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THE POLITICAL ECONOMY OF INEQUALITY AND GROWTH: ESSAYS ON SOVEREIGN DEBT, DEMOCRACY AND SAVING

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in

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by

Claudia Haydée Wehbe

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DEDICATION

I dedicate this dissertation to my parents, sister, family, and friends. The completion of this work would have not been possible without their continuous support, love, encouraging words, and understanding.

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ABSTRACT OF THE DISSERTATION

THE POLITICAL ECONOMY OF INEQUALITY AND GROWTH:

ESSAYS ON SOVEREIGN DEBT, DEMOCRACY AND SAVING

by

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This dissertation addresses three issues in the political economy of growth literature. The first study empirically tests the hypothesis that income inequality influences the size of a country's sovereign debt for a sample of developing countries for the period 1970-1990. The argument examined is that governments tend to yield to popular pressures to engage in redistributive policies, partially financed by foreign borrowing. Facing increased risk of default, international creditors limit the credit they extend, with the result that borrowing countries invest less and grow at a slower pace. The findings do not seem to support the negative relationship between inequality and sovereign debt, as there is evidence of increases in multilateral, countercyclical flows until the mid 1980s in Latin America. The hypothesis would hold for the period 1983-1990. Debt flows and levels seem to be positively correlated with growth as expected.

The second study empirically investigates the hypothesis that pronounced levels of inequality lead to unconsolidated democracies. We test the existence of a nonmonotonic relationship between inequality and democracy for a sample of Latin American countries for the period 1970-2000, where democracy appears to

consolidate at some intermediate level of inequality. We find that the nonmonotonic relationship holds using instrumental variables methods. Bolivia seems to be a case of unconsolidated democracy. The positive relationship between per capita income and democracy disappears once fixed effects are introduced.

The third study explores the nonlinear relationship between per capita income and private saving levels in Latin America. Several estimation methods are presented; however, only the estimation of a dynamic specification through a state-of-the-art general method of moments estimator yields consistent estimates with increased efficiency. Results support the hypothesis that income positively affects private saving, while system GMM reveals nonlinear effects at income levels that exceed the ones included in this sample for the period 1960-1994. We also find that growth, government dissaving, and tightening of credit constraints have a highly significant and positive effect on private saving.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

1. INTRODUCTION

This dissertation empirically addresses three broad issues in the political economy and growth literatures, namely how income inequality affects the amount that a country can borrow in international capital markets; the connection between income inequality and democratization; and the possibly non-monotonic link between income levels and saving rates.

The development literature had traditionally placed the focus on explaining income distribution as the result of government policies and the development process itself. However, attention turned later on to studying the reverse causality where income distribution explains certain aspects of economic performance. I study three political economy mechanisms[1] that have implications for growth. In chapter 2, I present empirical evidence on the relationship between income inequality, sovereign debt and economic growth for a sample of developing countries, an issue that has not been empirically studied yet in the literature. In chapter 3, I test the non-monotonic relationship between income inequality and democracy in Latin America. The link between these two variables has hitherto been thought to be monotonic. The possible non-monotonic association between these two variables has been studied in the theoretic literature. However, there are no empirical studies yet

[1] Three other mechanisms that link inequality to growth, namely credit imperfections, saving rates, and sociopolitical unrest (as classified by Barro (2000)) are not the focus of this dissertation. These theories yield ambiguous net effects of inequality on investment and growth, except for the saving rates channel, which seems to be the only mechanism that fosters growth.

that test the theoretical suggestions. In chapter 4, I empirically explore the relationship between per capita income and saving, testing for the presence of nonlinearities in a sample of Latin American economies. Chapter 4 differs from previous works in the set of saving determinants used, the departure from linearity for the sample considered, and the econometric methodology. Next, I briefly describe the three broad problems, estimation methods, and results found. Chapter 5 presents the conclusions for this dissertation.

In chapter 2, I explore the political economy channel that links inequality to sovereign debt and growth. A line of research that shows that redistributive policies followed by sovereign governments may limit the amount of credit they can secure in international markets is pioneered by Karayalcin and McCollister (2005). They argue that in societies with pronounced inequalities there will be popular pressures for redistribution. Karayalcin and McCollister (2005) formally show that the majority of the population would prefer redistribution as long as median income is below average income. In the political science literature, Frieden (1991) makes a similar argument to the effect that pronounced income inequalities result in popular demands for more redistribution.

While previous literature has typically placed the focus on channels through which fiscal decisions and the political environment affect income inequality, the main purpose of chapter 2 is to explore the reverse link. I test the hypothesis that income inequality leads to popular pressures on governments to finance income redistribution with foreign debt. As governments tend to yield to such pressures, the risk of default may increase. International lenders take these potential policies into

account and tend to impose credit limits, leading to lower investment and slower growth in economies with pronounced inequality.

The validity of this prediction is tested on a sample of developing countries using a system of equations to estimate sovereign debt and growth. In the first step, I analyze the impact of inequality on sovereign debt, selecting a sample of countries that would most likely face risk of default. To avoid sample selection bias, this procedure is done by performing Tobit estimation. The results provide insights on the duration of default periods and the probability of default for countries with no default history. The first relationship tested, i.e., that pronounced inequality is associated with limited international credit, is investigated by running OLS on debt flows, levels and ratios. The findings seem to contradict the expected result for a sample of developing countries with default history (most are Latin American) for the period 1970-1990. Further testing on the larger sample yields also a positive relationship between income inequality and sovereign debt. There is evidence of increases in multilateral flows until the mid 1980s in Latin America, after which the hypothesis would hold. In the next estimation step and to test the second relationship that limited international credit is associated to lower investment and growth, I use the two-stage least squares (2SLS) metho dology. This estimation procedure is performed to avoid endogeneity and consistency problems. The findings support the hypothesis for debt flows and levels (with a 10% significance level).

Numerous studies have emphasized the link running from democracy to inequality, arguing that more democratic regimes tend to improve income distribution. The focus on chapter 3 is on the reverse link that goes from inequality to democracy, examining the association between income inequality and democracy

in Latin America. Results indicate that inequality affects the process of democratization. Moreover, I test the hypothesis that the relationship is non-monotonic, i.e. economies with low or high values of income inequality tend to be associated with unconsolidated democracy. Low income inequality detracts initiatives to democratize while the opposite extreme (very high inequality) fosters nondemocracy (Acemoglu and Robinson (2004)). Democratization typically occurs at some middle level of income inequality.

Chapter 3 presents a political economy channel that affects growth through the effect of income inequality on democracy. The theoretical relationship between democracy and growth remains ambiguous. So far, the answer to the question as to whether democracy promotes economic development remains elusive. On the one hand, democracy limits the potential for excessive political power and unpopular policies, yielding a positive effect on growth. On the other hand, redistributive policies and enhanced power of certain interest groups negatively affect growth. Early theoretical research on political change supports the idea that economic development is a pre-requisite of democracy (the modernization hypothesis of Lipset, 1959), while a second line of theory of political change is offered by Huntington (1968), who suggested that growth came first and democracy came sequentially. The modernization hypothesis assumes that economic growth causes democracy, as democratization is the last stage in a progressive process of accumulation of social changes.

The empirical literature on the subject is replete with studies that obtain ambiguous results, such as those mentioned in surveys by Sirowy and Inkeles (1991) and reviews of 46 studies by Campos (1994) rejecting the hypothesis that democracy

is negatively associated with economic development. Barro (1996) finds evidence that democracy is nonlinearly related to growth. At low levels of political freedom, more democratic sets of institutions foster growth while after a moderate level of political freedom is achieved, growth seems to slow down. Typical cross-country studies on the relationship between democracy and economic performance do not find a statistically significant association. On the other hand, panel data estimation shows that democratization is not followed by poor economic performance (Rodrik and Wacziarg, 2005).

The econometric methodology I use to test the hypothesis that income inequality affects democratic consolidation is instrumental variables estimation. The baseline econometric specification is then augmented with a set of possible determinants of democracy. Both methodologies (fixed effects and GMM) confirm the hypothesis of a nonmonotonic relationship, and the results are in general highly significant. Lipset's modernization theory is rejected when fixed effects are included in the estimation. The cases of Bolivia and Venezuela, where pronounced income inequality and social exclusion threaten democracy consolidation, deserve special attention.

In the last part of this dissertation (chapter 4), I test for a nonlinear relationship between per capita income and saving levels for a sample of Latin American countries. Saving theories have little in common, although they agree that income is the main driving force behind saving. Studies suggest that very poor countries with low per capita income seem to be condemned to low saving rates and permanent economic stagnation. Theoretical work suggests that saving may increase with income up to an intermediate level of income, after which it tends to

fall. The positive and significant association between saving rates and the income level has been confirmed in recent empirical works that include Corbo and Schimdt-Hebbel (1991), Masson, Bayoumi and Samiei (1995), Edwards (1996), Dayal-Gulati and Thimann (1997). Studies that report a non-significant effect of the income level on saving include Bailliu and Reisen (1997) and Haque, Pesaran and Sharma (1999). Most of these studies fail to test for a nonlinear relationship between both variables.

Chapter 4 presents several econometric methodologies that take care of heterogeneity as well as endogeneity of explanatory variables, confirming the nonlinear relationship. I control for specific country-effects to deal with sources of potential bias. I then explore an instrumental variables estimation method that removes specific country-effects by time differencing, as proposed by Anderson and Hsiao. Finally, the study focuses on a state-of-the-art general method of moments estimator that exploits moment conditions and improves efficiency. System GMM, first introduced by Arellano and Bond (1991) and further developed by Arellano and Bover (1995) and Blundell and Bond (1998), uses a dynamic setting in which all available lags of the dependent variable as well as those of the exogenous regressors enter as instruments. System GMM reveals nonlinear effects at income levels that exceed the ones considered in this sample for the period 1960-1994. The negative effect of income on saving levels is confirmed at the income levels of Mexico, Uruguay, Venezuela, Trinidad and Argentina when using a second method of moments estimation, difference GMM.

Overall, per capita income significantly affects private saving. I find that growth has a highly significant and positive effect on private saving in Latin America. The results suggest that growth causes saving, being the most important

force behind increases in saving, along with government dissaving and tightening of credit constraints. Demographic and monetary variables (inflation, interest rates, M2 and terms of trade) don't seem to play an important role on saving in Latin America for the period studied. The signs of the coefficients agree with recent empirical results for a larger sample of developing countries investigated by Schmidt-Hebbel, Loayza, and Serven (2000).

CHAPTER 2

2. INEQUALITY, SOVEREIGN DEBT AND GROWTH

2.1 Introduction

One of the concerns of policymakers in many developing countries is the complex relationship between income inequality and macroeconomic outcomes. This chapter examines the argument that income inequality influences the size of a country's sovereign debt as, at the expense of public investment, governments tend to yield to pressures to engage in redistributive policies financed, partially, by foreign borrowing. As international creditors take such potential policies that may increase risk of default into account, the credit they extend tends to be limited. As a result, public investment is harmed and growth is slower.

Many developing countries experienced increased income inequality in the 1980s and 1990s. It is argued that high inequality in the form of high levels of wealth concentration led to slower growth in Latin America relative to East Asian economies with a more equal distribution of income and land[2]. In comparing the economic performance in both regions in the 1980s, some analysts argue that the shocks that hit East Asian countries were less severe. However, other analysts conclude that both groups were hit by external shocks of comparable magnitude

[2] Among the countries included in this study, Gini coefficients averaged 41.63 in Argentina, 52.98 in Mexico, 59.36 in Brazil, 39.93 in Indonesia, 44.06 in Thailand, and 47.77 in Turkey in the 1980s. For the major Latin American and East Asian economies, land Gini coefficients ranged from 60.70 in Mexico to 93.31 in Chile and from 41.80 in Bangladesh to 65.70 in Sri Lanka. Income inequality measured as the ratio of income of the top 20% of the households relative to that of the bottom 20% is much higher in Latin America.

(Rodrik (1998)), while those hitting East Asia may have been even stronger. The relatively equal land and income distribution in East Asia is typically cited as the source of the East Asian take-off and strong economic performance. In the 1970s, developing countries with pronounced income inequality relied on heavy foreign borrowing. Redistributive policies financed by foreign debt that led to high public sector deficits are among the main causes of the debt crisis of the mid 1980s (Wiesner, 1985)[3], when sovereign debt defaults became more frequent (see Figure 2.3). The macroeconomic and structural weaknesses that led to sovereign defaults are still debated.

In the introduction to this dissertation (chapter 1), I discuss how income inequality may adversely affect fiscal decisions made by governments that face distributional tensions, with negative implications on growth. The political economy mechanism is based on median voter decisions over some redistributive instrument (such as tax rates), which ultimately determines the rate of growth of the economy, as the tax system may diminish incentives to invest, slowing down economic growth. Cross-country regression analysis unveils a negative association between inequality and growth. In this chapter, I explore a political economy channel to test the governments' tendency to use international borrowing to redistribute income rather than investing in public projects, where the median voter approach is an instrument to represent preferences by the majority of the populace.

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[3] Internal and external factors on both the demand and supply sides contributed to the debt growth. Oil price shocks, recessions, high interest rates, and weak primary commodity prices had a significant contribution to the debt explosion in developing countries.

This chapter contributes to the empirical literature on sovereign debt, inequality and redistribution, differing from previous works in the following respects. This is the first empirical study that tests the association running from inequality to sovereign debt as governments face pressures to redistribute. The usual focus in the development literature (that income distribution results from government policies and the development process) is reversed. Second, this chapter contributes to the endogenous growth literature by focusing on a different channel that may lead to slower economic growth as income inequality interacts with politics. From a policy perspective, high levels of inequality likely undermine political stability (see chapter 3 for further analysis of this result).

This chapter is based on the central argument and analytical framework presented in Karayalcin and McCollister (2005), who pioneer the formal study of the relationship between inequality and sovereign debt. The political economy model they develop belongs to a class of models where the median voter prefers redistribution[4]. The argument is that inequality results in stricter limits on foreign borrowing, as creditors anticipate that sovereign governments will at least partially respond to pressures for redistribution. Governments have to decide whether to use international credit to invest in public projects and/or redistribute income. Redistribution is carried through lump-sum transfers, while repayment of sovereign debt is financed by imposing a proportional income tax to median voters. The income of median voters is harmed relative to the economy's average income. The pressure

[4] See Karayalcin and Ulubasoglu (2002) where the redistributive instrument is state owned enterprises, and Dutt and Mitra (2002a, 2002b), who use the median voter approach for trade policy determination.

for redistribution, which may occur either in democratic and even in non-democratic environments[5], is thus higher in economies with pronounced inequalities. International lenders, who foresee an increased risk of default and harmed public investment, limit the credit they extend. The theoretical model developed by Karayalcin and McCollister (2005) predicts that more unequal societies will thus be able to borrow less, a prediction that is empirically tested in this chapter for a panel of developing countries.

At least two main relationships can be analyzed in the context presented above, namely the association between income inequality, redistribution and growth as well as the link between sovereign debt and growth. First, systematic work on the relationship between income inequality, redistribution and growth is relatively recent[6]. Traditional theories assume a positive relationship between inequality and redistribution through the political process. Preferences for redistribution by the poor translate into more redistributive policies. The claim that higher inequality leads to higher redistributive taxation, pioneered by Meltzer and Richard (1981), is based on the fact that the median agent is poorer than the average agent and higher inequality increases the right-skewness in income distribution, while the tax rate voted by median agents is typically decreasing in the median to mean ratio. Thus, as income distribution becomes more unequal, taxation increases. According to the

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[5] Empirically, preferences of agents whose median income is below average income reflect those of the majority. The median voter approach has been used as an instrument to examine the idea that majoritarian electoral politics benefit median voters in democratic settings. To a certain extent, even nondemocratic governments are likely to respond to social pressures.

[6] Kuznet's (1955) seminal work on growth and inequality has been considered to be the first.

conventional political economy view, governments that favor redistributive policies in more unequal societies create negative incentives for investment, harming growth. Other formal models of voting over redistribution that support this argument and that have been integrated into theories of economic growth include Perotti (1993), Alesina and Rodrik (1994), and Persson and Tabellini (1994). Benabou (1996, 1998) argues that asymmetries in the distribution of political power break the positive link between inequality and redistribution. Meltzer and Richard (1983) find support for a positive association in time series analysis, although this relation seems to be a spurious correlation between two nonstationary time series. Other empirical studies fail to find a significant association. Examples include time series studies by Lybeck (1986) and Henrekson (1988), and cross-country studies by Perotti (1996) and Lindert (1996). Clarke (1992) and Perotti (1992b) argue that redistribution does not seem to be always positively associated with inequality. Saint-Paul and Verdier (1996) argue that the empirically observed negative correlation between inequality and growth may be explained by more unequal societies that tend to redistribute less, which has adverse effects on economic growth.

Second, the relationship between inequality and debt as well as that between debt and growth need to be considered. A careful empirical study of the analytical framework has to be addressed by setting up a system of equations in which sovereign debt and growth are the endogenous variables. The explanatory variables to be included in the debt equation are not particularly specified by economic theory. Some limited empirical evidence supports a nonlinear effect of debt on growth through lower capital accumulation. The answer to why the effect would be

nonlinear is not well explored in theoretical models. Various theoretical models argue that growth effects of reasonable levels of foreign indebtedness are positive, as in traditional neoclassical models the marginal product of capital in capital-scarce countries creates an incentive to borrow and invest. Some endogenous growth models show similar implications on growth. Contradicting this view, the crowding out effect of foreign flows on domestic savings as well as some political economy models suggest a negative relationship between foreign indebtedness and growth. Debt overhang theories imply low growth associated to large debt stocks, through reduced investment.

To capture all the relationships among growth, sovereign debt, and income inequality, I set a system of equations using Tobit censored method for the first equation where the duration of default episodes is the censored variable, along with a growth equation, where the predicted errors from the Tobit estimation along with the predicted values of sovereign debt enter as a regressor. Suspecting endogeneity, the growth equation is estimated by 2SLS. The initial sample consists of 33 developing countries, 67% of which have a default history. Default is expected to be positively associated by income inequality according to the hypothesis tested, i.e. countries where income distribution is more pronounced are more likely to default and thus, be able to borrow less. As a result, growth is expected to be lower, after controlling for demographic and fiscal variables.

Evidence found partially supports the hypothesis for sovereign debt ratios. Economies with pronounced inequalities seem to be associated to longer default periods as well as higher debt ratios. The findings suggest that pronounced income inequality increases the duration of default episodes in countries with a default

history as well as the probability of default in countries with no past defaults. Lower rates of growth result from higher sovereign debt in the sample of developing economies with a default history in 1970-1990 included in the sample. However, this result does not hold for debt ratios. Nondemocracies tend to be associated to higher sovereign debt and lower growth, relative to more democratic countries.

2.1.1 Related literature

Rising income inequality is a concern even in major economies in the world[7]. Has higher inequality been preceded by slower economic growth? Researchers have been prolific in studying the correlation between inequality and economic performance by running regressions of inequality on growth. A seminal work by Kuznets in 1955 revealed an inverted-U curve, where inequality first rises and later falls as an economy develops. The idea that fostered growth in turn reduced inequality was accepted as a strong empirical regularity in the income distribution literature and predominated through the 1970s until a rise in inequality followed the period of falling inequality and the use of larger data sets gave little support to the inverted-U relationship. As the relationship weakened, researchers explained that only fast growth episodes could be followed by higher inequality regardless of the initial level of income. More recently, Barro (2000) shows that the Kuznets curve

[7] The extent and timing of the raise in inequality has been different among OECD countries. When measuring disposable household incomes, the Gini coefficient in the US began to rise in the 1970s, in the UK it went from approximately 23% in 1977 to about 33% in 1990. New Zealand experienced a high rise. Other countries experienced a 3% increase, such as Canada and Germany, or no increase (France in the 1980s).

is still a clear empirical regularity; however, variations in inequality across countries or over time cannot be explained by this relation.

On the other hand, is economic growth harmed as a result of income inequality? A reversed link that studies how the distribution of income affects output growth has been extensively studied as well by endogenous growth models. In the early 1990s, the literature presented key contributions in the empirics of economic growth and inequality. Perotti (1992b, 1994, 1996) methodically test the main theories. Clarke (1992), Bourguignon (1994), Keefer and Knack (1995) find a negative and in general significant effect of inequality on growth or investment. Birsdall and Londono (1997) report a similar result, while Forbes (1997) finds a positive and significant coefficient. More recently, Banerjee and Duflo (2003) find support for a negative relationship when inequality is lagged one period and a strong negative relationship between changes in inequality and past inequality, explaining that changes in inequality in any direction are associated with lower future growth rates[8].

A substantial part of the income distribution literature has only turned in the 1990s into incorporating voting behavior to understand the effect of an unequal income distribution on growth. Benabou (1996) surveys previous empirical evidence

[8] Most of these studies use the third quintile to measure the degree of inequality. In general, the use of cross-sectional ordinary least squares (OLS) regressions yields a negative relationship (Benabou, 2000). Benhabib and Spiegel (1997), Li, Squire, and Zou (1998) argue that OLS estimates omit country specific effects and therefore use fixed-effects estimates, which yield a positive result. Barro (1999) disagrees with the use of fixed-effects, using instead a three-stage least squares estimator that treats country specific error terms as random, only finding a negative relationship for poor countries and positive for rich countries when he breaks up the sample. Banerjee and Duflo (2003) explain these results arguing in favor of non-linearity, as the literature had uniformly been following linearity in estimating the regressions.

on distributional effects arising when greater inequality increases the pressure for redistribution, discouraging investment and reducing growth. The so called political economy mechanism[9] that the literature has suggested to explain this result is based on median voter decisions on some redistributive policy instrument, such as tax rates, which ultimately determines the rate of growth of the economy. Inequality is defined as the difference between the median agent's income and average income, i.e., the larger the gap (the larger the number of poor citizens), the larger the redistribution to take place in more inegalitarian societies relative to that in more equal economies. The tax system may diminish incentives to invest, slowing down economic growth. Bertola (1993), Persson and Tabellini (1994) and Alesina and Rodrik (1994) pioneered the empirical work that found that initial income or wealth inequality variables had significant negative effects in cross-country growth regressions through redistribution. However, most studies such as Perotti (1994, 1996), Keefer and Knack (1995), Lindert (1996), and Easterly and Rebelo (1993) find no consistent relationship between inequality and the share of transfers or government expenditure in GDP. Other studies find a positive effect of redistribution on the investment rate, when redistribution increases the budget of

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[9] In addition, two other mechanisms are represented by the social conflicts channel and the capital market imperfections channel. The social conflicts channel that is recently being investigated addresses how inequality worsens political stability and lead to sub-optimal investment levels (Alesina and Perotti, 1996), diminishes the ability of political systems to effectively respond to external shocks (Rodrik, 1997), or is associated to a high opportunity cost caused by rising violence (Fajnzylber, Lederman, and Loayza (1998a, 1998b), Bourguignon (1998)). The capital market imperfections channel prevents the poor from undertaking an efficient amount of investment. This channel has found some empirical support in poorer countries, which holds up to a certain per capita income threshold. Representative examples include Galor and Zeira (1993), Ferreira (1995), Banerjee and Newman (1991, 1993), Aghion and Bolton (1997), and Piketty (1997).

public education or helps invest in profitable projects or human capital (Galor and Zeira (1993), Saint-Paul and Verdier (1993), Perotti (1993), as well as models by Banerjee and Newman (1991), Benabou (1996), Piketty (1997), Aghion and Bolton (1997). Other models show a bidirectional causality, where the initial distribution of income determines growth, which in turn affects the distribution of income (Perotti, 1993).

