Political institutions and human capital formation : a political economy analysis

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Abstract: La tesis fue dirigida por Adam Przeworski y defendida en la Universidad Autónoma de Madrid. Las preguntas principales son por qué las políticas educativas varían entre países; en qué medida y por qué los regímenes políticos difieren en las tasas de matriculación de primaria y secundaria. La tesis entiende que la política educativa tiene consecuencias distributivas, que los grupos políticamente relevantes tienen distintas preferencias acerca de la política educativa. Estas preferencias no están fijadas de antemano de forma exógena sino que varían en función del desarrollo económico, en función de la desigualdad de renta y también de en qué parte de la distribución se produce un incremento de la desigualdad (entendiendo que no es lo mismo que se incrementen desigualdades entre pobres y clase media o entre clase media y ricos). Las instituciones políticas son concebidas como instrumentos de resolución de conflictos al distribuir el poder de decisión entre los distintos grupos. No ejercen un impacto directo sobre la educación sino que mediatizan la política educativa del gobierno cuando se producen incrementos de la riqueza e incrementos de la desigualdad. La tesis distingue entre dictaduras según las clases sociales a que apelan los dictadores para forjar sus apoyos. Y clasifica así, con un criterio ideológico, todas las dictaduras en el mundo entre 1960 y 1996, con 3510 observaciones –de países/años bajo dictaduras. Lleva a cabo un análisis teórico muy riguroso y un análisis econométrico -con datos de panel- que muestra, primero, que en países muy pobres la naturaleza del régimen no importa; segundo, que el efecto del crecimiento económico sobre las tasas de matriculación es siempre positivo y es más fuerte en dictaduras que apelan a la clase baja -dictaduras de izquierdas; y tercero, que la desigualdad de renta influye en la política educativa dependiendo del desarrollo económico y de en qué parte de la distribución de la renta se manifiesta esa desigualdad. Es decir, que las políticas educativas de los gobiernos dependen de las instituciones políticas (el tipo de régimen) según cómo varía la renta per cápita y la desigualdad.

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POLITICAL INSTITUTIONS AND HUMAN CAPITAL FORMATION. A POLITICAL ECONOMY ANALYSIS

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Esta obra se presentó como tesis doctoral en el Departamento de Ciencia Política y Relaciones Internacionales de la Universidad Autónoma de Madrid el día 26 de Marzo de 2007. El tribunal estuvo compuesto por los profesores doctores José Ramón Montero (Presidente), Julio Carabaña (Secretario), Carles Boix, Joan María Esteban y Jacint Jordana. La tesis obtuvo la calificación de Sobresaliente *cum laude* por unanimidad.

Dulce Manzano (Granada, 1974) es licenciada en Ciencia Política y de la Administración por la Universidad Complutense de Madrid y doctora en Ciencia Política por la Universidad Autónoma de Madrid. Formó parte de la duodécima promoción de estudiantes del Centro de Estudios Avanzados en Ciencias Sociales del Instituto Juan March de Estudios e Investigaciones, donde obtuvo el título de *Máster* en 2001. Durante el período 2002-2005 fue investigadora visitante del Departamento de Política de la Universidad de Nueva York (NYU, EE.UU.). Defendió la tesis doctoral en el Departamento de Ciencia Política y Relaciones Internacionales de la Universidad Autónoma de Madrid, bajo la dirección del profesor Adam Przeworski.

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To the memory of my brother-in-law Pedro
To Jeck

Chapter 1

Introduction

1.1 Research Question

Why do some governments pursue more ambitious investing programs in education than others? Under what conditions is the access to formal pre-university schooling secured to broad social sectors of the population? What political and economic factors explain the existing national differences in human capital accumulation? These are the questions that I attempt to answer in this study. The motivation behind them comes from an intriguing puzzle: while there seem to be powerful economic reasons for the adoption of human capital enhancing policies, yet we observe a great deal of variation in educational outcomes across countries and over time.

Human capital has long been considered one of the main sources of economic growth. Different theoretical approaches of economic growth treat human capital either as an additional production input or as a factor associated directly with the rate of innovation (Sianesi and Van Reenen 2003). Moreover, economists have also emphasized the presence of externalities from schooling (i.e. investment in human capital). Besides the private returns to education,

it is argued that increases in education generate certain social benefits that are not received by the direct investors. Skilled workers may raise the productivity of their less educated co-workers. Increasing the proportion of educated people in the workforce may also enhance the adoption of new technology. Individuals do not typically care about these spillover benefits when taking their educational decisions. Therefore, this type of market failure may lead agents to under-invest in human capital so that the aggregate level of education in the society may be lower than the socially efficient level. This has constituted one of the central economic justifications for government intervention in the provision of education (Poterba 1994; Sianesi and Van Reenen 2003).

Another important economic reason for the public support of education concerns credit market imperfections (Poterba 1994). When capital markets are imperfect and individuals thus face borrowing constraints in their educational choices, schooling is only available to those with a high enough amount of wealth. Even if individuals do incorporate in their decisions both the private and social gains of their education, they might not realize their investments due to the lack of resources. Thus the fact that lower-income groups cannot have a free access to credit against future earnings calls for political intervention to reap the economy-wide benefits and the potential for economic growth of increased human capital accumulation.

The importance of such market limitations hinges obviously on the existence of certain costs related with the acquisition of education. Although one may think that the direct costs of pre-university education are relatively small -since primary and secondary schooling is often free or greatly subsidized-, the opportunity costs (foregone income) are much more significant, especially in secondary level. It is then reasonable to claim that schooling decisions are partly affected by the economic burden entailed in the attainment of education.

These lines of economic reasoning are forcefully echoed by several international development organizations, which stress the beneficial role of education for high growth. The World Bank, the Inter-American Development Bank or UNESCO, among others, have undoubtedly backed the conventional wisdom that expanding basic schooling is a prerequisite for prosperity and will foster economic development (Easterly 2002: 72). In a similar vein, the policy reform package advocated by the so-called "Washington Consensus" includes prioritizing education expenditure over other types of public spending more oriented to consumption when governments need to reduce fiscal deficit (Williamson 1990).

