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ESSAYS ON ECONOMIC DEVELOPMENT IN LATIN AMERICA

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF ECONOMICS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This dissertation studies three different aspects related to economic development in Latin America. I analyze the causes of political instability, the relationship between financial development and economic growth, and the effect of inequality on economic growth in Latin America. The findings from this empirical research are relevant for policymaking in the region.

Chapter One studies the determinants of political instability in Latin America. In this analysis, political instability is measured with the first principal component of nine variables related to political instability: assassinations, coups, government crises, anti-government demonstrations, riots, strikes, purges, guerrilla activity, and revolutions. This measure of instability is appropriate since I show that it closely matches historical events and conditions in Latin American countries during the period of analysis. Using a sample of 18 Latin American countries from 1971 to 2000, I find three important results. First, countries with higher democracy scores tend to experience less instability, while those with factionalized political parties are more unstable. Second, I find that income inequality, ethnic fractionalization, and urbanization have a nonlinear effect on instability. I show that increases in income inequality raise instability up to a point, after which any further increases lower instability. Ethnic fractionalization and urban growth have the opposite effect, whereby initial increases in either decreases instability up to a point, after which any further increases produce higher levels of instability. Third, I find that the only macroeconomic factor that has a significant impact on instability is trade openness, where an increase of this measure promotes political stability.

Chapter Two presents an analysis of the causal relationship between financial development and economic growth in Latin America. There is a big debate on whether financial development causes growth or vice versa, and there are few empirical tests on this relationship at the regional level. The analysis of the relationship between financial development and economic growth in Latin America is important since countries in this region experienced improvements in their financial sectors, but they are still financially underdeveloped. Using a sample of 13 Latin American countries from 1961 to 2004, I find that there is a bi-directional causality between financial development and economic growth. Nonetheless, once the sample is divided by initial income levels, I find that the bi-directional causality between financial development and economic growth only holds for countries with higher initial income levels. For those countries with lower initial income levels, evidence shows that financial development follows economic growth and that financial development does not cause economic growth.

Chapter Three empirically analyzes the effect of inequality on economic growth in Latin American countries. I use the area of family farms as a percentage of total agricultural holdings as a measure of inequality. In a sample of 18 Latin American countries from 1960 to 2004, I find a nonlinear effect of inequality on growth. This finding implies that the effect of equality on growth depends on the current levels of resource distribution, where the effect of equality on growth is increasing up to a certain level, after this level, the effect on growth is decreasing. For the purpose of robustness, I use a different measure of inequality that takes into consideration the distribution of agricultural and non-agricultural resources and address for endogeneity. I find that the nonlinear effect of inequality on growth is robust to these different approaches. In

addition, I find that those countries that are highly urbanized benefit the most from increases in equality in terms of the share of family farms.

From this research, there are three main implications for policymakers. First, Chapter One provides a good overview on what policymakers could do to decrease political instability in Latin America. The strengthening of democracy, a more equally distributed society, and further trade liberalization can promote stability in the region. Second, from the empirical analysis in Chapter Two, it can be concluded that financial reforms will not necessarily have the same effects in all Latin American countries. The positive effects of financial development on growth only hold for those countries with initial high income levels. Policymakers must take this into consideration, since there may be other complementary institutions that allow financial development to positively affect growth. Third, Chapter Three shows that inequality, in terms of resource distribution, has a nonlinear effect on growth. This is relevant since it is shown that the majority of Latin American countries are currently at levels of resource distribution where increases in equality produce greater economic growth. Policies that promote agricultural activity at a small scale are beneficial for the region. Another important implication is that policies which promote a more equal distribution of human capital will also result in higher economic growth in the majority of the Latin American countries included in the analysis.

Chapter One

Long Live Democracy: The Determinants of Political Instability in Latin America

1.1 Introduction

The link between political instability and economic development is well established. For example, the theoretical literature has long argued that instability reduces the incentive to accumulate physical capital. Investments in physical capital are often difficult to reverse, which means that investors will postpone new capital projects and wait until the policy environment clarifies, resort to purely speculative activities, or move their money abroad.[1] Subsequent empirical tests of this link have provided support for the hypothesis.

However, much less work has been done on determining the underlying causes of political instability. In this paper, I do exactly this in a panel of 18 Latin American countries from 1971 to 2000. I choose to focus on Latin America because the problem of instability seems especially relevant there.[2] For instance, during the sample period, there were more than 450 political assassinations, 20 coups, more than 140 guerrilla wars and revolutions, and 113 crises that threatened to bring down sitting governments. The most politically unstable country of the group, Argentina, managed to rack up 45 assassinations, three revolutions, and 15 riots in a four year period (from 1973 to 1976). Focusing on Latin America will allow me to choose region specific determinants of instability and also to say something important about the ways in which policymakers could reduce instability in the future.[3]

To investigate the reasons behind Latin America's instability, I first construct a composite measure of instability that is the first principal component of nine different

variables, including assassinations, coups, government crises, anti-government demonstrations, riots, strikes, purges, guerrilla activity, and revolutions. Given the difficulty in representing instability with just one variable, I believe using the first principal component is the best way to find the single most important common element within the nine underlying variables.

I find three important results. First, regime type is a significant determinant of instability. Countries with higher democracy scores have lower average political instability, which indicates that recent moves to increased democracy in the region may bring about less instability in the future. I experiment with alternative measures of democracy and show that this result is robust. In addition, estimates show that factionalized political parties experience higher average levels of political instability.

Second, I find that income inequality, urban growth, and ethnic fractionalization have significant nonlinear effects on instability. Specifically, I show that increases in income inequality raise instability up to a point, after which any further increases lower instability. Ethnic fractionalization and urbanization have the opposite effect, whereby initial increases in either decreases instability up to a point, after which any further increases produce higher levels of instability. Not only are these results important in themselves, but the fact that they have nonlinear relationships with instability may help to explain the lack of agreement in the literature over their role.

Third, most of the macroeconomic variables included in this estimation (including the standard deviation of inflation, investment share, and government budget deficit) are insignificantly related to instability. Only lagged values of trade openness have a significant and negative effect on instability.

Section 1.2 discusses why it is difficult to measure political instability and makes the argument that principal component analysis (PCA) is an efficient way to capture its multi-dimensionality. I go on to show that this measure of instability reflects real world instability in Argentina, Mexico, and Costa Rica. Section 1.3 investigates the determinants of instability, while Section 1.4 discusses the results of the estimation. Section 1.5 discusses the results of estimating the model with different measures of democracy, and Section 1.6 concludes with a discussion of the policy implications of my findings.

1.2 Measuring Political Instability

There is little agreement in the empirical literature about how to best measure instability. Some papers narrow the definition of instability to mean simply turnover in the executive branch (or propensity of government change). For instance, Cukierman et al. (1992) estimate a probit model of instability where the dependent variable is the number of government changes (both regular and irregular). They test whether variables such as riots, repressions, executive adjustments, attempts to change the government, and years from previous government change can determine political turnover. Similarly, Alesina et al. (1996) estimate a binary model of government change for a larger sample of countries (113 countries from 1950 to 1982).[4]

Much other work on instability expand the definition of instability to include phenomena such as civil wars, riots, assassinations, coups, and anti-government demonstrations, all of which can negatively affect property rights and deter new investment. The problem with broadening the definition of instability is that it becomes difficult (and more subjective) to measure with a single variable.[5]

Hibbs (1973) used PCA decades ago to tackle the multi-dimensionality of political instability, a practice which was revived by Alesina and Perotti (1996). Alesina and Perotti (1996) and Perotti (1996) use the first principal component of assassinations, deaths, coups, and dictatorships to construct an index of political instability. Since then, most of the empirical literature on instability has followed their lead and utilized PCA (Annett, 2000; Campos and Nugent, 2003; Schatzman, 2005).[6]

My dependent variable is the first principal component of nine different indicators of instability: assassinations, coups, government crises, anti-government demonstrations, riots, strikes, purges, guerrilla activity, and revolutions.[7] All of these variables are important, but imperfect, manifestations of political instability. That is, there is no one variable that clearly captures all dimensions of instability. For instance, choosing coups as one's measure would mean that Argentina would be considered relatively stable from 1973 to 1975 because of a lack of coups during this period. In reality (which I discuss in more detail below), those years were some of the most unstable in Argentina's history and included deadly guerrilla wars, revolutions, and assassinations.

The first principal component represents the element which explains the largest amount of variance in the data. In this case, the first principal component explains 32 percent of the variance of instability, which is within the range that Alesina and Perotti (1996) report (between 30 and 40 percent). For ease of interpretation, I multiply this number by minus one so that higher values of the dependent variable indicate higher levels of instability.[8]

Table 1.1 shows the average values of the index of instability for the individual countries in my sample. Based on this measure, the four most unstable countries are Argentina, Peru, Bolivia, and Guatemala, whereas the four most stable are Costa Rica, Paraguay, the Dominican Republic, and Panama. The unstable group had 706 events of instability during the sample, while the stable group experienced only 182 events of instability. The differential was especially great in the case of assassinations and guerrilla warfare. The unstable group had a total of 183 assassinations during the sample period and 56 instances of guerrilla warfare, while the stable group experienced a sum of 10 assassinations and two instances of guerrilla warfare.

Before continuing to the empirical portion of the paper, I first want to check whether my measure of political instability accurately reflects what actually took place in these countries. Figures 1.1 to 1.3 show the evolution of the instability measure for Costa Rica, Mexico, and Argentina. I selected Costa Rica and Argentina because they represent the two extremes of instability. Mexico is included to show an intermediate case, where most of the sample is relatively stable with only a few periods of marked instability.

Figure 1.1 shows that the measure of political instability is nearly flat in the Costa Rican case. For Costa Rica, my instability measure becomes slightly positive in 1991, when there were a few strikes and demonstrations, but for the rest of the sample it remains negative. This is consistent with what we know of Costa Rica, which has no military (and thus no possibility of a military coup) and has long been Latin America's most stable country.

Figure 1.2 plots the evolution of Mexican instability, indicating that the country was relatively stable up until the 1994 and 1995 period, after which instability moves around but is consistently above zero. This was a difficult period, both economically and socially, for Mexico. The Zapatistas took center stage in 1994 by staging an uprising in the southern state of Chiapas and the adoption of NAFTA and market oriented policies led to mass protests. The Peso crisis also occurred at the end of 1994, causing an economic crisis and subsequent recession. My measure of instability does a good job reflecting the increased instability during this period.

The Argentine case is considerably more volatile. Figure 1.3 shows five separate periods of high instability in Argentina, with the first two being the most severe. In fact, the instability measure reaches a maximum of 8.51 in1974, which is also the sample maximum. The return of Juan Perón in 1973 to Argentina after an 18 year exile exacerbated the divisions in the Peronist Party and sparked a four year period of escalating instability. At his arrival at the international airport in Buenos Aires (Ezeiza), the right wing group, knowing that most of Peron's airport supporters were from the leftist side, opened fire on the crowd. The Ezeiza massacre began a period of increasing guerrilla warfare between the two factions and frequent executive turnover (the country had four different presidents in the four year period). This period is represented in Figure 1.3 by the first shaded area.[9]

Argentina was under military rule from 1976 to 1983, but by the time 1981 came around, the generals were rapidly losing support.[10] There were large scale strikes in 1981 and 1982 and three separate crises which threatened to bring down the government. The large losses and embarrassing defeat in the Falkland Islands destroyed

any remaining credibility. The measure of instability seems consistent with this story, showing a large spike of instability around 1982 (the year of the Falkland Island invasion) and a decrease in instability as the transition to civilian rule takes place in 1983.[11]

1.3 An Empirical Model of Political Instability

In the paragraphs below, I discuss the independent variables I use to understand instability in the region. Table 1.3 provides a more detailed description of all the variables used in the estimation and their sources, while Table 1.4 provides summary statistics. All of the data is averaged into five year periods, allowing me to capture information from both average cross country differences and fluctuations over time.[12]

A. Democracy, Factionalism, and Regime Duration

Many studies highlight the importance of regime type to political stability. Ellingsen (2000) and Parsa (2003) argue that democratic regimes tend to experience less political instability than undemocratic regimes because they allow citizens to participate in the political process. By allowing political participation, violence will be less likely to arise in democratic regimes because conflict can be solved through voting and consensus (Rummel, 1995). Auvinen (1997) and Przeworski and Limongi (1997) also point out that democracies divert resources from investment to consumption, which allows democratic regimes to provide more economic and political goods, thus alleviating deprivation and discontent.

Feng (1997), in a sample of 96 countries from 1960 to 1980, presents evidence of a positive relationship between democracy and stability. Schatzman (2005), on the other hand, finds mixed results in a sample of Latin American countries, depending on

the measure of stability. She finds that countries with more democratic regimes are less likely to experience collective protests, but more likely to experience rebellions. Goldstone et al. (2004) find that democracy is one of the most important factors behind political stability around the world, but go on to show that weak and factionalized democracies are some of the most unstable regime types.

Factionalism has been associated with higher levels of instability because in a factionalized regime there is conflict inside the political parties.[13] According to Benton (2007, p. 58), factions inside a political party can be based on "personal, cultural, socio-economic, regional, or ideological cleavages." In Latin America, factionalized regimes have tended to promote the development of clientelist networks and patronage politics.[14] Benton (2007) argues that political parties in Bolivia, Brazil, Colombia, Ecuador, Peru, Argentina, Costa Rica, Honduras, and Venezuela have suffered significant internal divisions that have lead to conflict and party dissolution.

To measure democracy, I construct five year averages of democracy with the DEMOC variable from the Polity IV Project (Marshall and Jaggers, 2003). DEMOC is equal to a country's democracy score less its autocracy score. Since the two component scores range from zero to 10, DEMOC has a range of -10 and 10, where higher values represent stronger democracy.

I also include two other regime measures. The first is a dummy variable that accounts for the presence of factionalism, where factionalism is defined by the Polity IV dataset as "polities with parochial or ethnic-based political factions that regularly compete for political influence in order to promote particularist agendas and favor group members to the detriment of common, secular, or cross-cutting agendas"

(Marshall and Jaggers, 2002, p.26).[15] I take the average factional score for each five year period as a measure of particularist politics.

The second is a measure of regime durability and it is measured the year before each five year period. To control for the possibility that the duration of different regime types may have different effects on political instability, I include an interaction term of the duration of a regime and a dummy equal to one for democratic countries. Regime durability is defined as the number of years that a country has not undergone a significant regime change, defined by the Polity IV as a three point move in a country's democracy score. I also interact this variable with a democracy dummy which is equal to one when DEMOC is greater than zero.

B. Neighborhood Instability

Political instability can be contagious since revolutionary groups and ideologies can cross borders. Countries in 'bad neighborhoods' might suffer from neighboring instability, especially if that instability causes a flood of refugees into the country or if guerrilla armies use a country as a base from which to attack their home country. Goldstone et al. (2004) find that countries with four or more political unstable neighbors are more likely to experience political instability, while Schatzman (2005) finds that political instability in neighboring countries increases the probability of a country experiencing collective protests.[16] I create a variable that is equal to the number of neighbor countries that experienced political instability during each five year period. I follow Goldstone et al.'s (2004) approach and consider a country as politically unstable if there was either an ethnic conflict or a revolutionary war during the year, since these are the types of instability that are most likely to affect neighboring countries. In the

sample period, there are two main blocs of 'bad neighborhoods': the first includes Guatemala, El Salvador, and Nicaragua; the second includes Colombia and Peru.

C. Inequality

Eckstein and Wickham-Crowley (2003) and Oxhorn (2003) provide evidence that the increase in democracy in Latin America has come without an improvement in the distribution of income, and that income disparity may be threatening stability in the region. Acemoglu and Robinson (2006) develop a theoretical model of democracy and income inequality and argue that high income inequality in Latin America is one of the main causes of weak democracy in the region. Elites will be against democracy in highly unequal societies because a democratic system will impose more redistributive policies.[17] Empirically, Alesina and Perotti (1996), Perotti (1996), and Odedokun and Round (2001) show that countries with high income inequality are more likely to be politically unstable.[18]

To determine whether income inequality has a nonlinear effect on political instability, I include in the estimation a country's average Gini coefficient (from 1971 to 2000) and its square. The most unequal countries in the region are Guatemala, Peru, the Dominican Republic, and Bolivia, while the least unequal are Paraguay, Costa Rica, Uruguay, and Nicaragua. Except for the Dominican Republic, all of the highly unequal countries are also highly unstable. Likewise, two of the most politically stable countries have the least amount of income inequality (Costa Rica and Paraguay).

D. Other Socio-Demographic Conditions

Other variables, such as ethnic fractionalization, economic discrimination of ethnic minorities, and urbanization are relevant determinants of political instability.[19]

Ellingsen (2000), Auvinen and Nafziger (2002), and Goldstone et al. (2005) claim that economic discrimination of ethnic minorities can lead to political instability if discriminated groups rebel against the system. Empirically, Annett (2000), Ellingsen (2000), and Collier and Hoeffler (2004) show that ethnic fractionalization has a positive and significant effect on instability levels.[20]

While urbanization has also been considered in explanation of political instability, there is no consensus on how urban growth affects political instability. Collier and Hoeffler (2004) argue that the rate of urbanization is low during periods of instability, and that this negative relationship is due to the fact that a government has better military capability in a highly urbanized country. A highly dispersed population makes it difficult for the government to contain instability. On the other hand, Auvinen (1997) and Annett (2000) argue that urbanization tends to promote more political instability. High urban growth promotes more instability because it is difficult for the government to provide basic services in highly populated cities, which creates popular discontent.