Regarding the relationship between sovereign debt and growth, the theoretical literature suggests that nonlinear effects of debt on growth are likely to occur through the investment channel (see Pattillo, Poirson and Ricci (2002) for a survey on theoretical models). The expected influence of reasonable levels of current debt on growth is positive, according to traditional neoclassical models that allow for capital mobility or the ability of a country to borrow and lend. Eaton (1993) shows that an increase in the cost of foreign capital that lowers external borrowing results in lower long-run growth in an endogenous growth model. Barro and Sala-i-Martin (1995) and Barro, Mankiw and Sala-i-Martin (1995) show counterfactual empirical implications in models with perfect international capital mobility and unrealistic assumptions. However, a negative effect is expected after large levels of debt stocks are accumulated. Examples include models in which political economy considerations lead to overborrowing and low growth (Alesina and Tabellini (1989) and Tornell and Velasco (1992)). In the case of debt overhang theories, in which there is some likelihood that the debt will be larger than the country's ability to repay in the future, new domestic and foreign investment is discouraged. Expected debt service is an increasing function of the country's output level, thus lowering growth through the reduced investment channel (Krugman (1988), Sachs (1989a))

and a poor macroeconomic policy environment that likely affects the efficiency of investment.

Several empirical studies reveal a negative relationship between external debt and growth, although these do no distinguish the crowding out effect from the debt overhang effect[10]. In my study as debt limits are imposed (lower levels of sovereign debt), lower growth results from the mechanism described by Karayalcin and McCollister (2005). International creditors realize that the main use of the money borrowed by the sovereign government is redistribution, which lowers public investment and future income, thus harming growth. If sovereign governments default, creditors impose sanctions and limits on sovereign debt.

Section 2.2 presents the empirical specification and method of estimation. Section 2.3 describes the data and samples used for the analysis. The estimation results are showed in section 2.4, and section 2.5 summarizes the conclusions.

2.2 Empirical Methodology

I test the proposition that pronounced inequality influences the size of a country's sovereign debt and through this, its investment and growth. A one-equation model would not properly capture the correlations described in the introduction to this chapter nor avoid endogeneity issues, a potential problem in this setting as endogenous variables included in the system (debt, investment and

[10] Elbadawi, Ndulu and Ndung'u (1997) test the nonlinear effect of debt on growth using fixed and random effects on panel data. They find a growth maximizing ratio of debt to GDP threshold of 97%. Pattillo et al (2002) find that ratio to be 70%. Nonlinear effects of sovereign debt and growth are not significant in my study (results are not shown).

schooling in the growth equation) are correlated with the disturbances. The system explored contains three equations: sovereign debt (the equation of interest), risk of default (the selection equation) and growth, for an initial panel that includes 33 countries that may have a default history in the period 1970-1990. Default is a censored, continuous variable but not completely observable, as 33% of the countries in the sample (Bangladesh, Colombia, El Salvador, India, Indonesia, Kenya, Malaysia, Pakistan, Sri Lanka, Thailand and Tunisia) have not defaulted in the two decades under analysis, according to information provided by Standard and Poor's.

Consider the model[11]:

$$y_1 = x_1\beta_1 + \nu_1 \qquad (2.1)$$

$$y_2 = \max(0, x\beta_2 + \nu_2) \qquad (2.2)$$

where y_1 and y_2 represent sovereign debt and default (duration of default episodes), respectively; x and x_1 are sets of explanatory variables; ν_2 is assumed to be normal with zero mean and variance τ_2^2: $\nu_2 \sim N(0,\tau_2^2)$; $E(\nu_1 \mid \nu_2) = \gamma_1\nu_2$; (ν_1,ν_2) is independent of x; (x,y_2) is always observed; and y_1 is observed only when $y_2 > 0$ (if creditors expect higher probability of default, they will limit credit).

The purpose of including equation 2.2 is to determine what countries would face the greatest risk of default and would be exposed to credit limits, as well as to avoid sample selection bias. Selection of the sample of countries that will more likely face risk of default is based on the outcome of the Tobit equation. The debt equation could be estimated by equation 2.3:

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[11] Subscripts i to indicate country and t to indicate five-year period (1970-1974, 1975-1979, 1980-1984, and 1985-1990) have been dropped for convenience.

$$debt_i = x_{i1}\beta_1 + \alpha_1 ineq + \gamma_1 \hat{v}_{i2} + error_i \qquad (2.3)$$

where $\hat{v}_{i2} = default_{i2} - x_i\hat{\beta}_2$ for $default_{i2} > 0$, using the selected subsample. We expect that $\alpha_1 < 0$.

In the first stage of the estimation process, I run the default variable on lagged inequality, debt and per capita income using Tobit estimation (Tobin (1958), Nelson (1975, 1977), Maddala (1983)). Maximum likelihood estimation on Tobit is preferred for the first equation, assuming that the error terms are normally distributed. The Tobit residuals are included as additional explanatory variables in the OLS estimation of the sovereign debt equation to produce consistent estimators and $\sqrt{N}$ -asymptotically normal estimators of β_1 and α_{ineq}, under the assumption of possibly endogenous explanatory variables.

In section 2.1, I argued that if international creditors imposed limits on sovereign debt, developing countries would tend to grow slower. Equation (2.4) estimates such an impact on economic growth:

$$growth_i = x_{i3}\beta_3 + \delta_3 \hat{debt} + \mu_i \qquad (2.4)$$

by adding the predicted values of the potentially endogenous variable *debt* as explanatory variables. Equation (2.4) is estimated by 2SLS on the selected sample. The *debt* estimated coefficient is expected to be positive: $\delta_3 > 0$. 2SLS uses all the exogenous variables of the model in order to get consistent and efficient estimators. The two-stage methodology corrects for endogeneity in the corresponding variables and restores consistency to the coefficient estimates of the endogenous variable and to those of the other variables.

2.2.1 Interpretation of Tobit coefficients

The effect of past inequality on default can be disaggregated into the change in the probability of being in the default group due to past inequality, weighted by the expected value of duration of default for those in the default group, and the change in the expected value of the duration of default episodes of countries in the default group due to past inequality, weighted by the probability of being in the default group. This decomposition accounts for the fact that some nondefaulting countries, whose starting value is $y_2 = 0$ $(default = 0)$, may default due to changes in income inequality, switching to $y_2 > 0$ $(default > 0)$. Then:

$$\partial E(default \mid x) / \partial ineq_{t-5} =$$

$$[\partial P(default > 0 \mid x) / \partial ineq_{t-5}][E(default \mid x, default > 0)] +$$

$$+ \{P(default > 0 \mid x)[\partial E(default \mid x, default > 0) / \partial ineq_{t-5}]\} \quad (2.5)$$

where $ineq_{t-5}$ is x_j. For cases above the limit (default cases) and cases at the limit (nondefault cases), respectively, the effect yields:

$$\partial E(default \mid x, default > 0) / \partial ineq_{t-5} = \beta_{ineq_{t-5}} \{1 - \lambda(x\beta/\sigma)[(x\beta/\sigma) + \lambda(x\beta/\sigma)]\} \quad (2.6)$$

$$\partial E(default \mid x) / \partial ineq_{t-5} = \Phi(xb/\sigma)\beta_{ineq_{t-5}} \quad (2.7)$$

where $\beta_{ineq_{t-5}}$ is the Tobit coefficient of past inequality, $\lambda(x\beta/\sigma)$ is the inverse Mills ratio $\lambda(c) \equiv \phi(c)/\Phi(c)$ evaluated at $c = x\beta/\sigma$, $\phi(c)$ is the standard normal density function, and $\Phi(c)$ is the cumulative normal distribution function (for derivation details, see Maddala (1983), Wooldridge (2002), and McDonald and Moffitt (1980)). The interpretation of the results is shown in section 2.4.1.

2.3 Description of data

2.3.1 Variables included in the system

All variables included in the system are averages for several reasons, namely population growth, secondary schooling, openness, among other variables that are measured at best on a 5-year basis and data on income inequality is not regularly available on a yearly basis. The set is restricted to 33 developing economies for which Gini coefficients and other relevant data are available. Most of the countries in the sample have obtained at least once a credit rating from Standard and Poor's, who define a default as "the failure to meet a principal or interest payment on the due date (or within the grace period) contained in the original terms of the debt issue" (Standard and Poor's (2004)). The measure of sovereign default is the duration of episodes of foreign currency bond debt and foreign currency bank debt default in 1970-1990. The default variable takes values between 0 and 1, i.e., a country is assigned a score of 0.20 if it has spent one year in default in a five-year period. Gini coefficients, obtained from the Deininger and Squire (1996) dataset[12], account for income distribution and the level of inequality. Income inequality is a key variable that helps identify structural characteristics that change slowly over time. High inequality has been associated with a high probability of rescheduling, and in the context analyzed in this paper, it is expected to be associated with default and tighter limits on foreign debt, as suggested in section 2.1. Higher inequality

[12] Data used to measure equality in the distribution of income, such as the share of the 3rd quintal in total income, is very limited for the sample. The dataset provides income-based or expenditure-based Gini coefficients, so 6.6 points are added to expenditure-based coefficients to adjust for the measurement difference where income is typically more concentrated than expenditure (Deininger and Squire (1996), Dutt and Mitra (2002a)).

likely motivates more redistribution through the political channel[13] and a likelihood for default. Past inequality, level of per capita income and debt are included as explanatory variables to determine default.

The basic specification for the sovereign debt equation includes the errors from the Tobit estimation, inequality, past investment and growth, and openness. Openness tends to raise inequality in rich countries and lower it in poor economies and is linked to the process of industrialization. An outward-oriented trade policy has been shown to enhance growth and the ability of developing countries to effectively respond to external shocks. Debt is the share of external debt relative to GDP (Tables 2.4, 2.5 and 2.6), the level of external debt (Tables 2.7, 2.8 and 2.9), or debt flows (Table 2.12 and 2.13). In alternative specifications, I add a Latin America dummy variable to control for systematic differences across regions (most of the countries in the sample are Latin American and East Asian), and a democracy variable (Gastil democracy index) to control for a government's tendency to redistribute. I use democracy scores provided by Freedom House on a scale from 1 to 7, where 7 corresponds to the lowest level of political rights. Higher democracy scores are indicative of less democratic sets of institutions.

The general standard specification for the growth equation, which is an income distribution augmented growth equation in the framework of Levine and Renelt (1992), is widely accepted in the growth literature and is not the reduced form of any single model. Growth theory guides the choice of explanatory variables: initial real per capita income to reflect the convergence effect, investment to reflect

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[13] Traditional theories predict that inequality is associated with higher redistribution in democratic societies.

the effect of physical capital accumulation, population growth rate, and secondary schooling to proxy for human capital accumulation (more educated populations are expected to have a higher ability to anticipate government's fiscal decisions). The reduced form is augmented with predicted values of the debt variable. I use instrumental variables to account for a potential simultaneity bias: investment, school and the debt variables are instrumented with lagged values of investment, school, openness and budget deficits.

Control variables include fiscal deficits and terms of trade shocks. Fiscal deficits make it more difficult to effectively respond to a crisis. Terms of trade shocks, which are expressed as the difference between the growth rate of export prices and that of import prices, have also been found to be highly significant indicators of the structure of foreign trade and outward orientation. The World Development Indicators dataset (World Bank, 2001) provides the data on the level of external debt, as well as debt ratios and fiscal deficits (both as a proportion of GDP) for the period 1970 to 1990. Real per capita GDP and its growth rate have been provided by Barro and Lee (1994). The price level of investment, average years of secondary schooling, population growth, openness, and terms of trade shocks have also been provided by Barro and Lee (1994). Default episodes have been provided by Beers and Chambers (Standard & Poor's, 2003).

2.3.2 Descriptive statistics

The initial sample is conformed by 33 developing countries, 67% of which have defaulted at least once on their foreign currency bond debt and/or foreign currency bank debt (see Figure 2.3). Figure 2.3 shows the duration of default

episodes within each five-year period. In the period 1970-1990, Jamaica and Peru had their first defaults in the mid 1970s, while most of the emerging economies defaulted first into the 1980s.

Summary statistics and correlations for the main variables in the study are provided in Tables 2.1, 2.2 and 2.3. Turkey, with the lowest average debt ratio, is one of the rescheduling countries that recovered most vigorously from the crisis (Berg and Sachs, 1988). The correlation between inequality and debt ratios is positive (0.19), as well as the correlation between Gini coefficients and sovereign debt levels (0.15). The relationship is shown for the complete sample in Figures 2.1 and 2.2. The positive regression coefficient depends on holding constant the other variables in the equation.

2.4 Results

OLS regressions on the complete sample of 33 countries (Table 2.10) with no sample selection show evidence that inequality is positively related to debt ratios, significant at 10% in the baseline specification in columns 1 and 3, and at 5% with the Latin America dummy in column 2. Applying a limit on debt ratios not to exceed 80% of GDP yields a positive relationship between inequality and sovereign debt, although not significant at standard levels (Table 2.11). Limits on sovereign debt ratios between 10% and 70% of GDP yield significant and positive Gini coefficients at 5% level of significance. Applying a limit on the subsample of countries that face risk of default yields similar positive results. Running OLS on the complete sample, with and without first-step Tobit estimation, yield a positive and not significant effect of inequality on debt flows. Testing other specifications where default is a

regressor in OLS estimation (without first-step Tobit estimation of default episodes), as well as Tobit estimation of debt flows, yield a similar result.

In sections 2.4.1, 2.4.2 and 2.4.3, I present estimation results using the methodology explained in section 2.2. Tables 2.4, 2.5 and 2.6 use debt ratios. To check for robustness, Tables 2.7, 2.8 and 2.9 use debt stocks, and Tables 2.12 and 2.13 use debt flows.

2.4.1 Tobit estimation on default

In this section I present results from first-step Tobit estimation (Tables 2.4 and 2.7) on the initial sample of 132 cross-sectional observations (33 countries observed in 5-year periods 1970, 1975, 1980 and 1985). Past inequality is not significant when past debt ratios are included in the estimation, while it becomes significant (10% level) in the specification with debt levels. A one-unit increase in inequality for cases that have already experienced a default (Table 2.4) leads to an expected change of 0.002 in the duration of default episodes, i.e., within a five-year period, future default episodes in any country with a default history would tend to last 0.20% longer than previous defaults. The effect of inequality is larger on default episodes when debt ratios are replaced by debt levels (Table 2.7), i.e., in countries with a default history, a worsening of income distribution that increases the Gini coefficient by one unit is expected to lead to future longer defaults by 0.8% (a defaulting country that spent one year in default in the past is expected to stay in default longer than one year in the next default episode due to high inequality).

About 47% of the total effect of increases in inequality (47% of 0.007 in Table 2.4 and 0.020 in Table 2.7) would be attributable to having defaulted in the past.

Thus, about 53% of the total effect of inequality would seem to be associated to an increase in the probability of experiencing a default in countries without a default history in 1970-1990. Moreover, a unit increase in Gini coefficients is associated to a 0.26% (Table 2.4) and 1.32% (Table 2.7) higher probability of default in nondefaulting countries. About 47% of the effect of increases in past per capita income and debt ratios (both positive and significant at 1% level in Table 2.4 and at 5% in Table 2.7) on default episodes would be attributable to a country's default history. In the group of nondefaulting countries, 53% of the effect of increases in debt ratios and per capita income would raise the probability of default in nondefaulting economies.

2.4.2 Effect on sovereign debt

The initial sample of 132 cross-sectional observations gets reduced to 42 cross-sectional observations (see footnote to Tables 2.1 and 2.2) after first-step sample selection. Most of the countries with a history of default are Latin American. From the results in tables 2.5 and 2.8, we do not reject the hypothesis of no-selection problem $H_0 : \gamma_1 = 0$. The t-statistic on the estimates $\hat{\nu}_2 = 132.998$ in Table 2.5 column 1 ($t = 0.854$) and $\hat{\nu}_2 = 7.208$ in Table 2.8 column 1 ($t = 1.342$) show no evidence of a sample selection problem at the usual significance levels.

The hypothesis tested in this study predicts a negative association between pronounced income inequality and sovereign debt. However, as inequality increases, debt ratios (column 1 in Table 2.5), debt levels (column 1 in Table 2.8), and debt flows (column 1 in Table 2.12) tend to increase, contradicting the expected negative

result for the period studied and sample of countries that face risk of default. Inequality is significant at 10% level in the specification with debt ratios. This positive association[14] is supported by two facts: defaults becoming more likely as the economies contracted throughout the mid 1980s, and substantially increasing, countercyclical multilateral flows to Latin America up to the mid 1980s. After 1983, the flows started falling throughout the end of the decade while per capita GDP growth increased (IADB (2006)). These findings suggest that the hypothesis would hold for the period 1983-1990 rather than throughout the period 1970-1990.

Openness, which denotes an outward oriented trade policy, is statistically significant at conventional significance levels throughout all specifications. Openness is positively related to debt ratios and negatively related to debt levels and debt flows, possibly confirming Barro and Lee's (2005) suggestion that multilateral loan frequency, specifically from the IMF, is affected by country voting rights in the IMF and the alignment of countries with the U.S. in terms of trade patterns as well as voting patterns in the United Nations assembly. Lower past investment is associated to lower debt ratios and levels at 10% significance level (column 1). Higher past growth seems to lead to lower debt ratios (Table 2.5, column 1) at 10% significance level, while there is an indication that it would be associated to higher debt levels, although not significantly (Table 2.8, column 1).

A dummy for Latin American countries as well as an interaction term is added to the baseline specification in column 2 (Tables 2.5, 2.8 and 2.12) to control for any systematic differences across regions. The geographical location indicates

[14] Berg and Sachs (1988) argue that more unequal economies are expected to have a higher debt/export ratio.

similarities among developing countries[15]. Holding openness and past growth and investment fixed, the results show that the estimated debt ratio for developing countries would be 4.358%, while the debt ratio in Latin America would be 1.041%, not economically large but statistically significant at 5% level.

In section 2.1, I hypothesized that both democratic and non-democratic governments tend to respond to pressures for redistribution. I test for this hypothesis by including a democracy variable and an interaction term in column 3 (Tables 2.5, 2.8 and 2.12). The marginal effect of an increase in Gini coefficients by 1 point would be an increase in debt ratios and debt levels in nondemocracies. A 1 point increase in inequality would raise debt ratios by 1.366 standard deviations from the mean debt ratio (Table 2.5), while an increase in inequality by 10 points would increase estimated debt levels by 0.15% standard deviations from the mean debt level.

2.4.3 Results on growth rates

All growth regressions are run using the estimated values of sovereign debt (debt ratios in Table 2.5, debt stocks in Table 2.8, and debt flows in Table 2.12) under the analytical framework of Pattillo, Poirson and Ricci (2002, 2004), who investigate the channels through which external debt affects growth. Growth theory guides the choice of possible regressors, but the specification chosen cannot be interpreted as the reduced form of any single model. The empirical growth literature has found some negative effects of debt on growth. In what follows, I consider the

[15] The case of the Mexican crisis in the mid 1990s and its domino effect on other developing countries can be mentioned.

positive relationship between external debt (particularly, debt flows) and growth to be consistent with Karayalcin and McCollister's (2005) analytical framework, i.e., countries that are able to borrow less grow at a slower pace.

Most of the empirical work done in the beginning of the 1990s regressed the average growth rate of per capita GDP over a period of about 20 years on initial income and several control variables, such as regional dummies and the initial stock of human capital or proxies in the form of school enrollment ratios, to assess their relative contribution to growth. This reduced form regression consistently gets a negative and significant coefficient for initial income and positive for the control variables in cross-section analysis. In this chapter, results from panel estimation seem to agree with past research.

Tables 2.6, 2.9 and 2.13 present estimated results of the growth equation for the reduced panel of countries with a default history, where predicted debt ratios, debt stocks, and debt flows are included as an additional instrument, respectively. Increases in predicted debt ratios seem to harm growth rates, indicating the presence of debt overhang, although not significantly in all specifications in Table 2.6. The signs of all regressors are as expected; however, no regressor is significant, except for per capita income when the democracy score is included (column 3). Per capita income seems to reflect the convergence effect. Holding other variables fixed (debt ratios, investment, per capita income, population and schooling), Latin American countries would grow 1% more relative to developing countries in the sample such as Nigeria, Philippines, Zambia, Egypt, Jordan, Tanzania and Turkey (column 2), while nondemocracies would tend to grow less (column 3) relative to countries with democratic sets of institutions.

By introducing a democracy variable as a measure of political rights in column 3, it seems that less democratic developing economies with a default history in this sample would have tended to grow less in 1970-1990 (Tables 2.6 and 2.9). A coefficient of 1 is assigned to the highest level of political rights while a coefficient of 7 is assigned to the least democratic set of institutions. Thus, as systems tend to be more democratic, growth would fall although not at significant levels.