However, despite all these international institutions' claims and the economic rationale for expanding the provision of education, the educational performance of countries varies considerably. As an illustration of the large cross-sectional variation, in 1990, the global distribution of secondary enrollment rates[1] has an average value of 52.12 percent with a standard deviation of 31.49 percent. And the actual range of national performance is fairly wide going from 4.9% (Tanzania) to 119.5% (Netherlands). If human capital accumulation is so good for growth, why is it the case that countries have not completely converged towards high levels of education results?

A rather evident factor driving partially such educational disparities is the wealth of the economy. The simplest explanation is that the amount of resources available in the society will determine how many people can acquire formal schooling as long as investing in education involves certain economic costs. Or it defines the economic constraints facing governments in their attempts to expand education.[2] Yet, even after taking per capita income into consid-

[1] These data are from the World Bank (*World Development Indicators 2000*). For a more precise definition of this variable (ENROLSEC), see Appendix B.

[2] One can also think in demand-side mechanisms. The increasing degree of industrialization and the services sector growth entailed in the process of

eration, there are still substantial differences that need to be accounted for. Figure 1.1 presents the magnitude of variation among country-year observations with alike levels of GDP per capita.[3]

As the figure clearly shows, the rate of secondary enrollment seems to be positively associated with average income: the higher the value of the latter, the greater the average percentage of young people enrolled in secondary school. However, the story does not end here. For a given level of income per capita, we usually observe a relatively sizeable degree of dispersion around its corresponding educational mean. For instance, when average income is between 5000 and 6000 dollars, the mean of enrollment is equal to 57% and its standard deviation 18%.

What are the causal forces behind these remaining differences in human capital accumulation? the argument put forward in this thesis looks at the supply-side of human capital and contends that education-enhancing policies, notwithstanding their efficiency consequences, need to be politically sustainable. They must be in the interests of the politically dominant groups in the society. The argument starts by recognizing that any government intervention aimed to increase human capital may have redistributive implications. It may benefit certain social groups at the expense of others.

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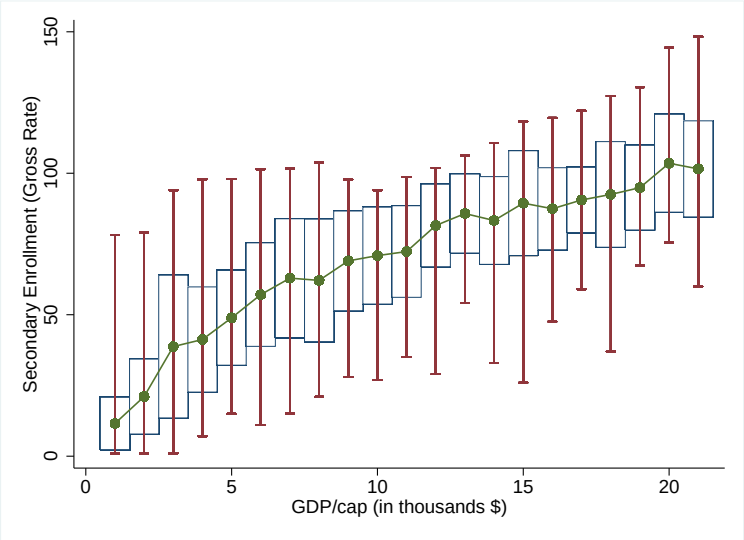
economic development have changed the individual preferences concerning the acquisition of education. The accompanied structural changes of the labor market result in a stronger link between education and job opportunities. Thus individuals would be more prone to invest in human capital so that they could improve their positions in the labor market (Shavit and Blossfeld 1993).

[3]The figure is a box plot where the dots refer to the mean values of each income interval. For each one-thousand dollars interval of GDP per capita, the box extends plus to minus one standard deviation from the mean; and the vertical lines expands to the maximum and minimum values. The last box includes the cases with per capita income greater than 20000$. Six Middle Eastern oil countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) are excluded -its inclusion would significantly drop the enrollment mean in the highest income intervals. See Appendix B, variable INCOME, for a definition of the GDP per capita data.

Figure 1.1: Variance of Secondary Enrollment by Per Capita Income



Note: Dot indicates mean values. Box extends plus to minus one standard deviation from mean and lines extend to maximum and minimum.

Even if increasing the number of educated people in the population creates positive externalities (i.e. gains that are captured by all individuals in the society), the distribution of the costs of such policy may generate net "losers" and "winners." Thus a potential conflict of interest may arise between different societal actors. Individuals, in that case, are likely to sustain divergent views about the policy to be implemented. In turn, if the would-be "losers" of that intervention possess effective power to determine public decisions, we should not expect that an educational-efficient policy, although desirable for the economy as a whole, will be adopted.

There are two questions we ought to answer in order to know when an educational promoting program is likely to be carried out. The first one concerns the preferences over policies held by the relevant political groups. To answer this question, this thesis follows the approach of the most important political-economy analyses of education (Saint-Paul and Verdier 1993; Perotti 1993; Fernandez and Rogerson 1995). The costs and gains derived from those public actions affecting schooling outcomes are assumed to be economic. Policy preferences depend on the economic positions of individuals and thus the relevant groups, potentially confronted, are defined by their income. The favorite policies of groups, the argument goes, are not fixed but they may change as certain conditions modify, particularly, income inequality and per capita income. These two economic factors will determine then the underlying structure of preferences and the nature of the political conflict. Unlike the previous analyses, this thesis argues that the effect of wealth inequality might be different depending on what part of the distribution the wealth dispersion occurs. It is not the overall configuration of the distribution what shapes individual choices but which social classes are impoverished or enriched as a consequence of the income spread. Simplifying the number of economic groups to be the poor, the middle-class and the rich, it is theoretically examined and empirically assessed the impact of increased inequality between these

three classes in pairwise comparisons.