To investigate the effect of these socio-economic factors on instability, I include the number of years of the five year period in which there is at least one group that experiences economic discrimination and the ethnic fractionalization index (and its square). Since the literature on urbanization and stability is still unsettled, I test whether it is possible that urbanization has a nonlinear effect on instability. Perhaps initial urbanization is good for stability, while high levels create citizen discontent and thus more instability. To study this, I include in my estimation a country's average urban growth and its square for each five year period.

E. Macroeconomic Factors

Poor economic performance has been considered as a major cause of political instability for two reasons. First, when income is low (or falling), the opportunity cost for an individual to rise up, protest, or revolt is low (Collier and Hoeffler, 2004). Under this situation, individuals have an incentive to quit their participation in productive activities and take part in protests and insurrections (Grossman, 1991). Second, poor economic conditions increase deprivation, which will fuel political instability as citizens perceive their government to be incompetent (Posner, 1997; Auvinen and Nafziger, 1999; and Ellingsen, 2000).[21] Empirically, Cuzan et al. (1988), Booth (1991), Annett (2000), and Blomberg and Hess (2002) show that low income growth has a positive effect on instability.[22]

Many papers study the effect of political instability on inflation rates, but few have investigated the possibility that high (or volatile) inflation may destabilize polities. Cukierman et al. (1992) find in a sample of 79 countries that politically weak governments are more likely to resort to seignorage. Paldam (1987) focuses on eight Latin American countries from 1946 to 1983 and shows that the causality between inflation and instability works both ways. He goes on to demonstrate that almost no regime in the region has survived a bout of hyperinflation, a trend that still holds in the region. Of the countries with the highest and most volatile inflations, almost all were forced out of power.

Besides inflation itself, government spending may be a stabilizing or destabilizing factor, depending on how the spending is financed. Annett (2000) finds that an increase in government spending is associated with lower levels of political

instability, while Cuzan et al. (1988) find that an increase in government spending increases political instability in Latin American countries.

Lastly, Donovan et al. (2005) and Goldstone et al. (2005) discuss the possibility that trade openness might have an effect on political instability. Goldstone et al. (2005, p. 26) note that "countries with lower trade openness (at the 25th percentile in the global distribution) had roughly two to three times higher odds of near term instability than countries with higher openness to trade (those at the 75th percentile)." Donovan et al. (2005) argue that trade openness may be negatively associated with instability if openness brings about more economic growth.

To investigate the effects of macroeconomic variables on instability in the region, I include the share of investment as a percentage of GDP, the standard deviation of inflation (as a measure of inflation volatility), the share of the government budget deficit as a percentage of GDP, and openness to trade. All of these variables are constructed in five year averages. However, since there may be a reverse causality issue between them and political instability, I use the first lag in each case.

1.4 Results

In this section I estimate a model of political instability using the composite measure of instability and the independent variables discussed above. Unless otherwise noted, all of the data is averaged over five year periods, which gives six observations per country and a total of 108 observations. All regressions are estimated with ordinary least squares with White robust standard errors.

Column 1 of Table 1.5 presents my results and shows that the model explains 48 percent of the variation in the instability index. One of the most interesting results from

column 1 is that regime type significantly affects instability levels in the region. The coefficient on the measure of democracy, DEMOC, is negative and significant at the 1 percent level, meaning that countries with higher levels of democracy in the five year period have lower levels of instability on average. The quantitative effect of democracy, however, is not large: a one standard deviation increase in DEMOC (equal to 6.09 points in the index) is associated with a 0.43 point decrease in the political instability index (which is equal to about one third of a standard deviation of political instability).

The coefficient on the factional dummy is positive and significant at the 1 percent level, supporting Goldstone et al.'s (2005) findings that factionalized political regimes are also more unstable on average. The quantitative effect of factionalism on instability is larger than the effect of the DEMOC variable, but it is still small. A one standard deviation increase in factionalism (equal to 0.36) is associated with a 0.53 point increase in the political instability index. The coefficients on durability and the interaction between durability and democracy are both insignificantly different from zero, implying that whether a country was a stable democracy or a stable autocracy in the previous five year has no significant effect on contemporary levels of instability.

I also find no evidence of regional contagion in the region. The coefficient on neighborhoods is insignificantly different from zero. The coefficient on the variable representing economic discrimination of minorities is likewise insignificant. I do find, however, that overall ethnic diversity matters for instability. The ethnic fractionalization index has a significant negative effect on instability at the 5 percent level, while the square of this index has a significant positive effect on political instability at the 1 percent level. Figure 1.4 graphs the nonlinear relationship between ethnic diversity and

instability that I find. Increases in diversity lower instability until the fractionalization index reaches 0.33, at which point any further ethnic diversity increases average instability levels. Ethnic diversity in my sample ranges from 0.17 (Paraguay) to 0.74 (Bolivia), but the majority of the countries have diversity levels greater than the turning point (this high diversity group includes Bolivia, Brazil, Colombia, the Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, and Venezuela).

Income inequality also has an important nonlinear effect on instability in the region. The coefficient on the inequality variable is positive and significant at the 1 percent level, while the square of the variable is negative and significant at the 1 percent level. These results indicate that inequality raises instability until the Gini coefficient reaches 0.45, at which point any further increases will be negatively associated with instability. This finding supports Acemoglu and Robinson's (2006) claim that the effect of income inequality on political instability is a nonlinear function of the Gini coefficient.[23]

Lastly, on the socio-demographic factors, the results in column 1 show that urban growth has a nonlinear effect on instability. The coefficient on the urban growth is negative and significant at the 1 percent level while its square is positive and significant at the 5 percent level. The finding of a nonlinear relationship between the two is especially interesting since there are two contrasting views in the literature on urbanization and instability. Increased urban growth increases average stability until the rate reaches 13.6 percent, at which point any further increases in urbanization will bring about more instability. All of the countries have rates to the left of this rate, except for

Nicaragua from 1996 to 2000, when the rate of urbanization grew by 18 percent.[24] This finding provides support for the argument that urbanization can help to promote political stability (Collier and Hoeffler, 2004). Specifically, I find that one standard deviation increase in the urban growth rate (equal to 3.243) is associated with a drop in the political instability index of 0.45 points.

Of the different macroeconomic variables discussed in the previous section, only trade openness is consistently significant. Neither the level nor the standard deviation of inflation are statistically significant (I report only the results of using the standard deviation for reasons of space), nor is government deficit share or investment as a percentage of GDP. Trade openness is negative and significant at the 1 percent level, indicating that an increase in openness by one standard deviation in the previous five year period is associated with a 0.35 point decrease in the instability index. This result mirrors Goldstone et al.'s (2005) finding of a negative relationship between openness and instability for Sub-Saharan Africa.

In column 2 of Table 1.5 I re-estimate the model and exclude the variables that are not significant at least at the 5 percent level (regime durability, neighborhood conflict, economic discrimination, the standard deviation of inflation, investment, and the government deficit share).[25] The signs and statistical significance of the remaining variables are very similar to that of column 1. The only exceptions are that the coefficient on ethnic fractionalization is now significant at the 1 percent level and the coefficient on the square of urban growth falls to the 10 percent level.

1.5 Alternative Measures of Democracy

For robustness purposes, I re-estimate the restricted model using two different measures of democracy. First, I re-define democracy as the five year average of the democracy score (called DEMOC2) provided by the Polity IV data set. The variable ranges from zero to 10 and it measures the degree of openness of political institutions. Like the DEMOC variable, higher values of this score are associated with higher levels of democracy. Column 1 of Table 1.6 shows the estimates when using this new measure of democracy. The coefficient on the democracy score indicates that an increase on democracy of one standard deviation (equal to 3.54) is associated with a decrease in the political instability index between 0.32 point, which is somewhat less than the estimate when I use the polity score (DEMOC) as a measure of democracy. The sign and significance of the other variables in the estimation remain the same.

I also test for the possibility that the relationship between democracy and instability is not linear (and should not be entered as a cardinal value). For example, moving from a negative one to zero on the DEMOC index may have much greater implications for instability than moving from nine to a 10. To investigate this possibility, I create a dummy variable for high democracy that is equal to one if a country's five year DEMOC average is greater than zero. Column 2 of Table 1.6 presents the results of including the high democracy dummy in the estimation. The coefficient on the dummy is negative and significant at the 1 percent level, indicating that countries with high levels of democracy have lower average instability. The signs and significance levels of the other independent variables remain the same. In sum,

democracy is a significant indicator of instability and is robust to several alternative specifications.

1.6 Discussion

Latin America has a long history of political instability. Any attempt to change this path requires policymakers to have a good understanding of the reasons behind this persistent instability. I try to improve our understanding of this instability by studying 18 Latin American countries. Using a broad composite measure of instability, I test whether variables such as regime type, regime durability, factionalism, income inequality, ethnic diversity, ethnic discrimination, regional spillover effects, urban growth, and a host of macroeconomic variables matter for regional instability.

I find several interesting results. First, I show that democracy is strongly associated with political stability. Countries with strong democratic regimes suffer less political instability on average, a finding which is robust to several different measures of democracy. In addition, I find that factionalized political regimes tend to experience higher average levels of instability. These findings highlight the need to establish institutions and policies which promote strong democracies in the region. More broad-based political parties, ones which are not so divided on cultural, ethnic, or regional lines, would also help alleviate instability.

Second, I find that income inequality, ethnic fractionalization, and urbanization all have important nonlinear effects on instability. This finding is relevant since Latin America is one of the most unequal and ethnically diverse, regions of the world. It has also had very high rates of urbanization in the post World War II era. My results indicate that reducing income inequality can pay off in terms of less instability. While

the promotion of a more egalitarian society through taxation may not be politically feasible, policymakers could reduce inequality (and reduce the problems that may arise from high diversity) through educational reforms. Although high rates of urban growth have caused many problems for administrators, including increasing pressure on infrastructure and city services, results show that most urban growth in the sample reduced political instability. Only one country in the sample experienced a rate of urbanization that was high enough to bring about more instability.

While researchers have posited the relevance of macroeconomic factors as determinants of instability, I find that the majority of the macroeconomic variables I studied were insignificant. The only macroeconomic factor that explains instability in Latin America significantly is openness to trade. I show that openness to trade is negatively and significantly associated with political instability. Although Latin American countries have already considerably decreased their barriers to international trade, these results suggest that further trade liberalization will promote stability in the region.

In conclusion, my analysis shows that regime type and socio-demographic conditions, not macroeconomic factors, matter most for regional stability. This finding is relevant not only because many have blamed instability on the poor economic performance of Latin American countries in the last decades, but also because it gives policymakers positive options, such as the strengthening of democracy and the reduction of inequality, to promote future stability.

Notes

[1] There is a large literature on the effects of instability on economic development. See, for example, Hibbs (1973), Stewart and Venieris (1985), Alesina and Perotti (1996), Alesina et al.

(1996), Benhabib and Rustichini (1996), Edwards (1996), and Gyimah-Brempong and Traynor (1996). See Cukierman (1980) and Bernanke (1983) for more on the irreversibility of investment.

[2] Goldstone et al. (2005) ranks Latin America as the third most unstable region in the world in the post-war era. Table 1.1 lists the countries used in this sample.

[3] While most of the work on understanding political instability does so with a wide sample of countries, it may not be appropriate to pool data from such dissimilar countries. Grier and Tullock (1989) and Block (2001) illustrate the importance of testing the validity of pooling data from large samples of countries together in a single equation. They both show that the coefficients in a growth equation are significantly different across different sub-samples and cannot be appropriately pooled.

[4] See also Chen and Feng (1996), Feng (1997), and Svensson (1998).

[5] Some early papers chose to measure instability along a single dimension with variables like the number of coups or revolutions (Londregan and Poole, 1990; Barro, 1991). Others, such as Auvinen (1997), Posner (1997), Ellingsen (2000), and Bloomberg and Hess (2002), recognize instability's multi-dimensionality by estimating models sequentially with separate measures. Nel (2003) constructs an aggregate index that sums the number of coups, civil war, riots, and revolutions for each country, while Goldstone et al. (2005) consider a country unstable if it experiences either an adverse regime change, ethnic conflict, revolutionary war, or genocide during the period studied.

[6] See Kim and Mueller (1982) for a good overview of PCA.

[7] Broadly speaking, these nine variables can be classified into three different types of events: those that pose a major threat to the political and economic system (coups, revolutions, and government crises), those that reveal citizen discontent with the political system (strikes, riots, and anti-government demonstrations), and those characterized by extreme violence either by opposition elements or by the government (guerrilla warfare, assassinations, and purges. Table 1.2 provides a detailed definition of these components.

[8] The factor weightings indicate that all of the component variables contribute to the index, with the highest weights on revolutions, guerrilla activity, and assassinations.

[9] Sturzenegger (1991) argues that that the persistent upheaval and violence made people lose confidence in the democratic system and helped legitimize the military coup that took place in 1976.

[10] The economic situation was dire, with inflation reaching more than 450 percent, and labor unions began to assert themselves again (Andersen, 1984, p. 157). Munck (1992, p. 205) notes that while the military was trying to engage the opposition in dialogue, by 1982 it was clear that they had lost control of the process.

[11] The other three periods of Argentine instability occur under democratic regimes and consist more of demonstrations and strikes instead of guerrilla wars, military coups, and revolutions. There were large social protests at the end of President Raul Alfonsín's tenure in 1989, forcing him to step down six months early. The instability measure shows a spike in instability in 1988

and 1989 which is consistent with this. Likewise, there were strikes and protests in the mid 1990s and again in 2000 against increasing economic problems which is reflected in Figure 3.

[12] See Grier and Tullock (1989) for a justification of using five year intervals instead of averaging over long periods.

[13] Benton (2007) develops a theoretical model of why Latin American regimes are factionalized. She argues that there are subgroups inside political parties that fight for power and resources. Her paper presents a good overview on how factionalism matters for overall instability.

[14] Factions are "coalitions used by politicians to bolster careers" (Benton, 1997, p. 62). See Benton (2007, p. 56) for concrete examples of political party factionalism in Latin American.

[15] According to the Polity IV, factional regimes also must have the following electoral participation characteristics: "There are relatively stable and enduring political groups which compete for political influence at the national level–parties, regional groups, or ethnic groups, not necessarily elected–but there are few, recognized overlapping (common) interests" (Marshall and Jaggers, 2002, p. 25).

[16] On the other hand, she finds that regional instability decreases the probability of rebellions in the domestic country.

[17] In addition, Perotti (1996) and Auvinen and Nafziger (2002) argue that an unequal distribution of income can produce social discontent if individuals perceive that income is unfairly distributed and rebel against the system. Eckstein and Wickham-Crawley (2003), Oxhorn (2003), and Parsa (2003) also argue that high income inequality in Latin America promotes political instability in the region.

[18] However, in a sample restricted to Sub-Saharan countries, Nel (2003) finds that income inequality has a significant effect on investors' perceptions about the political environment but not a significant effect on political instability.

[19] Alesina and Perotti (1996) also use primary school enrollment rates as an explanatory variable of political instability and find that education has a significant negative effect on political instability. Collier and Hoeffler (2004) use the male secondary enrollment rate as an explanatory variable, arguing that the variable reflects the opportunity cost of rebellion. I do not include education in my estimation because I found no significant relationship between it and political instability in any of the estimations.

[20] Easterly and Levine (1997) use ethnic fractionalization as an explanatory variable of political instability but find that it is not significant. Auvinen and Nafziger (2002), however, caution that ethnic fractionalization is not a sufficient condition for political instability since ethnic antagonism does not necessarily exist in highly factionalized societies.

[21] Goldstone et al. (2005) use infant mortality as a measure of the standard of living and find that this variable is one of the best overall predictors of political instability around the world.

[22] I do not report the results of including infant mortality or income levels in my model because I found that they have no significant effect.

[23] Caution should be used when interpreting these results, however, because the countries in the sample have very similar levels of inequality. For instance, the least unequal country in the sample (Paraguay) has a Gini coefficient of 0.41 while the most unequal countries (Peru and Guatemala) have a coefficient of 0.48. If a country were to move from being the most unequal to the least unequal, the effect on instability would be very small and actually negative (a decrease in the instability index of about 0.008).

[24] Some countries had urban growth rates that were close to the turning point, including the Dominican Republic from 1971 to 1975 (13.3 percent), and Honduras from 1991 to 1995 (12.6 percent).

[25] I perform an F test and find that I cannot reject at the 5 percent level the hypothesis that these variables as a group do not explain significantly political instability.