The hypothesis that lower sovereign debt is associated with lower growth seems to hold for debt levels (Table 2.9). The sign of predicted sovereign debt is positive in the three specifications and significant at 10% level in columns 1 and 2 and at 5% level when democratic environments are controlled for. The signs of all the regressors are robust to the change in measurement of the debt variable. Per capita income becomes more significant (5% level) when predicted debt levels are used (significant at 10% level with debt ratios). The Latin America dummy shows again a positive sign, i.e., Latin American economies grow more relative to the group of developing countries in the sample.

In Table 2.13, we confirm the hypothesis that debt flows are positively associated to growth rates. The relationship is significant at 10% level in columns 1 and 2, and at 5% level in column 3. The results mirror those estimated with debt stocks.

2.5 Concluding Remarks

The study to test the hypothesis that pronounced inequalities create popular pressures to redistribute income and lead to limited debt credit, which in turn harms investment and growth is partially confirmed for the group of developing countries

with a default history included in this study. The findings for the first relationship tested suggest that increases in income inequality lead to higher sovereign credit (debt ratios, stocks and flows), both in a sample that includes countries with and without a default history as well as in a smaller sample where only countries with default history are included. This finding is supported by increases in multilateral flows to Latin America, especially throughout the mid 1980s, which show a countercyclical pattern relative to per capita GDP growth.

The second relationship tested seems to hold for sovereign debt levels and debt flows, as increases in external debt are expected to foster growth with a 10% significance level. Pronounced inequalities seem to be associated with higher external debt ratios, levels and flows. As long as the gap between median and average income widens, future default episodes would tend to last longer in economies with past defaults. About 47% of the total effect of increases in inequality, debt ratios and per capita income in the past five-year period on current default episodes would be attributable to having defaulted in the past, while 53% of these effects would increase the probability of default in countries with no default history.

From a policy perspective, the results show that sovereign debt would tend to increase in the sample of countries with a default history included in this study in the period 1970-1990, as a result of increases in inequality, keeping constant past growth and investment, and outward orientation. However, lower past investment tends to lead to decreases in external credit at 10% significance level. In turn, higher debt ratios tend to harm growth rates, while increases in debt levels and debt flows would tend to foster growth.

Nondemocratic developing countries in the sample would tend to grow less relative to democracies, while Latin American economies would be expected to grow 1% more relative to non-Latin American countries in the sample. More democratic environments contribute to higher growth rates. The findings suggest that nondemocracies would tend to be associated to higher debt ratios and debt levels and lower growth in this study. This result would agree with Alesina and Rodrik's (1994) finding that even dictators redistribute.

In general, more educated populations seem to have larger growth rates. Larger per capita incomes are associated with lower growth rates, an indication that the poorest countries in the sample tend to converge to long-run growth in the period considered.

Table 2.1: Debt ratio: descriptive statistics

Name	mean	sd	min	max
Argentina	55.715	8.342	49.816	61.614
Bolivia	131.778	2.614	129.930	133.627
Brazil	40.036	0.795	39.474	40.598
Chile	93.680	22.566	77.723	109.636
Costa Rica	117.729	12.799	108.679	126.779
Dom. Rep.	51.413	26.216	32.876	69.951
Egypt	106.657	.	106.657	106.657
Guatemala	35.114	.	35.114	35.114
Honduras	77.075	13.729	67.367	86.783
Jamaica	113.582	56.162	58.365	170.644
Jordan	108.716	.	108.716	108.716
Mexico	54.353	13.656	44.697	64.009
Nigeria	77.011	59.452	34.972	119.050
Panama	99.708	13.771	89.970	109.445
Peru	66.004	17.499	51.439	85.415
Philippines	75.455	12.698	66.477	84.434
Tanzania	125.960	0.000	125.960	125.960
Trinidad	41.468	.	41.468	41.468
Turkey	23.233	10.399	15.880	30.585
Uruguay	54.017	17.456	41.673	66.360
Venezuela	55.608	12.581	46.711	64.504
Zambia	192.529	113.928	111.970	273.088
Total	82.888	46.883	15.880	273.088

External debt as a percent of GDP. The statistics correspond to the sample of observations selected by Tobit estimation. Five-year periods that report default episodes: 1980 and 1985 in Argentina, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Honduras, Mexico, Nigeria, Panama, Phillipines, Uruguay, Venezuela and Zambia; 1980 in Egypt; 1985 in Guatemala, Jordan, Tanzania, and Trinidad; 1975, 1980 and 1985 in Jamaica and Peru; and 1975 and 1980 in Turkey.

Table 2.2: External debt: descriptive statistics

Name	mean	sd	min	max
Argentina	24.595	0.250	24.418	24.772
Bolivia	22.163	0.254	21.984	22.343
Brazil	25.335	0.161	25.221	25.45
Chile	23.627	0.139	23.529	23.725
Costa Rica	22.119	0.173	21.997	22.241
Dom. Rep.	21.866	0.281	21.668	22.065
Egypt	23.989	.	23.989	23.989
Guatemala	21.724	.	21.724	21.724
Honduras	21.613	0.360	21.358	21.867
Jamaica	21.717	0.519	21.177	22.212
Jordan	22.451	.	22.451	22.451
Mexico	25.229	0.142	25.129	25.329
Nigeria	23.653	0.460	23.328	23.978
Panama	22.246	0.264	22.059	22.433
Peru	23.146	0.343	22.848	23.522
Philippines	23.948	0.174	23.825	24.071
Tanzania	22.561	0.001	22.56	22.562
Trinidad	21.356	.	21.356	21.356
Turkey	23.404	0.445	23.09	23.719
Uruguay	21.906	0.316	21.682	22.129
Venezuela	24.25	0.011	24.243	24.258
Zambia	22.259	0.358	22.006	22.512
Total	22.992	1.207	21.177	25.450

Ln of external debt. The statistics correspond to the sample of observations selected by Tobit estimation. Five-year periods that report default episodes: 1980 and 1985 in Argentina, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Honduras, Mexico, Nigeria, Panama, Phillipines, Uruguay, Venezuela and Zambia; 1980 in Egypt; 1985 in Guatemala, Jordan, Tanzania, and Trinidad; 1975, 1980 and 1985 in Jamaica and Peru; and 1975 and 1980 in Turkey.

Table 2.3: Correlations

	Debt ratio	GDP	Growth	Invest	Open	School	Budget	Democ	Ineq
Debt ratio	1.000								
GDP	-0.572	1.000							
Growth	0.097	-0.169	1.000						
Investment	0.042	-0.084	-0.202	1.000					
Open	0.559	-0.149	-0.285	0.168	1.000				
School	0.074	0.396	-0.082	-0.251	0.213	1.000			
Budget	-0.331	0.409	0.014	-0.241	-0.236	0.463	1.000		
Democracy	0.220	-0.269	-0.161	0.219	-0.017	0.048	-0.208	1.000	
Inequality	0.188	-0.326	0.048	-0.100	-0.022	-0.349	-0.412	0.252	1.000

	Debt	GDP	Growth	Invest	Open	School	Budget	Democ	Ineq
Debt	1.000								
GDP	0.334	1.000							
Growth	0.164	-0.169	1.000						
Investment	0.000	-0.084	-0.202	1.000					
Open	-0.570	-0.149	-0.285	0.168	1.000				
School	-0.036	0.396	-0.082	-0.251	0.213	1.000			
Budget	-0.070	0.409	0.014	-0.241	-0.236	0.463	1.000		
Democracy	0.112	-0.269	-0.161	0.219	-0.017	0.048	-0.208	1.000	
Inequality	0.146	-0.326	0.048	-0.100	-0.022	-0.349	-0.412	0.252	1.000

Debt ratio is external debt as a percent of GDP; debt is the ln(debt); GDP is the ln of per capita GDP; growth is the growth rate of per capita GDP; investment is the price level of investment; open is outward orientation or openness; school is average years of secondary schooling; budget is budget deficit; democracy is a measure of political rights; and inequality is income inequality.

Table 2.4: Tobit estimation of default episodes

	(1)
Gini t-5	0.004
	(0.411)
Ln gdp t-5	0.451***
	(3.927)
Debt ratio t-5	0.014***
	(5.773)
N	97
sigma	0.549***
t-stat	(8.036)
Log likelihood	-61.111

Dependent variable: default episodes.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

Tobit estimation on a sample of 33 developing countries: Argentina, Bangladesh, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, El Salvador, Guatemala, Honduras, India, Indonesia, Jamaica, Jordan, Kenya, Malaysia, Mexico, Nigeria, Pakistan, Panama, Peru, Phillipines, Sri Lanka, Tanzania, Thailand, Trinidad, Tunisia, Turkey, Uruguay, Venezuela and Zambia.

Table 2.5: Estimation of debt ratios on subsample

	(1)	(2)	(3)
Tobit S.E.	132.998	61.897	89.729
	(0.854)	(0.463)	(0.687)
Gini	1.984*	4.358***	-1.415
	(1.668)	(4.773)	(-0.582)
Growth t-5	-202.952*	-154.850	-272.293**
	(-1.786)	(-1.219)	(-2.117)
Inv t-5	29.490*	21.837	20.792
	(1.826)	(1.496)	(1.316)
Open	272.822***	265.230***	270.996***
	(3.524)	(4.774)	(4.634)
Dummy LAm		134.126*	
		(1.806)	
Gini*LAm		-3.317**	
		(-2.116)	
Democracy			-32.684
			(-1.057)
Gini*Democ			0.847
			(1.375)
R-squared	0.329	0.389	0.400
F	5.327	46.827	13.317
N	41	41	41

Dependent variable: debt ratios.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

OLS estimation of debt ratios on the sample selected with first-stage Tobit estimation.

Tobit S.E.: standard errors from Tobit estimation in Table 2.4.

Table 2.6: Growth regression with fitted values of debt ratios

	(1)	(2)	(3)
Pred. debt ratios	-0.001	-0.001	-0.001
	(-1.376)	(-1.310)	(-1.423)
Investment	0.054	0.060	0.051
	(1.035)	(1.025)	(1.005)
School	0.013	0.014	0.019
	(0.528)	(0.519)	(0.736)
Ln GDP	-0.023	-0.027	-0.031*
	(-1.421)	(-1.352)	(-1.735)
Population	-0.492	-0.353	-0.327
	(-0.450)	(-0.292)	(-0.308)
Dummy Lam		0.010	
		(0.470)	
Democracy			-0.007
			(-1.444)
F	0.657	0.503	0.732
N	37	37	37

Dependent variable: growth rates.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

2SLS estimation of growth rates on the sample selected with first-stage Tobit estimation in Table 2.4.

Predicted debt ratios from regression in Table 2.5.

Table 2.7: Tobit estimation with alternative debt variable

	(1)
Gini t-5	0.020*
	(1.847)
Ln gdp t-5	0.281**
	(2.370)
Ln debt t-5	0.187**
	(3.161)
N	99
sigma	0.656***
t-stat	(8.029)
Log likelihood	-73.927

Dependent variable: default episodes.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

Tobit estimation on a sample of 33 developing countries: Argentina, Bangladesh, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, El Salvador, Guatemala, Honduras, India, Indonesia, Jamaica, Jordan, Kenya, Malaysia, Mexico, Nigeria, Pakistan, Panama, Peru, Phillipines, Sri Lanka, Tanzania, Thailand, Trinidad, Tunisia, Turkey, Uruguay, Venezuela and Zambia.

Table 2.8: Estimation of debt levels on subsample

	1	2	3
Tobit S.E.	7.208	7.912	7.714
	(1.342)	(1.544)	(1.471)
Gini	0.017	-0.052	0.085
	(0.503)	(-1.623)	(1.104)
Growth t-5	0.709	-1.213	-0.142
	(0.208)	(-0.350)	(-0.038)
Inv t-5	0.644*	0.638*	0.585
	(1.917)	(1.734)	(1.619)
Open	-8.354***	-7.569***	-8.005***
	(-3.338)	(-2.949)	(-3.420)
Dummy LAm		-4.890*	
		(-1.861)	
Gini*LAm		0.103*	
		(1.857)	
Democracy			1.001
			(1.233)
Gini*Democ			-0.021
			(-1.200)
R-squared	0.324	0.353	0.314
F	5.333	5.899	4.897
N	42	42	42

Dependent variable: debt levels.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

OLS estimation of debt levels on the sample selected with first-stage Tobit estimation.

Tobit S.E.: standard errors from Tobit estimation in Table 2.7.

Table 2.9: Growth regression with fitted values of external debt

	(1)	(2)	(3)
Pred. debt	0.014*	0.014*	0.017**
	(1.730)	(1.697)	(2.103)
Investment	0.002	0.003	0.003
	(0.094)	(0.096)	(0.134)
School	0.005	0.005	0.013
	(0.323)	(0.319)	(0.745)
Ln GDP	-0.020*	-0.021	-0.027**
	(-1.788)	(-1.629)	(-2.245)
Population	-0.786	-0.775	-0.655
	(-1.022)	(-0.966)	(-0.868)
Dummy Lam		0.001	
		(0.061)	
Democracy			-0.005
			(-1.500)
F	1.120	0.907	1.431
N	37	37	37

Dependent variable: growth rates.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

2SLS estimation of growth rates on the sample selected with first-stage Tobit estimation in Table 2.7.

Predicted debt levels from regression in Table 2.8.

Table 2.10: OLS estimation of debt ratios with no sample selection

	(1)	(2)	(3)
Gini	1.137*	1.396**	0.992*
	(1.890)	(2.154)	(1.941)
Growth t-5	-399.667***	-456.590***	-434.873***
	(-4.413)	(-5.386)	(-4.589)
Inv t-5	31.418**	29.159***	27.860**
	(2.517)	(2.616)	(2.303)
Open	133.408**	147.677***	142.572***
	(2.078)	(2.629)	(2.603)
Dummy LAm		-16.080*	
		(-1.741)	
Democracy			3.758
			(1.547)
R-squared	0.352	0.381	0.368
F	6.957	8.914	6.741
N	98	98	98

Table 2.11: Limits on sovereign debt ratios with no sample selection

Limit on debt/GDP	Estimated Gini coeff.	t-statistic	
10%	1.190	(2.460)	**
20%	1.199	(2.360)	**
30%	1.212	(2.160)	**
40%	1.462	(2.300)	**
50%	1.725	(2.020)	**
60%	2.078	(2.170)	**
70%	2.563	(2.040)	**
80%	1.914	(1.450)	
90%	1.670	(1.000)	
100%	1.620	(1.110)	

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

Table 2.12: Estimation of debt flows on subsample

	(1)	(2)	(3)
Tobit S.E.	6.344	7.126*	7.527**
	(1.618)	(1.959)	(2.040)
Gini	0.017	-0.036	0.067
	(0.601)	(-1.551)	(1.160)
Growth t-5	9.284**	7.748*	7.127*
	(2.445)	(1.888)	(1.735)
Inv t-5	0.899***	0.729*	0.654*
	(2.696)	(1.734)	(1.778)
Open	-9.210***	-8.147***	-8.641***
	(-4.989)	(-3.927)	(-5.193)
Dummy LAm		-4.421*	
		(-1.913)	
Gini*LAm		0.084*	
		(1.768)	
Democracy			1.010
			(1.562)
Gini*Democ			-0.018
			(-1.370)
R-squared	0.413	0.441	0.437
F	10.847	11.798	7.912
N	41	41	41

Dependent variable: debt flows.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

OLS estimation of debt flows on the sample selected with first-stage Tobit estimation.

Tobit S.E.: standard errors from Tobit estimation in Table 2.7.

Table 2.13: Growth regression with fitted values of debt flows

	(1)	(2)	(3)
Pred. debt	0.012*	0.013*	0.015**
	(1.706)	(1.676)	(2.062)
Investment	0.002	0.002	0.002
	(0.064)	(0.077)	(0.058)
School	0.007	0.007	0.016
	(0.410)	(0.412)	(0.877)
Ln GDP	-0.021*	-0.022	-0.029**
	(-1.759)	(-1.629)	(-2.271)
Population	-0.786	-0.757	-0.628
	(-0.983)	(-0.904)	(-0.807)
Dummy Lam		0.002	
		(0.159)	
Democracy			-0.006*
			(-1.712)
F	1.063	0.861	1.363
N	37	37	37

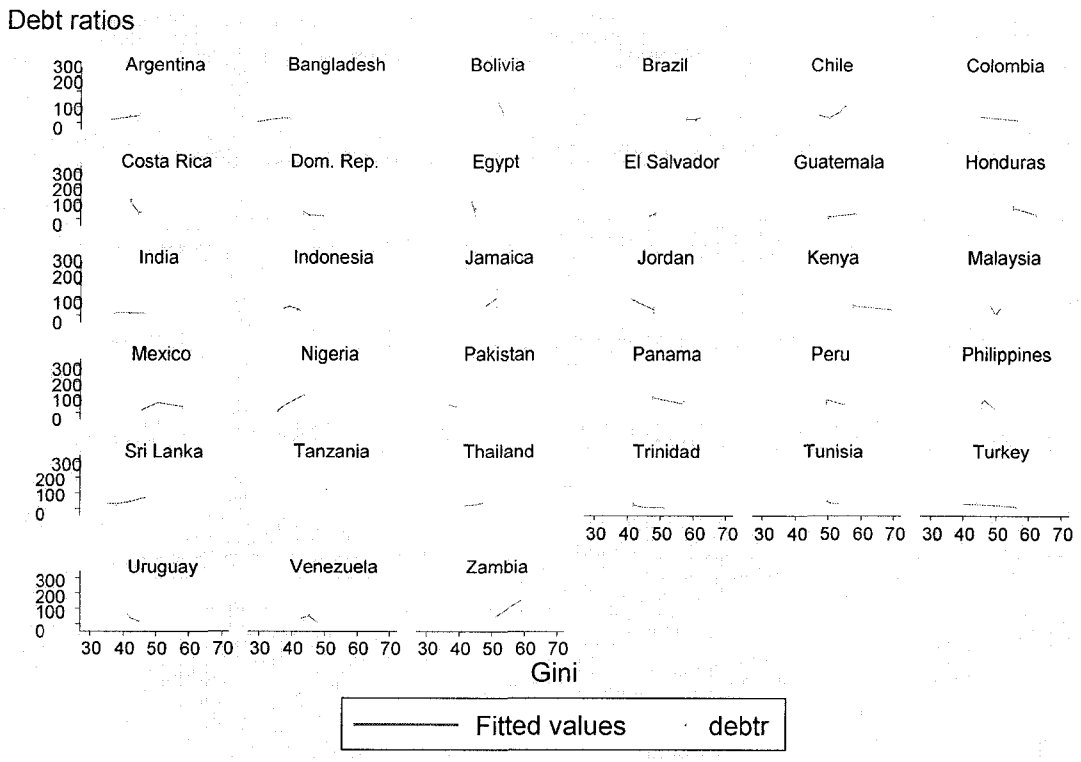
Dependent variable: growth rates.

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses.

2SLS estimation of growth rates on the sample selected with first-stage Tobit estimation in Table 2.7.

Predicted debt flows from regression in Table 2.12.

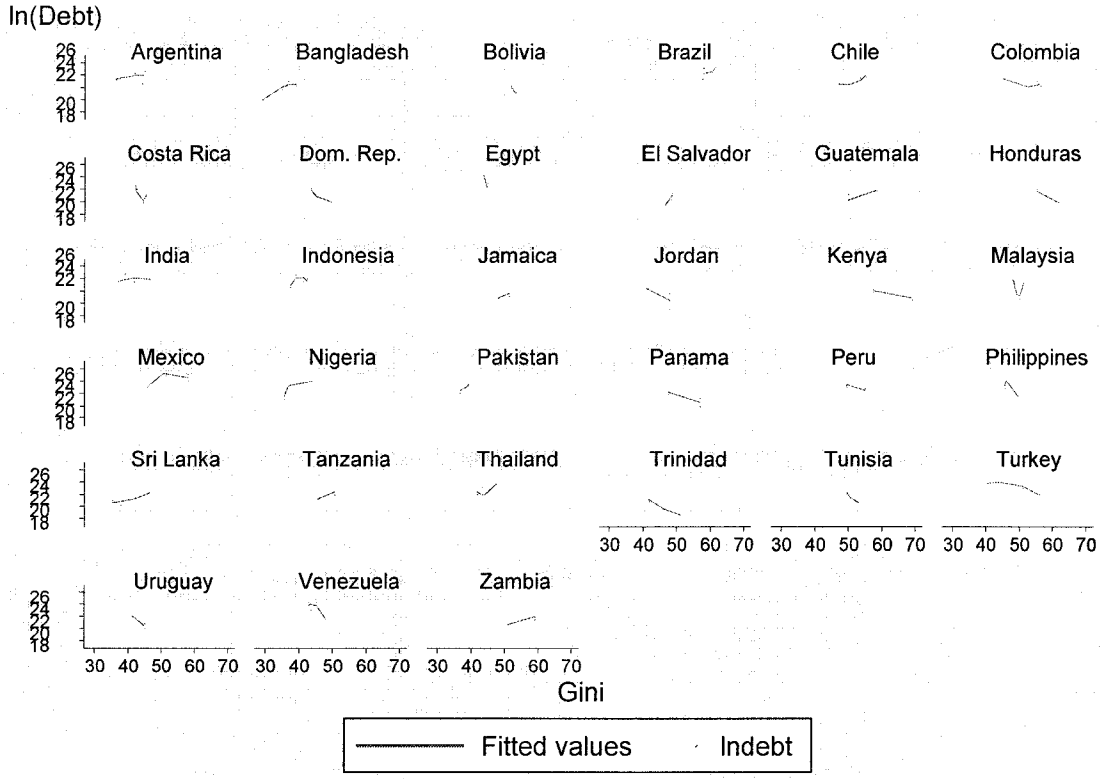
Figure 2.1: Scatter of debt ratios against inequality



Initial sample of 33 countries with and without default history.