The second question deals with the political method used to aggregate such conflicting preferences into public policies. In the absence of a benevolent educational planner, political institutions play a crucial role in the selection of proposals by distributing political power among the social groups in conflict. They will determine thus whether the demands of those sectors of the population against further expansion of education are politically accommodated. This thesis focuses on the most basic kind of institutions structuring the decision-making process, namely the nature of political regimes, and embraces a class-based model of politics. As discussed in the following chapter, the growing literature on the relationship between education and political regime examines the impact of the regime type based on a dichotomic category contrasting democratic and dictatorial systems. In this work, however, I further distinguish among dictatorships according to their ideological orientation. They are separated into two types: left-wing or "populists" dictatorships and right-wing ones. It is assumed throughout that the former maximize the welfare of the poor, while right-wing dictatorships principally accommodate the preferences of the wealthy. In line with the conventional political-economy approach, conflicts over policies under democracy are resolved by majority voting so that either the person who dictates policy is the median voter -who belongs to the middle class- or the winning coalition encompasses the middle class as a member.[4]

By affecting the balance of power between social classes, the impact of political regime on policies and educational outcomes is expected to change with economic conditions. Political institutions is argued not to exert a direct and constant effect but an indirect and conditional one. Given that first the preferences of social groups hinge on per capita income and income inequality

[4]See next chapter for a theoretical justification of this institutional classification.

and, second, institutions determine which group gets its demands converted into public policies, the causal mechanism proposed in this thesis -through which regimes influence schooling outcomes- is that institutions shape the educational responses of governments to shifting economic states. Hence the impact of the regime type is conditional on per capita income and economic inequality.

In sum, this study offers an unified account centered around the general idea that the wealth of the economy and its distribution among social classes interact with political institutions to produce different patterns of education. Depending on the joined configuration of these factors, different expectations regarding policy and educational results arise. The substantial differences in human capital outcomes shown above could be partly explained then by the variation in economic and institutional conditions. The key initial assumption concerns the redistributive nature of those policies affecting human capital accumulation, making societal actors hold different views of the proper policy.

1.2 Plan of the Study

This thesis is organized as follows. Chapter 2 presents a review of the main accounts given to the more general question of the aggregate educational performance of countries and, in particular, to the relationship between political regimes and human capital. It also presents the central building blocks of the proposed argument and stresses their analytical relevance in view of the theoretical and empirical gaps of the literature. Two existing strands of research are directly related with this work. The first one comprises several studies on the political economy of education that have examined the effect of certain economic factors on the political equilibria, reached in democratic systems, with respect to education-related policies. Even though they acknowledge the existence of preference heterogeneity around the collective educational choices, they do

not explore whether different institutional mechanisms of conflict resolution produce political equilibria with divergent consequences for educational outcomes. The second strand of research deals directly with the impact of political regimes on human capital. Its main flaw, however, is that their explanations implicitly ignore the redistributive effects of human capital accumulation programs.

Chapter 3 is devoted to the formal analysis of the argument. Various interaction mechanisms are formally examined, generating a series of specific hypotheses to be tested. It takes as a point of departure the main models of the political-economy literature on education (Saint-Paul and Verdier 1993; Perotti 1993; Fernandez and Rogerson 1995). These models attempt to disentangle how wealth inequality and per capita income influence total investment in human capital under an institutional scenario in which redistributive policies are made by majority vote. By examining these models, the purpose of this chapter is to analyze their implications for other institutional frameworks. In other words, it tries to extend their logic to non-democratic institutions and derive some clear-cut predictions with which to make comparisons across types of regimes. An additional extension of these models, carried out in this chapter, is an evaluation of the differential impact of inequality increases in different parts of the income distribution.

To empirically test the predictions from the formal analysis, Chapter 4 introduces a new database on the ideology of dictatorships for all dictatorial regimes from 1960 to 1996. Based on several indicators about the ideological preferences of autocratic governments, a procedure is built to consistently classify them according to whether dictators are located on the "left," "center," and "right" of the left-right continuum. From secondary sources, several indicators are founded concerning 1) the ideological orientation of the dictator and his ruling party, and 2) the policies that are orthogonal to the domestic policy space. After discussing various problematic cases in which these indicators do not point to the same conclu-

sion and justifying the decisions regarding them, it is offered some descriptives of the data.

Chapter 5 tests with quantitative data the empirical validity of the theory. Using different econometric models, it checks the causal links whereby regimes shape human capital investment and assesses the conditional impact of political institutions. Two separate empirical analyses are carried out. First, by exploiting the over-time variation of the data, it is examined the effect of the regime type conditional on per capita income. Second, the interactive hypotheses regarding economic inequality, per capita income and political institutions are tested using time-series as well as cross-sectional variation. The findings obtained through these analyses come eventually to discriminate among the various formal models, which propose distinct political economy mechanisms relating redistributive politics and educational outcomes. Finally, Chapter 6 summarizes the theoretical contribution of this thesis and its main empirical findings.

Part I

Theory and Predictions

Chapter 2

The Institutional Link

As claimed in the introduction to this thesis, understanding the divergent educational patterns of countries requires a comprehensive explanation based on the interaction between political institutions and those factors shaping policy preferences. On the one hand, given some primary interests of individuals like maximizing income, economic conditions determine the distributional consequences of policies and thus individual preferences over them. On the other hand, political institutions shape the balance of power among conflicting interests. Therefore, to derive testable predictions about human capital programs and, accordingly, about educational outcomes, we need to take the combined effects of these two dimensions into consideration. Or put it in another way, the effect of one cause depends on the other one. Unless one of the dimensions is fixed, say the type of political institutions, we cannot be certain about the relationship between education and, for instance, income inequality.