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Table 1.1 Political Instability from 1971 to 2000

	Political Instability*	Instability Ranking	Number of Events**	PI Events Ranking
Argentina	1.232	1	218	1
Peru	0.94	2	157	4
Bolivia	0.763	3	136	7
Guatemala	0.618	4	195	2
Colombia	0.444	5	168	3
Chile	0.18	6	155	5
El Salvador	0.177	7	154	6
Nicaragua	-0.197	8	94	9
Ecuador	-0.215	9	86	10
Mexico	-0.233	10	119	8
Brazil	-0.732	11	81	11
Honduras	-0.764	12	72	13
Venezuela	-0.779	13	65	14
Uruguay	-0.863	14	58	16
Panama	-0.908	15	58	15
Dom. Rep.	-0.913	16	72	12
Paraguay	-1.299	17	36	17
Costa Rica	-1.63	18	16	18

*Political instability refers to the average from 1971 to 2000 of the first principal component of assassinations, coups, government crises, anti-government demonstrations, riots, strikes, purges, guerrilla activity, and revolutions. The number is multiplied by minus one to make increases in the variable represent higher instability.

**This is the total number of assassinations, coups, government crises, anti-government demonstrations, riots, strikes, purges, guerrilla activity, and revolutions that occurred in each country from 1971 to 2000.

Table 1.2 Description of the Components of Instability

Variable	*Defined by the Cross-National Time Series Data Archive As:*
Coup d'etat	"The number of extra-constitutional or forced changes in the top government elite and/or its effective control of the nation's power structure in a given year. The term 'coup' includes, but is not exhausted by, the term 'successful revolution'. Unsuccessful coups are not counted."
Government Crisis	"Any rapidly developing situation that threatens to bring the downfall of the present regime - excluding situations of revolt aimed at such overthrow."
Revolution	"Any illegal or forced change in the top governmental elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government."
Anti-government Demonstration	"Any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature."
Riot	"Any violent demonstration or clash of more than 100 citizens involving the use of physical force."
General Strike	"Any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority."
Guerrilla Warfare	"Any armed activity, sabotage, or bombings carried on by independent bands of citizens or irregular forces and aimed at the overthrow of the present regime."
Purge	"Any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition."
Assassination	"Any politically motivated murder or attempted murder of a high government official or politician."

Source: Cross National Time Series Data (Banks, 2005)

Table 1.3 Description of the Independent Variables

Variable	*Description*
Average Gini coefficient	Average Gini coefficient from 1971 to 2000 (average constructed with the available observations for each country). Source: University of Texas Inequality Project (Galbraith and Kum, 2004).
Democracy	Combined polity score (DEMOC) computed by subtracting the autocracy score from the democracy score. Source: Polity IV Project (Marshall and Jaggers, 2003).
Economic discrimination	Number of years in the 5 year period that a country has had state-led economic discrimination against at least one group, measured as a 4 on the economic discrimination index. Source: Minority at Risk Dataset (Wilkenfeld, 2004).
Ethnic fractionalization	Ethnic fractionalization index. Source: Alesina et. al. (2003).
Factionalism	Political competition score (POLCOMP) that combines the regulation and competitiveness of participation scores. Source: Polity IV Project (Marshall and Jaggers, 2003).
Government budget deficit as a share of GDP	The percentage of government budget in nominal prices (government expenditure minus government revenue). Source: Oxford Latin American Economic History Database.
Inflation	The level and standard deviation of inflation in the 5 year period. Inflation calculated using the GDP deflator. Source: World Development Indicators (World Bank, 2005).
Investment share of GDP	The percentage of GDP that comes from investment. Source: Penn World Tables 6.2 (Heston et al., 2002).

Table 1.3 Description of the Independent Variables (Continued)

Variable	*Description*
Neighborhood conflict	Number of neighbour countries that experienced either an ethnic conflict or a revolutionary war. Source: Political Instability Task Force Dataset (Goldstone et al., 2005).
Regime durability	Number of years a country has had a particular regime (durable). Source: Polity IV Dataset (Marshall and Jaggers, 2003).
Trade openness	Openness is equal to exports plus imports divided by real GDP (Laspeyres method). Source: Penn World Tables 6.2 (Heston et al., 2002).
Urban population growth	Growth of the percentage of the total population that live in urban areas. Source: Oxford Latin American Economic History Database.
Democracy (alternative measure)	Democracy score (DEMOC2) measures the general openness of political institutions. Source: Polity IV Project (Marshall and Jaggers, 2003).
High democracy dummy	High democracy is equal to one if the 5 year average of DEMOC is greater than 0.

Table 1.4 Summary Statistics

	Mean	Median	Std. Dev.
Average Gini coefficient	44.846	45.031	2.488
Democracy (DEMOC)	2.806	5.800	6.087
Democracy (DEMOC2)	4.955	6.000	3.537
Economic discrimination	1.509	0.000	2.177
Ethnic discrimination	0.427	0.491	0.187
Factionalism	0.204	0.000	0.360
Government deficit share	-0.299	-0.014	2.838
High democracy dummy	0.64	1.00	0.48
Investment share	14.911	14.556	5.407
Low democracy dummy	0.36	0.00	0.48
Neighborhood conflict	0.667	1.000	0.749
Openness	48.005	39.282	35.707
Political instability index	-0.232	-0.662	1.336
Regime durability	12.685	6.500	16.133
Standard deviation of inflation	195.825	8.593	808.505
Urbanization	5.013	4.124	3.243

All variables have 108 observations

Table 1.5 A Model of Political Instability

	1	*2*
Constant	-123.3	-94.9
	(3.5)	(2.6)
DEMOC	-0.07 [a]	-0.05 [a]
	(5.9)	(12.3)
Factionalism	1.48 [a]	1.41 [a]
	(2.8)	(3.5)
Regime durability	0.002	---
	(0.2)	
Regime durability * democracy dummy	0.008	---
	(1.0)	
Neighbourhood conflict	0.04	---
	(0.2)	
Average inequality	5.57 [a]	4.27 [a]
	(3.6)	(2.9)
Average inequality^2	-0.06 [a]	-0.05 [a]
	(4.0)	(2.9)
Economic discrimination	0.03	---
	(1.3)	
Ethnic fractionalization	-9.26 [b]	-9.72 [a]
	(2.6)	(3.7)
Ethnic fractionalization^2	13.59 [a]	13.47 [a]
	(4.1)	(5.4)
Urbanization	-0.31 [a]	-0.29 [a]
	(4.1)	(3.4)
Urbanization^2	0.012 [b]	0.011 [c]
	(2.4)	(1.9)
Standard deviation of inflation $_{t-1}$	-.0001	---
	(1.2)	
Investment share $_{t-1}$	-0.03	---
	(0.8)	
Government deficit share $_{t-1}$	0.03	---
	(1.4)	
Trade openness $_{t-1}$	-0.01 [b]	-0.01 [b]
	(2.4)	(2.4)
R-squared	0.48	0.44
Observations	108	108

t-statistics in parentheses use White's robust standard errors. a, b, and c represent statistical significance at the 1, 5, and 10 percent level, respectively.

Table 1.6 A Model of Political Instability with Different Measures of Democracy

	1	*2*
Constant	-91.4	-93.7
	(2.9)	(2.8)
DEMOC2	-0.09 [a]	---
	(9.9)	
High democracy dummy	---	-0.76 [a]
		(3.4)
Factionalism	1.33 [a]	1.55 [a]
	(3.3)	(5.0)
Average inequality	4.14 [a]	4.23 [a]
	(2.95)	(2.8)
Average inequality^2	-0.045 [a]	-0.05 [a]
	(2.97)	(2.7)
Ethnic fractionalization	-9.94 [a]	-10.2 [a]
	(3.6)	(3.0)
Ethnic fractionalization^2	13.77 [a]	14.2 [a]
	(5.3)	(3.5)
Urbanization	-0.29 [a]	-0.32 [b]
	(3.3)	(3.1)
Urbanization^2	0.011 [c]	0.011 [c]
	(1.9)	(1.7)
Trade openness $_{t-1}$	-0.01 [b]	-0.007 [b]
	(2.5)	(2.6)
R-squared	0.44	0.44
Observations	108	108

t-statistics in parentheses use White's robust standard errors. a, b, and c represent statistical significance at the 1, 5, and 10 percent level, respectively.

Figure 1.1 The Evolution of Political Instability in Costa Rica

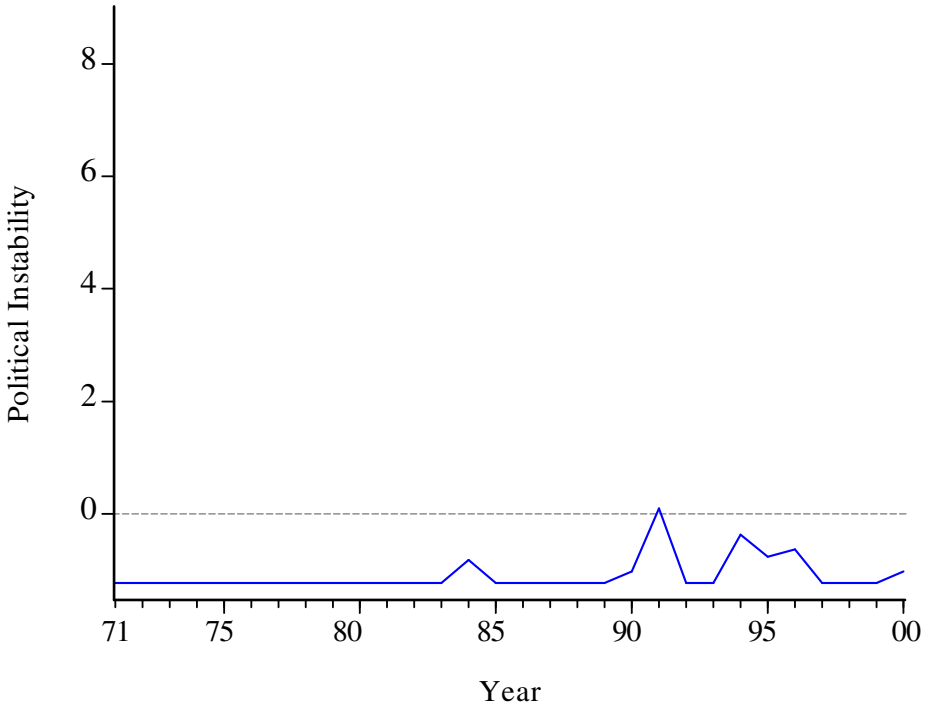


Figure 1.2 The Evolution of Political Instability in Mexico

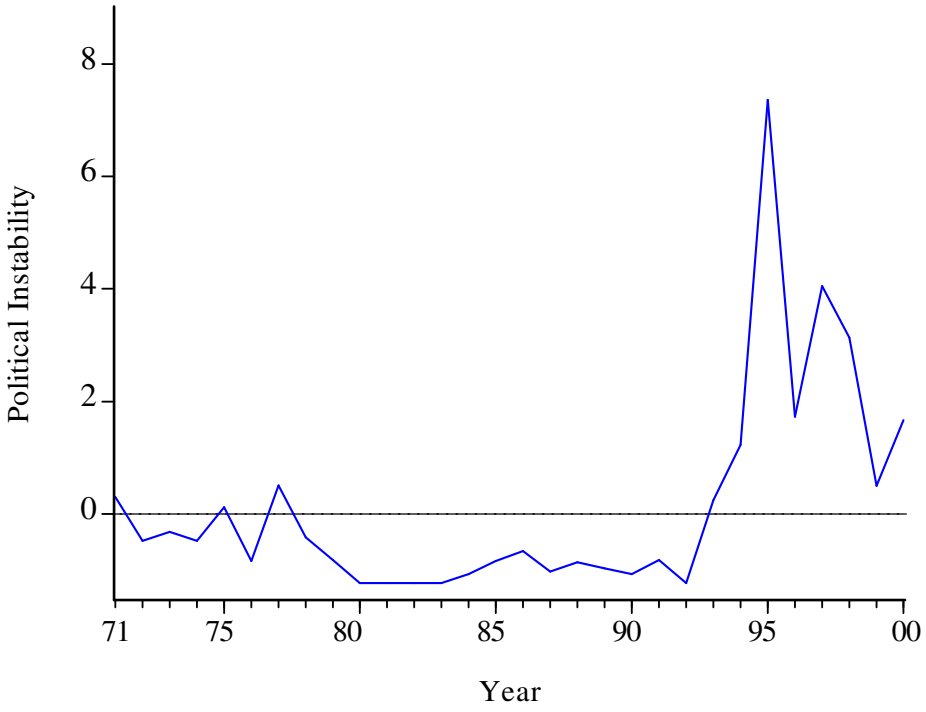


Figure 1.3 The Evolution of Political Instability in Argentina

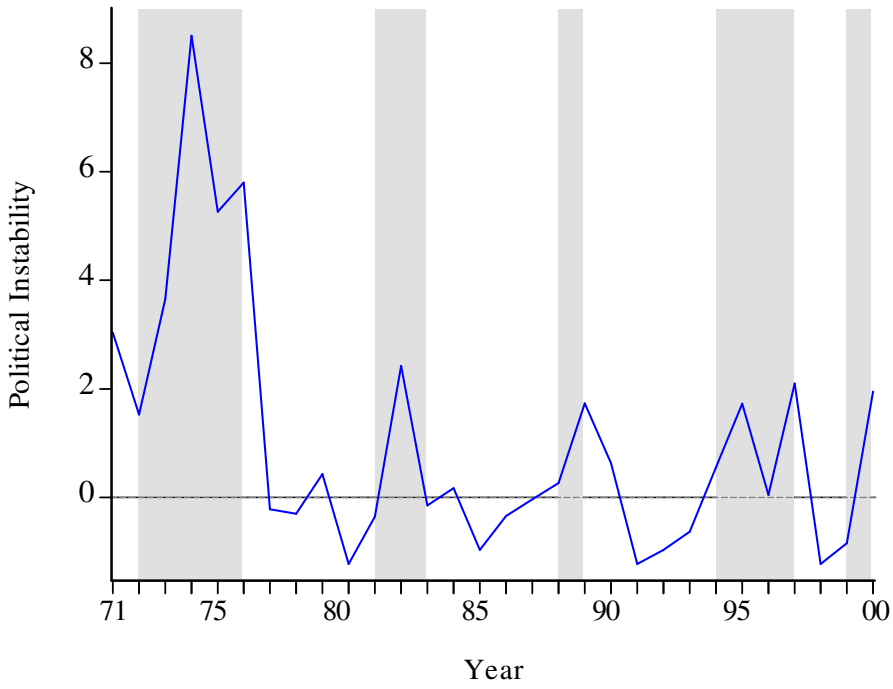
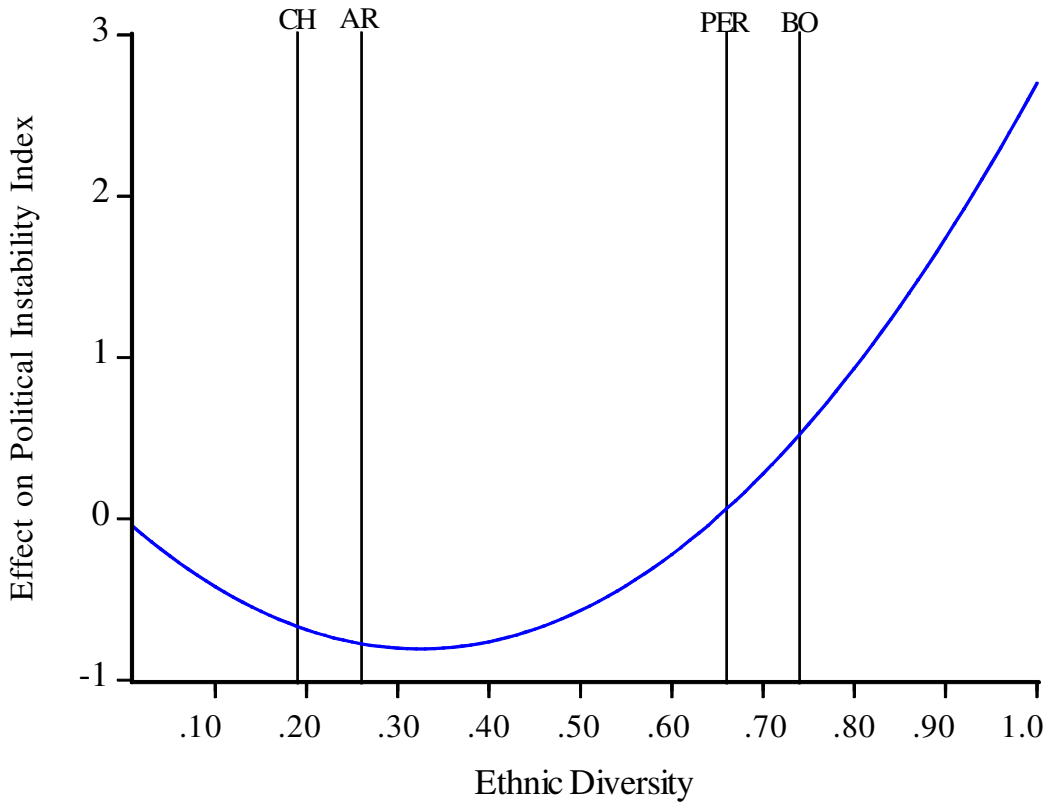


Figure 1.4 The Effect of Ethnic Diversity on Political Instability



Chapter Two

The Finance-Growth Link in Latin America

2.1 Introduction

During the 1980s, most Latin American countries suffered from distorted financial systems. In this decade the government kept interest rate controls, allocated credit arbitrarily, and deterred the expansion of securities markets and the creation of new financial institutions (Edwards, 1999). Even though Latin American countries experienced significant financial reforms in the 1990s that promoted financial deregulation and the expansion of the stock market, financial development indicators show that the region still financially underdeveloped.[1] Credit to the private sector as a share of GDP in the 2000s reached 30 percent in Latin America, which is double the size of what this region had in the 1960s, but only one half the size of East Asian credit markets (Galindo et al., 2007). Therefore, lack of financial depth may be a barrier to better economic performance in Latin America.