Five-year periods that report default episodes: 1980 and 1985 in Argentina, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Honduras, Mexico, Nigeria, Panama, Phillipines, Uruguay, Venezuela and Zambia; 1980 in Egypt; 1985 in Guatemala, Jordan, Tanzania, and Trinidad; 1975, 1980 and 1985 in Jamaica and Peru; and 1975 and 1980 in Turkey.

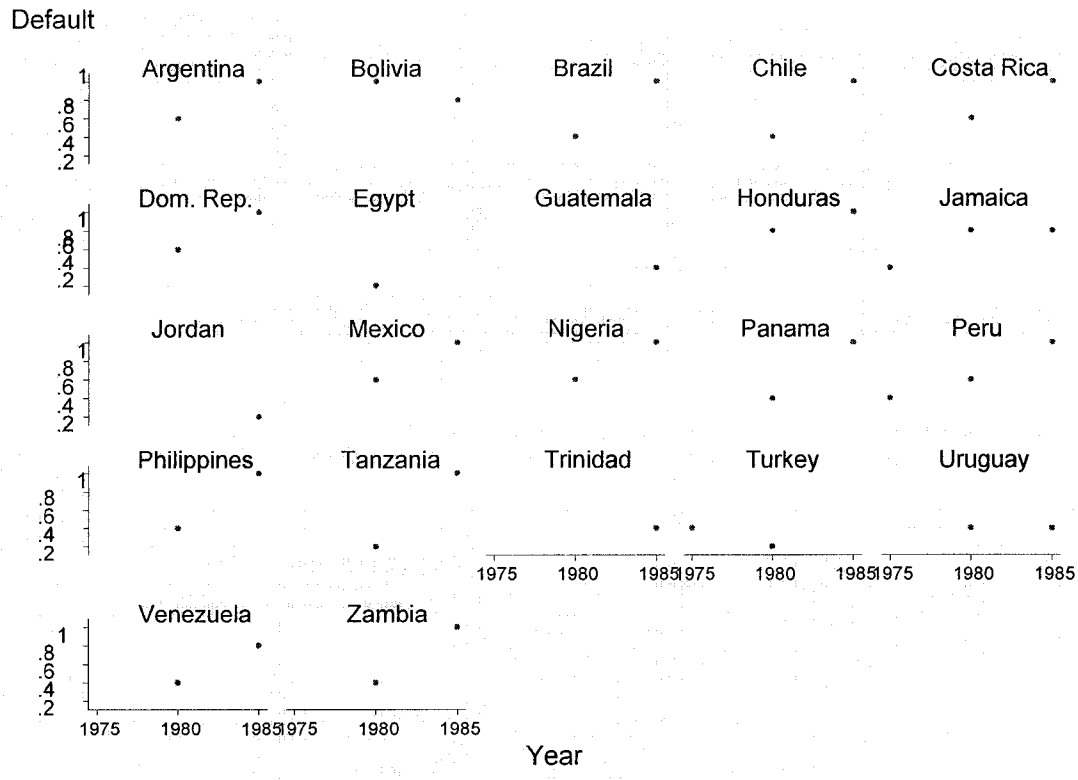
Figure 2.2: Scatter of external debt against inequality



Initial sample of 33 countries.

Five-year periods that report default episodes: 1980 and 1985 in Argentina, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Honduras, Mexico, Nigeria, Panama, Phillipines, Uruguay, Venezuela and Zambia; 1980 in Egypt; 1985 in Guatemala, Jordan, Tanzania, and Trinidad; 1975, 1980 and 1985 in Jamaica and Peru; and 1975 and 1980 in Turkey.

Figure 2.3: Duration of default episodes within five-year periods



Countries included in subsample with default history.

The graphs show 5-year periods in which at least one default episode occurred.

CHAPTER 3

3. INEQUALITY AND DEMOCRACY CONSOLIDATION IN LATIN AMERICA

3.1 Introduction

This chapter addresses the links between democracy[16] and inequality. There is evidence that very equal societies do not democratize in the first place and that very high levels of inequality discourages democratization. Moving away from these two extreme cases, one may consider intermediate levels of inequality at which democracy tends to consolidate. The attempts to find a conclusive answer regarding the empirical relationship between income inequality and democracy have resulted in some tentative answers, raising further questions that need to be investigated.

The main purpose of this chapter is to study the political economy mechanisms that link the potential impact of pronounced inequality to democratization, particularly in Latin America. Intermediate levels of income inequality are expected to lead to consolidated democratic societies. Societies with more equal income distributions tend not to democratize, as threats of a revolution may never be strong enough to induce a political change and lead to democratization. At the other extreme, threats of a coup are more likely with pronounced inequality, leading to nondemocratic sets of institutions. Pronounced inequalities likely discourage democracy consolidation, which has been hard to

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[16] Democracy is "a set of formal and informal institutions that regularize political interaction" (Frieden, 1991, p. 6). In this chapter, I alternatively use the terms democracy and political equality; nondemocracy and political inequality relative to democracy; more democracy and an expansion of political rights or political freedom. The term nondemocracy is preferred to authoritarian regime or dictatorship. Democratization is a significant move towards mass democracy, which is more likely to survive when income inequality is reduced and economic growth is generated.

achieve in many Latin American countries until recently (with such examples as Argentina, Brazil, Chile, Guatemala, Peru and Uruguay). I investigate the existence of a non-monotonic (inverted U-shaped) relationship between inequality and democracy, as we consider different shades of democracy that range from more democratic, consolidated sets of institutions (on the positive segment of the curve) to settings in which democracies fail to consolidate (on the negative segment of the inverted-U curve).

3.1.1 Definitions of democratic transition and consolidation

In attempting to establish how far a country has gone toward completing a transition to democracy, Linz and Stepan (1996) use a standard definition: "A democratic transition is complete when sufficient agreement has been reached about political procedures to produce an elected government, when a government comes to power that is the direct result of a free and popular vote, when this government de facto has the authority to generate new policies, and when the executive, legislative and judicial power generated by the new democracy does not have to share power with other bodies de jure."

Linz and Stepan's (1996) definition of a consolidated democracy follows: "Behaviorally, a democratic regime in a territory is consolidated when no significant national, social, economic, political, or institutional actors spend significant resources attempting to achieve their objectives by creating a nondemocratic regime or turning to violence or foreign intervention to secede from the state. Attitudinally, a democratic regime is consolidated when a strong majority of public opinion holds the belief that democratic procedures and institutions are the most appropriate way

to govern collective life in a society such as theirs and when the support for antisystem alternatives is quite small or more or less isolated from the pro-democratic forces. Constitutionally, a democratic regime is consolidated when governmental and nongovernmental forces alike, throughout the territory of the state, become subjected to, and habituated to, the resolution of conflict within the specific laws, procedures, and institutions sanctioned by the new democratic process."

There is a variety of consolidated democracies, whose quality range from low to high. Consolidated democracies could break down in the future, which would be related to "a new dynamic in which the democratic regime cannot solve a set of problems, a nondemocratic alternative gains significant supporters, and former democratic regime loyalists begin to behave in a constitutionally disloyal or semiloyal manner" (Linz and Stepan (1996)). In traditional political science literature, consolidation refers to a solidification of an institutional framework, in which competing political and economic projects are eliminated. The emergence of a single compromise-consensus project is needed to achieve full democratic consolidation. However, the dynamics of an ongoing democratization process should not be overlooked even when it is claimed that consolidation has been achieved. Viewing democratization as a dynamic process enables assessment of how distinct political and social actors appear and disappear in the process (Gamarra (1994)).

3.1.2 Transition to democracy in Latin America

At least since the 1850s, social scientists have discussed the importance of inequality in determining the nature of political regimes. Extreme inequality has

historically characterized Latin America. By the late 1970s, the region had the most unequal distribution of income in the world, which deepened during the 1980s. The economic recovery in the 1990s did not significantly improve income inequality. The Latin American region oscillated through cycles of democratic rule (in the 1940s and 1950s) and authoritarian rule (1960s and 1970s). Many observers did not expect the return of the democratic rule in the 1980s to last throughout the 1990s, but democratization rapidly accelerated through the 1980s[17]. In countries such as Costa Rica, democracy was introduced with relatively little conflict. In countries such as El Salvador and Nicaragua, democracy was strongly opposed: in the first case the elites finally conceded democracy, while in the latter the elites were swept away by revolutions. In the cases of Argentina, Chile, and Brazil, once created, democracy did not consolidate until late in the twentieth century.

Profound transformations took place in the 1980s and 1990s. Statecentric and populist models of regulation initiated during the 1980s started dismantling in the 1990s. Transition manifested toward both democratic consolidation and neoliberal, market-oriented restructuring (Smith and Gamarra (1994)). In the second half of the 1980s, democratically elected presidents in the region pursued public sector reforms and implemented neoliberal, market-oriented stabilization strategies, such as deregulation, decentralization, privatization, and trade liberalization, in the context of hyperinflation. This first generation of leaders aimed to correct short-term problems by means of stabilization policies and the stat-led development strategy remained in place since the 1940s. These reforms were not as successful as expected,

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[17] Chile and Paraguay were the last two nations to democratize in 1989. A civilian president was elected and the dictator had to leave the government, respectively.

and by the end of the decade, the region faced declining social indicators, bankrupt economies, lagged economic growth, declines in per capita income, and exacerbated social inequality (Gamarra (1994)). In the mid 1980s, stabilization programs were designed to close fiscal and external gaps and manage controllable levels of inflation. The globalization process in the world and shifts in U.S. foreign policy helped the political and economic transformations in the region.

In the early 1990s, some would argue that Latin American democracies had reached minimal levels of consolidation. A second generation of democratically elected leaders continued imposing neoliberal reforms with an authoritarian and exclusionary decision-making style, inserting their nations into the Washington Consensus on economic policy. Attaining relatively constant low rates of inflation and stable key relative prices became the immediate goals of stabilization policies. The leaders crafted short-term ways out to the crisis in the form of political pacts and electoral coalitions, and those who exerted an uncommon capacity to govern successfully transcended the threshold of crisis (Gamarra (1994)). Patronage and the distribution of symbolic rewards such as voting, elections, and freedom of speech, became the pillars for building democracy in Latin America.

Privatization, deregulation, fiscal discipline, public expenditure priorities, tax reform, respect for property rights, foreign direct investment, unified exchange rates, financial liberalization, and trade liberalization were considered the ten key reforms to end the downward spiral in Latin America and elsewhere. In the mid 1990s, Smith and Gamarra (1994) argued that the specific institutional characteristics and the social bases of post-transition democratic regimes in Latin America would vary considerably.

After a decade of democratic rule, democratic institutions seemed to be detached from a "democratic culture". Social exclusion and inequality explain gobernability problems and political instability in the region. The democratic rule has not achieved the goal of significantly reducing social, economic and political inequalities, even in a context of improved economic development indicators (health and education). According to Latinobarometro (2003), the democratic transition in Latin America was an electoral transition with institutional structural changes that lacked articulation. Towards the 2000s, the major component of the third democratization wave in Latin America was free elections, which established structural legal democratic rules. The result is an unconsolidated democracy that lacks the needed structural democratic elements, and where citizens feel excluded.

As a consequence of economic crises, in the beginning of the 2000s higher unemployment rates, fears of being unemployed, difficulties of reinserting into the labor force, falling income, the widening of the income gap between richer and poorer segments of the population, and increasing number of families whose income fell below the poverty line were examples of major failures after a decade of democracy rule. Although the highest, richest segments have consolidated their position on top of the socioeconomic pyramid, extreme poverty had not been reverted.

After 2003, almost all economies in the region have expanded, in a favorable world context. Between 2003 and 2006, Latin America has had the best economic and social performance in the past 25 years, evidenced by advances in reducing poverty and indigence and unemployment, small improvements in income distribution in some countries, and increases in employment levels. Still high

inequality and extreme poverty make Latin America one of the most unequal regions in the world.

Towards the end of the 2000's, the results from the Washington Consensus have not been as expected. Argentina did not achieve the goals after implementing the reforms, while Chile partially implemented the reform and relatively did better. Uruguay rejected privatizations and is the most solid democracy in the region. Mexico and Venezuela underwent financial crises that destabilized the economic and political system. Privatizations benefited economic agents but in general at higher costs and poor service. It appears that, as of 2007, more is expected from the state ("Estado") rather than from the market (Latinobarometro, 2007).

Thirty years after the transition to democracy started, several remarks can be noted regarding democratic consolidation in the region. In the cases of Chile and Venezuela, the opinion that their citizens express about whether their democratic country differs much from how these democracies are perceived from outside. In Chile, regarded as one of the most successful economies in the region, citizens are not very satisfied with the outcome of democracy and there is a feeling that the country should be doing better and that the expectations have not been met. Venezuela is regarded as a democracy that limits its civil liberties and the functioning of political institutions. However, its citizens in general have a positive view of its democracy. Bolivia can be regarded as a special case that still faces many of the problems it did when democratic rule was established in 1982: social exclusion of the indigenous and mestizo, deep-seated poverty, and illegal drug production (Gamarra (2007)). Bolivia undergoes a process of deep transformation, reconstruction and inclusion of ethnic groups. Stability and democratic governance

is currently threatened by the Morales administration and regional governors, who seek a relative degree of independence from the central government, creating tensions, as well as exacerbating political, ethnic, and racial schisms.

3.1.3 Literature review

Earlier empirical studies of the subject mainly focused on the effect of democracy on inequality. A second literature reversed the direction of causality. Here I focus on inequality as the main determinant of democracy in Latin America, and find support for recent theoretical explanations for democracy consolidation and democratization in the region. This is the first empirical study based on the analytical framework elaborated by Acemoglu, Johnson, Robinson, and Jared (2005) to test the presence of a non-monotonic relationship between inequality and democracy for the Latin America region. While non-quantitative literature claims that democracy is not possible in highly unequal societies, previous empirical evidence is mixed. Moreover, there is no consensus in the literature on the relationship between inequality and growth. To motivate the presentation of the topic, I will first discuss recent theoretical and empirical results that focus on other determinants of democracy.

The political science literature on democratization is replete with discussions of the main determinants of democracy. Earlier studies concentrate on the structural characteristics of societies, such as income level and class composition (Lipset (1959), Moore (1966)). Other lines of research focus on political factors (Rustow (1970), Dahl (1971), Linz (1978), O'Donnell and Schmitter (1986), Przeworski (1991), Linz and Stepan (1996)), and the actions of the disenfranchised

poor to explain democratization (Rueschemeyer, Stephens and Stephens (1992), Acemoglu and Robinson (2001)). O'Donnell (1973) highlights social conflicts within Latin American development strategies. Acemoglu and Robinson (1997) emphasize democratization as a commitment to future redistribution while Acemoglu and Robinson (2001) focus on social conflict and redistribution. Numerous studies, which include the works by Sorensen (1993), Vanhanen (1997), Grugel (2002), and Pinkney (2003), exemplify a shift of focus to factors other than economic development, such as income inequality, civil society, political culture, external actors, elite interactions and leadership processes. The effect of economic conditions in theoretical models is not well developed or elaborated, with the focus being placed on increased education and enlarged middle class.

One of the determinants of democracy that has been carefully investigated is economic growth. The traditional focus in political science has been on the association between economic growth and democratization. On economic grounds, empirical democratic theory finds a strong link between both variables, although economic theories of democratization have been unable to successfully predict regime change in Latin America in the past. Such are the cases of Argentina, Uruguay, Chile and Panama in the post-World War II, which were economically advanced and yet had their democracies overturned by dictatorships (after moving between democracy and oligarchy between 1912 and 1983, Argentina became an example of unconsolidated democracy (Acemoglu, Johnson, Robinson, and Jared (2005)).

Economic development[18] is believed to be the principal cause of democratic stability in social science, following Lipset's (1959) hypothesis. The strong positive relationship is one of the most robust empirical findings in the literature. Lipset (1961, 1981) associated economic underdevelopment with unstable democratic government or dictatorship, and classified two thirds of Latin America as stable dictatorships in the 1960s. Since then, almost all of them have progressed economically, except for Nicaragua and Haiti, and democracy has notably expanded throughout the region[19]. A large body of comparative research on democracy (Lipset (1959), Cutright (1963), Dahl (1971)) discusses necessary minimum levels of socioeconomic development[20] to sustain the democratic rule. Latin America was typically found lacking, supporting the conclusion that underdevelopment and stable democracy could not coexist. The cases of Argentina, Chile, and Costa Rica, which experienced breakdowns in democracy after World War II, highlight the argument that a minimum economic development threshold was not a sufficient condition. On the other hand, two relatively economically advanced economies such as Costa Rica and Venezuela have had stable democracies since the 1960s. However, while Costa

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[18] Economic development is measured by the income level or indexes of development, such as telephones per capita and energy consumption per capita. Lipset (1959), Cutright (1963), Jackman (1973), Diamond (1992), Helliwell (1994), and Burkhart and Lewis-Beck (1994), among others, report a positive relationship between economic development and democracy.

[19] Freedom House classifies most Latin American countries as free in 2007. Countries classified as partly free include Bolivia, Paraguay, Colombia, Guatemala, Honduras, Venezuela, Ecuador, Guyana, Haiti, and Nicaragua, while Cuba is classified as not free.

[20] Per capita income of $ 250 (in 1957) and socio-cultural threshold for educational development to reducing illiteracy to below 50% were considered the minimum levels of socioeconomic development at the time.

Rica has maintained a maximum political freedom score of 1 for the last four decades, Venezuela has gone from a freedom level of 2 in the 1970s and the highest level of 1 throughout the 1980s and beginning of the 1990s, to a level of 3 in the 1990s and up to the beginning of the 2000s, while recently being assigned a score of 4 in 2006-2007. Honduras (the poorest economy in Central America) has experienced the deepest democratic transition in the region (Seligson (1990)).

The literature on democracy and growth did not yield strong empirical evidence that dictatorships as a group perform economically better or worse than democracies as a group (Alesina, 2000). Some authoritarian regimes have promoted growth and economic stability, even better than the average democracy. Chile and Peru, respectively under the administrations of Pinochet and Fujimori, are examples of autocracies that expanded economic freedoms and achieved relatively higher growth rates. Przeworski et al. (1996, 2000) argue that there is no impact of economic development on the probability of inauguration of democracy (at least partially refuting Lipset's finding), and that democracies do not break down after surpassing a minimum economic threshold (in the 1960s many poor countries were run by dictators, while in the 2000's many of them converted into democracies). Even relatively poor Latin American countries have electoral democracies today (Huntington (1991), Vanhanen (1997), Peeler (1998), Smith (2005), Booth and Seligson (2006))[21]. Booth and Seligson's (2006) results contradict Lipset's theory for a sample of eight Latin American neighbor countries, showing that less developed

[21] Some analysts argue that the relationship between economic development and democracy has weakened due to the impact of external powers that have supported or imposed electoral democracy in the early 1990s (Schoultz (1987), Grugel (2002)).

countries are more likely to actively engage in politics. Underdevelopment should thus be negatively associated with political participation.

There is also a large body of research investigating the reverse link, i.e., the role of democracy in improving income distribution, the argument being that more democratic and consolidated political and institutional systems lead to a better distribution of income (Li et al. (1998), Rodrik (1998)) or higher growth. However, democracies tend to stimulate as well as retard growth; the net effect of democracy on growth is thus inconclusive on theoretical grounds (Barro, 1997).

In this chapter, the focus is on the link that runs from inequality to democracy. This link between different forms of inequality (income, land holdings) and democracy (equality of participation of citizens, civil liberties) has been mentioned since Aristotle as a major theoretical and policy issue. Many cross-national studies report a negative relationship between income inequality and some measure of democratization (Rubinson and Quinlan (1977), Muller (1988, 1995), Feng and Zak (1999), Muller and Seligson (1987) and Alessina and Perotti (1996)). Barro (1999b) finds some indication that greater income inequality predicts less democracy, for given measures of the standard of living. Bourguignon and Verdier (2000) show that initial inequality negatively affects the likelihood for democracy and democratization for countries that are experiencing a democratic transition. As has been stressed by many researchers, the size of the middle class and the extent of democracy are positively related. Boix (2000) shows the role that inequality plays on the choice and stability of a particular political regime. Democracy is more likely to occur as the distribution of political and economic assets is more equal, and the chances of democracy creation increase as development takes place. In Rubinson and

Quinlan (1977), countries with a low income inequality and a strong middle class are shown to more easily inaugurate a democracy. There seems to be more empirical support for a negative relationship regarding the stability of democracy after its creation. This negative relationship could reflect the country's level of economic development. The lack of extreme inequality should lead to stable democracies, although democracies with relatively low level of development should be unstable (Muller, 1988).

Recent theoretical literature develops a framework to explain a potential non-monotonic relationship between inequality and democracy. Acemoglu and Robinson (2001) and Acemoglu, Johnson, Robinson, and Yared (2005) argue that the relationship between inequality and regime changes is potentially non-monotonic. The inverse U-relationship indicates that democracy is unlikely in very egalitarian (the case of Singapour) or very inegalitarian (the case of South Africa) societies, thus assuming that democratization occurs at some intermediate level of inequality. Democratic consolidation is more likely in more equal societies, i.e., low levels of inequality are needed for the consolidation of a democratic system. Among the countries that democratize, highly unequal societies are less likely to consolidate democracy and more likely to oscillate between regimes or tend to a nondemocratic repressive regime. Inequality is a crucial determinant of frequent regime changes (political instability), that encourages the rich to contest power in democracies and to initiate social unrest in nondemocratic societies.

The main argument for studying a nonmonotonic relationship is that (for instance, as in Western Europe) the elite extend the democracy only when the poor threaten to expropriate the elite through a revolution. The elite stands to lose from

democracy as the extension of the franchise results in the poor having a voice in the making of economic policy and thereby redistributing income from the elite to themselves. Whether the elite chooses democracy depends on how much they lose from redistribution as opposed to a revolution and the chances of a revolution.

In societies with equal distributions of wealth and income, the poor do not have much to gain from revolution (which is disruptive and costly in economic terms), nor do they expect to gain much from the redistribution that democracy can bring. Thus, they do not pose a revolutionary threat and the elite do not extend the franchise for long periods of time (as in South Korea and Taiwan). In societies with very unequal distributions of income, democracy is very costly to the elite as the redistribution that will follow threatens to be large. In this case, the elite will postpone the introduction of democracy for long periods of time. It is in the middle case where democracy is not very costly to the elite but promises some welcome income redistribution to the poor that a democracy is more likely to be introduced and remain consolidated.