In this chapter, I discuss the potential explanatory power of this approach and its contribution to the existing literature related with the research purposes at hand. The next section examines those explanations that link the level and the distribution of wealth to ag-

gregate educational outcomes. It argues that these accounts fails to offer a complete account of human capital accumulation because an important cause, political institutions, is missing from their comparative statics. This section also presents a theoretical justification for the proposed classification of political regimes into democracy, left-wing and right-wing dictatorships. Finally, in Section 2.2, I review the main arguments given, mostly from the political science literature, to the relationship between political regimes and education. As shown below, my theoretical approach differs from these studies in two relevant aspects: first, my perspective emphasizes the redistributive nature of the educational enhancing policies and examines the potential struggle that may surface among social classes over the policy to adopt. Second, it suggests a fine-grained classification of non-democracies according to their ideological orientation, which is taken as a proxy of the regime's core social bases of support.

2.1 A Political-Economy Rationale for the Causal Role of Political Institutions

Economic development and wealth inequality are frequently proposed as candidates to determine a society's aggregate investment in human capital. Per capita income (used as a proxy of economic progress) is always argued to exert a positive effect on education -an effect that has been indeed corroborated by a number of empirical studies.[1] The predictions concerning inequality as well as its causal mechanisms have been, on the contrary, much more controversial.

Besides the simple idea that wealthier countries can more easily expand education -because for instance state bureaucracies must be developed enough to establish an effective system of public

[1] see Lake and Baum (2001), Pineda and Rodríguez (2006), Brown (1999), Mingat and Tan (1998) Perotti (1996), and Dasgupta (1993).

education-, some scholars put forward more elaborated arguments about the underlying mechanisms through which development enhances the educational prospects of society. Galor and Moav, in their 2006 paper, build a theory based on the assumption that a capital-skill complementarity exists in the production process. The relative importance of human and physical capital as engines of economic growth changes with the increasing industrialization of the economy. In the early stage of the industrialization process, the returns of human capital formation are lower to those of physical capital. Economic growth relies essentially on the accumulation of the latter and human capital plays a limited productive role. In later phases of development, the increased capital accumulation raises the importance of skilled labor in production due to the existence of a capital-skill complementarity. Improving the skills of the workforce becomes essential for sustaining profit rates and economic growth. The positive effect of human capital on the productivity of physical capital in more developed countries induces capitalists "to support universal publicly financed education....The support for public education is unanimous among workers and capitalists who carry its prime financial burden" (2006: 86).[2]

[2]The historical evidence these author provide in favor of their theory suffers, however, some inconsistencies in relation to their own argument. They examine the various educational reforms that took place in some Western nations (England, France, Prussia and the United States) during the different phases of the Industrial Revolution. Although the above theoretical account seems to explain well the evolution of educational public programs within countries, it is less compelling as an explanation of the national differences in education observed specially at the beginning of the period. During the early decades of the nineteenth century, Germany, France and North America were far ahead in promoting public education than England despite its economic and industrial leading position. Faced with this paradoxical historical evidence, Galor and Moav use ad-hoc reasons to account for the former expansion of education in less-industrialized European countries. Social control, religion or national cohesion are brought into play as the underlying motives of rulers to promote education in nations with relatively industrial backward positions.

In an attempt to understand the growth of the public sector in the last century, Boix (2001; 2003 chapter 5) proposes a similar line of reasoning when studying the role of the state in the provision of public education. Echoing the modernization theory, he contends that the broad process of economic development induces policy-makers to supply certain public goods such as infrastructures and skill formation. "At very low levels of (per capita) income, public investment increases the marginal productivity of labor either very slightly or not at all...However, beyond a certain income threshold, an increase in the provision of collective goods and public investment has strong effects on the productivity of factors" (2003: 177). Thus, governments will systematically respond to rises in per capita income by expanding public schooling.

However, even though human capital accumulation may generate larger economic gains as countries grow, we should not conclude that politicians automatically increases education neither that all citizens reach a consensus over a policy fostering skill acquisition. This will be determined by the other side of policy: the distribution of its costs. Given a certain allocation of the financial burden entailed in the design of educational programs, it is reasonable to think that those individuals who bear a greater share of the costs may prefer a more limited state intervention. Moreover, as will be shown in the next chapter, the magnitude of such costs from the standpoint of different groups might change depending on other factors such as wealth inequality. Hence in order to predict political preferences, we should examine the conditions under which the benefits of education-enhancing policies outweigh or not their associated costs. There are no a priori reasons to expect that the net effect of these policies in more developed countries is positive for all citizens. It is possible that, under some inequality configurations, relative wealthier groups oppose extending the access of schooling to lower-income groups albeit it generates social externalities. Suppose that the former groups have effective power to

impose their preferences, inequality will be then an intermediary variable conditioning the responses of pro-wealthy governments to economic development. This more promising story is in fact more consistent to the stylized facts portrayed in Figure 1.1 (in the introduction to this thesis) according to which, for a given level of per capita income, a lot of variation remains among country-year observations of secondary enrollment.

As stated above, the predictions and causal channels of the impact on aggregate education of inequality have been the subject of much debate. In a very influential work, Galor and Zeira (1993) stressed a purely *economic mechanism* leading to the hypothesis that equality promotes total investment in human capital. When capital markets are imperfect and agents face borrowing constraints, investment depends upon individuals' wealth. Keeping everything constant, a more equal distribution of resources will help the less affluent groups of society to invest in education, and thus one should observe a positive relationship between economic equality and human capital accumulation. Yet if there are fixed costs of education, the empirical validity of this expectation might be limited to wealthy countries as first claimed by Perotti (1993). More concretely, he suggests the idea that opposite patterns of income distribution are conducive to human capital accumulation at different levels of per capita income. When the economy has sufficient resources to finance the education of all social classes, equality is expected to increase total investment in education. But in poor societies, a higher dispersion of the few existing resources may impede the rich (the potential investors in the economy) to invest in human capital. It might be necessary then a certain degree of wealth concentration for some individuals to be able to pay the fixed cost of education.