The link between financial development and economic growth is complex since the direction of causation between the two variables may run both directions. Theoretical and empirical analyses support the positive effects of financial development on economic growth, and there is evidence that countries with high GDP per capita tend to have more developed financial systems. Therefore, it is important for policymakers in Latin America to determine whether financial development leads to economic growth. In this paper, I analyze the relationship between financial development and economic growth in Latin America.

There is a vast literature on the analysis of the relationship between financial development and economic growth, but few empirical analyses pool countries from a single region. Pooling only Latin American countries in the analysis is appropriate since empirical evidence has shown 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.[2] In this paper, I use a sample of 13 Latin American countries from 1961 to 2004 to determine the way of causation between financial development and economic growth. The indicators of financial development used are private credit and liquid liabilities as a share of GDP.

Using bivariate and multivariate vector autoregression (VAR) models, I find two way causality between financial development and economic growth for the full sample. Nonetheless, I find that the two way causation does not hold once the sample is divided by initial levels of income. The two way causation holds only for those countries with higher initial income levels. For those countries with lower initial income levels, evidence shows that financial development follows economic growth. There is no evidence that financial development causes economic growth for the lower income group. These results are relevant not only because they provide evidence supporting one side of the debate on the finance-growth relationship, but also an insight on the real effects of financial reforms in Latin America.

To summarize, the main objective of my analysis is to determine whether financial development causes economic growth in Latin America. This analysis also explores whether the direction of causality is different across countries with different income levels. The rest of the paper is organized as follows. In section 2.2, I present a

review of the literature on the relationship of financial development and economic growth and an overview on financial development in Latin America. Section 2.3 describes the data; Section 2.4 outlines the model specification; Section V presents the empirical results; and Section 2.5 concludes.

2.2 The Finance–Growth Link and the Latin American Case

A. Financial Development and Economic Growth

The level of financial development in a country is determined by the access that individuals have to credit and financial services. The primary function of the financial sector is to "facilitate the allocation of resources across space and time in an uncertain environment" (Levine, 1997, p. 691). Financial development also decreases market frictions that result from imperfect information by connecting savers with investors in an efficient way and by allocating resources to profitable projects (Demirguc-Kunt, 2006). Therefore, the financial sector plays a crucial role in the economy because any entrepreneurial and trading activity will depend on it. An efficient financial sector will lead to higher economic growth because it provides relevant information for savers and investors, monitors investment projects, promotes risk diversification, and increases the amount of transactions in the economy (Levine, 2005). The financial sector has also been considered relevant for the development of technology and the accumulation of physical capital (King and Levine, 1993).

A country is considered financially developed if it has a large financial sector that successfully connects savers with investors (Beck et al., 2001). In the empirical literature, financial development has been measured using private credit issued by deposit money banks and other institutions as a share of GDP. Private credit not only

reveals the ability of the financial sector to reach businesses and to allocate resources to profitable projects, but also accounts for credits allocated only through private institutions to the private sector (Beck et al., 2000a). An alternative measure of financial depth commonly used is liquid liabilities as a share of GDP. Liquid liabilities is the addition of currency and interest bearing liabilities of financial intermediaries and non-bank financial intermediaries as a share of GDP.

There is a debate about the relationship between financial development and economic growth, with some arguing that financial development causes economic growth, while others assert that economic growth causes financial development. Supporters of the positive effect of financial development on economic growth state that the characteristics of the financial sector are relevant for economic activity and base their argument on Schumpeter's view of financial development as creative destruction (Rajan and Zingales, 2003). On the other hand, others argue that financial development may be the consequence of economic growth because developed economies create the demand for developed financial sectors (Shan, 2005). Empirical analyses on the relationship between financial development and economic growth use cross country, panel, and firm/industry data to support both sides of the debate.

In a literature review on the relationship between financial development and economic growth, Levine (2005) concludes that causality runs from financial development to economic growth. The channels through which financial development positively effects economic growth are productivity and capital accumulation (Beck et al., 2000b). Financial development promotes the increase of technology because access to financial resources allows for labor specialization, which creates a virtuous cycle in

the economy (Saint-Paul, 1992). More efficient financial sectors are also associated with better resource allocation that leads to higher capital accumulation.

Some empirical analyses recognize that financial development may be endogenous in the growth equation and address this. Beck et al. (2000b), Benhabib and Spiegel (2000), Khan and Senhadji (2000), Levine et al. (2000), and Loayza and Ranciere (2006) show that the exogenous component of financial development has a positive effect on economic growth. It has also been shown empirically that financial development has a positive effect on productivity and capital accumulation (King and Levine, 1993; Beck et al. 2000b; Nourzad, 2002; Rioja and Valev, 2004a).[3] According to Aghion et al. (2005), by increasing productivity and capital accumulation, financial development helps income levels of less developed countries (LDCs) to converge to the income levels of developed countries (DCs).

Analyses at the firm/industry level also support the argument that financial development is conducive to growth. It is argued that with a more developed financial system, manufacturing industries have a comparative advantage (Beck, 2002). For example, Rajan and Zingales (1998) show that financial development is beneficial to those industries that rely on external financing.[4] Furthermore, Love (2003) has empirically shown that financial development reduces the cost of capital, and this allows firms to allocate investment more efficiently.

Although there is an extensive amount of work that supports the argument that financial development is conducive to growth, others argue that financial development is just the consequence of economic growth or that the causality between the two is bi-directional. As stated by Shan et al. (2001), the relationship between financial

development and economic growth may be a 'chicken and the egg' problem since financial institutions are usually developed in DCs and underdeveloped in LDCs. Greenwood and Jovanovic (1990) and Berthelemy and Varoudakis (1996) present theoretical explanations of the two way causation between financial development and economic growth. They argue that there is a virtuous cycle in developed economies since an expansion in the real sector leads to an increase in the demand for loanable funds, which leads to improvements in the financial sector. The empirical record is mixed.

Empirical analyses have shown that the positive effect of financial development on growth does not hold for all countries, and that the effect of financial development on economic growth is significantly different in LDCs (Xu, 2000; Rioja and Valev, 2004b).[5] While Shan et al. (2001) and Shan (2005) find no evidence that financial development causes economic growth, others find bi-directional causality between financial development and economic growth (Berthelemy and Varoudakis, 1996; Demetriades and Hussein, 1996; Luintel and Khan, 1999).

The debate on determining what comes first, financial development or economic growth, is far from being solved. Finding the direction of causation between financial development and economic growth in Latin America is necessary in order to determine whether further reforms to this sector are conducive to growth.

B. The Latin American Case

In most Latin American countries, the financial sector is bank based and the stock market is small. In the 1990s, the average level of credit to the private sector in Latin America was only 28 percent of GDP, which is considerably smaller than that

found in other developing regions (e.g. 72 percent for Asia and 43 percent for countries in the Middle East and North Africa).[6] Galindo et al. (2007) argue that, although the region has experienced a significant financial liberalization, the financial sector in Latin America has not been able to catch up with other emerging regions.

Evidence shows that the lack of financial depth has characterized the Latin American region since independence. In the early 1900s, capital markets were extremely weak and the banking system was very small (Bulmer-Thomas, 2003).[7] The stagnation of capital markets during the late 1800s and early 1900s, made the sources of credit limited, and this led to a high concentration in the financial sector.[8] The underdevelopment of the financial system in the region has been attributed to short term lending strategies and to the governments' inability to pay back their debt. According to Levine (2000), another reason behind the underdevelopment of the financial sector in Latin America is the legal framework that lacks contract enforcement.[9]

The underdevelopment of the financial sector in Latin America today has also been attributed to financial repression throughout the 1970s and 1980s. During these decades, Latin American governments used the banking sector to finance their budget deficits with borrowing and implicit taxation. Governments also used the banking sector to subsidize sectoral development projects and this produced a "bias to refinance non-performing loans," that "benefited bad banks and especially bad borrowers" (Mas, 1995; p. 695). Mas (1995) notes that it was not until the 1990 reforms that the banking sector experienced a significant change.

It is argued that the structural reforms implemented in Latin America during the 1990s have promoted the participation of the private sector in financial institutions

(Loayza and Palacios, 1997). However, Burki and Perri (1997) posit that these reforms did not make financial markets in Latin America more efficient. According to them, reforms in the future should focus on increasing competition, reducing government participation, developing efficient bond and equity markets, and promoting foreign participation. De la Torre et al. (2006) concur with this view and argue that reforms in the financial sector should focus on helping the small and medium enterprises.[10] In a comprehensive analysis of financial reforms in Latin America in the last two decades, Galindo et al. (2007) conclude that other reforms, related to the legal framework, are required in order to further expand the financial sector in the region and to allow this sector to have a real effect in the economy. They argue that financial liberalization has not given the expected results because institutions in the region do not protect contracts and creditors' rights.

There are few region-specific empirical studies on the relationship between financial development and economic growth, and especially for the Latin American region. McKinnon (1989) analyzes the effect of financial development on growth in Latin America using real interest rates as a measure of financial development. He finds that those countries that had high real interest rates had high levels of financial development and high real GDP. De Gregorio and Guidotti (1994) use a panel data analysis of 12 Latin American countries between 1950 and 1985 and find that there is a significant negative relationship between financial development and economic growth. On the other hand, Nazmi (2005) finds, using a panel data of 5 Latin American countries from 1960 to 1995, that financial development has a significant positive effect on investment.

It is important to analyze the relationship between financial development and economic growth using more current data because of the significant changes that the financial sector has experienced in the late 1990s and early 2000s. Figure 2.1 shows private credit and liquid liabilities as a share of GDP in Latin America from 1961 to 2005. This figure shows significant fluctuations in the levels of financial development: the average levels of financial development were lower in the 1960s than in the 1990s, dropped in the 1980s, and reached the highest point in the early 2000s. This paper analyzes the direction of causation between financial development and economic growth using data that accounts for these fluctuations. Pooling only Latin American countries in the analysis allows me to control for cross-country heterogeneity and to determine the real effects of financial development on economic growth in the region.[11]

2.3 Data

I analyze the direction of causality between financial development and economic growth in a panel of 13 Latin American countries from 1961 to 2004. The countries included are: Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Panama, Paraguay, Trinidad and Tobago, and Venezuela.[12] The sample period allows me to capture the pre and post reform years. Table 2.1 provides a detailed description of all variables used and their sources, and Table 2.2 provides a summary statistics of these variables.

I measure economic growth as the percentage change of real GDP per capita. To measure financial development, I use the growth of private credit issued by deposit money banks and other institutions as a share of GDP. I also use the growth of liquid liabilities as a share of GDP as a measure of financial development.[13] The control

variables used in the multivariate VAR are the growth of the openness to trade as a share of GDP and the inflation rate.

2.4 Model Specification

I use a Granger causality test in a VAR framework to determine the direction of causality between financial development and economic growth. The panel VAR model in this analysis has the following form:

$$Y_{i,t} = c_0 + A_1 Y_{i,t-1} + A_2 Y_{i,t-2} + \ldots\ldots\ldots\ldots + A_p Y_{i,t-p} + D\alpha + T\lambda + \varepsilon_{i,t} \qquad (1)$$

where c is a vector of constants and for each j = 0, 1,…p, $Y_{i,\,t-j}$ is a vector of variables evaluated at time t – j, A_j is a matrix that gives the relationship among the variables at time t – j, while $\varepsilon_{i,\,t}$ is a vector of error terms for the country i in period t. D is a vector of country dummy variables and T is a vector of time effects.

This VAR estimation includes fixed effects to control for cross country differences and time variation. The fixed effect approach to the Granger causality test in a panel VAR provides the advantage of accounting for individual heterogeneity by removing the average variation across countries and across time.[14]

For the Granger causality test I use two specifications, a bivariate and a multivariate VAR. In the bivariate VAR, $Y_{i,\,t-j}$ is a vector of two variables: real GDP per capita growth and financial development growth evaluated at time t – j. In the multivariate VAR, $Y_{i,\,t-j}$ is a vector consisting of four variables, real GDP per capita growth, financial development growth, openness to trade growth, and inflation evaluated at time t – j. Because I experiment with different lags, j is equal to one, two, and four. Based on this framework, I test the hypotheses that financial development growth does not Granger cause real GDP per capita growth, and that real GDP per

capita growth does not Granger cause financial development. Therefore, the null hypotheses of this test are

$H_0 : \beta_1^{FDG} = \beta_2^{FDG} = ... = \beta_p^{FDG} = 0$, where β^{FD} are the coefficients of financial development growth (FDG) in periods t – p in the economic growth equation.

$H_0 : \beta_1^{RGDPG} = \beta_2^{RGDPG} = ... = \beta_p^{RGDPG} = 0$, where β^{RGDPG} are the coefficients of real GDP per capita growth (RGDPG) in periods t – p in the financial development growth equation.

It is important to note that, although it is argued that time series techniques are biased in analyses that include few observations (small t), the results obtained from the Granger causality test in this analysis are reliable. According to Beggs (1986), cross sectional data improves the reliability of time series techniques. He shows that time series processes can be identified for samples that include at least 25 observations and five countries. In this analysis, I include at least 40 observations per country in the bivariate VAR and 36 in the multivariate VAR and at least six countries in the sample.[15]

2.5 Empirical Results

A. The Finance–Growth Link

Table 2.3 shows the results from the Granger causality test of the bivariate VAR model in a balanced panel framework with fixed effects. From this estimation, there is evidence of a bi-directional causality between financial development and economic growth. When using the growth of private credit and liquid liabilities as a share of GDP with the different lags (one, two, and four), results show that economic growth causes financial development at the 1 percent level. When using two and four lags, the growth of financial development causes economic growth at the 5 percent level. This indicates

not only that financial development is endogenously determined in the growth equation, but that it causes economic growth in Latin America.

To check for the robustness of these results, I perform a country-by-country Jack-knife Granger test analysis. For the Jack-knife approach, I perform the Granger causality test 13 times, each time excluding observations from one country in order to determine whether previous results are driven by a specific country. Table 2.4 presents the summary statistics of the Granger causality tests excluding one country at the time and using four lags and private credit as a measure of financial development. The standard deviation for the F-statistics obtained is less than one and the median of the F statistics shows that, in general, there is two way causality between financial development and economic growth at the 5 percent level. When estimating the Granger test by excluding one country at the time, I find that in all cases, economic growth granger causes financial development at the 1 percent level. In relation to whether financial development causes economic growth, I find that in 10 out of 13 cases, financial development growth causes economic growth at the 5 percent level. Based on these estimates, it can be concluded that there is strong evidence that economic growth Granger causes financial development and that this result does not depend on the exact sample used in this analysis.

I find a bi-directional causality using the multivariate VAR model with fixed effects and private credit as a measure of financial development. The variables included in this model are: real GDP growth, private credit growth, openness to trade growth, and inflation.[16] To maintain a balanced panel structure, the multivariate VAR estimation uses a sample period from 1961 to 2003 and excludes Haiti, which lacks data on the

openness to trade series. For all the variables in the multivariate VAR, according to the Augmented Dicker-Fuller (ADF) unit root test, I reject the hypothesis that the series are non-stationary.[17] Table 2.5 shows that economic growth Granger causes the growth of private credit at the 1 percent level, when using one, two, and four lags. The growth of private credit Granger causes economic growth when using two and four lags at the 5 percent level.

From Tables 2.3, 2.4, and 2.5, it can be concluded that there is evidence of a bi-directional causality between financial development and economic growth, where the effect of economic growth on financial development is a little more robust than the effect of financial development on economic growth. Therefore, based on these results obtained for the full sample, it can be said that financial development leads to a virtuous cycle in Latin America.

B. The Finance–Growth Link Across Income Groups

In the analysis of the relationship between financial development and economic growth, many have argued that the effects of financial development may vary across countries due to their different income levels. For this reason, following Rioja and Valev's (2004b) approach, I separate the 13 countries into two groups based on their income levels in 1960. The low income group includes Colombia, the Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, and Paraguay. The high income group includes Costa Rica, El Salvador, Mexico, Panama, Trinidad and Tobago, and Venezuela. Since there is a difference in the initial real GDP per capita level of 595 (in constant USD) from the country with the highest income level in the low income group (Guatemala) and the country with the lowest income level in the high income group (El

Salvador), the cut off point that leads to including seven countries in the low income group and six in the high income group seems appropriate.