My investigation relates to political economy models where political rights are influenced by unequal distributions of income and complements the empirical political economy literature on the creation and consolidation of democratic systems. I test the hypothesis that a nonmonotonic (inverted U-shaped) relationship between inequality and democracy exists and that the consolidation of democracy is unlikely in very inegalitarian Latin American societies. Lower levels of inequality may enable a non-democratic regime to protect itself without undergoing democratization. Latin American economies included in the sample have current Gini coefficients between 44.00 and 64.00 on average.

The hypothesis that pronounced levels of inequality harm democratic consolidation in a sample of 15 Latin American countries is tested using fixed effects and general method of moments (GMM) estimation techniques. The results support the hypothesis of nonmonotonicity under both methods. However, by introducing fixed effects I find that inequality and its squared term lack significance when population and education are added individually. In a specification that includes Barro's covariates in addition to inequality (population, education, urbanization and per capita income), the inequality coefficients are significant at 10% level using fixed effects. Recent experiences in Bolivia and Venezuela deserve further attention, as pronounced levels of inequality threatens democracy consolidation. In what follows I present the framework for the proposed study, data and correlations, empirical results, and conclusions.

3.2 Estimation Methodology

I test the hypothesis that increases in income inequality above a threshold level lead to unconsolidated democratic regimes. I estimate a model that accounts for political and economic differences among countries, frequently omitted in pooled OLS estimation. Country-specific factors that characterize each country affect democratic consolidation.

Consider the regression model:

$$democ_{it} = \beta democ_{i,t-T} + \gamma ineq_{i,t-T} + \varsigma ineq^2_{i,t-T} + x'_{i,t-T}\delta + \xi_i + \mu_t + \varepsilon_{it} \quad (3.1)$$

where $i = 1,..,15$ denotes 15 countries; $t = 1970-1999$ is the 30-year period computed in every 5 years; T is a 5-year lag; $democ_{it}$ is the democracy score and

$democ_{i,t-T}$ denotes lagged democracy to capture persistence; $ineq_{i,t-T}$ is the measure of lagged income inequality and its squared term $ineq^2_{i,t-T}$ is included to explore possible nonlinear effects of income distribution; $x_{i,t-T}$ is the set of all potential covariates (lagged) that includes per capita real income as an indicator of economic development; ξ_i denotes a set of country dummies to capture time-invariant country characteristics; μ_t denotes a set of time effects; and ε_{it} is an error term where $\varepsilon_{it} \sim (0, \sigma_i^2 I)$ and $E[\varepsilon_{it}] = 0$. The parameter of interest ς is expected to capture the negative effect of inequality on democracy as argued above: I expect $\gamma > 0$ and $\varsigma < 0$, while $\beta > 0$ as it captures persistence in current democracy level.

Pooled OLS estimation omits country fixed effects ε_i. As long as (3.1) is the true model and fixed effects estimators ε_i are correlated with $x_{i,t-T}$ or $ineq_{i,t-T}$ or $ineq^2_{i,t-T}$, pooled OLS estimates are biased and inconsistent: $Cov(x^j_{i,t-T}, \xi_i + \varepsilon_{it}) \neq 0$ or $Cov(ineq_{i,t-T}, \xi_i + \varepsilon_{it}) \neq 0$ or $Cov(ineq^2_{i,t-T}, \xi_i + \varepsilon_{it}) \neq 0$, where $x^j_{i,t-T}$ is the jth component of $x_{i,t-T}$. Fixed effects estimation is superior relative to pooled OLS; however, $democ_{i,t-T}$ is correlated with ε_{is}, for $s < t$, yielding fixed effects estimators that are not consistent. In order to remove sources of inconsistency such as the endogeneity of explanatory variables and omitted variable bias due to incorrect treatment of fixed effects, I explore Arellano and Bond's (1991) GMM estimator, which gains efficiency when all moment conditions are valid. The method assumes that unobserved country effects are not correlated with changes in the error term: $E(\xi_i \Delta\varepsilon_{it}) = 0$. Lagged differences of the corresponding variables constitute the

instruments used in the levels equations. The additional assumption that $E(\xi_i \Delta democ_{i,t-5}) = 0$, i.e., that first differences of the dependent variable are not correlated with the country-specific effect, is required. Another condition is that $E(x_{i,t}\varepsilon_{i,s}) \neq 0$ for $s \leq t$, so contemporaneous correlations between the current shock $\varepsilon_{i,t}$ and $x_{i,t}$ are allowed, as well as feedbacks from past shocks $\mu_{i,t-s}$ onto the current value of $x_{i,t}$. And $E(\xi_i \Delta x_{i,t}) = 0$, assuming first differences of $x_{i,t}$ are uncorrelated with the individual-specific effects. I instrument for income inequality using a double lag and include year dummies.

3.3 Data

3.3.1 Description and sources

Democracy is the variable that identifies the political regime as being more or less democratic. The main explanatory variable is a measure of income distribution to represent income inequality, along with its square to account for a possible nonmonotonic relationship between inequality and democracy. The set of covariates is used in the standard literature on democracy (Barro (1999), and Acemoglu, Johnson, Robinson, and Yared (2004, 2005)) and are added to check for robustness of the baseline specification. The composition of wealth, measured by land Gini coefficients, and ethnic and religious diversity turn out to be not significant, while life expectancy is significant (not shown). Per capita income is associated to Lipset's claim that countries should become more democratic as they become richer. The influence of the urbanization ratio has been often considered in the political science literature. Population is added to proxy for country size. There is a wisdom that high

levels of education are a prerequisite of democracy, as it leads to greater prosperity and thus, causes political development (Lipset (1959), Barro (1999), Przeworski, Alvarez, Cheibub and Limongi (2000)).

All variables that influence democracy are computed every five years, starting in or around 1970, based on data availability. Averaging 5-year data would introduce serial correlation. Thus, observations at or around the beginning of each 5-year period are considered. Growth rates of income, per capita income, and measures of political instability have been provided by Barro and Lee. The data on urban ratio and population have been obtained from the World Bank, and land Gini indicators around 1960 have been obtained from Taylor and Hudson (complemented with Deininger and Olinto). Measures of ethnic and religious fractionalization have been obtained from Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003), indicating the probability that two randomly selected individuals from a population belong to different groups. The rest of the data is provided by the Barro and Lee dataset for a sample of 17 Latin American countries (indicators of schooling and life expectancy).

Gastil's index of political rights provided by Freedom House classifies political rights and civil liberties according to a scale from 1 to 7, where 1 indicates the highest level of political rights. The scores are transformed here on a scale from 0 to 1, where the most democratic set of institutions is assigned a score of 1 and the least democratic is assigned a 0. The scores to measure civil liberties are also normalized to lie between 0 and 1, in order to allow for comparisons. Gini coefficients and the share of the third quintal to proxy for middle class are computed

from around 1965 to around 1990[22] from the Deininger and Squire (1996) dataset, complemented with inequality coefficients provided by the UNDP statistical compendium (2004) for 1995 and 2000. Other considerations remarked upon in chapter 2 about Gini coefficients and the share of the median quintile of population in national income apply to this chapter as well.

3.3.2 Summary statistics and correlations

Tables 3.1, 3.2 and 3.3 show the summary statistics for democracy, civil liberties, and correlations between democracy and other variables in the analysis. Costa Rica has the highest level of political rights (Table 3.1, a maximum score of 1.00 on a scale 0-1), followed by Venezuela (0.86) and Dominican Republic (0.74). The average for Latin America is 0.65 in the period 1965-2000. Panama has the lowest average (0.43), followed by Peru and Honduras, with scores of 0.50 and 0.52 respectively. Mexico and Chile have the same average score (0.55), while Colombia, El Salvador and Uruguay present an average of 0.71 throughout the period. In Table 3.2, Costa Rica shows the highest level of civil liberties (0.95), while Guatemala presents the lowest (0.48). El Salvador and Mexico (0.57) and Panama and Peru (0.55) have the same scores, on average for the period 1970-2000.

Figure 3.5 shows a U-shaped relationship for the change in democracy against the change in inequality between 1970 and 2000. These correlations have been derived while keeping other variables such as institutional characteristics,

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[22] As the income-based coefficients are typically more concentrated, those based on expenditure are added a constant equal to 6.6 to make both comparable. 6.6 is the mean (average) difference between income and expenditure-based Gini coefficients suggested by Deininger and Squire (1996).

historical factors, education, population growth and per capita income constant. Figure 3.6 shows that, on average, higher levels of income inequality would tend to be associated to higher levels of democracy in 2000, keeping variables such as population growth, education and per capita income constant. At the end of the period (2000), all the countries in the region were predicted to be located in the negative portion of the fitted curve (Figure 3.6). Uruguay and Costa Rica, with the lowest level of inequality in the sample, had the highest level of political rights while the rest of the economies tended to have higher levels of inequality associated to lower levels of democracy.

Regarding civil liberties, the inequality threshold of 57.91 indicates that only Brazil would be predicted to experience an increase in civil liberties as inequality increases (Figure 3.7). Figure 3.3 shows an increase in civil liberties from 1995 to 2000 in Brazil, while other economies that were moving towards greater civil liberties in 2000 include Argentina, Bolivia, Dominican Republic, Guatemala, Mexico, Panama, Peru and Uruguay. According to Freedom House, none of the countries in the sample experienced a worsening of their civil liberties in 2005 relative to 2000. However, democracy levels fell in Argentina, Bolivia, Guatemala and Venezuela in 2005. Argentina, Bolivia and Guatemala had been moving towards higher levels of political rights from 1995 to 2000 (Figure 3.1). Brazil, Chile, Colombia and Peru improved their political rights between 2000 and 2005, while Dominican Republic, El Salvador, Honduras, Mexico and Peru maintained their scores in the same period. In 2007, Guatemala has been assigned a higher score of democratic set of institutions (3 vs. 4 in 2005). None of the other democracies and

civil liberties scores have changed for the rest of the countries between 2005 and 2007.

3.4 Empirical Results and Discussion

The baseline specification in Table 3.4 reports parameter estimates for democracy (index of political rights), which is regressed on lagged inequality and its square. The three regressions include year dummies, and all standard errors are robust to heteroskedasticity in the variance-covariance matrix. Clustering at the country level corrects the standard errors for potential correlation across observations over time and within the same time periods. Column 1 presents the estimated coefficients obtained with pooled OLS, the standard procedure in the literature. Lagged democracy is highly significant and persistent. As fixed effects are introduced (column 2), the findings suggest the presence of an inverted-U relationship, although inequality and its squared term do not appear to have a significant effect on democracy. GMM estimation (column 3) seems to reveal the nonmonotonic relationship as hypothesized, where both inequality and its square are statistically significant at any conventional level. In Table 3.5, I control for population (columns 1 and 2) and education (columns 3 and 4). Both inequality terms suggest the presence of a nonmonotonic relationship. None of these covariates is significant at the standard levels.

Table 3.6 adds other determinants that influence the extent of democracy identified in the literature, particularly those discussed by Barro (1999): population, education, urbanization, and per capita income. The signs of inequality and its squared term do not change with the addition of these other determinants of

democracy. Inequality is no longer significant under GMM estimation, but it is significant at 10% level under fixed effects estimation. None of the covariates is significant at the standard levels. Other factors such as land inequality do not appear to be significant (not shown).

It appears that Lipset's modernization theory is confirmed under GMM estimation (column 2), i.e., richer economies tend to be more democratic. However, this hypothesis is rejected under fixed effects estimation. This finding agrees with recent results reported by Acemoglu, Johnson, Robinson and Yared (2005), who find that the positive relationship between per capita income and democracy disappears once country effects are introduced. Lipset's theory that education leads to democratization is rejected when using fixed effects estimation, in agreement with the findings by Acemoglu, Johnson, Robinson and Yared (2004). The same result is achieved by using GMM estimation.

From Table 3.6 (column 1) with all covariates and under fixed effects estimation, the intermediate value of inequality is 51.75 for the complete sample. For values of Gini coefficient below 51.75, there seems to be a positive relationship between inequality and democracy, while for values above the threshold the relationship turns out to be negative. These results suggest that, by using fixed effects estimation, we get values of Gini coefficients that are closer to those included in the analysis, which range from 44 to 64 on average.

3.5 Concluding Remarks

Historically, Latin America has been characterized by a significant inequality in income distribution, which was continued throughout the 1990s and even

worsened in the 2000s. However, some improvements seem to have been made since the mid 2000s in some countries in the region. Extreme poverty and indigence still make Latin America one of the most unequal regions in the world.

Thirty years after the transition to democracy started, in Chile and Venezuela the opinion that their citizens express about whether their democratic country differs much from how these democracies are perceived from outside. In Chile, regarded as one of the most successful economies in the region, citizens are not very satisfied with the outcome of democracy and there is a feeling that the country should be doing better and that the expectations have not been met. Venezuela is regarded as a democracy that limits its civil liberties and the functioning of political institutions. However, in general its citizens have a positive view of its democracy. Bolivia can be regarded as a special case that still faces many of the problems it did when democratic rule was established in 1982: social exclusion of the indigenous and mestizo, deep-seated poverty, and illegal drug production. Bolivia undergoes a process of deep transformation, reconstruction and inclusion of ethnic groups. Stability and democratic governance is currently threatened by the Morales administration and regional governors, who seek a relative degree of independence from the central government, creating tensions, as well as exacerbating political, ethnic, and racial schisms.

The hypothesis that pronounced levels of inequality harm democratic consolidation in a sample of 15 Latin American countries is tested using fixed effects and general method of moments (GMM) estimation. The results suggest that the nonmonotonic relationship between inequality and democracy is revealed in all specifications under fixed effects OLS and GMM estimation methodologies (the only

exception is pooled OLS). The signs of Gini and Gini squared do not change after covariates such as population, education, urbanization and per capita income are added to the baseline specification. Lipset's modernization theory is rejected as we introduce country effects.

Table 3.1: Democracy: statistics

Country	Mean	SD	Min	Max
Argentina	0.690	0.363	0.170	1.000
Bolivia	0.570	0.394	0.000	1.000
Brazil	0.619	0.185	0.330	0.830
Chile	0.547	0.414	0.000	1.000
Colombia	0.713	0.157	0.500	0.830
Costa Rica	1.000	0.000	1.000	1.000
Dom. Rep.	0.737	0.188	0.500	1.000
El Salvador	0.713	0.185	0.330	0.830
Guatemala	0.549	0.208	0.170	0.830
Honduras	0.524	0.324	0.000	0.830
Mexico	0.547	0.159	0.330	0.830
Panama	0.429	0.394	0.000	1.000
Peru	0.500	0.333	0.000	0.830
Uruguay	0.713	0.285	0.330	1.000
Venezuela	0.857	0.149	0.670	1.000
Total	0.647	0.294	0.000	1.000

Table 3.2: Civil liberties: statistics

Country	Mean	SD	Min	Max
Argentina	0.643	0.178	0.330	0.830
Bolivia	0.524	0.153	0.330	0.670
Brazil	0.571	0.190	0.330	0.830
Chile	0.616	0.267	0.330	0.830
Colombia	0.620	0.126	0.500	0.830
Costa Rica	0.951	0.083	0.830	1.000
Dom. Rep.	0.739	0.086	0.670	0.830
El Salvador	0.573	0.134	0.330	0.670
Guatemala	0.477	0.179	0.170	0.670
Honduras	0.670	0.000	0.670	0.670
Mexico	0.573	0.091	0.500	0.670
Panama	0.549	0.282	0.170	0.830
Peru	0.549	0.129	0.330	0.670
Uruguay	0.664	0.273	0.330	1.000
Venezuela	0.713	0.185	0.330	0.830
Total	0.629	0.196	0.170	1.000

Table 3.3: Correlation matrix

	Dem	Gini	GDP	Growth	Urban	Ln(pop)	Ethn	Relig	Land	School
Democ	1.000									
Gini	-0.387	1.000								
GDP	0.146	-0.367	1.000							
Growth	-0.059	0.241	-0.354	1.000						
Urban	0.083	-0.373	0.732	-0.270	1.000					
Ln(pop)	-0.076	0.329	0.301	0.036	0.454	1.000				
Ethnic	-0.112	0.446	-0.019	0.018	0.029	0.431	1.000			
Religion	-0.271	0.394	-0.222	0.228	-0.134	0.187	-0.077	1.000		
Land	0.192	-0.155	0.193	-0.321	0.272	-0.032	0.047	0.033	1.000	
School	0.207	-0.337	0.231	-0.300	0.586	-0.047	0.195	-0.193	0.240	1.000

Table 3.4: Baseline specification for inequality and democracy

	Pooled OLS	Fixed Effects OLS	GMM
	(1)	(2)	(3)
Democ t-5	0.385***	0.127	
	(3.337)	(1.011)	
Gini	-0.036	0.105	0.040***
	(-0.370)	(0.875)	(4.482)
Gini sq.	0.000	-0.001	-0.001***
	(0.347)	(-0.815)	(-3.041)
N	75	75	60
R-squared	0.289	0.356	
Sargan			0.000

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses. All regressors have been lagged 5 years.

Dependent variable: democracy scores (Freedom House).

Table 3.5: Baseline specification with population and education

	Fixed Effects OLS (1)	GMM (2)	Fixed Effects OLS (3)	GMM (4)
Democ t-5	0.145		-0.020	
	(1.076)		(-0.166)	
Gini	0.136	0.033*	0.182	0.055***
	(1.376)	(1.826)	(1.435)	(4.356)
Gini sq.	-0.001	-0.000**	-0.002	-0.001***
	(-1.274)	(-2.113)	(-1.362)	(-3.447)
Population	-0.899	0.011		
	(-1.288)	(0.397)		
Schooling			0.099	-0.148
			(0.245)	(-1.131)
N	74	60	60	45
R-squared	0.37		0.473	
sargan		0.000		0.000

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses. All regressors have been lagged 5 years.

Dependent variable: democracy scores (Freedom House).

Table 3.6: Baseline specification with additional covariates

	Fixed Effects OLS (1)	GMM (2)
Democ t-5	-0.009	
	(-0.067)	
Gini	0.207*	0.038
	(1.803)	(0.868)
Gini sq.	-0.002*	-0.001
	(-1.718)	(-1.060)
Population	-0.961	0.004
	(-0.904)	(0.063)
Schooling	-0.073	-0.193
	(-0.178)	(-1.114)
Urban	2.298	0.178
	(1.213)	(0.288)
Pcap income	-0.369	0.031
	(-0.941)	(0.156)
N	59	45
R-squared	0.464	
sargan		0.000

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level; t-statistics in parentheses. All regressors have been lagged 5 years.

Dependent variable: democracy scores (Freedom House).