Several empirical studies at country level have corroborated the existence of a negative association between income inequality and education. Using the share of the middle class (share of quintiles

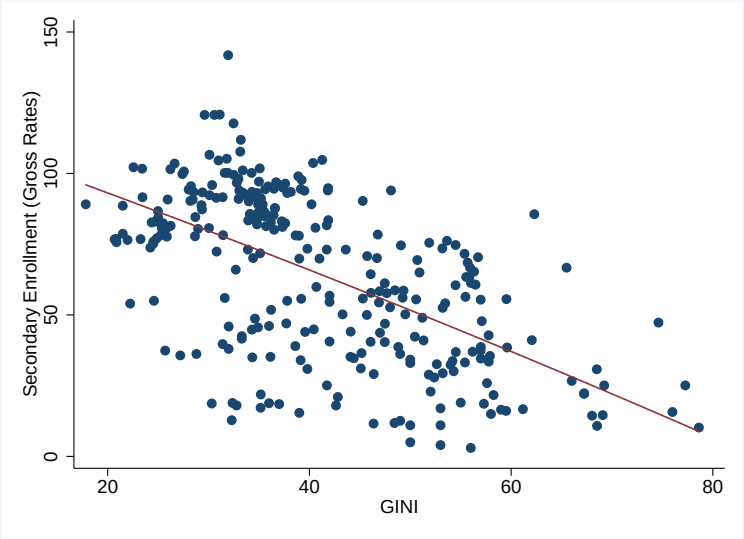
2-4) as a measure of equality, Easterly (2001) finds that secondary and tertiary enrollment expand significantly as this share increases. In a more recent article, Easterly (2006) observes again that inequality (measured with the share of the top quintile and the Gini coefficient) tends to reduce the size of secondary enrollment rates. In line with the previous qualifications to the expected impact of equality, Perotti (1996) provides evidence showing that the positive effect of the share of the middle class (share of quintiles 3-4) is stronger in more developed economies. A graphical inspection of the association between gross secondary enrollment (ENROLSEC) and the Gini coefficient (GINI) appears to confirm that there is indeed a negative relationship between these two covariates. As seen in Figure 2.1, the higher the degree of inequality, the lower the educational performance of countries.[3]

The influence of inequality in education is unlikely to run exclusively through economic or market mechanisms. Government policies, either in the form of direct provision of education or redistributive transfers, have certainly a large impact on the educational patterns of nations and may counteract the effects of increasing inequality. After all, education specially pre-university schooling is publicly financed in most countries. If the initial income distribution shapes the incentives of policymakers to carry out educational expansion programs, as argued in this thesis, an additional *political mechanism* is missing in the explanation. Figure 2.2 shows the same correlation between inequality and secondary enrollment as before but for the sample of democracies and non-democracies.[4] As the fitted curves indicate, while inequality reduces monoton-

[3]For a definition of these variables and a description of the sources, see Appendix B. This figure is based on the pool sample of all country-year observations for which data on both variables are available.

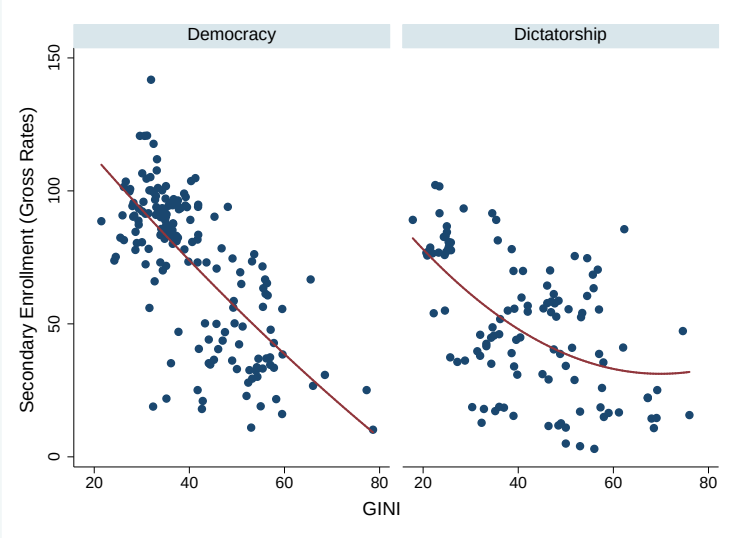
[4]The indicator used to distinguish political regimes (REGH) is a dummy measure of democracy developed by Przeworski, Alvarez, Cheibub and Limongi (2000). The lines in the graph show the predictions of enrollment based on a quadratic regression of this variable on the Gini coefficient.

Figure 2.1: Inequality and Secondary Enrollment



ically predicted enrollment under democratic institutions, we see that the negative effect of the former wanes at higher values of the Gini coefficient in non-democracies. If the causal channels of the relationship between inequality and education were only economic then this association should be the same under all institutional settings. The fact that it changes with the political regime in place tells us that there must be other political forces mediating the impact of inequality. In short, albeit these differential patterns may not reflect causal associations, still they offer some preliminary information justifying the presence of some political mechanisms at work.

Figure 2.2: Inequality and Secondary Enrollment by Political Regime



There have been significant efforts aimed to elucidate the political economy reasons underlying the effect of inequality (Saint-Paul and Verdier 1993; Perotti 1993; Fernandez and Rogerson 1995).

Building on the median voter model of politics, Saint-Paul and Verdier (1993) came to the conclusion that inequality is expected to be positively related with education via the increased pressure for redistribution. This model conceives public education as a tool for redistribution. The size of the publicly allocated education among the citizenry is collectively decided by majority voting and thus it reflects the preferences of the median income. As a mean preserving spread of income makes the median voter poorer, she will want a higher degree of redistribution and thus inequality will be translated into more government expenditure on education. However, the "facts" displayed in Figures 2.1 and 2.2 are hard to reconcile with this argument.

Based on a majority voting decision rule as well, but adopting different modeling strategies with regard to the education-related policies, Perotti (1993) and Fernandez and Rogerson (1995) came to different conclusions. The main implication of these models is that per capita income determines the direction of the impact of inequality: it is hypothesized to be positive among poor economies but negative in rich countries.