Tables 2.6 and 2.7 show the results obtained from the Granger causality test for the low and high income groups. These tables provide support to the argument that financial development leads to higher economic growth only for countries with higher initial income levels. Table 2.6 shows that for the low income countries, the growth of financial development does not Granger cause economic growth. On the other hand, for the high income group, Table 2.7 shows that the growth of private credit Granger causes economic growth at the 5 percent level when using one, two, and four lags. For both groups, there is evidence that economic growth leads to financial development at the 5 percent level when using private credit and one and two lags. When using liquid liabilities as a measure of financial development and one and four lags, economic growth leads to financial development growth at the 5 percent level for both income groups.

2.6 Conclusion

From these empirical results there are two main findings. First, there is a bi-directional causality between the growth of financial development and economic growth for the whole sample from 1961 to 2004. Results show that, in average, economic growth promotes higher financial development and financial development causes economic growth. This result is robust to different measures of financial development (private credit and liquid liabilities), different samples (Jack-knife approach), and different estimation methods (bivariate and multivariate VAR). This finding is relevant in the sense that it supports the argument that financial development creates a virtuous

cycle in the economy. Second, this analysis shows that there is an income threshold that limits the effects of financial development on economic growth. Estimates show that financial development causes economic growth only in those countries that had high initial income levels. This finding is relevant for policymakers in the region because it shows that financial reforms will not necessarily have the same effects in all Latin American countries. This finding provides support to the argument that there may be some specific conditions that allow financial development to cause economic growth in high income countries that may not be present in low income countries.

Based on these empirical results, there may be initial conditions, specific institutions, or special macroeconomic circumstances that allow financial development to cause economic growth in certain countries. For further research, it would be valuable for policymakers to determine what are the other complementary reforms needed so that financial development leads to higher economic growth in Latin America.

Notes

[1] Garcia Herrero et al. (2002), in a cluster analysis, find that the majority of Latin American countries are financially underdeveloped when compared to other emerging regions.

[2] Rioja and Valev (2004a,b) show that financial development has different effects on growth in countries with different income levels and different levels of financial development. Furthermore, Garcia-Herrero et al. (2002) show that countries included in this analysis have similar levels of financial development.

[3] They all address for endogeneity either using an IV approach or a GMM dynamic model.

[4] Ju and Wei (2005) developed the wooden barrel theory of international trade. Under this theory, economic growth depends on the financial sector if finance constraint is binding.

[5] Eschenbach (2004), in his survey of the literature, supports this view.

[6] Garcia Herrero et al. (2002, p.23) note that in 2000 "the stock market in Latin America is only one fourth of Asia's in terms of capitalization, even after the Asian crisis." Chile is the only

Latin American country that has a financial sector that is compared to the financial sector of some DCs.

[7] In 1914, Argentina had a bank deposits per head in US dollars of 75.5 and Guatemala had 0.9, while Australia, and Canada had 150.3 and 142.9 respectively (Bulmer-Thomas, 2003, p. 98).

[8] Marichal (1997) provides evidence of this for the Mexican case.

[9] Haber (2006) finds that the institutions established by the Mexican government determined the level of financial development in this country. He argues that the government monopolized the financial system and established a legal framework that lacked contract enforcement.

[10] Hosono (2002), in a comparative analysis of the financial sectors in Latin American and East Asian countries, provides support for De la Torre's (2006) argument. He finds that the access to capital is limited in Latin America. According to Hosono (2002), new firms in Latin America use personal funds as their main source of capital and existing firms adjust to the lack of credit by getting credit from suppliers, advances from clients, or delaying tax payments.

[11] Grier and Tullock (1989) show that the effect of macroeconomic variables varies across countries and that it is not appropriate to pool together countries from different regions. Garcia Herrero et al. (2002) show, using a cluster analysis that takes into consideration income and financial development levels, that the majority of the Latin American countries belong to the same group.

[12] Other Latin American countries that belong to the same group, according to Garcia Herrero et al. (2002), were excluded from the sample due to the significant amount of missing observations for the financial development indicators.

[13] There were missing observations in the financial development indicators series for Colombia, which were filled in using linear interpolation. I use the growth of the financial development indicators since the levels have unit roots.

[14] In this fixed effect estimation, the individual effect is estimated for each country i in period t. This method removes the unobserved effects that are correlated with the explanatory variables and solves for the omitted variable bias (Wooldridge, 2002). Holtz et al. (1988) mention the advantages of using fixed effects in panel VAR estimations.

[15] Beggs (1986) argues that the bias associated with short time series sample is reduced when we pool cross-sectional units and the estimator is efficient. He shows that, with the panel approach, the sampling variance of the estimator is reduced.

[16] In the multivariate VAR economic growth equation, when using four lags, the first and second lags of openness growth have a significant positive effect at the 10 percent level and the third lag of inflation has a significant negative effect at the 5 percent level. In the financial development growth equation, when using four lags, the second and third lags of inflation have a significant positive and negative effect at the 5 percent level. The economic growth and financial development growth equations have R-squares equal to 0.38 and 0.41 respectively.

[17] Other variables that have been used in a multivariate VAR framework, such as investment share of GDP and total factor productivity, were not included in this analysis because of their

high correlation with GDP growth. The interest rate and the stock market index were not included since they are themselves indicators of financial development. See Luintel and Khan (1999), Xu (2000), and Shan (2005) for multivariate VAR models that include these variables.

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Table 2.1 Variables Description

Variable	*Description*
Real GDP per Capita Growth (RGDPG)	Annual growth of real GDP per capita estimated using constant 2000 international dollars. $RGDPG = (RGDP_t - RGDP_{t-1})/RGDP_{t-1}$ Source: World Development Indicators (2006).
Private Credit Growth (FDG)	Annual growth of the value of credits by financial intermediaries to the private sector as a share of GDP. This measure includes credit issued by deposit money banks and other financial intermediaries. $FDG = (FD_t - FD_{t-1})/FD_{t-1}$ Source: Financial Structure Database (2007).
Liquid Liabilities Growth (FDG)	Annual growth of liquid liabilities as a share of GDP. $FDG = (FD_t - FD_{t-1})/FD_{t-1}$ Source: Financial Structure Database (2007).
Trade Growth (TRADEG)	Annual growth of openness to trade. $TRADEG = (Open_t - Open_{t-1})/Open_{t-1}$ Source: Penn World Tables 6.2 (2006).
Inflation (INF)	Percentage change of the Consumer Price Index (CPI) $INF = (CPI_t - CPI_{t-1})/CPI_{t-1}$ Source: World Development Indicators (2006).

Table 2.2 Summary Statistics (1961 – 2004)

	Mean	Max	Min	S. D.	Obs.
Real GDP per Capita Growth	0.014	0.158	-0.152	0.040	572
Private Credit Growth	0.024	0.866	-0.378	0.128	572
Liquid Liabilities Growth	0.021	0.409	-0.296	0.088	572
Trade Growth	0.017	0.496	-0.305	0.092	551
Inflation	13.492	131.827	-11.449	16.083	572

Table 2.3 Bivariate VAR – Granger Causality F-Values (1961 – 2004)

	k = 1	k = 2	k = 4
Null Hypothesis: Financial development growth does not Granger-cause economic growth			
Private Credit	1.56	3.22	2.85
	(0.21)	(0.04)	(0.02)
Liquid liabilities	0.15	3.60	2.86
	(0.70)	(0.03)	(0.02)
Null Hypothesis: Economic growth does not Granger-cause financial development growth			
Private Credit	16.13	8.88	4.62
	(0.00)	(0.00)	(0.00)
Liquid liabilities	11.67	5.29	4.16
	(0.00)	(0.01)	(0.00)
Period	1962-2004	1963-2004	1965-2004
Observations	559	546	520

K = number of lags in the VAR
p-values are in parenthesis and the p-values are the same when using the Chi-sqr statistic.

Table 2.4 Jack-knife Granger Causality Test

	Mean	Med	S. D.	Min	Max
Null Hypothesis: Financial development growth does not Granger-cause economic growth					
F-Statistic	2.665	2.572	0.374	2.089	3.255
Probability	0.038	0.037	0.021	0.012	0.081
Null Hypothesis: Financial development growth does not Granger-cause economic growth					
F-Statistic	4.550	4.369	0.864	3.922	6.446
Probability	0.002	0.002	0.001	0.000	0.004

Each F statistic was estimated 13 times for N-1 of the countries in the sample; 480 observations. Jack-Knife test based on k = 4 and private credit as a measure of financial development.

Table 2.5 Multivariate VAR – Granger Causality F-Values (1961 – 2003)

	k = 1	k = 2	k = 4
Null Hypothesis: Financial development growth does not Granger-cause economic growth			
Private Credit	2.66	3.70	2.90
	(0.10)	(0.03)	(0.02)
Null Hypothesis: Economic growth does not Granger-cause financial development growth			
Private Credit	15.03	7.07	3.71
	(0.00)	(0.00)	(0.01)
Period	1962-2003	1963-2003	1965-2003
Observations*	504	492	468

k = number of lags in the VAR
p-values are in parenthesis and the p-values are the same using the Chi-sqr statistic.
*This sample excludes Haiti due to missing observations in the openness to trade series.

Table 2.6 Bivariate VAR – Granger Causality F-Values (1961 – 2004)
Low Income Countries

	k = 1	k = 2	k = 4
Null Hypothesis: Financial development growth does not Granger-cause economic growth			
Private Credit	0.13	0.49	0.75
	(0.72)	(0.62)	(0.56)
Liquid liabilities	2.75	2.38	1.45
	(0.10)	(0.09)	(0.22)
Null Hypothesis: Economic growth does not Granger-cause financial development growth			
Private Credit	5.66	4.39	2.16
	(0.02)	(0.01)	(0.07)
Liquid liabilities	6.85	4.16	2.61
	(0.01)	(0.02)	(0.04)
Period	1962-2004	1963-2004	1965-2004
Observations	301	294	280

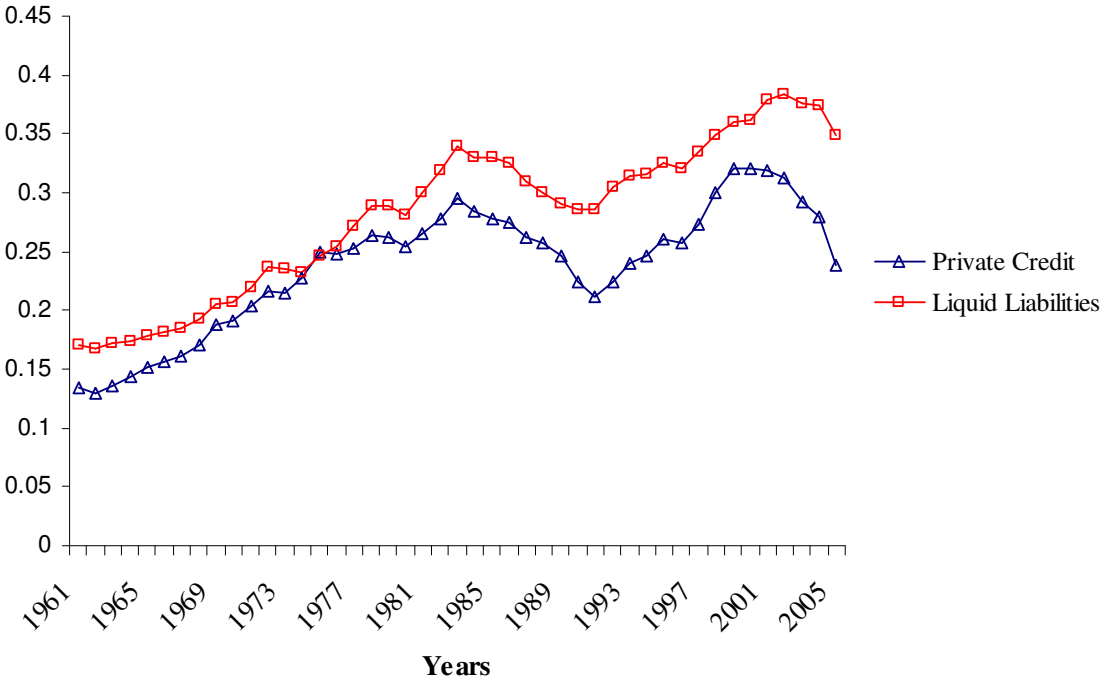
k = number of lags in the VAR
p-values are in parenthesis and the p-values are the same when using the Chi-sqr statistic.

Table 2.7 Bivariate VAR – Granger Causality F-Values (1961 – 2004)
High Income Countries

	k = 1	K = 2	k = 4
Null Hypothesis: Financial development growth does not Granger-cause economic growth			
Private Credit	6.61	5.60	3.03
	(0.01)	(0.00)	(0.02)
Liquid liabilities	1.65	1.69	1.10
	(0.20)	(0.19)	(0.36)
Null Hypothesis: Economic growth does not Granger-cause financial development growth			
Private Credit	8.25	7.67	3.82
	(0.00)	(0.00)	(0.01)
Liquid liabilities	5.75	2.76	2.97
	(0.02)	(0.07)	(0.02)
Period	1962-2004	1963-2004	1965-2004
Observations	258	252	240

k = number of lags in the VAR
p-values are in parenthesis and the p-values are the same when using the Chi-sqr statistic.

Figure 2.1 Financial Development in 13 Latin American Countries



Chapter Three

Life is Unfair in Latin America, But Does it Matter for Growth?

3.1 Introduction

Many researchers have attempted to determine the effects of inequality on economic growth. While Kuznets (1955) stated that an increase in inequality in the early stages of development was a pattern in developed countries (DCs), others have argued that inequality is detrimental to growth (Easterly, 2007). Inequality in opportunities is relevant to economic development since the well-being of society is not only considered a function of income, but also a function of the access that individuals have to education, health, and other services (Sen, 2000). Therefore, the analysis of the persistence and the effects of inequality in less developed countries (LDCs) is important for policymakers.

Latin America is the second most unequal region of the world (World Bank, 2006) and income inequality increased during the 1990s (Sáinz, 2006). The average Gini coefficient in the region between 2000 and 2005 was 54.2, which is considerably higher than the Gini coefficients of a sample of five DCs.[1] In Latin America between 2000 and 2005, the richest tenth of the population received on average more than 42 percent of the total income, while the poorest 10 percent received between 0.25 and 1.46 percent. On the other hand, in DCs, such as the United States, Canada, United Kingdom, France, and Italy, the richest tenth received on average between 22 and 30 percent, while the poorest received between 1.80 and 4 percent (Table 3.1).[2]

Engerman and Sokoloff (2002) argue that initial factor endowments in Latin America, such as soil, climate, and the density of native population, produced an

unequal distribution of resources. Because Latin American countries have soils and climates suitable for the production of crops that require economies of scale and are labor intensive, there was an agricultural organization based on concentrated ownership of land in the colonial period. This early inequality led to the establishment of institutions that were detrimental to growth, and these institutions persisted over time. Hence, the unequal distribution of assets could be an important factor that keeps this region underdeveloped.

Recently, Easterly (2007) tested the Engerman and Sokoloff (ES) hypothesis by analyzing the effects of inequality on growth. He controlled for the possibility that inequality may be endogenously determined in a growth equation with an instrumental variable (IV) approach. In a cross-sectional framework, he used an instrument for inequality that is related to initial factor endowments: the abundance of land suitable for growing wheat relative to that for growing sugarcane. He showed that this instrument has a significant negative effect on income inequality, where suitability to grow wheat is associated with a more equal distribution of resources. He finds support for the ES hypothesis by showing that inequality has a negative effect on economic growth, schooling, and institutions.[3]

Most studies on the effect of inequality on growth are cross-sectional or use inconsistent measures of inequality, and it is easy to see why. To obtain a measure of inequality that is available over time for a large set of LDCs is difficult. Gini coefficients on income and land distribution are not available consistently for Latin American countries, and taking a panel framework approach to analyze the effects of inequality on growth in the region with these measures would be impossible.[4]

Nonetheless, to determine the effects of inequality on growth in a panel framework, the area of family farms as a percentage of total area of agricultural holdings can be used. This measure was constructed by Vanhanen (2003a) and is available from 1850 to 2000 for a large set of countries in a 10 year frequency.

In this paper I analyze the effects of inequality on economic growth in a panel of 18 Latin American countries from 1960 to 2004. I test the ES hypothesis by using a measure of inequality that is related to resource distribution, the area of family farms as a percentage of the total area of agricultural holdings. The ES hypothesis posited that countries with soils suitable to grow wheat were more likely to have family farms, and therefore, had a more equal distribution of income. The share of family farms is an important measure of inequality because access to land has been associated with the degree to which people participate in the economic and political systems. In Latin America, even after rapid urbanization, access to land is an important determinant of wealth and social mobility (Torche and Spilerman, 2006). Individuals who have access to land are also more likely to participate in the political process and receive an education.