Figure 3.1: Evolution of democracy scores by year

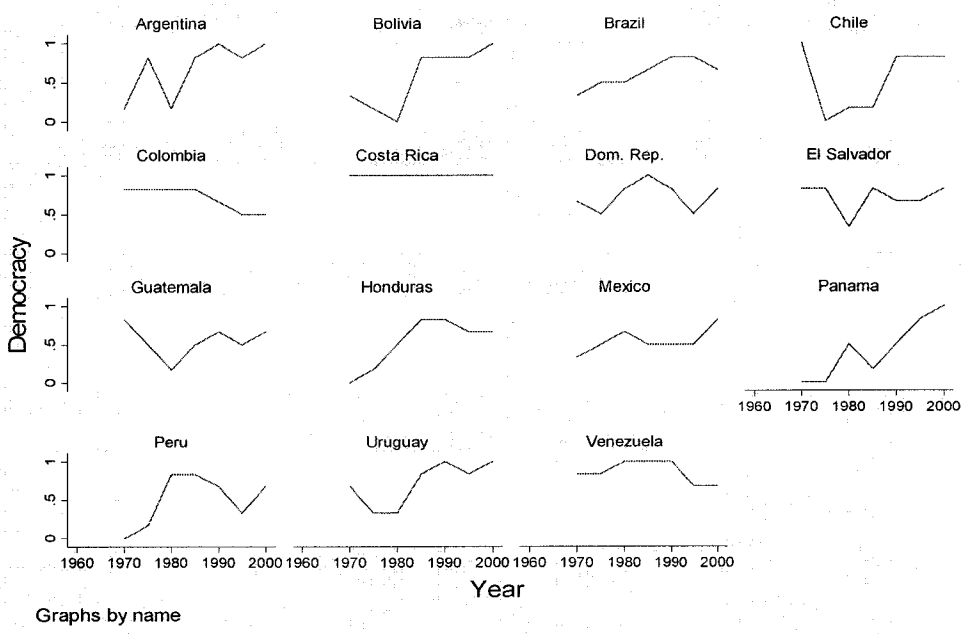


Figure 3.2: Predicted democracy scores against Gini coefficients

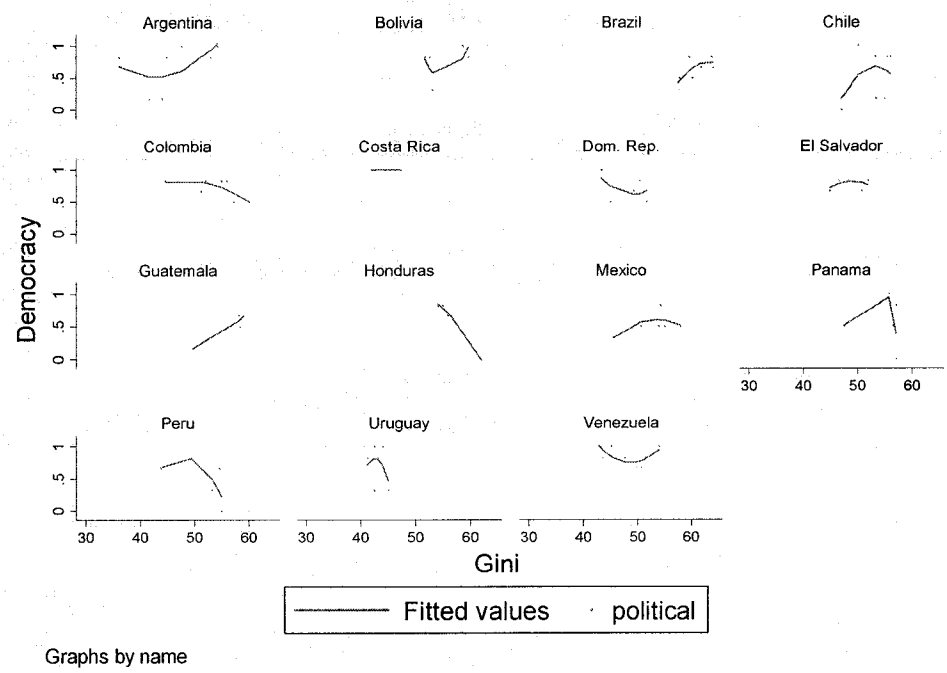


Figure 3.3: Evolution of civil liberties by year

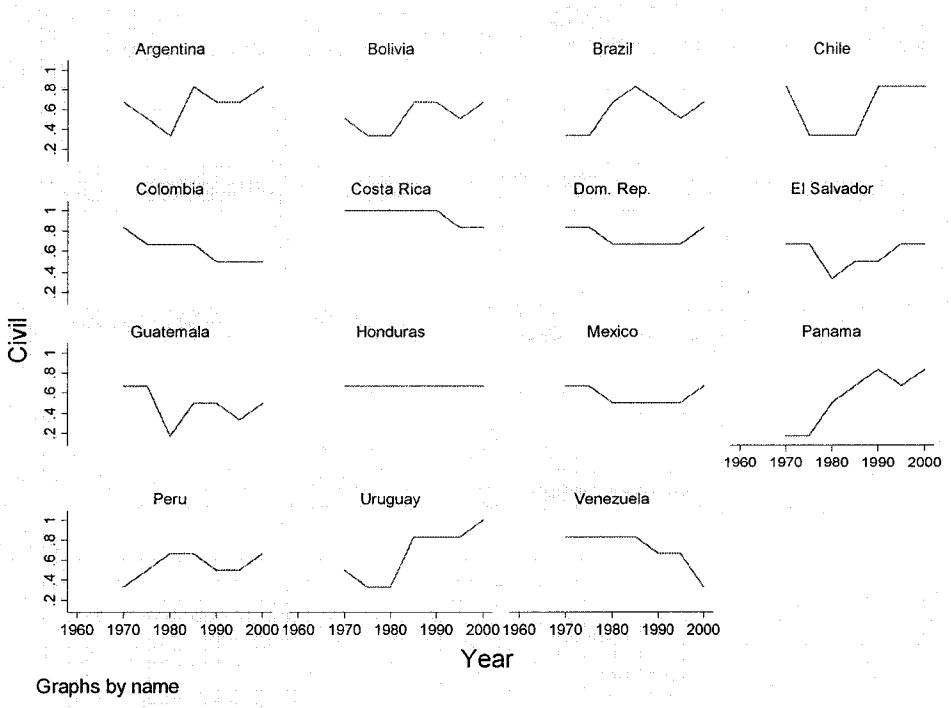


Figure 3.4: Predicted civil liberties against Gini coefficients

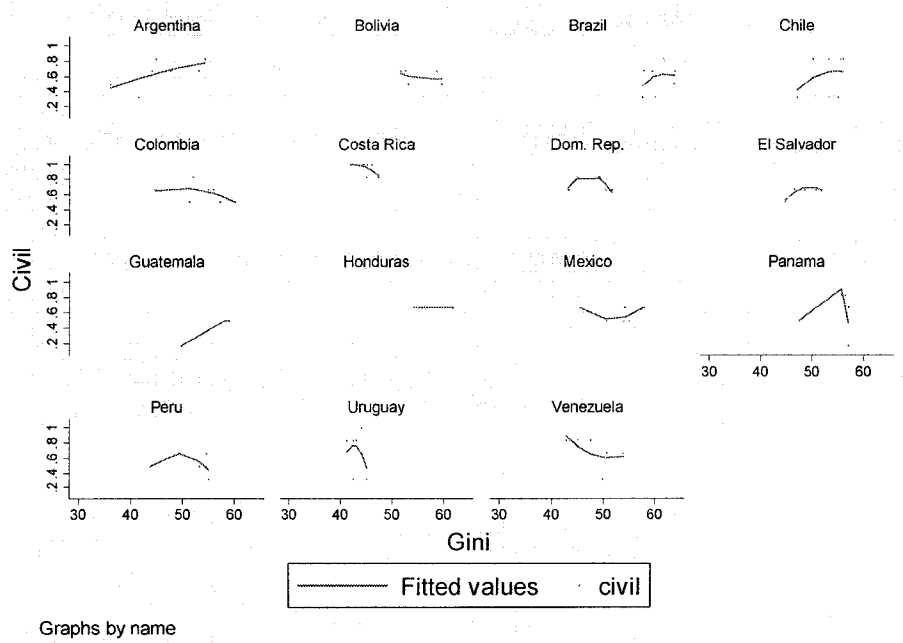


Figure 3.5: Change in democracy (1970-2000)

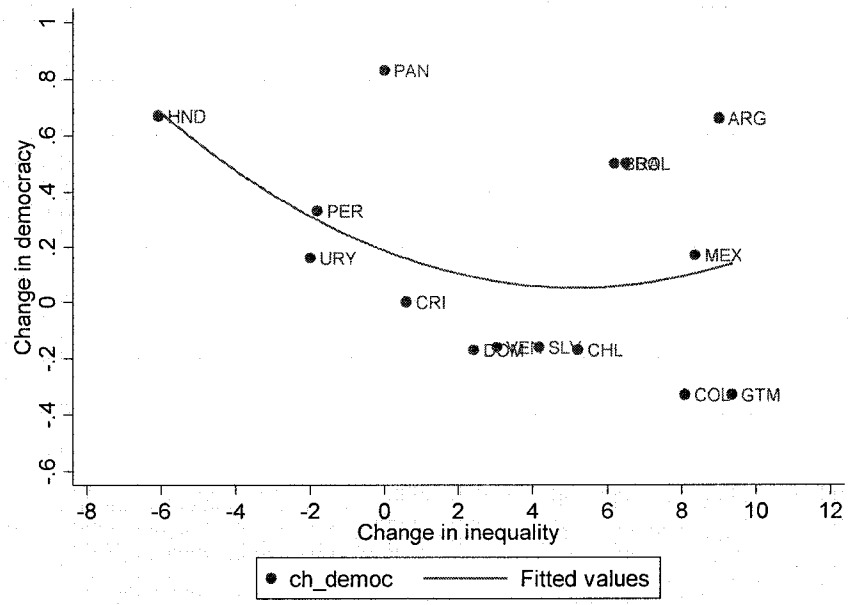


Figure 3.6: Predicted democracy against inequality in 2000

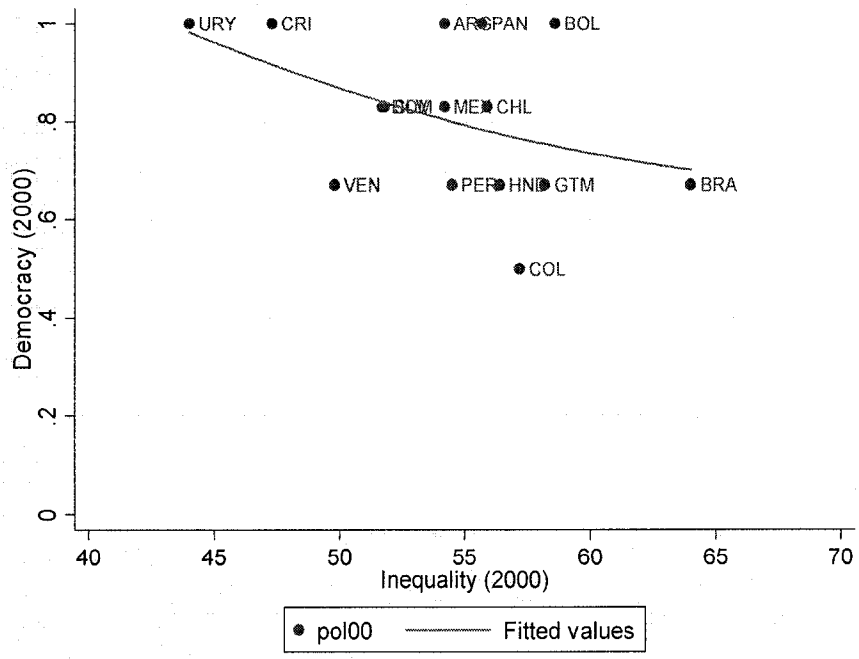
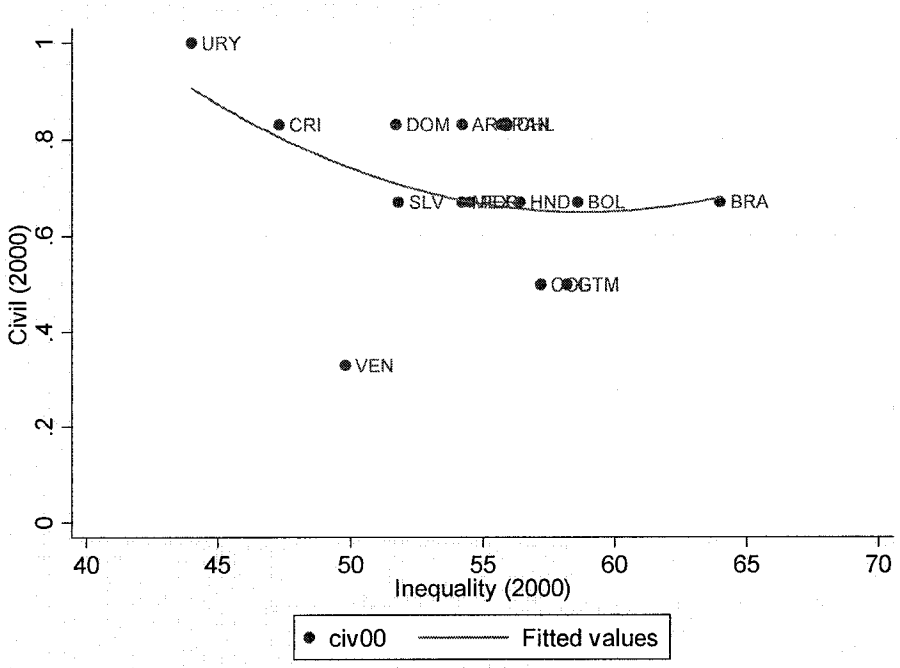


Figure 3.7: Predicted civil liberties against inequality in 2000



CHAPTER 4

4. EMPIRICAL ANALYSIS OF INCOME AND SAVING IN LATIN AMERICA

4.1 Introduction

This chapter empirically explores the correlation between saving and real per capita income across Latin America. Among all the potential saving determinants, income is the most important driving force behind consumption and saving and seems to explain persistent country differences in saving. Saving theories agree on this fact; however, the justifications differ. Similar income levels across countries do not preclude similar saving levels though. Models cannot explain why savings rates in Latin America are much lower than those in many Asian economies, for example.

Latin American nations virtually stopped growing for almost a decade as a consequence of the debt crisis. They recovered and restarted growing in the early 1990s after successful market-oriented reforms. Edwards (1996) argues that low Latin American savings are due to the magnitudes of their determinants rather than to structural differences. The hypothesis tested in this study is that the relationship between per capita income and saving is nonlinear, i.e. saving levels first tend to increase and then level off and fall as per capita income rises. In contrast with previous studies, I analyze a sample of Latin American developing economies within a dynamic econometric setting. This chapter extends and complements the work by Loayza, Schmidt-Hebbel, and Serven (2000), who use panel instrumental-variables techniques and focus on a worldwide sample of countries as well as on subsamples of industrial and developing countries. A reduced-form saving equation is instrumented with policy and nonpolicy

determinants of private saving, which have been selected among standard relevant saving factors and identified in consumption and saving theory. Initially, the literature emphasized fiscal policy and other quantifiable factors, such as the role of demographic conditions, economic growth, and financial depth, while the role of other institutional and structural determinants has been discussed later on. The expected signs of the estimated coefficients are not consistent across previous studies and some turn out to be ambiguous (income growth, M2, urban dependency ratio, and interest rate).

The motivation for this research is to contribute to the literature on saving behavior and development extending the analysis of saving as related to income, while controlling for relevant saving determinants and focusing on per capita income as the main variable in a dynamic setting. The analysis differs from that in the existing literature in the following aspects. First, several works have studied saving behavior at a world and regional level. Here, the focus is on a sample of Latin American economies, which includes countries that have undergone saving transitions (Belize, Chile, Costa Rica, Panama, and Paraguay) as defined by Rodrik (2000), i.e., sustained saving increases by more than five percentage points of national income for a four-year period. Second, earlier research has exposed a positive correlation between saving and income under different types of settings (large cross-national or panel data sets), estimation techniques, sample of countries, and time periods. However, none of them exploits both the time-series and cross-sectional dimensions of the data while allowing for dynamic comparisons, except for Loayza, Schmidt-Hebbel and Serven (2000). Their study analyzes a linear relationship. This chapter explores nonlinearities at higher levels of income, being

the first time that a study tests a complete set of relevant saving determinants (policy and non policy variables such as public saving, terms of trade, demographic and financial variables) while investigating the nonlinear relationship between income and saving. Third, this study tests empirical regularities for the Latin America region by using dynamic panel data estimation, which is superior to OLS, fixed effects OLS, and instrumental variables estimation methodologies. Fourth, this study takes advantage of the largest cross-section, time-series dataset on saving assembled by the World Bank, which provides standardized data that lets researchers overcome data problems that have been present in previous analysis.

The literature has generally placed the focus on the response of saving rates rather than saving levels. Theoretical considerations partially support the hypothesis of a positive response of saving rates due to increases in the income level. Friedman's and Modigliani's theories[23] contradicted Keynes' notion that saving rates rise with income, based on the downward trend of US saving rates (Maddison, 1992). According to Friedman's (1957) permanent income hypothesis (permanent income net of taxes), increases in net permanent income do not affect a representative consumer's saving rate (consumption level increases proportionally). On the other hand, Modigliani and Brumberg's (1954) life-cycle hypothesis (permanent income net of taxes over the life-cycle) argued that Keynes' hypothesis that individual saving rates are expected to rise with the level of income does not agree with

[23] According to the permanent income hypothesis, people tend to smooth out consumption over their lifetime. The life-cycle hypothesis indicates that aggregate saving is determined by the aggregation over individuals at different stages of the life cycle. Individuals borrow and save to smooth their consumption over time on the basis of their anticipated lifetime income.

empirical facts. Earlier, Kuznets (1942) had disagreed with Keynes' paradox on the basis that the long-term saving ratio had not increased over time in the US.

Many empirical studies of saving have found that saving rates tend to rise with per capita income, typically analyzing a linear relationship between per capita income and the saving rate. Among the cross-country data studies, Collins (1991), Carroll and Weil (1994), and Schmidt-Hebbel and Serven (2000) are good examples. Among studies with panel data sets, Schmidt-Hebbel, Webb and Corsetti (1992), Edwards (1996), Masson, Bayoumi and Samiei (1998) and Loayza, Schmidt-Hebbel and Serven (2000) confirm the positive correlation. However, among the few cross-country studies of saving that suggest a nonlinear relationship where saving ratios appear to level off at high levels of per capita income, we can mention Sahota (1993) and Mason, Bayoumi, and Samiei (1995). The initial positive association appears to become negative after a high income level is reached, predicting that the effect is likely to be smaller in industrial economies.

Rebelo (1991) and Sarel (1996) present models where the saving rate need not increase in the transition from middle-income to high-income levels. Ogaki, Ostry, and Reinhart (1996) find that the association between the level of income and the saving rate appears to be nonlinear for a sample of developing countries, i.e., that saving rates should increase with the level of wealth at the initial stages of development, the largest increases occurring as a country moves from low-income to middle-income levels. The nonlinear relationship between the intertemporal elasticity of substitution of consumption and the level of development implies that the interest rate elasticity of saving will be close to zero in low-income countries and only slightly higher in high-income than in middle-income countries. Empirical

evidence on saving rates in low-income countries reveals that saving rates are generally very low and increase as income rises marginally above subsistence.

Carroll and Kimball (1996) show that, as long as there is uncertainty about labor and capital income, saving is nonlinear for commonly used utility functions. Relatively low private savings rates and subsistence consumption in low-income developing countries support this result, as the share of subsistence consumption over total expenditure declines with income. Sachs (2002) develops a model in which the net saving rate falls to zero as income drops below a minimum subsistence level, to show that in a poverty trap, nonlinearities in saving, investment, and production can lead some low-income countries to remain stuck at low or even falling levels of per capita GNP despite forces of economic convergence. This finding supports the empirical evidence that saving rates are generally very low in low income countries and higher as income rises, presumably as the margin of income rises above subsistence. Low income countries seem to be condemned to low saving rates and permanent economic stagnation.

To test the nonlinear hypothesis between per capita income and saving, I explore different estimation methods to deal with the potential bias introduced by including lagged saving as a regressor. I explore a reduced-form nonlinear specification for saving levels. First, I start by controlling for country-specific effects to deal with sources of potential bias. I then explore an instrumental variable (IV) estimation method proposed by Anderson and Hsiao that removes specific country-effects by time differencing. Lagging the dynamic panel one period removes fixed effects. Finally, the use of estimation methods that fail to remove sources of inconsistency such as the endogeneity of explanatory variables and omitted variable

bias due to incorrect treatment of fixed effects is attempted to be overcome by using two general methods of moments (difference GMM and level or system GMM) procedures for dynamic panels, which potentially allow for obtaining consistent parameter estimates, even when measurement error and endogenous regressors may be present in the specification. Sargan tests of overidentifying restrictions help evaluate the validity of specific instruments. Difference GMM estimation removes the fixed effect, eliminating a potential source of omitted variable bias in estimation. System GMM estimation generates consistent estimates of the parameters included. The justification for using Anderson-Hsiao and GMM estimation methods is described in sections 4.2.3.1 and 4.2.3.2, respectively.

The results support the hypothesis for Latin American countries in the period considered: increases in private real per capita income lead to increases in saving. Nonlinearities would appear at higher income levels than the ones considered, under both dynamic panel estimation methodologies. It appears then that as income increases, saving increases, although leveling off and falling after some very high income level is reached. This negative effect seems to be significant in the models investigated. The results show that, once country-specific effects are introduced, the estimate of per capita income increases, although not significantly affecting saving. Instrumental variable (IV) estimation does not raise the significance of per capita income. Both GMM estimation strategies yield similar, highly significant results. Overidentifying restrictions are not rejected and there is no third-order serial correlation, implying that the instruments chosen (double lags of income and income squared, as well as year dummies) are valid. Control variables such as growth, public saving, and credit flows are the factors that most significantly affect saving,

while there appears to be no significant effect of demographic variables, the interest rate, M2, and terms of trade on saving. Running the same tests on saving rates yield in general not significant results, while the nonlinear relationship still holds.

The rest of the chapter is organized as follows. The next section describes in detail the estimation procedure and data and presents the dynamic panel model, section 4.3 presents the estimation results, and section 4.4.

4.2 Estimation

4.2.1 Econometric specification

The hypothesis tested in this chapter is that the relationship between per capita income and saving in the developing countries included in the sample is nonlinear. I choose the estimation of reduced-form nonlinear specifications, commonly found in the literature and which include policy and non-policy determinants of saving. This type of specification is in agreement with the standard practice in empirical studies under the private consumption -or saving- theory and is therefore preferred.

Consider the following dynamic panel model:

$$saving_{it} = \gamma saving_{i,t-1} + \varsigma income_{i,t} + \zeta income_{i,t}^2 + x_{it}'\beta + \alpha_i + \delta_t + \mu_{it} \qquad (4.1)$$

where $saving_{it}$ and $saving_{i,t-1}$ refer to current and lagged private saving, respectively, $income_{i,t}$ and $income_{i,t}^2$ are the variables of interest, where the quadratic term is included to test for nonlinear effects on current saving, X_{it} is the set of relevant regressors, α_i is the set of time-invariant country effects, δ_t is a set

of time effects, and $\mu_{it} \sim N(0,\sigma^2)$ is a random disturbance and is uncorrelated; $i = 1,...,N$ represent countries and $t = 1,...,T$ represent years. The following assumptions hold: $E(x_{it},\mu_{js}) = 0$ for all i,j,t,s; $E(\mu_{it},\mu_{js}) = 0$ for $i \neq j$ and $t \neq s$; $E(\alpha_i,\mu_{jt}) = 0$ for all i,j,t; and $\sigma_\mu^2 \geq 0$. We expect that $\varsigma > 0$, while $\zeta < 0$.

Relevant determinants of saving[24] tested include the variable of interest: real per capita income (a linear term and its square), as well as the growth rate of real per capita income[25], terms of trade, money and quasi money (M2) to account for financial depth, private credit flow to account for domestic borrowing constraints, a fiscal policy variable such as public saving, demographic variables such as urbanization ratio and young and old dependency ratios (ratios of population younger than 15 and older than 65 years old, respectively), real interest rate, and inflation rate to proxy for uncertainty and macroeconomic instability. The relevant measure for real per capita income level and growth is disposable income. Terms of trade, the urbanization ratio, and the young and old dependency ratios are considered to be strictly exogenous, i.e., uncorrelated with the error term at all leads and lags. All other explanatory variables are considered weakly exogenous in the

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[24] Relevant variables have been identified in previous empirical studies and the saving project developed by the World Bank. Other variables not considered in this study include pension systems and income distribution, for which the availability of yearly data is limited. Social security systems, by replacing the saving motive of providing for retirement, are thought to have a significant negative impact on private saving. The sign of the relationship between saving and inequality is ambiguous. Consumption theory indicates that inequality can positively affect saving, but recent political economy theory supports an indirect negative effect of inequality on aggregate saving.

[25] Prior evidence indicates that growth is the most robust variable to explain the saving rate. Causality running from growth to saving has been found to be strong.

specification and are thus treated as being uncorrelated with future realizations of the error term, although they can be affected by current and past realizations of saving. The intuition for including these variables is explained in the next section.