These two studies claim that the relationship between inequality and education is contingent on the level of economic development. By keeping the institutional framework constant, they focus on a "one-level interaction effect" between purely economic variables. More importantly, the political-economy mechanisms they examine center around the preferences over taxation and redistribution of the decisive voter (or the winning coalition) of democratic institutions and how the economic structure shapes these preferences. This, however, raises the question that if there are conflicting interests around policies, something assumed in these models, then who decides policies will have a major impact on final outcomes. Thus the predictions regarding the interactive effect of inequality and per capita income may change if the interests of individuals other than the median voter are protected in the political process. A

potential source of variation of the dependent variable is therefore omitted from the analysis, namely those factors determining the distribution of power between the politically relevant groups. To fulfill this gap and offer a more comprehensive account of the educational patterns of countries, this thesis brings the role of political regimes to the fore. The type of political regime, according to the proposed argument, is the key feature of constitutions defining the political weight of societal actors.

There is a prominent tradition in comparative politics arguing that the political institutions structuring the decision-making process have important implications for the allocation of power among social groups. From Aristotle to the Founding Fathers, democracy was viewed as the government of the poor, opposed to an oligarchy in which political power is controlled by the few rich. In line with this reasoning, J.S. Mill argued that:

> The egalitarian threats of mass society and democratic mass politics....would necessarily lead to tyranny and "class legislation" by the propertyless, uneducated majority. (J. S. Mill, quoted in Franzese 2002: 8).

Karl Marx also declared that:

> [Democracy is] a political form that....exacerbate[s] social contradicions by withdrawing political guarantees from the socially dominant and giving political power to the subordinate. (Karl Marx, quoted in Franzese 2002: 8).

In more contemporary studies of democratization, political systems have also been connected with the class structure of society by emphasizing the social forces leading to democracy and the social basis of nondemocratic regimes. Barrington Moore, in a very influential book about the *Social Origins of Dictatorship and Democracy* (1966), explained the three "paths to the modern world" (democracy, fascism and communism) as the result of the organization of

the agriculture-based groups and their interaction with the commercial interests. The strength of the bourgeoisie and the middle class is the key factor behind the emergence of democratic systems. Although embracing a similar approach, Rueschemeyer, Stephens and Stephens (1992) stressed the role of the working classes in forcing transitions to democracy. When the political power of lower-income groups increases, which is associated with greater capitalist development, the likelihood of democratic regimes rises as well.

In this thesis, political institutions are viewed first and foremost as a method of aggregating conflicting preferences to arrive at social choices favoring certain groups over others. This view resembles the approach of the recent political-economy analyses on the choice of regimes (Boix 2003; Acemoglu and Robinson 2006). Drawing their substantive roots from the previous literature, these models offer a more formal treatment to the groups' preferences over the type of political institutions as well as to the political dynamics in each regime. In democracies, public decisions are set by the majority voting rule and everybody votes on policies. Accordingly and as long as individuals have single-peaked preferences in a one-dimensional policy space, the median voter theorem tells us that the winning proposal corresponds to the ideal point of the median voter. With political parties, this theorem predicts also a convergence of the policy platforms announced by parties toward the preferred proposal of the median voter. Either in a Downsian model of political competition -where parties care only about winning elections- or in a model á la Wittman -where parties care about the interests of different constituencies as well-, politicians of different political stripes have incentives to offer the ideal policy of the median voter, provided that they have certainty about the behavior of voters (Roemer 2001).

Under this formalization of democratic politics, the identity of the median voter hinges on the number of groups and their proportions in the population. When the politically relevant groups

are the poor and the rich, and the former constitutes a majority of the population, the decisive voter is a poor agent and thus democratically-reached choices are determined by the interests of the poor. Yet in more realistic analytical frameworks where the middle class forms a distinct political actor participating also in the decision-making process, the median voter is a member of the middle class if neither of the three social classes represents a majority proportion greater than one half in the population.[5] In the formal models examined in this thesis, this latter framework is generally assumed implying therefore that democratic institutions allocate political power in favor of the middle class.

The conventional modeling approach of nondemocracies tends to see dictatorships as an unified category defined by the absence of the majority rule in which an "oligarchy" of rich individuals dictate policies (Acemoglu and Robinson 2006; Wacziarg 2001; Bourguignon and Verdier 2000). For instance, Acemoglu and Robinson presume that nondemocracies, "instead of representing the wishes of the population at large, they represent the preferences of a subgroup of the population: the "elite"....nondemocracy is generally a regime for the elite and the privileged." (2006: 17-18). Moreover, although these authors do not a priori associate the nature of the elite to any social traits or cleavages, they focus almost exclusively on models in which the elite is identified with the wealthy. They actually assert that "there is often a close association between what nondemocratic regimes do and what the rich want" (2006: 119).[6]

[5]This framework is also more consistent with the idea that "the presence of the middle class may act as a buffer between the rich and the poor" (Acemoglu and Robinson 2006: 274) increasing the occurrence of consolidated democracies. This is so because when the median voter belongs to the middle class, the redistributive pressures of democratic politics diminishes and, as a consequence, the rich are more willing to concede democracy.

[6]Truly, they later subject this statement to the qualification that the poor sectors of society may establish under certain conditions effective constraints on what these regimes can do.

Yet, understanding dictatorships as political systems that represent systematically the interest of the rich seems very far-fetched. There are cases that certainly indicate the opposite. Perhaps the most outstanding experiences against this view would be the Communist regimes. However, the list of "left-wing" dictatorships does not end here. In many African countries, the ruling party or the dictator has endorsed platforms with clearly socialist or leftist tenets. This pattern is evident, for example, from the statements made by party congresses during the tenures of Neto and dos Santos in Angola, Kerekou in Benin, Machel and Chissano in Mozambique or Nyerere in Tanzania. In Latin America, we find also examples of dictatorships advocating leftist programs like the regimes established under Velasco Alvaredo in Peru, Ortega Saavedra in Nicaragua or Torrijos Herrera in Panama. For instance, the military-dominated administration of Velasco Alvaredo (1968-1974) approved the Plan of the Revolutionary Government of the Armed Forces aimed at a "Social Proprietorship" in which all enterprises would be either state or worker-owned and would be managed collectively (Banks *et al.* 1997: 659). The list goes on and on including countries all over the world. Actually, in a worldwide sample of all country-year dictatorships from 1960 to 1996, the percentage of leftist governments turns out to be higher, 46 %, than that of right-wing regimes, 36% (see Chapter 4, Section 4.4).