I find that inequality has nonlinear effect on growth, where the effect of family farms share on growth is increasing up to a certain level, once this level is reached the effect of family farms share on growth is decreasing. This finding is robust after controlling for urbanization, where highly urbanized countries benefit the most from a greater family farms share. Based on the family farm shares in 1998, all the countries in this analysis would benefit by increases in the share of family farms since they have family farm shares at which the effect of family farms on growth is increasing. For the

purpose of robustness, I analyze the effect of an alternative measure of resource distribution, which accounts for agricultural and non-agricultural resource distribution, on growth. Later, I estimate the effect of inequality on growth by instrumenting for this measure of inequality. I find that the nonlinear effect of inequality on economic growth is robust when using this alternative measure of inequality and instrumenting for inequality.

This paper is organized as follows: Section 3.2 reviews the literature on the effects of inequality on growth and discusses the importance of analyzing the effects of resource distribution on economic growth in Latin America; Sections 3.3 presents the methodology used in this analysis; Sections 3.4 and 3.5 discuss the results obtained from the empirical analysis and the robustness tests; and Section 3.6 concludes.

3.2 Literature Review

A. The effect of inequality on growth

There are several theoretical models which explain why inequality may negatively affect economic growth. First, the imperfect capital market model states that, with high inequality, it will be difficult for poor people to invest in physical and human capital. In a society where wealth is not equally distributed, the poor face credit constraints, and this leads to a vicious cycle of low productivity and economic growth (Banerjee and Newman, 1991; Galor and Zeira, 1993). Second, in the political economy framework, the model of redistribution states that as inequality increases the median voter will be more likely to vote for redistributive policies. These policies deter economic growth since they discourage investment (Benabou, 1996; 2000). Third, in the social conflict model, high inequality is associated with lower economic growth

because it precedes social unrest and political instability. Economic growth in this model is hampered by inequality because instability discourages investment (Benhabib and Rustichini, 1996). Fourth, inequality can have a negative effect on growth through its effect on institutions. Highly unequal societies may be unable to achieve democracy since the distribution of resources determines the distribution of political power (Acemoglu and Robinson, 2006; Vanhanen, 2003b). In highly unequal societies, there are institutions that promote the persistence of inequality and that hamper economic growth in the long run (Engerman and Sokoloff, 2002).

There is some empirical support for the idea that inequality negatively affects growth. In a sample of 64 countries, Deininger and Squire (1998) find evidence in favor of the imperfect capital model. Alesina and Rodrick (1994) and Persson and Tabellini (1994) find empirical support for the political economy model of redistribution, both in a broad sample of 46 countries and in one restricted to DCs. Alesina and Perotti (1996) and Rodrick (1999) show that inequality decreases growth through its effects on instability using cross-sectional samples.[5] Vanhanen (2003b) presents empirical support for his resource distribution theory of democratization, where the distribution of resources determines the distribution of political power. He finds, in an analysis that includes 170 countries, that the distribution of resources determined the average level of democracy between 1999 and 2001. Keefer and Knack (2002) and Easterly et al. (2006) show empirically that high inequality leads to bad institutions, such as weak property rights and low governance.[6]

On the other hand, there is also theoretical and empirical work that finds that inequality is beneficial to growth, supporting Kuznets' (1955) inverse U shaped

relationship between inequality and growth.[7] Barro (2000) argues that the imperfect capital market model can explain the positive effect of inequality on growth. In equally distributed societies, there are low levels of investment because firms tend to be small. Small firms have less incentive to invest since they face low returns on investment. Furthermore, since the rich will have less incentive to save in an environment with less redistribution, lower levels of inequality are associated with lower savings rates. Partridge (1997), Li and Zou (1998), and Forbes (2000) show empirically that inequality leads to higher economic growth. Alternatively, Barro (2000) finds that inequality has a positive effect on growth only in rich countries; in poor countries increases in inequality produce a negative effect on growth. Nonetheless, Banerjee and Duflo (2003) challenge previous empirical and theoretical work by arguing that inequality has a nonlinear effect on economic growth. According to them, the nonlinear effect of inequality on growth, measurement bias, and endogeneity of inequality explain why there are different empirical results.

There is no general consensus on the effect of inequality on growth. However, this analysis could benefit significantly with econometric techniques that take into consideration the dynamics of the relationship between inequality and growth over time. Obtaining a measure of inequality that is consistent through time and that is comparable across countries is difficult. Because Gini coefficients of income distribution are usually estimated from different surveys that cover different populations and different sources of income (income, earnings, consumption, or expenditure), using them in the analysis of the effects of inequality on growth can be problematic.[8] In fact, Atkinson and Brandolini (2001) show, using a sample of DCs, how the distribution of income differs

from one source to another and how this leads to misleading empirical results in the analysis of the effects of inequality on growth.[9] In addition, Perry et al. (2006) argue that Gini coefficients based on income surveys are biased since surveys reflect short term income but not lifetime income.

In the analysis of the effects of inequality on growth, an alternative approach is to use a measure of inequality that is related to resource distribution. Since the income of individuals depends significantly on the access to the means of production, we could use a measure related to the access that individuals have to land to quantify inequality.

B. Resource distribution in Latin America

Resource distribution is a key determinant of long run economic growth according to the ES hypothesis (2002). Engerman and Sokoloff (2002) posited that factor endowments determined how resources were distributed in the colonial period in Latin America. In highly unequal environments, institutions that precluded the participation of a large fraction of the population in the economic and political systems and promoted the persistence of inequality were created. On the other hand, in more equally distributed societies, the institutions established allowed the majority of the population to take advantage of economic opportunities and to participate in the political process. According to Engerman and Sokoloff (2006, p.74) "economic institutions shape opportunities", and these opportunities were important for the early industrialization process of Latin American countries. In the ES hypothesis, levels of inequality determined the type of economic institutions, and consequently the prospects of long run economic growth.

Several empirical and theoretical analyses attempted to test the ES hypothesis.[10] Acemoglu and Robinson (2006) and Acemoglu (2007) argue that in unequal environments, there is more likely to be an oligarchic political system that does not allow for democratization. Rajan and Zingales (2006) argue that within an oligarchic system there are institutions that promote the persistence of inequality and barriers to entering the market and the political process that are costly for society. Based on the ES hypothesis, resource distribution determines the type of institutions established, and therefore, plays a central role in development.[11]

To account for resource distribution in the analysis of the effects of inequality on growth, some have used the Gini coefficient of land distribution (Birdsall and Londono, 1997; Deininger and Squire, 1998; Easterly, 2001; Engerman and Sokoloff, 2005).[12] These analyses find that inequitable ownership of land depresses growth through its effect on the political environment, institutions, investment, and schooling.

An alternative measure of inequality related to resource distribution is the area of family farms as a percentage of the total area of agricultural holdings. This measure has been associated with the distribution of income in North America and Latin America (Przeworski and Curvale, 2005).[13] Easterly (2007) shows, for a large sample of countries, that the share of family farms in early periods has a significant negative effect on the average of the income share of the top quintile from 1960 to 1998. In addition, I find a negative correlation of 0.72 between the average of the Gini coefficient of land distribution and the family farms share from 1960 to 2000.[14] Because the control of land has been unequally distributed in Latin American since the colonial period (Birdsall and

Londono, 1997; Morley, 2001; Justino et al. 2003; Perry et al. 2006; Torche and Spilerman, 2006), the share of family farms seems a reasonable measure of inequality.

Few have attempted to test the effect of inequality on growth in Latin America. De Gregorio (1992), in a growth equation for 12 Latin American countries from 1950 to 1985, finds that income inequality has no significant effect on growth. De Gregorio and Lee (2005), in a sample period from 1970 to 2000, find that income inequality has no effect on growth, but that it has a significant negative effect on schooling and institutional quality and a positive effect on fertility.[15] To measure inequality, De Gregorio (1992) uses the share of income received by the highest 20 percent, the lowest 20 percent, and the lowest 40 percent of households; De Gregorio and Lee (2005) use the income Gini coefficient. While they both use a panel framework, De Gregorio's (1992) measure of inequality is time invariant. There are measurement issues related to the measure of inequality used by De Gregorio and Lee (2005) since it is obtained from the World Income Inequality Database (WIID). My paper differs from these previous analyses by using the share of family farms, which is consistently available for Latin American countries, and a larger sample period that accounts for current changes in economic growth and inequality.

3.3 Methodology

The countries in my sample are: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. I construct 10 year averages from 1960 to 1999, except for the last observation which is only a five

year average from 2000 to 2004. There are 5 observations per country for a total of 90 observations.

The measure of inequality that I use is the share of family farms constructed by Vanhanen (2003a). Vanhanen (2003b) defines a family farm as any farm that employs no more than four people, including family members. A benefit of using the family farms share instead of the Gini coefficient of land distribution is that the former accounts for "holdings that are mainly cultivated by the holder family itself and are owned by the cultivator family or held in ownerlike possession" (Vanhanen, 2003b, p. 84). Therefore, the share of family farms used as a measure of equality helps us to avoid the problem of not including in our measure those individuals who have control of land but may not have legal ownership, have communal ownership, or tenancy rights. According to Vanhanen (2003) those individuals should be considered socially and economically independent and they should be accounted for when measuring inequality.

When using the share of family farms as a measure of inequality, there are some caveats. The concept of family farms has been kept fixed by Vanhanen (2003a), but it is possible that it differs across countries and across time due to differences in technology and geographic conditions. The share of family farms is estimated mainly from agricultural censuses provided by the Food and Agriculture Organization (FAO) of the United Nations, but other sources were used when agricultural holdings were not available from the FAO reports. Many LDCs have experienced fast urbanization that has decreased their agricultural activity, and it could be argued that the share of family farms is not relevant for the distribution of income today. However, the access to land reveals the initial conditions that individuals face in the urbanization process. Although

these caveats are relevant, the share of family farms is the only measure of inequality that is available consistently through time for a large sample of Latin American countries in the period of analysis.

To analyze the effect of inequality on growth, I estimate a version of the augmented Solow model:

$$\ln(Y)_{i,t} - \ln(Y)_{i,t-1} = \alpha_0 + \alpha_1 \ln(Y)_{i,t-1} + \alpha_2 \ln(I/Y)_{i,t} + \alpha_3 \ln(school)_{i,t} + \alpha_4 \ln(n+g+\delta)_{i,t} + \varepsilon_{i,t} \quad (1)$$

In equation (1), the dependent variable is the period average of the difference of the natural log of real GDP per capita. I control for initial conditions by using the average of the natural log of real GDP per capita in the previous period. The natural log of investment as a share of GDP (I/Y) and the natural log of schooling (school) are included as independent variables. I also include a term that controls for population growth (n), technology advancement (g), and depreciation (δ). In this model, n is measured as the growth rate of the working age population and g + δ is assumed to be equal to 0.05 (Mankiw et al., 1992).

Inequality is measured as the area of family farms as a percentage of the total area of agricultural holdings, so increases in this variable represent increases in equality. Since inequality may be correlated with unobservable factors associated with growth, I use the first lag of the family farms share. Banerjee and Duflo (2001) argue that changes in inequality are more costly in terms of growth at either very high or very low levels of inequality, hence, I test for the nonlinear effect of inequality on growth by including the square of the lagged family farms share. This leads to the following equation:

$$\ln(Y)_{i,t} - \ln(Y)_{i,t-1} = S_{i,t,t-1} + \beta_1 equality_{i,t-1} + \beta_2 equality^2_{i,t-1} + T_{it}\lambda + \varepsilon_{i,t} \quad (2)$$

In equation (2), $S_{i,t,t-1}$ represents the variables from the augmented Solow model specified in equation (1), and T is a vector of four time dummy variables. The measure of equality is the share of family farms. The variables used in this analysis and their sources are described in Table 3.2; Table 3.3 shows the summary statistics.

3.4 Results

Column 1 of Table 3.4 shows the results of estimating the basic growth model specified in equation (1), with ordinary least squares (OLS) and time period dummies.[16] In this estimation, initial real GDP per capita has a significant negative effect at the 5 percent level, which supports the idea of conditional convergence. Investment has a significant positive effect at the 1 percent level, which is expected as well. The coefficients for human capital and $(n + g + \delta)$ have the expected signs but are not statistically significant. I add the lagged family farms share to the augmented Solow model and find that it is statistically significant at the 1 percent level. Column 2 shows that the effect of the level of family farms on growth is small since an increase of the share of family farms by one standard deviation (10.25) increases growth by 0.3 percent. In column 3, I report the results of adding the square of the lagged family farms share. I find that the level and the square of family farms share are statistically significant at the 1 percent level. These estimates support the argument that inequality has a nonlinear effect on growth.

Using the coefficients from column 3 of Table 3.4, Figure 3.1 shows how economic growth varies with changes in the family farms share. The effect of the family

farms share on growth is increasing up to the point where the family farms share is equal to 40 percent. After the share of family farms reaches 40 percent, any further increase in family farms have a decreasing effect on growth. This result supports Banerjee and Duflo's (2003) finding that growth is hampered at very high and very low levels of inequality.

Figure 3.1 shows an inverse U shaped relationship between inequality and growth and this finding is relevant for policymakers in Latin America. The latest available observations for the share of family farms (1998) are shown in Table 3.5. This table shows that all countries in the sample would benefit by an increase in the family farms share since the sample mean of the share of family farms is 25.61 and all the countries have current family farm shares in the left hand side of the curve in Figure 3.1. Figure 3.2 shows a close up of the effect of increases of family farms share up to the point where the effect of an increase on the share of family farms on growth is increasing (40 percent). The countries with the lowest family farms share are Honduras, Paraguay, Venezuela, and Panama (with family farm shares below 20 percent), and those with the highest family farms share are Colombia, Mexico, Costa Rica, Ecuador, and El Salvador (with family farm shares between 32 and 36 percent).

Furthermore, to determine whether my results are robust to different model specifications, I add to the growth equation two other variables commonly used in analyses of the effect of inequality on growth. Column 4 of Table 3.4 shows the results of controlling for government expenditure by including the natural log of government consumption as percentage of real GDP. I find that, although the coefficient of the natural log of government consumption share has a significant negative effect at the 1

percent level, the family farms share still has a significant nonlinear effect on growth. Political regime type has been also considered as an important determinant of growth. Following Perotti (1996) and Barro (2000), I add the growth rate of the period average of the polity score to the growth equation to account for changes on the political regime. The polity score is the combined score of the democracy and autocracy scores and goes from -10 to 10, where 10 is assigned to high democracies and -10 to high autocracies. Estimates in column 5 show that the growth of the polity score has a significant positive effect at the 1 percent level, while inequality still has a significant nonlinear effect on economic growth. It is important to note that the coefficients' magnitude and significance on the level and square of the lagged family farms share are the same when these control variables are added (columns 3 to 5).[17]

Additionally, I determine whether the nonlinear effect of inequality on growth is relevant for Latin American countries when I control for urbanization. It could be argued that my results may be driven by certain countries that are less urbanized, and that the share of family farms has no impact on growth in highly urbanized countries. I include in the growth equation the first lag of a dummy variable that is equal to one if a country has a period average of urban population as a percentage of total population equal or greater than 50 percent and an interaction term of the first lag of the share of family farms and this urban dummy. Table 3.5 shows in which decade a country had for the first time an average of urban population share of 50 percent or above. The countries that started the period of analysis with a urban population share higher or equal to 50 percent were Argentina, Chile, Colombia, Mexico, Peru, Uruguay, and Venezuela. Table 3.4, column 6 shows that the nonlinear effect of equality on growth persists and,

while the urban dummy has a significant negative effect at the 1 percent level, the interaction term has a significant positive effect at the 1 percent level, meaning that highly urbanized countries benefit the most with larger family farm shares in the previous period. Without taking into consideration the nonlinear effect of inequality on growth, an increase of the family farms share by one standard deviation in highly urbanized countries in the previous period causes an increase on growth of 1 percent.

3.5 Robustness Tests

To check for the robustness of the nonlinear effect of inequality on growth I use a measure of inequality that takes into consideration not only the distribution of agricultural resources, but also the distribution of non-agricultural resources. I use as an alternative measure of inequality the index of power resources (IPR). This index takes into consideration the distribution of land, non-agricultural resources, and education. In addition, I deal with potential endogeneity issues by instrumenting for inequality and investment.

Since many Latin American countries have become highly urbanized and other types of wealth have become important for the distribution of income, I use the IPR as a measure of inequality. Vanhanen (2003) constructed the IPR by dividing by 10,000 the product of three indices that account for the distribution of different types of resources: the index of occupational diversification, the index of knowledge distribution, and the index of the distribution of economic power resources.

The index of occupational diversification measures the decentralization of economic and organizational power resources. This index is the mean of two indicators of the percentage of the population that do not participate in agricultural activities: the

percentage of the urban population and the percentage of non-agricultural population of the total population. According to Vanhanen (2003b), the larger this index, the higher the occupational diversification is, and the more distributed economic and human power resources are. The index of knowledge distribution is the mean of the percentage of students in higher education per 100,000 inhabitants and the percentage of literate population. This index accounts for the distribution of knowledge at two different educational levels. The index of the distribution of economic power resources is equal to the share family farms times the percentage of the agricultural population plus the degree of decentralization of non-agricultural resources times the percentage of the non-agricultural population. This index accounts for the distribution of resources in the agricultural and non-agricultural sectors in relation to the population in each sector.