4.2.2 Potential determinants of savings in Latin America

Saving is the natural log of private saving or the private saving rate (calculated as the ratio of gross private saving to gross national disposable income), although the results are in general not significant and thus, not shown. Lagged saving enters into all the regressions to capture persistence in saving levels, except in Anderson-Hsiao estimation. The double lag of saving levels is an instrument in GMM estimation. Gross private saving[26] is the difference between gross national saving and gross public saving, for which the adjusted version in the World Bank database is used. Real per capita income, computed in natural logs, is the gross private disposable income in real terms. It is calculated as a residual by subtracting gross public disposable income from gross national disposable income. The growth rate of real per capita income is calculated by taking the difference of logs. Per capita income has fallen for Latin America since the beginning of the 1980s. The real per capita income variable is expected to be strongly significant and positive. The nonlinear relation is evaluated by adding the square of real per capita income. Growth has been highly correlated with saving over long time horizons, for many regions and stages of development (Bosworth (1993), Schmidt-Hebbel, Serven, and Solimano (1996)). The rate of growth is endogenous and its sign is ambiguous

[26] The analysis is restricted to measures of gross saving, as estimates of depreciation are not calculated under the same benchmark across countries.

(positive effect or no effect) in earlier empirical works. Rapid growth is expected to rise saving while higher saving is likely to lead to faster capital accumulation and stimulate growth. As saving increases domestic investment, higher domestic saving will generally result in higher growth if the economy is below its steady state (Dayal-Gulati and Thimann (1997)). To evaluate causality running from growth to saving, I use two procedures: difference GMM and system GMM estimators. Difference GMM takes first differences to eliminate country-specific effects. Then right-hand-side variables (differenced values of the original regressors) are instrumented using lagged values of the original regressors (in levels) as instruments. System GMM mitigates the weak instruments problem of difference GMM.

Public saving is calculated by subtracting public consumption from gross public disposable income and converted into a ratio over gross national disposable income. The broad definition of public sector used in this chapter includes the general government or consolidated nonfinancial public sector, including public enterprises, depending on available information as explained in the World Bank database. A rationalization of public investment programs as a form of fiscal restraint would raise public sector saving directly. Government saving only partially crowds out private saving and is thus expected to negatively affect private saving. Reported private credit flows are expressed as the ratio over gross national disposable income. End of period data have been transformed into flows following the procedure used by Loayza, Schmidt-Hebbel, and Serven (2000). Restrictive credit policy would raise interest rates and stimulate private saving, i.e., if credit is rationed, private saving would increase, so a negative sign is expected. The degree of

financial development has been measured through the degree of monetization of the economy, i.e., $M2/GNP$. The ratio of quasi-money over GNP is a proxy for financial deepening. The effect is ambiguous in the literature, although some studies have found it to be positive. Financial market development increases the availability of credit flows, making it easier for individuals to borrow, although it may thus result in lower saving. On the other hand, by increasing the availability of saving instruments, it most likely increases the return of saving (Edwards (1995), Harrigan (1995)). Most previous studies indicate that the net effect seems to be positive and significant.

Positive terms of trade shocks, expected to be significant for Latin America, should have a positive effect on saving through the positive effect on wealth and income (Fry (1986), Masson, Bayoumi, and Samiei (1995)). The predictions of the economic theory are ambiguous about whether private saving is responsive to changes in interest rates, while the limited empirical evidence on the interest rate effect on saving in developing countries is mixed. It seems that an increase in the real interest rate (computed as $\ln(1+r)$) has a positive, small size effect on private saving through the substitution effect. The effect of interest rates on aggregate saving is likely to be weak. Volatility of the inflation rate (calculated as $\ln(1+\pi)$) is used to proxy macroeconomic stability. Low volatility in inflation, as well as that in interest rates or exchange rates, has been found to be important for saving (Gavin, Hausmann, and Talvin (1997)). Generalized macro instability may exert a negative effect on national saving. Thus, private saving would tend to decrease as inflation rates rise. Three demographic ratios are explored: urbanization ratio as well as young and old dependency ratios (ratios of population below 15 and above 65 years

old, respectively). Demographics better explain long-term trends in saving, which is likely to increase as the share of working population relative to retired population increases. As in previous studies, demographics are expected to have a negative effect on private saving.

4.2.3 Description of the methodology

4.2.3.1 Anderson-Hsiao estimation

The IV method proposed by Anderson-Hsiao (1981) removes the fixed effect by lagging the dynamic panel in equation (4.1) one period:

$$saving_{i,t-1} = \gamma saving_{i,t-2} + x'_{i,t-1}\beta + \alpha_i + \delta_{t-1} + \mu_{i,t-1} \qquad (4.2)$$

and taking first differences:

$$saving_{it} - saving_{i,t-1} = \gamma(saving_{i,t-1} - saving_{i,t-2}) + (x'_{it} - x'_{i,t-1})\beta + (\delta_t - \delta_{t-1}) + (\mu_{it} - \mu_{i,t-1}) \qquad (4.3)$$

More generally:

$$\Delta saving_{it} = \gamma \Delta saving_{i,t-1} + \Delta x'_{it}\beta + \Delta\delta_t + \Delta\mu_{it} \qquad (4.4)$$

This process implies that $saving_{i,t-2}$ can be used as an instrument for $\Delta saving_{i,t-2}$, and consistent estimates can be obtained if there is no serial correlation in $\mu_{i,t}$. However, the procedure yields estimates that are not efficient as all further lags of $saving_{i,t}$ could be used as additional instruments.

4.2.3.2 GMM estimation

Arellano and Bond (1991) develop a generalized method of moments (GMM) estimator for dynamic panel data to take advantage of all additional moment

conditions: not only $saving_{i,t-2}$ is uncorrelated with $\Delta\mu_{it}$, but all further lags of $saving_{it}$ can be used as additional instruments. This method removes the individual effect and substantially gains efficiency by using all available lags of the dependent variable as well as year dummies as instruments, as shown below. To study the dynamic relationship between saving and per capita income, two generalized method of moments estimators are explored (difference GMM and system GMM) in order to eliminate two possible sources of inconsistency, i.e., the presence of endogenous variables among the regressors and correlated individual effects.

First, I consider the first-differenced GMM estimator, adapted from Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991), which attempts to control for the presence of endogenous variables among the explanatory variables as well as the omitted variable bias that arises if country-specific effects are not well treated. The two biases are eliminated by making the system dynamic and instrumenting right-hand-side variables by taking differences to eliminate the country-specific effect, respectively. All the linear moment restrictions implied by the model are exploited. The GMM estimator treats the model as a system of equations, one for each time period. Predetermined and endogenous variables in first differences are instrumented with suitable lags of their own levels, while strictly exogenous regressors enter in first differences. Despite its pros over other estimation methods discussed in this study, this estimator behaves poorly when the explanatory variables are persistent over time and the number of time series observations is small.

Finally, I consider the system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998), which combines the set of equations in first-differences (with suitably lagged levels as instruments) with an additional set of equations in levels (with suitably lagged first differences as instruments). Predetermined and endogenous variables in levels are instrumented with suitable lags of their own first differences. System GMM mitigates the weak instruments problem of difference GMM.

4.2.3.3 Tests and measurement error

Two tests are employed to test the null hypothesis of the validity of the instruments. First, the Sargan test of overidentifying restrictions to analyze the sample analog of the moment conditions used in the estimation process, testing whether the instruments as a group appear exogenous. As the Sargan test is not robust to heteroskedasticity or autocorrelation, the Hansen J statistic, which is robust, is thus considered. All models in section 4.3 estimated by GMM do not reject overidentifying restrictions (Tables 4.3, 4.4, 4.5, and 4.6). In addition, a test for autocorrelation is performed on the first-difference equation residuals to purge the unobserved and perfectly autocorrelated group level effect α_i. AR(1) is expected in first differences as the differenced error term at time t is correlated with that at time $t-1$[27]. In the context of highly persistent series and in the presence of serially uncorrelated measurement errors, it is important that suitably lagged first

[27] This occurs even in the case that the original error term is uncorrelated, unless it follows a random walk. If the original error term is serially correlated and follows a moving average process of at least order 1, second-order serial correlation of the differenced residual is expected.

differences of the observed series can still be used as instrumental variables for the level equations. This holds provided that the measurement error induces no correlation between the observed first differences and the individual effects α_i. The tests suggest that there is no further serial correlation after second-order correlation, indicating that the appropriate instruments are used in the estimation (Tables 4.3, 4.4, 4.5, and 4.6).

4.2.4 Data analysis

The initial Latin American sample is further restricted to include economies that have at least five consecutive annual observations, resulting in an unbalanced pooled database. All data have been provided by the largest saving database compiled by researchers at the World Bank, except for data on terms of trade, inflation rates, and real interest rates, which have provided by the Global Development Network Growth Database by the World Bank.

The sample for Latin America comprises 20 countries[28]. Time series available on saving, per capita income, and other financial, demographic, fiscal, and macroeconomic variables start in the early 1960s and run up to the early 1990s for most of the countries included. The correlation coefficient between saving and per capita private disposable inco me is 0.64 (Table 4.1). Terms of trade (0.30) and inflation (0.34), urban ratio (0.64) and young dependency ratio (-0.33) are highly correlated with per capita income. However, urban ratio and young dependency ratio do not have a significant effect on saving in the regressions.

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[28] Brazil, Barbados, Dominican Republic and Guyana were part of the initial sample, but were dropped from the estimation.

Saving ratios have been traditionally low in Latin America. The highest average saving rates for the period correspond to Argentina (0.18), Panama (0.17), Venezuela (0.16), Trinidad (0.15), and Mexico (0.14) (Table 4.2). The average saving rate for the sample is 0.12[29] in the 1961-1994 period for 20 Latin American economies. Ten countries (Jamaica, Honduras, Colombia, El Salvador, Costa Rica, Ecuador, Paraguay, Belize, Bolivia, and Peru) had average saving rates between 0.10 and 0.13. Three countries on average saved less than 0.10 (Uruguay, Chile, and Guatemala), while Haiti shows the lowest positive saving rate (0.06). Nicaragua, the only country with a negative 0.04 average annual saving rate between 1972 and 1994, had a positive average saving rate of 0.10 if the negative saving rates in the periods 1984-1990 and 1992-1994 are dropped from the dataset.

In Figure 4.1, it can be observed that saving rates tend to rise with per capita income. This positive association is analogous to the one found in previous studies[30]. Saving rates appear to taper off at average income of $ 1,994[31] for the 1960-1994 period. Thus, the positive association between saving and development appears to hold for values of income below the value indicated, implying that saving increases as private income increases in all countries, except for Argentina, Mexico, Venezuela, Uruguay and Trinidad.

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[29] By excluding Nicaragua's negative saving rate of -0.08 the average for the sample drops to 0.118.

[30] Some of the previous empirical studies on saving that have reported a positive relationship include Collins (1991), Schmidt-Hebbel, Webb and Corsetti (1992), Carroll and Weil (1994), Edwards (1995), Masson, Bayoumi and Samiei (1995), and Loayza, Schmidt-Hebbel and Serven (2000).

[31] The polynomial regression fits a curve by regressing saving rates on income and its square, with an adjusted R^2 of 0.32 for private income.

The individual scatter plots (Figure 4.2) show the relationship between predicted saving rates and private real per capita income. Predicted saving rates for Argentina, Paraguay and Mexico seem to be stable over time, slightly increasing (Argentina and Paraguay) and falling (Mexico), respectively. Those for Uruguay, Honduras, Bolivia, Costa Rica, El Salvador, Trinidad and Venezuela fall and then tend to rise. Chile's saving rates clearly rise as income increases. Haiti, Jamaica, Panama and Nicaragua (with negative saving rates) show decreasing saving rates, while saving rates in Belize, Colombia, Ecuador, Guatemala, and Peru level off and tend to fall.

4.3 Empirical Results

4.3.1 Basic model

Results for saving rates reveal the nonlinear relationship, although they are not significant (not shown). Results for the relationship between income and saving using five estimation methods are presented in Table 4.3. Column 1 shows results for pooled OLS regression under the standard linear regression assumptions, frequently found in the saving literature. The estimate of lagged saving is highly significant, showing persistence in saving. Per capita income is positive and not significant, and the estimation yields a positive squared term. Computed standard errors are asymptotically robust to both heteroskedasticity and serial correlation, allowing for residuals to be clustered at the country level. However, biased estimates are obtained if structural differences among Latin American countries are ignored.

To characterize heterogeneity across units and in order to get an unbiased and efficient regression, differences across units are captured by using fixed effects.

Fixed effects estimation assumes that the variance or source of heterogeneity is fixed, i.e., each unit or time period has a unique but constant source of variation, resulting in an unbiased and efficient regression. The core model is estimated in column 2, where per capita income is significant at levels higher than 10%. The magnitude of its effect on saving now increases. The coefficient of the square of per capita income is negative, indicating that the positive effect of income would become negative at income levels above any of the included in the dataset. The use of an instrumental variable approach (Anderson-Hsiao (1982), column 3), where the dependent variable is specified in first-differences to remove the fixed effect does not yield significant results except for lagged saving, and the square term is positive. The magnitude of the coefficient of per capita income is about the one obtained with fixed effects estimation.

Columns 4 and 5 show GMM estimation for dynamic panel data models, where the saving variable is specified in differences and in levels, respectively. Both methods maintain the nonlinear relationship, yielding significant effects of per capita income on saving. A 1% increase in income would result in increases in saving by 1.79% and 1.66%, respectively. Keeping all other factors constant, the negative effect of income would again start taking place at extremely high income levels, i.e., saving would level off and fall at higher income levels than the ones considered.

The null hypothesis for the Hansen J test is that instruments are uncorrelated with the error term. The p value indicates that the null cannot be rejected in all the models (Tables 4.3, 4.4, 4.5 and 4.6), implying that the instruments are valid. The tables report t-statistics based on standard errors that are asymptotically robust to heteroskedasticity. Appropriate lags of the explanatory

variables are used as instruments. Second-order and further serial correlations of the error terms are rejected (Tables 4.3, 4.4, 4.5 and 4.6).

4.3.2 Control variables

Tables 4.4, 4.5 and 4.6 present estimation results from utilizing fixed effects OLS, difference GMM and levels GMM, which have evidenced the presence of a nonlinear association between income and saving in Table 4.3. Columns 1, 2 and 3 in Table 4.4 add the growth rate of per capita income, which is positive and significant at 5% level with the three methods. Per capita income is only significant with GMM estimation. Columns 4, 5 and 6 in Table 4.4 expose a negative effect of public saving (crowding out effect), which turns out to be significant with fixed effects and difference GMM. Columns 7, 8 and 9 in Table 4.4 show that credit flows negative affect private saving in the short run as expected, although there is no evidence of a significant effect.

Table 4.5 evaluates the significance of financial development and monetary variables taken individually: terms of trade, M2 and inflation[32]. None of these factors seem to have a strong effect on saving in Latin America, except for terms of trade with country-specific estimation (positive effect, column 2) and inflation with difference GMM (negative effect, column 6). Income remains highly significant with both GMM strategies in all the models. Fixed effects method does not yield strong results, except for lagged saving, which is highly persistent with every estimation methodology.

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[32] The interest rate does not significantly affect saving in the basic model (Table 4.5) nor in the core model with significant determinants (Table 4.6).

4.3.3 Core model with significant determinants

To check the robustness of the results, in Table 4.6 I estimate the core model with alternative determinants. Focusing on the results obtained by level GMM, which uses all moment conditions available and is superior to the other methods explored, it can be inferred that exogenous terms of trade shocks and demographic variables such as urban ratio, young dependency ratio and old dependency ratio seem not to be important for saving levels. The same can be argued about the inclusion of M2 and inflation. Credit flows remain highly significant, implying that a rise in the flow of private domestic credit relative to income reduces saving. Increases in public saving significantly reduce private saving. The persistence of lagged saving is confirmed. Income is positive as in Corbo and Schmidt-Hebbel (1991), Masson, Bayoumi, and Samiei (1995), Edwards (1996), and Dayal-Ghulati and Thimann (1997), while the association between income and saving would imply that an increase in income by 1% raises private saving by 1.41% (column 9).

Loayza, Schmidt-Hebbel, and Serven (2000) estimate that the long-run private saving rate rises by about ten percentage points of disposable income as income per capita doubles in their sample of developing countries, if variables such as rates of urbanization and demographics were equal. Although the samples are not comparable, the estimation presented in column 6 would lead to a rise of about 6% in saving levels in Latin America.

Throughout different estimation methods, this study shows that the effect of growth is positive as in Masson, Bayoumi, and Samiei (1995, 1998), and Edwards (1996). Growth rates remain highly significant at 1% level in GMM system (column 9). In Latin America the growth effect would yield a 1.41% increase in saving levels,

holding control variables fixed. Loayza, Schmidt-Hebbel, and Serven (2000) find that a 1 percentage-point rise in the growth rate increases the private saving rate by a similar amount, advising that this effect may be partly transitory. Earlier works argue as well that growth drives saving (Modigliani (1970), Carroll and Weil (1994); moreover, that growth Granger causes saving, especially over the short-run, supporting a strong positive correlation between saving and growth rates (Maddison (1992), Bosworth (1993)). This correlation is interpreted as coming from the effect of saving on growth through the saving-investment link (Levine and Renelt (1992) and Mankiw, Romer and Weil (1992), or as growth driving saving (Carroll and Weil (1994)).

4.4 Concluding Remarks

There seems to be some indication of a nonlinear relationship between real per capita income and private saving when using country-specific effects and both GMM dynamic panel estimation methods in Latin America in the 30-year period under study, although it would occur at higher income levels than the ones included in the sample. Overall, per capita income significantly affects private saving. An increase in income by 1% would raise private saving by 1.4%, while an increase in income growth by 1% would raise saving by 1.3%, in the short-run.

The magnitude of the coefficients reported by other papers are not exactly comparable to the ones shown in this chapter, as this is the first study to test nonlinearities in the Latin America region using GMM estimation. However, the signs of the coefficients agree with recent empirical results for a larger sample of developing countries investigated by Schmidt-Hebbel, Loayza, and Serven (2000).

Low saving rates have characterized Latin America, especially during the 1980s, constraining economic expansion. The policy implication of the results found suggest that income growth is the most significant force behind increases in private saving, along with offsetting government dissaving and tightening of credit constraints. Demographic and monetary variables (inflation, interest rates, M2 and terms of trade) don't seem to play an important role on saving in Latin America for the period studied.

Table 4.1: Correlation coefficients - Latin America

	Saving	Lagged saving	Income	Growth	Public saving	Credit	TOT	M2	Inflation	Urban ratio	Young ratio	Old ratio
Saving	1.000											
Lagged saving	0.945	1.000										
Income	0.635	0.639	1.000									
Growth	0.125	0.006	0.007	1.000								
Public saving	0.214	0.241	0.308	0.100	1.000							
Credit	-0.002	-0.034	0.043	0.460	0.012	1.000						
TOT	0.300	0.270	0.212	0.146	0.222	0.050	1.000					
M2	-0.086	-0.072	0.482	-0.193	0.112	-0.035	-0.057	1.000				
Inflation	0.340	0.383	0.300	-0.120	0.195	-0.208	0.084	-0.016	1.000			
Urban ratio	0.643	0.648	0.687	-0.003	0.367	-0.004	0.191	0.243	0.506	1.000		
Young dep. ratio	-0.326	-0.334	-0.589	0.025	-0.265	0.033	-0.118	-0.471	-0.435	-0.684	1.000	
Old dep. ratio	0.065	0.075	0.365	0.014	0.113	-0.032	-0.008	0.466	0.377	0.503	-0.806	1.000

Saving is the ln of private saving. Income is the ln of gross private disposable income in real, per capita terms. Growth is the growth rate of real per capita income. Credit represents private credit flows. TOT is terms of trade. M2 represents the degree of monetization of the economy. Urban, young and old are ratios over total population.

Table 4.2: Statistics - Latin American saving rates

Name	N	mean	sd	min	max
Argentina	29	0.179	0.029	0.124	0.248
Belize	12	0.133	0.046	0.037	0.221
Bolivia	32	0.129	0.079	0.004	0.26
C.Rica	28	0.115	0.04	0.015	0.185
Chile	25	0.089	0.056	0.005	0.186
Colombia	27	0.109	0.02	0.051	0.136
Ecuador	28	0.117	0.043	0.047	0.21
El Salvador	27	0.110	0.028	0.043	0.157
Guatemala	28	0.095	0.037	0.052	0.21
Haiti	21	0.064	0.03	0.002	0.118
Honduras	33	0.106	0.028	0.05	0.168
Jamaica	27	0.118	0.066	0.015	0.236
Mexico	24	0.142	0.037	0.018	0.194
Nicaragua	13	0.103	0.056	0.003	0.193
Panama	26	0.174	0.064	0.044	0.263
Paraguay	31	0.121	0.04	0.061	0.221
Peru	26	0.125	0.054	0.018	0.226
Trinidad	25	0.148	0.04	0.069	0.22
Uruguay	18	0.091	0.046	0.008	0.18
Venezuela	26	0.155	0.076	0.028	0.281
Total	506	0.122	0.055	0.002	0.281

Table 4.3: Per capita income and private saving levels in Latin America

	Pooled OLS	Fixed Effects OLS	Anderson-Hsiao	GMM Difference	GMM Level
	(1)	(2)	(3)	(4)	(5)
Lagged saving	0.889***	0.446***	0.198**	0.247***	0.410***
	(30.389)	(4.627)	(2.404)	(4.202)	(4.473)
Pcap income	0.064	1.152	1.015	1.785**	1.660**
	(0.210)	(1.276)	(0.439)	(2.314)	(2.072)
Pcap income sq.	0.009	-0.008	0.005	-0.034	-0.040
	(0.375)	(-0.143)	(0.031)	(-0.673)	(-0.806)
R-squared	0.890	0.913			
N	463	463	439	439	439
P-value: Hansen J test				1.000	1.000
P-value: AR(1)				0.001	0.002
P-value: AR(2)				0.698	0.357

* significant at 10%, ** significant at 5%, *** significant at 1%; t-statistics in parenthesis.