More consistent with this evidence, the theory of political transitions proposed by Boix (2003) starts from a class-based distinction of dictatorships according to which there are two types of nondemocratic systems controlled either by the poor or by the rich. In a "right-wing" autocracy, the wealthy impose their optimal policies and repress the poor while in a "left-wing" dictatorship the poor "rule after expropriating all the wealthy's capital." (p. 23). However, although he theoretically examines the conditions under which each type of political institution (democracy, right-wing and left-wing dictatorship) is more likely to occur, he does not empirically

distinguishes among non-democracies when testing the hypotheses with the data. More important for our purposes, when he analyzes the distributive consequences of institutions via an empirical examination of the size of the public sector, he merges all dictatorial cases and, in line with the conventional approach mentioned above, assumes that all of them serve the interests of the most affluent groups of the society.

The classification of institutions used in this thesis separates political systems depending on who controls decision power. From a class-based model of politics, conflicts over public decisions under democracy are resolved by majority voting so that the person who dictates policy is the median voter -who is also the median of the income distribution. Dictatorships are divided into two types: left-wing or "populists" dictatorships and right-wing autocracies. It is assumed throughout that left-wing dictatorships maximize the welfare of individuals who are poorer than the person with the median income, while right-wing dictatorships maximize the welfare of individuals who are wealthier than the mean income in the economy.

One may justify this classification of regimes as follows. Suppose that there are two political parties distinguished by their ideology. One is on the left protecting the interests of the poor. The other is on the right advancing the welfare of the rich. Under democracy, as both parties need to appeal to the median voter in order to win elections, they confront electoral constraints that lead them to moderate their positions toward the median income's ideal policy. By contrast, in dictatorships they do not encounter such constraints. They can implement their favorite policy without risking any electoral prospects. As a result, it is more likely that under nondemocratic institutions they will consider just the interest of their own constituencies when making decisions.

The presence of electoral constraints is, therefore, the key dimension to distinguish democratic from nondemocratic regimes. Thus, if other constraints on rulers are equally binding in any type

of regime, dictatorships are less restricted in their choices of policies. This and the assumption that politicians are perfect agents of social classes lead naturally to the proposed ideological distinction of dictatorships.[7]

Based on a new dataset that I have created about the ideological orientation of dictatorships (see Chapter 4), this thesis contributes in understanding the empirical implications of different ideological types of nondemocratic regimes for educational outcomes. Summarizing, the present work tries to cover two important gaps of the literature just reviewed. On the one hand, it is argued that the nature of political institutions constitutes a key variable in any complete account of human capital accumulation since it determines the relative political weight of individual preferences during the decision process. Albeit there could be other mechanisms in the explanation of why political regimes make a difference for educational investment,[8] here I concentrate and explore the causal link about the distribution of power among the social groups in conflict. On the other hand, in an attempt to overcome the shortcomings of the standard political-economy approach to dictatorships, I incorporate the ideological positions of autocratic regimes in the theoretical and empirical analysis.

[7]Certainly politicians may have personal interests such as maximizing their rents that, in the absence of accountability institutions or electoral controls, may induce them to ignore the welfare of their own constituencies. This may distort the expected policy implications of different regimes when politicians are assumed to be perfect agents of social groups. Yet my interest is to see to what extent the view of institutions as a method of allocating political power among conflicting social groups helps to explain the cross-country and over-time variation of aggregate educational outcomes.

[8]The next section reviews the main alternative mechanisms of the relationship between political regimes and education that have been suggested in the literature.

2.2 The Type of Political Regime and Education: An Overview of Existing Accounts

The relationship between political regimes and education has been the subject of several investigations. Even though it has been studied from different perspectives, the existing research points generally to a positive association. Democracy is argued to be positively related with the aggregate education level in the population. A first distinction of the studies dealing with institutions and human capital could be established along the lines of the causal direction they emphasize.

There is first a body of research within the broader modernization theory that explores the effect of increasing education on the incidence of democracy. The basic story, advanced by Lipset (1960), is that the process of development and industrialization advances the level of education in the population -among other democracy-encouraging forces. In turn, a better-educated population develops a kind of outlook more culturally compatible with democratic practices. Education triggers a change of individual values more in accordance with democratic attitudes such as a higher level of toleration toward different political views. Besides showing the theoretical weaknesses of this account, some scholars have provided empirical evidence to the contrary (Acemoglu, Johnson, Robinson and Yared 2005). Perhaps the most rigorous econometric analyses against the main hypothesis of the modernization theory -the one that relates economic progress to the emergence of democracy- are Przeworski and Limongi (1997), and Przeworski *et al.* (2000). In both studies, these authors challenge this hypothesis by showing that the strong correlation between democracy and development that systematically appears in the data is due to the positive effects of per capita income on the stability of democracies and not on the odds of democratic transitions.[9]

[9]See Boix and Stokes (2003) for recent supporting evidence of the "endoge-

The second strand of research is directly related with the purposes of this thesis. Based on a dichotomic classification of political regimes, its principal goal is to evaluate the impact of institutions on educational outcomes. Although the main contributions within this literature stress slightly distinct mechanisms, the overall conclusion is that democracies tend to carry out more ambitious educational programs. Basically, these arguments can be grouped into two main building blocks. In the first place, there is an argument about the virtuous effect of democracy rooted in the recurrent idea that democratic politicians are less insulated from citizens' demands than their autocratic counterparts (Brown 1999; Lake & Baum 2001). Even though these studies do not embrace a conception of democratic politics in which citizens select directly the policies -as in standard median voter models-, they still conceive the vote as an instrument in the hand of citizens to somewhat guide government affairs. Elections compel politicians to take the preferences of citizens into consideration when setting public policies. As long as policymakers need the support of a majority of voters to enter or stay in the government, the former put into practice certain policies as a strategy to build electoral coalitions of support. Now educational policy can be manipulated to that end, and the more comprehensive it is, the higher the electoral pay-off.