The IPR goes from zero to 100 and is a measure of the distribution of different resources, such as access to land, different occupations, knowledge, and non-agricultural assets. The higher the IPR, the more distributed power and resources are. According to Vanhanen (2003b), the IPR is a good approximation of the distribution of resources in a society since it takes into consideration those resources that allow individuals to participate in the political process and the economic system.

Table 6 reports the results of including the IPR as a measure of equality in the growth equation. Estimates in column 2 support the finding of a nonlinear effect of inequality on growth.[18] The level and square of IPR are both statistically significant at the 1 percent level with positive and negative coefficients respectively. In this estimation, the coefficients for the measure of equality are bigger than those found when using family farms share. Figure 3 shows the nonlinear effect of inequality on

growth, where the effect of an increase in the IPR is increasing up to the point where the IPR is equal to 24, after which, the effect on growth is decreasing. The average of the IPR in 1998 is 16 and all countries, except Argentina, Uruguay, Chile, and Venezuela have IPRs on the left hand side of the curve in Figure 4. The countries with the lowest IPR are Guatemala, Paraguay, Honduras, and Bolivia.

The nonlinear effect of inequality on growth remains robust when adding to the estimation the natural log of the government share and the growth of the polity score one at the time (columns 3 and 4).[19] Column 5 of Table 3.6 shows the estimates obtained when I use the IPR as a measure of equality and control for urbanization. In this estimation, there is a nonlinear effect of inequality, but the urban dummy and the interaction term are not statistically significant. Since the IPR takes into account the distribution of non-agricultural resources as well, it is expected that the urban dummy and the interaction term will make no difference in the estimation.

I explore whether my results are robust to a different model specification that addresses the issue that the first lag of the measure of equality may be correlated with the error term. I use a general method of moments (GMM) estimator with White's robust standard errors and period fixed effects. Easterly (2007), in his cross-sectional analysis, uses the natural log of the wheat-sugar ratio as an instrument for inequality. Since the analysis here is in a panel framework and an instrument that varies through time is preferred, my instrument for inequality is Easterly's (2007) instrument times the natural log of the period average of the price of wheat. Table 3.7 shows that this new instrument is a good explanatory variable of the IPR, but not of the family farms share. The correlation between the instrument and the IPR is equal to 0.50. Therefore, I

perform the GMM estimation only for the model that includes the linear and quadratic effect of the IPR.

Table 3.8 shows the GMM estimates obtained when I use Easterly's (2007) transformed instrument, a second lag of inequality and three time dummy variables as instruments for the IPR. Column 1 shows that the level of IPR has a significant positive effect at the 1 percent level, while the squared of IPR has a significant negative effect at the 5 percent level. The magnitude of the coefficient for the linear term is larger in this estimation than what was found earlier. At the same time I use the instruments for inequality mentioned before, I also address the endogeneity of investment by using the first lag of investment as an instrument. Column 2 shows very similar coefficients to those found before. I test in both GMM estimations the validity of the overidentifying restrictions. I find that the J test for both estimations is less than zero; therefore, I cannot reject the null hypothesis at the 15 percent level that the overidenfifying restrictions are valid.[20]

3.6 Conclusion

The results obtained in this empirical analysis are relevant for the analysis of the effect of inequality on growth and for policymakers in Latin America. This analysis benefits significantly from using a measure of inequality that is observable through time for a large sample of Latin American countries. The empirical results show a robust nonlinear effect of inequality on growth in Latin America. It can be concluded that countries in Latin America could benefit from more equality up to a certain level. After equality reaches this level, the effect of increases in equality on growth will be decreasing.

When using the family farms share as a measure of inequality, I find that all countries would benefit with increases in the share of family farms. When I use the IPR measure, I find that some countries will benefit more than others with increases in this index. For example, Honduras and Paraguay will benefit significantly by increases in both since they are ranked as most unequal based on the share of family farms and IPR. While Argentina, Chile, and Venezuela are ranked as three of the four most equally distributed in terms of the IPR, they have family farm shares below the sample mean. On the other hand, Bolivia and Guatemala are ranked as two of the four most unequally distributed based on the IPR, but have family farm shares above the sample mean. Therefore, this shows that some countries should focus policy efforts on making agricultural resources more equally distributed, while others should focus on achieving a more equal distribution of non-agricultural resources.

Since an increase in the percentage of family farms would seem to be beneficial in Latin America, programs that promote agricultural activity on a small scale, such as the creation of microfinancing and support institutions, could benefit the region significantly. A more developed financial system, in which individuals have more access to private credit could also promote an increase in the percentage of family farms. In fact, credit markets play a central role on the expansions of agricultural activity at a small scale since the poor lack the capital required for this type of activity. In addition, programs that allow farmers to insure themselves against natural disasters or bad weather conditions could also promote more equality in Latin America. These programs can significantly help to avoid poverty traps in agricultural areas.

Because one of the components of the IPR is the index of the distribution of knowledge, another important policy implication from this analysis is that more equality could be achieved by increasing the access and the quality of public education. Increases in literacy rates and the number of students that attained higher education could lead to a better distribution of resources, and consequently, to higher economic growth in Latin American countries. The unequal distribution of human capital in Latin America has contributed to the perpetuation of high income inequality. Therefore, to break the cycle of high inequality in the region, policymakers need to target those segments of the population that are unable to invest in human capital.

Notes

[1] See Table 3.1 for an explanation of how this average was estimated and the source of the data. Table 3.1 also shows the average of the Gini coefficient for five DCs.

[2] See De Ferranti et al. (2004) for a comprehensive study of inequality in Latin America.

[3] Replicating his estimation in a sample restricted to 20 Latin American countries, I find similar results. In a cross-sectional framework, I use the average of the Gini coefficients from 1960 to 2000 provided by the World Institute of Development and Economics Research (WIDER) and Easterly's (2007) instrument for income inequality. I find that income inequality has a negative effect on growth and the percentage of secondary enrollment. This empirical analysis is not included for reasons of space, but the results are available upon request.

[4] Appendix, Table A.3.1 shows that if a minimal criterion was specified for the Gini coefficient of income distribution, only 6 of the 18 Latin American countries included in this analysis would have observations from 1960 to 2000 using the World Income Inequality Database, May 2007 version (WIID2). Table A.3.2 shows that there are only few available Gini coefficients of land distribution for the Latin American countries included in this analysis.

[5] Benabou (1996) presents a review of the theoretical models that explain the negative effects of inequality on growth and a table with the results of a large number of empirical analyses.

[6] Thorbecke and Charumilind (2002) present a figure showing all the different channels through which inequality affects growth negatively. Birdsall (2007) reviews the negative effects of inequality on growth in LDCs.

[7] Fields (2001) presents a review on Kuznets hypothesis and on the empirical analyses that test this hypothesis.

[8] See Deininger and Squire (1996) for an explanation on these measurement issues.

[9] Panizza (2002) also shows empirically that different methods used to measure inequality lead to different empirical results in the United States.

[10] See Easterly (2007) for a review on the ES hypothesis.

[11] See Hoff (2003) and Levine (2005) for a good review on the theoretical and empirical work on this hypothesis.

[12] See Frankema's (2006) appendix for an overview on how is the land Gini coefficient estimated.

[13] Przeworski and Curvale (2005) show, in a sample that includes 15 Latin American countries, Canada, and the United States, that there is a negative correlation between the family farms share and the income Gini coefficient.

[14] For the countries included in this analysis, I calculate the average of the land Gini coefficient using the available observations provided by Frankema (2006).

[15] Some have found that income inequality has deterred the accumulation of physical and human capital in the region (Grier, 2002; De Gregorio and Lee, 2003; Motiram and Nugent, 2007). Others argue that education is unequally distributed in Latin America, and this has contributed to the perpetuation of high levels of inequality (Altimir, 1997; Frankema and Bolt, 2006).

[16] All estimations are OLS with White's standard errors and period fixed effects, unless specified otherwise.

[17] The size and significance of the coefficients on the level and square of lagged family farms share do not change if I include in the growth equation the natural log of the government share and the polity growth at the same time. Results were not included for reasons of space.

[18] Column 1 of Table 3.6 shows that equality has no effect on growth when only the level of IPR is included.

[19] The size and significance of the coefficients on the level and square of lagged IPR do not change if I include in the growth equation the natural log of the government share and the polity growth at the same time. Results were not included for reasons of space.

[20] The critical value for the chi-square distribution, with 3 degrees of freedom, at the 15 percent level is 5.32.

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Table 3.1 Averages of Gini Coefficients and Income Share of Lowest and Highest Deciles (2000 – 2005)

	Gini Coeff.*	Gini Coeff. **	Income share of lowest 10^{th}	Income share of highest 10^{th}
Bolivia	61.69	61.30	0.25	48.01
Brazil	58.51	58.25	0.90	46.84
Chile	56.42	57.06	1.21	46.66
Colombia	56.95	57.08	0.75	45.36
Costa Rica	48.76	48.46	1.30	37.18
Dom. Republic	51.09	51.09	1.36	40.19
Ecuador	56.02	56.37	1.03	45.34
El Salvador	51.68	51.83	0.78	38.63
Guatemala	54.12	54.12	1.03	42.70
Honduras	54.35	54.35	0.96	41.82
Mexico	52.36	52.39	1.19	41.19
Nicaragua	54.42	54.42	1.22	44.10
Panama	56.32	56.17	0.73	43.16
Paraguay	56.86	56.86	0.77	44.76
Peru	51.69	51.69	1.17	40.61
Venezuela	45.91	45.64	1.46	34.22
Latin American countries average	*54.20*	*54.19*	*1.01*	*42.55*
United States	44.36	44.52	1.80	29.47
Canada	33.01	33.02	2.71	24.75
United Kingdom	27.6	27.4	4.0	22.0
France	34.1	34.1	2.4	25.2
Italy	33.6	33.8	2.9	26.5

Averages are obtained from available observations that meet the three following criteria:
a) The coverage is the whole population and area
b) The income share unit of analysis is the household
c) The definition is based on the income concept
Argentina and Uruguay are not included in this table since the gini coefficients available did not meet these criteria.
* Gini calculated by World Institute for Development Economic Reasearch (WIDER) using methods developed by Tony Shorrocks and Guang Hua Wan, which estimate the Gini coefficient from decile data almost as accurately as if unit record data were used.
** Reported Gini by the source or calculated by WIDER or Deininger and Squire for the old databases that estimates the Gini coefficient with a program that uses parametric extrapolation called POVCAL.

Source: World Income Inequality Database (WIID2), WIDER.

Table 3.2 Description of Variables

Variable	*Description*
Economic growth (GDP growth per capita)	Dependent variable equal to $\ln Y_t - \ln Y_{t-1}$. Variable estimated as the period average of the difference of the natural log of real GDP per capita (constant prices: Laspeyres). Source: Penn World Tables 6.2.
Real GDP per capita (Y)	Period average of the natural log of real GDP per capita (constant prices: Laspeyres). Source: Penn World Tables 6.2.
Investment share (I/Y)	Period average of investment share of real GDP (constant prices: Laspeyres). Source: Penn World Tables 6.2.
Population growth (n)	n is the period average of the growth rate of the working age population (15 to 64). Source: World Development Indicators (2006).
Technological growth and depreciation (g + δ)	Technological growth is represented by g and depreciation is represented by δ. g + δ is equal to 0.05. (n + g + δ) Source: Mankiw et al. (1992).
Secondary Attainment (school)	Period average of the percentage of the population that attained secondary education. Source: Barro and Lee (2000).
Family farms share (equality)	The area of family farms as a percentage of the total area of holdings. Variable available in 10 year frequency. Source: Vanhanen (2003a).
Index of power resources (equality)	Estimated by Vahanen (2003a) "by multiplying the values of index of occupational diversification, index of knowledge distribution, and index of the distribution of economic power resources and then dividing the product by 10 000." Variable available in 10 year frequency. Source: Vanhanen (2003a).
Government share (G/Y)	Period average of the government share of real GDP (constant prices: Laspeyres). Source: Penn World Tables 6.2.
Polity growth	Growth of the period average of the combined polity score (polity2) computed by subtracting the autocracy score from the democracy score. Source: Polity IV Project.

Table 3.2 Description of Variables (Continued)

Variable	*Description*
Instrument (ln(wheat-sugar ratio) *ln(P_{wheat}))	Computed by multiplying the natural log of the wheat-sugar ratio by the natural log of the period average of the price index of wheat. Sources: Easterly (2007) and Oxford Latin American Economic History Database
Urban dummy	Dummy equal to 1 if a country has a period average of the percentage of the population that lives in urban areas of 50 percent or above. Source: World Development Indicators (2006).

Variables are estimated as the 10 year average from 1960 to 1999 and as the 5 year average from 2000 to 2004.

Table 3.3 Summary Statistics (1960 – 2004)

	Mean	Med.	S. D.
GDP growth per capita	0.01	0.01	0.02
Ln(Y)	8.49	8.50	0.44
Ln(I/Y)	2.53	2.51	0.40
ln(n + g + δ)	-2.59	-2.57	0.11
ln(school)	2.53	2.54	0.59
Family farms share $_{t-1}$	23.33	23.00	10.25
Index of power resources $_{t-1}$	7.38	4.80	6.97
ln(G/Y)	2.90	2.88	0.28
Polity growth	-0.66	-0.03	2.13
ln(wheat-sugar ratio)*ln(P_{wheat})	-0.17	-0.52	1.11
Urban dummy	0.67	1.00	0.47

All variables have 90 observations since the summary statistics for the family farms share and the index of power resources are from 1951 to 1999.

Table 3.4 Growth Model with Inequality

	1	*2*	*3*	*4*	*5*	*6*
Constant	0.05	0.05	0.05	0.07	0.06	0.03
	(0.88)	(1.07)	(0.95)	(1.37)	(1.21)	(0.47)
$\ln(Y)_{t-1}$	-0.01 [b]	-0.01 [b]	-0.01 [c]	-0.01 [b]	-0.01 [c]	-0.01
	(2.27)	(1.98)	(1.83)	(2.02)	(1.68)	(1.49)
$\ln(I/Y)_t$	0.02 [a]	0.01 [a]	0.02 [a]	0.02 [a]	0.02 [a]	0.02 [a]
	(2.98)	(2.84)	(2.87)	(3.05)	(2.86)	(4.10)
$\ln(n + g + \delta)_t$	-0.01	0.002	0.01	0.01	0.01	-0.003
	(0.37)	(0.15)	(0.45)	(0.31)	(0.63)	(0.20)
$\ln(school)_t$	0.001	0.003	0.004	0.004	0.004	0.001
	(0.52)	(1.32)	(1.47)	(1.37)	(1.35)	(0.49)
Family $farms_{t-1}$		0.0003 [a]	0.001 [a]	0.001 [a]	0.001 [a]	0.001 [c]
		(2.58)	(4.46)	(6.54)	(4.61)	(1.88)
Family $farms^2_{t-1}$			-0.00001 [a]	-0.00001 [a]	-0.00001 [a]	-0.00002 [a]
			(3.95)	(6.51)	(4.47)	(3.36)
$\ln(G/Y)_t$				-0.01 [a]		
				(2.67)		
Polity $growth_t$					0.001 [a]	
					(5.81)	
Urban $dummy_{t-1}$						-0.025 [a]
						(4.98)
Urban $dummy_{t-1}$ *family $farms_{t-1}$						0.001 [a]
						(6.92)
R-squared	0.47	0.49	0.50	0.51	0.50	0.55

t-statistics in parentheses use White's robust standard errors. a, b, and, c represent statistical significance at the 1, 5, and 10 percent level, respectively. All estimations have 90 observations. Only the estimation in column 6 has 72 observations since urban population rates are not available in the 1950s. Estimations include time dummies but coefficients are not shown for space purposes.

Table 3.5 Resource Inequality and Urbanization in Latin America

	FF rank	Family farms share (1998)	*IPR rank*	Index of power resources (1998)	Average urban population rate reached 50 %
Argentina	*6*	22	*18*	33.4	1960
Bolivia	*13*	31	*4*	9.6	1980
Brazil	*5*	20	*8*	13.6	1970
Chile	*7*	23	*16*	26.4	1960
Colombia	*14*	32	*11*	15.8	1960
Costa Rica	*16*	33	*14*	20	1990
Dominican Rep.	*12*	30	*9*	13.8	1980
Ecuador	*17*	36	*10*	15.3	1980
El Salvador	*18*	36	*6*	10.6	1990
Guatemala	*11*	29	*1*	3.8	- -
Honduras	*1*	13	*3*	5	- -
Mexico	*15*	32	*12*	15.9	1960
Nicaragua	*9*	25	*5*	10.4	1980
Panama	*4*	18	*7*	11.4	1980
Paraguay	*2*	15	*2*	4.7	1990
Peru	*8*	24	*13*	17.9	1960
Uruguay	*10*	27	*17*	28.5	1960
Venezuela	*3*	15	*15*	24.3	1960
Mean		25.61		15.58	59.34
Median		26		14.55	57.93
Std. Dev.		7.32		8.34	17.15
Maximum		36		33.4	92.02
Minimum		13		3.8	25.44

In columns 1 and 2, the summary statistics for the family farms share and IPR are for 1998, while those in column 3 are for the percentage of the population in urban areas from 1960 to 2004. The ranking goes from 1 to 18 where 1 is the most unequal and 18 the most equal in terms of the family farms share and the IPR.. Guatemala and Honduras did not reach 50 percent of urban population by the period between 2000 and 2004.

