent Variable: *Inequality*		
Constant	3.715	-1.578
	(18.12)	(-1.879)
Private credit	-0.057	8.602
	(-0.193)	(2.383)
Log (initial GDP per cap.)	-0.006	*
	(-0.195)	
Price	-0.0002	*
	(-0.159)	
Government	0.004	*
	(2.546)	
Prim. edu. completed	-0.0009	*
	(-0.047)	
Growth of GDP per cap.	*	-2.989
		(-2.104)
Initial ineq. / std dev.	*	0.994
		(153.598)

The numbers in parenthesis are t-statistics

Table 14

Growth of GDP per capita regression

Instruments: language, area, and year of constitution.

Variable	OLS	GLS	2SLS	GMM
Constant	-0.062	-0.05	-0.068	-0.072
	(-0.721)	(-0.57)	(-0.783)	(-1.254)
Bank Deposit	-0.102	-0.11	-0.021	-0.040
	(-3.41)	(-3.97)	(-0.195)	(-0.584)
Investment	0.003	0.003	0.002	0.002
	(3.68)	(4.22)	(2.033)	(2.270)
D(log(population))	0.786	0.58	1.035	0.664
	(1.32)	(1.08)	(1.508)	(1.061)
D(log(openness))	0.041	0.003	0.048	0.046
	(1.005)	(0.097)	(1.131)	(1.171)
Primary education	-0.0001	-0.0006	5.97E-5	0.0003
	(-0.159)	(-0.84)	(0.074)	(0.409)
Log(initial GDP per cap.)	0.012	0.012	0.011	0.012
	(1.05)	(1.03)	(0.907)	(1.633)
	R-sqr = 0.1066	R-sqr=0.101	R-sqr= 0.0862	R-sqr=0.0913
	F-stat = 6.30		F-stat = 4.21	

The numbers in parenthesis are t-statistics

Table 15

Inequality/std deviation regression

Instruments: language, area, and year of constitution.

Variable	OLS Coefficient	GLS Coefficient
Constant	0.019	-0.016
	(0.113)	(-0.104)
Bank Deposit	1.56	2.132
	(3.05)	(4.83)
Growth of GDP per cap.	-3.25	-4.75
	(-3.58)	(-5.08)
Initial ineq. / std dev.	1.004	1.005
	(283.17)	(313.67)
	R-sqr = 0.9959	R-sqr = 0.9959
	F-stat = 27037	

The numbers in parenthesis are t-statistics

Table 16

Primary and Secondary Education share models
Model I – Primary Education share as dependent variable (OLS)
Model II – Secondary Education share as dependent variable (OLS)
Model III – Primary Education share as dependent variable (GLS)
Model IV – Secondary Education share as dependent variable (GLS)

Variable	Model I (OLS-prim)	Model II (OLS-sec)	Model III (GLS-prim)	Model IV (GLS-sec)
Constant	4.63	1.965	2.59	1.32
	(7.63)	(5.71)	(8.59)	(7.42)
Bank Deposit	-1.58	7.37	1.85	7.95
	(-0.89)	(5.91)	(2.34)	(9.57)
Growth of GDP per cap.	3.29	-2.18	-5.40	-1.527
	(0.992)	(-0.982)	(-3.62)	(-1.14)
Initial education	0.738	0.674	0.857	0.798
	(18.5)	(14.19)	(26.28)	(24.22)
	R-sqr = 0.5215	R-sqr = 0.5098	R-sqr = 0.8490	R-sqr = 0.7809
	F-stat = 120.64	F-stat = 115.10		

The numbers in parenthesis are t-statistics

Appendix 1

Variables Description

Macroeconomic Indicators

Name	*Description*
POP	Population (unit: 000s)
GDPPCAPgrowth	Real gross domestic product per capita growth
INV	investment share of CGDP (% in current prices)
GOV	government share of CGDP (% in current prices)
PRICE	price level of gross domestic product (US =100 in current prices)
OPEN	openness in constant prices (% in current prices)
INITIALGDP(71)	GDP per capita in 1971

Inequality Indicators

Name	*Description*
INEQ	Estimated Household Income Inequality based in two regressors which are the measures of pay inequality and the share of manufacturing in total population
INEQ/STD	The measure of inequality is divided by the standard deviation of inequality *Note: the standard deviation of inequality is calculated by country
INITIAL INEQ/STD	The initial value of inequality divided by the standard deviation (1971)

Social Indicators

Name	*Description*
EDUPRIM	Percentage of the population that completed primary education
EDUSEC	Percentage of the population that completed secondary education
INITIAL P	Initial percentage of the population that completed primary education (1971)
INITIAL S	Initial percentage of the population that completed secondary education (1971)

Financial indicator

Name	*Description*
Private Credit	Private credit by deposit money banks and other financial institutions as a share of GDP
Bank Deposit	Total of bank deposits as a share of GDP

Instrumental Variables

Name	*Description*
Area	Total area of a country on square kilometers
Language	Number of official languages in the country
Year of Constitution	Earlier year in which there was an adoption, revision, or major amendment

Source: Country Reports Organization and the World Fact Book

Productivity Variables

Name	*Description*
Kgrowth	Capital growth per capita
Prodgrowth	Productivity growth calculated as residual

Note: In order to calculate productivity growth I follow Rioja and Valev's (2004a) work, where I assume a neoclassical production function.

$$Y = AK^{\alpha}L^{1-\alpha}$$

$$\text{Pr}\,oductivity\_growth = Output\_growth - 0.3 * Capital\_growth$$

Sources: macroeconomic indicators constructed from the Penn World Table; inequality indicators constructed from the University of Texas Inequality Project (linear interpolation for missing observations); social indicators obtained from Barro and Lee (linear interpolation to adjust for annual observations), financial indicators obtained from
Beck, Demirguc-Kunt, and Levine, Financial Development Database (linear interpolation for missing observations); instrumental variables obtained from the Country Reports Organization and the World Fact Book.

Appendix 2

Summary Statistics

Variable	Obs	Mean	Std Dev
Code	336	6.500	3.457
Year	336	1984.500	8.090
GDPpercapgrowth	336	0.058	0.062
Government	336	19.400	5.564
Independence yr	336	1825.000	24.237
Inequality	331	42.151	11.179
InitialGDPpcap(71)	336	1195.590	395.333
Investment	336	14.805	6.219
Language	336	2.083	0.641
Openness	336	50.771	26.388
Population	336	14451.940	19927.990
Price	336	48.934	14.307
Private credit	336	0.252	0.158
Bank deposits	336	0.204	0.118
Prim. Education	336	13.670	5.357
Sec. Education	336	6.851	3.545
Inequality/std dev	331	26.287	17.176
Initial Ineq/stddev	336	26.020	16.965
Initial prim edu	336	12.416	5.263
Initial sec edu	336	5.205	3.087
Yr of constitution	336	1974.000	21.980
Area	336	559160.830	591953.850

Appendix 3

Summary Statistics

Variable	Obs	Mean	Std Dev
Code	324	6.500	3.474
Year	324	1985.000	7.800
Private credit	324	0.254	0.160
Bank deposits	324	0.207	0.119
Government	324	19.474	5.594
Openness	324	50.758	26.104
Price	324	48.999	14.228
Sec Education	324	6.926	3.543
GDPpercapita	324	3544.710	1957.230
InitialGDPpcap(72)	324	1256.910	418.391
Capital growth	324	0.080	0.243
Prod. growth	324	0.034	0.084