Dependent variable: private saving levels. Year dummies have been added to all columns. Robust standard errors have been clustered by country. Fixed effects OLS has been estimated with country dummies. Anderson-Hsiao and both GMM methods instrument for income. Variables in Anderson-Hsiao are differences.

Table 4.4: Estimation of saving levels with control variables

	Fixed Effects OLS	GMM Difference	GMM Level	Fixed Effects OLS	GMM Difference	GMM Level	Fixed Effects OLS	GMM Difference	GMM Level
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged saving	0.505***	0.316***	0.450***	0.445***	0.247***	0.408***	0.440***	0.240***	0.393***
	(5.728)	(4.777)	(4.925)	(4.588)	(4.278)	(4.395)	(4.601)	(3.771)	(4.451)
Pcap income	0.881	1.403*	1.410*	1.036	1.839**	1.615*	1.169	1.789**	1.667**
	(1.072)	(1.717)	(1.651)	(1.102)	(2.214)	(1.920)	(1.288)	(2.307)	(2.109)
Pcap income sq.	-0.010	-0.025	-0.038	-0.004	-0.044	-0.040	-0.007	-0.031	-0.036
	(-0.214)	(-0.517)	(-0.746)	(-0.075)	(-0.836)	(-0.765)	(-0.123)	(-0.611)	(-0.713)
Growth	1.573**	1.143**	1.041**						
	(3.572)	(2.339)	(3.191)						
Public saving				-1.295*	-1.333*	-0.931			
				(-2.034)	(-1.835)	(-1.358)			
Credit							-0.446	-0.426	-0.917
							(-0.664)	(-0.733)	(-1.380)
R-squared	0.922			0.914			0.913		
N	463	419	419	463	439	439	463	433	433
P-value: Hansen J test		1.000	1.000		1.000	1.000		1.000	1.000
P-value: AR(1)		0.001	0.002		0.001	0.002		0.001	0.001
P-value: AR(2)		0.513	0.211		0.559	0.284		0.786	0.488

* significant at 10%, ** significant at 5%, *** significant at 1%. Dependent variable: private saving levels. Notes to Table 4.3. apply.

Table 4.5: Basic model with financial development and monetary variables

	Fixed Effects OLS	GMM Difference	GMM Level	Fixed Effects OLS	GMM Difference	GMM Level	Fixed Effects OLS	GMM Difference	GMM Level
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged saving	0.374***	0.231***	0.323***	0.442***	0.240***	0.407***	0.500***	0.249***	0.439***
	(4.306)	(3.864)	(4.871)	(4.650)	(4.035)	(4.512)	(4.295)	(3.503)	(3.737)
Pcap income	1.942	2.327**	2.630***	1.076	2.016**	1.606*	1.043	1.797*	1.562*
	(1.665)	(2.523)	(3.431)	(1.181)	(2.547)	(1.869)	(1.090)	(1.940)	(1.648)
Pcap income sq.	-0.059	-0.071	-0.102**	-0.003	-0.048	-0.036	-0.010	-0.035	-0.037
	(-0.812)	(-1.155)	(-2.166)	(-0.057)	(-0.962)	(-0.682)	(-0.166)	(-0.597)	(-0.644)
TOT	0.172	0.332*	0.224						
	(1.001)	(1.665)	(1.390)						
M2				-0.228	0.678	-0.146			
				(-0.446)	(0.883)	(-0.506)			
Inflation							-0.435	-0.557*	-0.460
							(-1.299)	(-1.911)	(-1.482)
R-squared	0.915			0.913			0.919		
N	430	403	403	461	433	435	442	408	409
P-value: Hansen J test		1.000	1.000		1.000	1.000		1.000	1.000
P-value: AR(1)		0.001	0.001		0.001	0.002		0.001	0.002
P-value: AR(2)		0.935	0.715		0.753	0.356		0.570	0.497

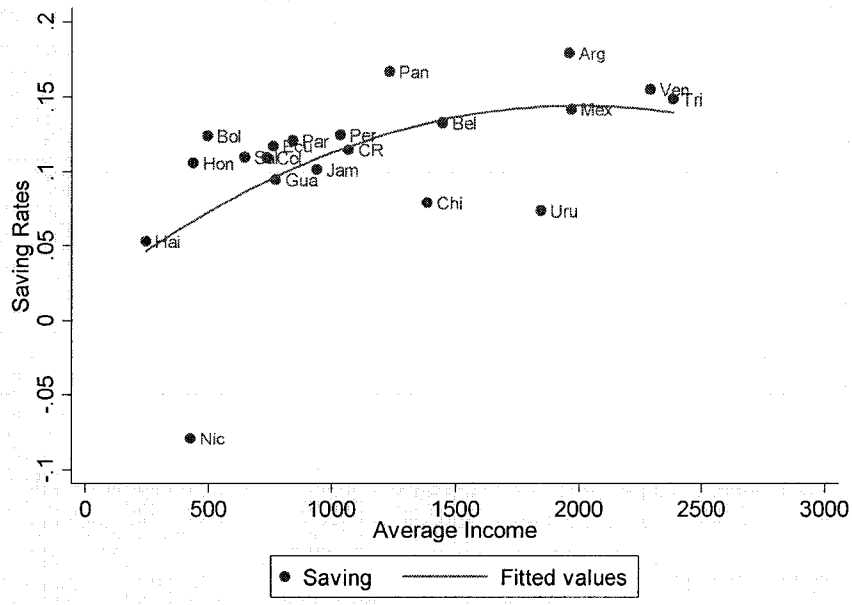
* significant at 10%, ** significant at 5%, *** significant at 1%. Dependent variable: private saving levels. Notes to Table 4.3 apply.

Table 4.6: Robustness of saving determinants in Latin America

	Fixed Effects OLS	GMM Difference	GMM Level	Fixed Effects OLS	GMM Difference	GMM Level	Fixed Effects OLS	GMM Difference	GMM Level
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged saving	0.447***	0.302***	0.337***	0.445***	0.301***	0.337***	0.494***	0.316***	0.435***
	(4.491)	(3.384)	(4.002)	(4.407)	(3.378)	(3.925)	(5.907)	(4.765)	(5.116)
Pcap income	1.539	2.772**	2.963**	1.419	2.203	2.968**	0.762	1.442*	1.409
	(1.274)	(2.217)	(2.589)	(1.194)	(1.578)	(2.419)	(0.889)	(1.703)	(1.559)
Pcap income sq.	-0.061	-0.121	-0.142**	-0.053	-0.086	-0.145*	-0.003	-0.031	-0.036
	(-0.860)	(-1.556)	(-2.010)	(-0.741)	(-1.014)	(-1.883)	(-0.051)	(-0.611)	(-0.655)
Growth	1.551**	1.074**	1.213**	1.589**	1.110**	1.255**	1.822**	1.387**	1.308***
	(3.265)	(2.188)	(2.406)	(3.516)	(2.444)	(2.660)	(3.700)	(2.622)	(3.564)
Public saving	-1.928**	-1.502*	-1.689*	-1.956**	-1.418	-1.777*	-1.541**	-1.374**	-1.145*
	(-2.224)	(-1.682)	(-1.792)	(-2.188)	(-1.608)	(-1.831)	(-2.591)	(-2.009)	(-1.686)
Credit	-1.231*	-1.172*	-1.482**	-1.364**	-1.174*	-1.506**	-1.634**	-1.266*	-1.762**
	(-1.772)	(-1.693)	(-2.416)	(-2.141)	(-1.769)	(-2.744)	(-2.189)	(-1.814)	(-2.663)
TOT	0.255	0.314	0.319	0.256	0.318	0.324			
	(1.450)	(1.417)	(1.605)	(1.470)	(1.427)	(1.611)			
M2	-0.251	0.306	0.361	-0.182	0.265	0.358			
	(-0.375)	(0.399)	(0.648)	(-0.303)	(0.355)	(0.708)			
Inflation	-0.328	-0.361	-0.338	-0.369	-0.394	-0.340			
	(-0.917)	(-0.752)	(-0.770)	(-1.038)	(-0.838)	(-0.793)			
Urban				0.627	-1.572	-1.029			
				(0.346)	(-0.522)	(-0.492)			
Young				-1.244	0.829	-1.915			
				(-0.656)	(0.357)	(-0.902)			
Old				-8.582	-16.174	-13.869			
				(-0.796)	(-0.819)	(-1.133)			
R-squared	0.930			0.929			0.924		
N	407	353	359	405	352	359	463	419	419
P-value: Hansen J test		1.000	1.000		1.000	1.000		1.000	1.000
P-value: AR(1)		0.001	0.001		0.001	0.001		0.001	0.002
P-value: AR(2)		0.441	0.470		0.464	0.455		0.495	0.245

* significant at 10%, ** significant at 5%, *** significant at 1%. Dependent variable: private saving levels. Notes Table 4.3.

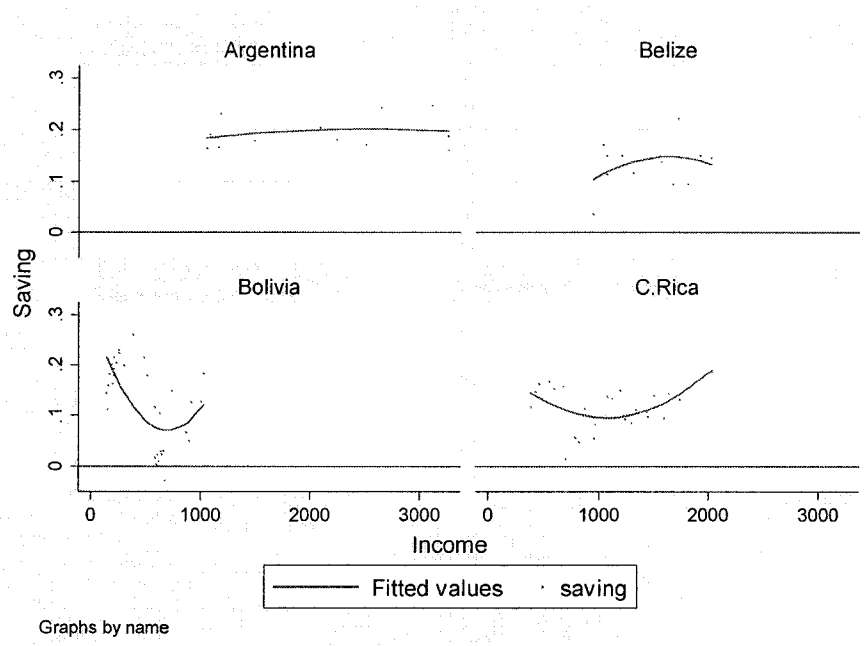
Figure 4.1: Long-run per capita private income levels and saving rates

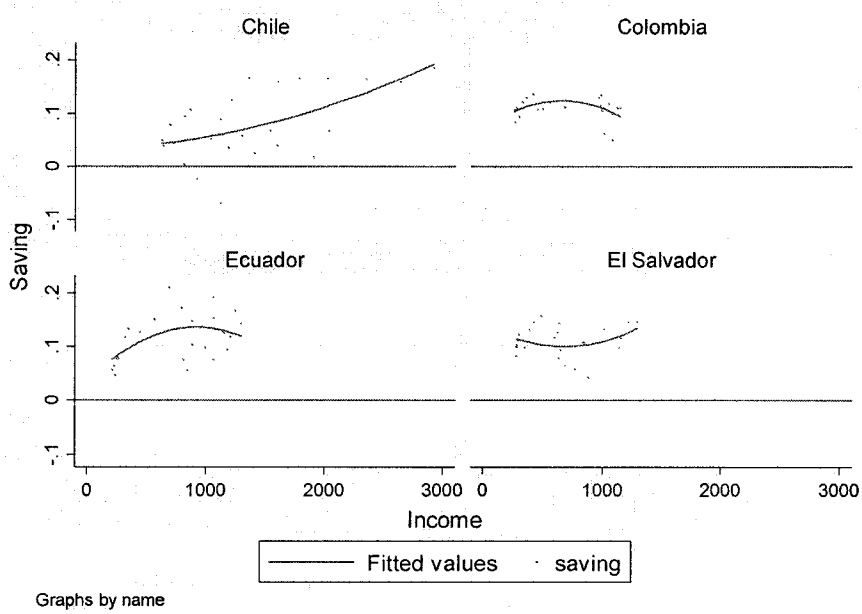


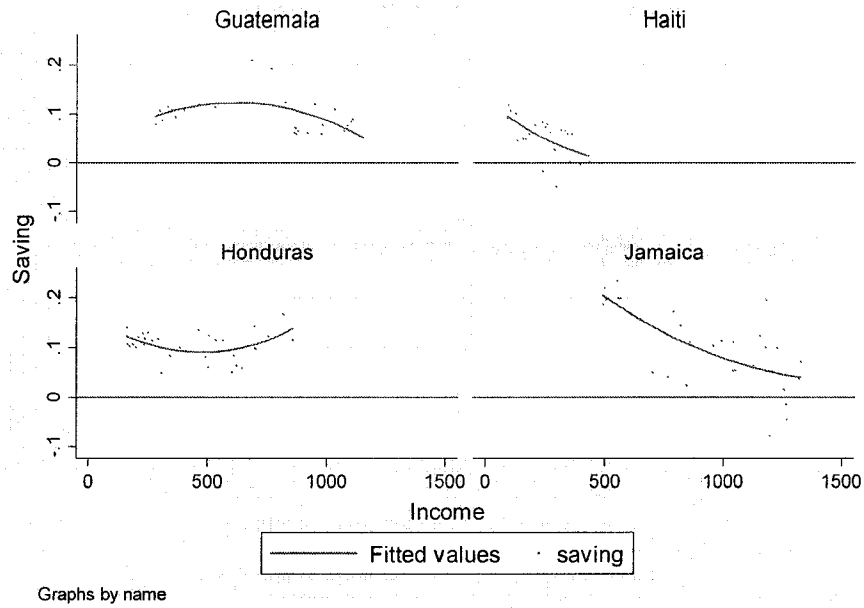
Average saving rates and income levels correspond to the following periods: Argentina 1966-1979 (1966-1994 for the rest of the variables), Bolivia and Honduras 1962-1994, Jamaica 1965-1994, Peru and Venezuela 1969-1994, Chile 1968-1994, Costa Rica, Ecuador and Guatemala 1967-1994, Colombia, El Salvador and Panama 1967-1993, Belize 1983-1994, Haiti 1971-1994, Mexico 1970-1993, Nicaragua[33] 1972-1994 (the only country in the sample with negative average saving), Paraguay 1964-1994, Trinidad and Tobago 1967-1991, and Uruguay 1973-1993.

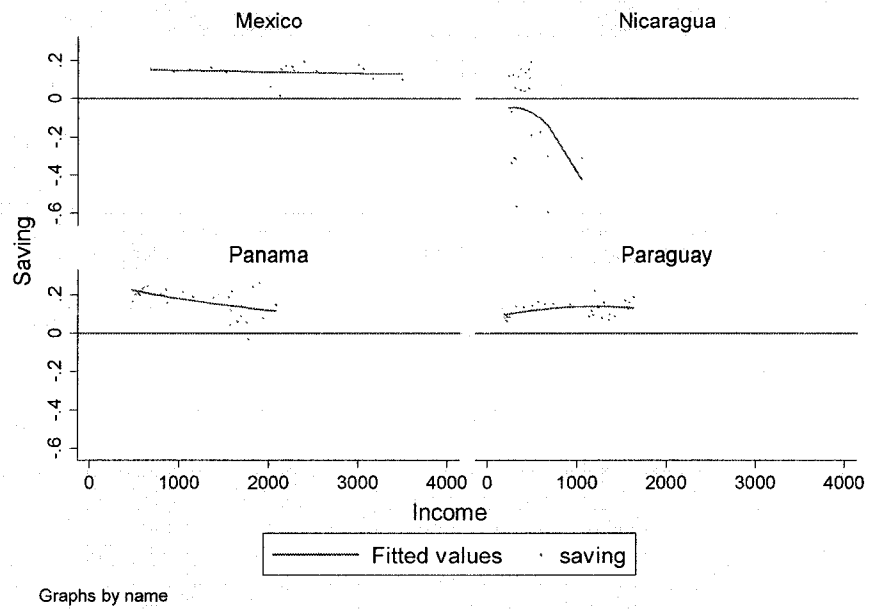
[33] Excluding the periods 1984-1990 and 1992-1994 in which Nicaragua had negative saving rates, the average for the period 1972-1994 is 0.10.

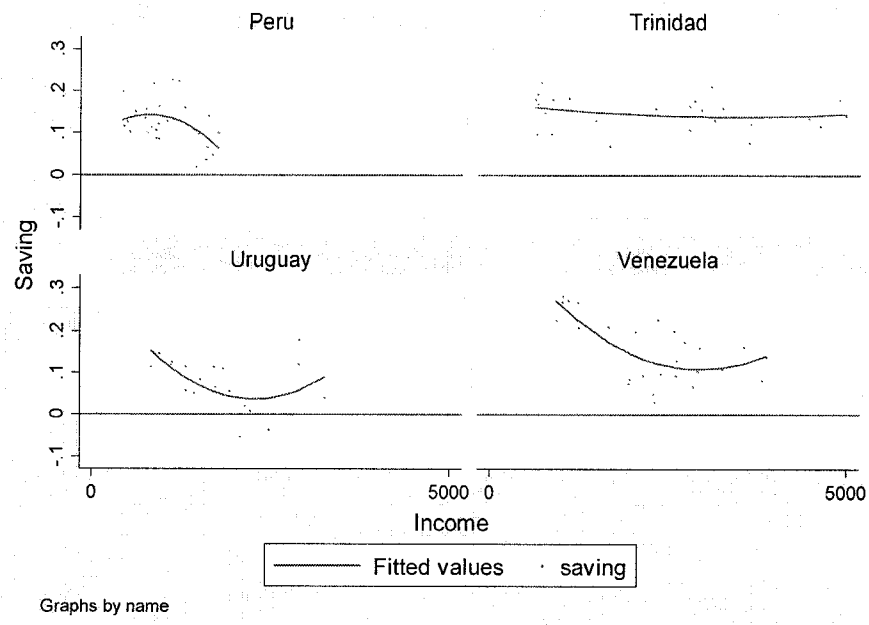
Figure 4.2: Per capita private income levels and saving rates by country











CHAPTER 5

5. CONCLUSIONS

This dissertation explores three broad issues in the political economy of inequality and growth. The first study analyzes a political economy channel that has negative implications for growth for a sample of developing countries in 1970-1990, confirming the prediction in the analytical framework developed by Karayalcin and McCollister (2005). The mechanism is such that pronounced inequalities lead to popular demands for redistribution. Both democratic and nondemocratic governments tend, at the expense of investment, to engage in redistributive policies, financed partially by foreign borrowing, increasing the risk of default. As international creditors take such potential policies into account, they tend to limit the credit they extend.

To empirically analyze this mechanism, I set up a system of equations to estimate sovereign debt and economic growth. In the first stage of the estimation process, I select a sample of countries that would face risk of default. Sample selection bias is avoided by performing Tobit estimation. I then test whether pronounced inequality leads to limited international credit by running ordinary least squares on the selected sample. To test that in turn growth is harmed, and suspecting endogeneity, the growth equation is estimated by two-stage least squares. Predicted values of sovereign debt enter as a regressor in the second stage of the estimation process. The two-stage methodology corrects for endogeneity in the corresponding variables and restores consistency to the coefficient estimates of the endogenous variable and the other variables.

The evidence found partially supports the hypothesis in a sample of developing economies with default history, most of which are Latin American. Economies with pronounced inequalities seem to be associated with higher debt flows, levels and ratios, contradicting the hypothesis. There is evidence of increases in multilateral flows until the mid 1980s in Latin America, after which the hypothesis would hold. Harmed growth results from limited sovereign debt levels and flows. The findings suggest that nondemocracies would tend to grow less relative to democracies. The investigation further studies the probability of default as governments tend to implement redistributive policies. Increases in inequality raise the probability of default in countries with no default history, and raises the duration of default episodes in economies with a default history.

The second issue I explore is the impact of income inequality on democracy consolidation, based on the analytical framework of Acemoglu and Robinson (2005), who recently developed a theory of democracy consolidation. The hypothesis of the existence of a nonmonotonic relationship between inequality and democracy is supported for a sample of 15 Latin American economies in 1970-2000. The methodology employed involves fixed effects, which accounts for political and economic differences among countries, and general method of moments (GMM) estimation, which removes sources of inconsistency such as the endogeneity of explanatory variables and omitted variable bias due to incorrect treatment of fixed effects. I find that there is a nonmontonic relationship which is robust to the addition of covariates used in the standard literature, such as population, education, per capita income, and urbanization. Pronounced inequalities in Bolivia and

Venezuela, where democratic consolidation is threatened, deserve further study and confirm the predictions of the model.

The last issue investigated focuses on the nonlinear relationship between per capita income and saving for a sample of Latin American countries in 1960-1994. The hypothesis is that saving levels tend to increase with income, falling after some threshold per capita income is reached. Many past studies have failed to test for nonlinearities at higher levels of income. My research is related to that of Loayza, Schmidt-Hebbel and Serven's (2000) study, and differs from previous studies in terms of estimation techniques used, sample of countries and time periods. Different estimation methods to deal with the potential bias introduced by including lagged saving as a regressor are employed. I first explore pooled OLS and fixed effects OLS estimation as a benchmark. I further extend the analysis by utilizing an instrumental variables method (proposed by Anderson and Hsiao (1982)), which removes the fixed effect. This estimation procedure yields estimates that are not efficient, as the first lag of saving is used as an instrument. In order to take advantage of all additional moment conditions, I employ two generalized method of moments estimators for dynamic panel data (difference GMM and system GMM). In doing so, two possible sources of inconsistency are removed, such as the presence of endogenous variables among regressors and correlated individual effects.

Overall, I find that per capita income significantly positively affects private saving, while growth has a positive and highly significant effect on private saving. The results seem to have important policy implications: government dissaving as well as tightening of credit constraints have a significant effect on private saving.

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