Source: Vanhanen (2003a) and World Development Indicators (2006).

Table 3.6 Growth Model with Inequality (Robustness)

	1	*2*	*3*	*4*	*5*
Constant	0.12	0.16	0.17	0.16	0.12
	(2.57)	(3.74)	(4.39)	(4.03)	(1.76)
$\ln(Y)_{t-1}$	-0.02 [a]	-0.02 [a]	-0.02 [a]	-0.02 [a]	-0.02 [a]
	(2.70)	(3.19)	(3.47)	(2.90)	(3.63)
$\ln(I/Y)_t$	0.01 [a]	0.01 [a]	0.01 [a]	0.01 [a]	0.02 [a]
	(2.76)	(2.67)	(2.91)	(2.66)	(3.32)
$\ln(n + g + \delta)_t$	0.01	0.02	0.01	0.02	0.003
	(0.53)	(1.15)	(0.84)	(1.26)	(0.15)
$\ln(school)_t$	0.001	0.002	0.002	0.002	0.001
	(0.53)	(0.82)	(0.82)	(0.76)	(0.51)
IPR_{t-1}	0.001	0.003 [a]	0.003 [a]	0.003 [a]	0.003 [a]
	(1.35)	(5.38)	(4.63)	(5.29)	(5.14)
IPR^2_{t-1}		-0.0001 [a]	-0.0001 [a]	-0.0001 [a]	-0.0001 [a]
		(4.10)	(3.66)	(4.02)	(2.58)
$\ln(G/Y)_t$			-0.008 [b]		
			(2.21)		
Polity growth $_t$				0.001 [a]	
				(4.28)	
Urban $dummy_{t-1}$					-0.005
					(1.17)
Urban $dummy_{t-1}$ * IPR_{t-1}					-0.0003
					(0.669)
R-squared	0.49	0.52	0.53	0.52	0.55

t-statistics in parentheses use White's robust standard errors. a, b, and c represent statistical significance at the 1, 5, and 10 percent level, respectively. All estimations have 90 observations. Only the estimation in column 5 has 72 observations since urban population rates are not available in the 1950s. Estimations include time dummies but coefficients are not shown for space purposes.

Table 3.7 Equality Measure Regressed on Instrument

	1	*2*
Constant	23.45	7.92
	(195.42)	(76.63)
ln(wheat-sugar ratio)*ln(P_{wheat})	0.70	3.32 [a]
	(0.94)	(5.23)
R-squared	0.14	0.77
Correlation ln(wheat-sugar ratio)*ln(P_{wheat}) and family farms	0.07	
Correlation ln(wheat-sugar ratio)*ln(P_{wheat}) and IPR	0.50	

t-statistics in parentheses use White's robust standard errors. a, b, and c represent statistical significance at the 1, 5, and 10 percent level, respectively. All estimations have 90 observations. Estimations include time dummies but coefficients are not included for space purposes.

Table 3.8 Growth Model with Instrument for Equality and Investment

	1	*2*
Constant	0.34	0.33
	(3.77)	(6.02)
$\ln(Y)_{t-1}$	-0.03 [a]	-0.03 [a]
	(4.00)	(5.10)
$\ln(I/Y)_{t}$	0.003	-0.0003
	(0.26)	(0.01)
$\ln(n + g + \delta)_{t}$	0.052 [a]	0.05 [a]
	(4.02)	(8.47)
$\ln(school)_{t}$	0.001	0.003
	(0.74)	(1.04)
IPR_{t-1}	0.01 [a]	0.01 [a]
	(2.67)	(2.97)
IPR^{2}_{t-1}	-0.0003 [b]	-0.0002 [b]
	(2.19)	(-2.42)
R-squared	0.22	0.34

t-statistics in parentheses use White's robust standard errors. a, b, and c represent statistical significance at the 1, 5, and 10 percent level, respectively. All estimations have 72 observations. Estimations include time dummies but coefficients are not shown for space purposes. Instruments used in the 2SLS estimation in Column 1: second lag of inequality, time dummies, and the natural log of the wheat-sugar ratio times the natural log of the period average price of wheat. Instruments used in the 2SLS estimation in Column 2: first lag of investment, second lag of inequality, time dummies, and the natural log of the wheat-sugar ratio times the natural log of the period average price of wheat.

Figure 3.1 Nonlinear Effect of Family Farms Share on Growth (Range 1 to 100)

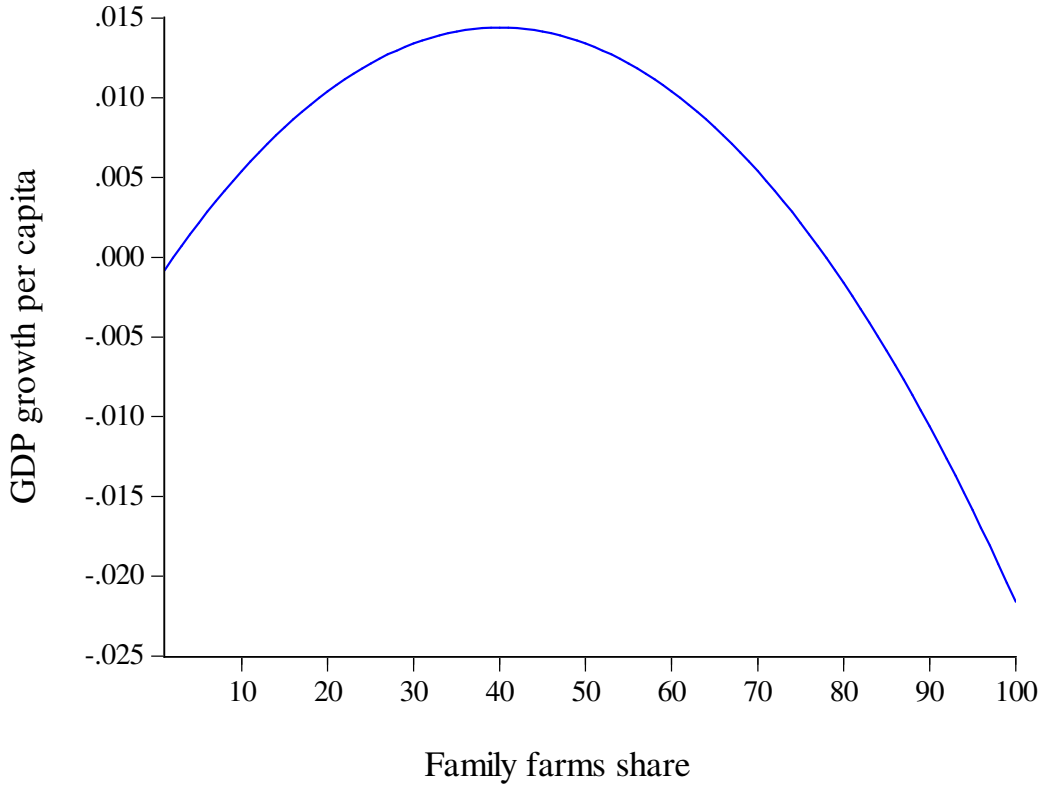


Figure 3.2 Nonlinear Effect of Family Farms Share on Growth (Range 1 to 40)

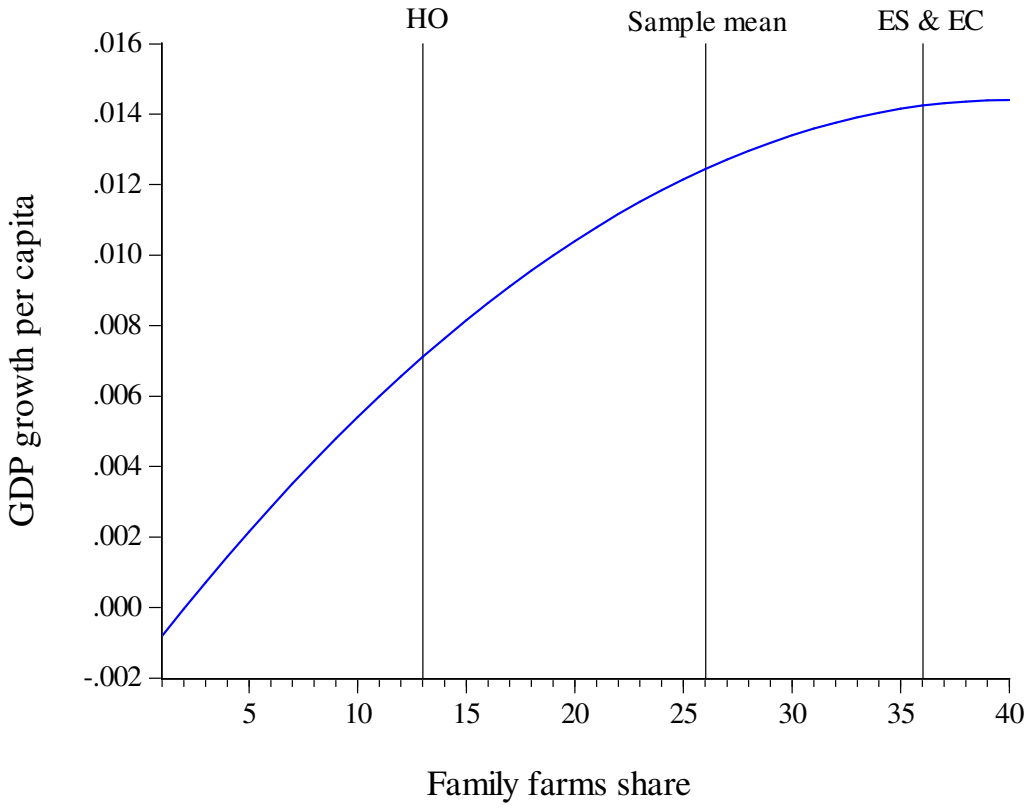


Figure 3.3 Nonlinear Effect of the Index of Power Resources on Growth (Range 1 to 100)

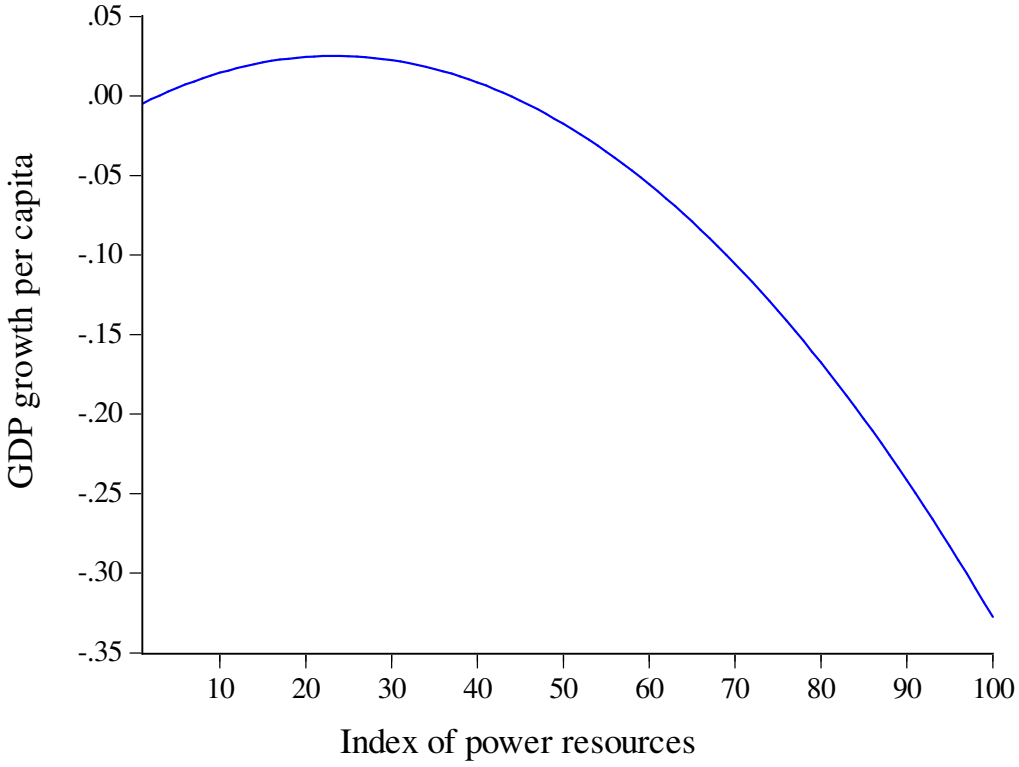
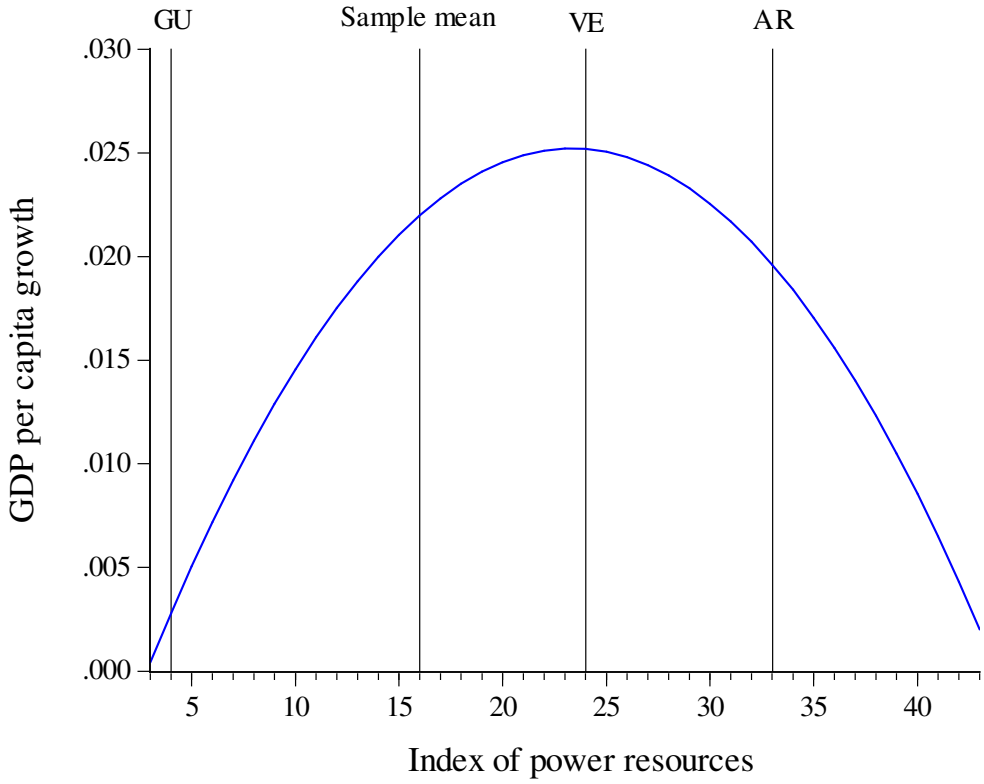


Figure 3.4 Nonlinear Effect of the Index of Power Resources on Growth (Range 3 to 43)



Appendix

Table A.3.1 Availability of Income Gini Coefficients

	1950	1960	1970	1980	1990	2000
Argentina	X	X	X			
Bolivia		X			X	X
Brazil		X	X	X	X	X
Chile		X	X	X	X	X
Colombia		X	X		X	X
Costa Rica		X	X	X	X	X
Dominican Republic			X	X	X	X
Ecuador				X	X	X
El Salvador		X	X		X	X
Guatemala				X	X	X
Honduras		X		X	X	X
Mexico	X	X	X	X	X	X
Nicaragua					X	X
Panama		X	X	X	X	X
Paraguay					X	X
Peru			X	X	X	X
Uruguay		X				
Venezuela		X	X	X	X	X

X if there is at least one Gini coefficient in the 10 year period that meets the following criteria:

a) Sample covers the whole population and area of the country
b) The income share unit is the household or family
c) Estimation based on the income concept (where the income concept could be different across countries and across time)

Source: World Income Inequality Database (WIID2), WIDER.

Table A.3.2 Land Gini Coefficients Availability

	1950	1960	1970	1980	1990	2000
Argentina		X		X		
Bolivia		X				
Brazil		X		X		
Chile		X			X	
Colombia		X		X		
Costa Rica		X				
Dominican Republic		X				
Ecuador	X		X			
El Salvador		X				
Guatemala	X	X				
Honduras	X				X	
Mexico		X				
Nicaragua		X				
Panama		X			X	
Paraguay		X			X	
Peru		X			X	
Uruguay		X				
Venezuela	X	X				

X if there at least one land Gini coefficient in the 10 year period in Frankema's Table A.1.

Source: Frankema (2006).