In contrast, dictatorial regimes lack institutional incentives that could induce rulers to meet social demands. As there is not any institution that makes the political survival of dictators dependent on the consent of people, it is commonly asserted that they are more insulated from the pressures of social groups and thus less likely "to shift resources toward education in respond to popular demands for educational opportunity. To the extent that society demands subsidized primary education, a less insulated state is more likely to increase the level of educational opportunity available to its citizens." (Brown 1999: 684). Hence democratic regimes are

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nous democratization" view claimed by the modernization theory.

expected to have higher educational profiles than dictatorial ones.

The fundamental problem of this theory is that it implicitly assumes that voters share similar preferences over the desired level of public educational provision. The fact that all individuals may want to increase their own human capital, it does not follow that they agree on enacting a particular educational policy or a specific tax-subsidy scheme. As already maintained, the redistributive nature of education-enhancing public plans leads to a distributional conflict between social groups in which they hold opposing views about the degree of state intervention in facilitating human capital investment and about the fiscal burden needed to finance these state programs. Once we recognize the presence of the distributional tensions around educational policies, a set of questions arises immediately, what are the relevant societal actors in confrontation? what are their preferences? How do these preferences change when the design of education-related policies or other important conditions such as income inequality change? These questions will be answered in the next chapter through an examination of several political-economy models that acknowledge the existence of individual heterogeneity.

Another problem of such theory is that it presumes not only that citizens sustain similar preferences but also that they always demand a larger size of educational public provision. Unless we are willing to accept that policy preferences are exogenous and do not vary with economic conditions, it is reasonable to think that social groups adjust their favorite policies to different political economy contexts. In the next chapter, we will see how per capita income and economic inequality are important exogenous factors that condition individuals' most desired government action.

The final point deals with the kind of political regimes' effect proposed by the theory grounded on the idea of the insulation of dictators. This theory implies a direct effect of political institutions. In econometric terms, this means that the variable of regimes en-

ters into the equation independently of other causal factors. The theoretical argument stresses an accountability mechanism, which entails the existence of a conflict between politicians and voters. Assuming that citizens desire always a high level of public education, democracy compels politicians to respond to these demands. In turn, autocrats do not face any electoral constraints that could motivate them to accommodate such social pressures. Therefore, the empirical implication of this hypothesis is that the type of regime influences educational outcomes directly and independently of the rest of causes. The indicator of political institutions therefore constitutes an independent variable that, in the case of a dichotomic measure, changes the intercept of the regression line.

My argument, however, stresses a power-distribution mechanism among the social groups in conflict. Political institutions determine outcomes by allocating political power between conflicting interests. It follows logically that it is not possible to draw predictions regarding the relationship between democracy and education that can be applied across the board regardless of particular conditions. Since the policy preferences of groups are not exogenous but change with per capita income and inequality, as claimed above, then the impact of political regimes may vary with these conditions. The implications for econometric modeling is that the institutional variable interacts with other factors and that institutions exert an indirect effect on educational outcomes.

The second type of explanation within the literature that points towards a positive impact of democratic regimes starts from the assumption that public education serves as an instrument of redistribution from the rich to the poor (Wacziarg 2001). Accordingly, lower-income individuals would rather larger educational subsidies than relatively more affluent agents. Using a democratic method of collective decisions would result, thanks to the political competition, in the adoption of the most preferred policy of the median voter -who is the median income. On the contrary, dictato-

rial regimes tend to approve those policies that benefit the well-off groups. Hence the conclusion that the democratic nature of institutions promotes human capital accumulation. However, it is very unrealistic to presume that the wealthy always dictate policies under dictatorships. As discussed above, there are autocratic experiences in which dictators appeal to the poor as their bases of support and openly maintain ideological positions more in accordance with the interest of the less affluent sectors of society. Another shortcoming of this account is that individual policy choices are not revised when the economic context changes. It is assumed that individuals hold the same policy views independently of economic conditions.

From a historical perspective, Lindert (2004) offers a similar explanation. In an attempt to account for the unlike historical paths followed by the Western countries in extending formal education to the masses, he argues that the extent of government decentralization and the presence of democratic institutions are the key causal factors. Yet the effect of these two variables is contingent on the degree of economic development of nations since it determines social demands for public schooling.

At early stages of development, citizens are not particularly concerned with getting some formal education. Thus whether politics is open to most social groups or decentralized to local units is something irrelevant for education policy. Schooling enrollment will be very low either because the authoritarian political elite does not wish to extend education to middle and poor income groups or because most ordinary citizens in a democracy do not defend a public and universal educational provision.

Only when countries take off, one may expect that these political factors would unchain their influence on public schooling. As the economy develops, the level of education attained by agents becomes a valuable asset in the market and a primary source of income. Consequently, citizens start to demand a deeper involvement of government in the provision of education. The fact that

institutions are open to the political voice of these groups may positively alter the degree of accommodating the social pressures on the public education system.

In sum, the main limitations of the existing studies about the causal role of political institutions in human capital accumulation are that they usually ignore the heterogeneity of citizens preferences around educational policies or, when they do consider the distributional consequences of such policies, these studies tend to picture nondemocratic regimes as political organizations that exclude systematically the poor sectors of society. The theoretical arguments developed in the next chapter tackle these substantive limitations.

Chapter 3

Tracing the Impact of Political Regimes

In this chapter, I present the formal argument of this thesis. I first layout the three main models of the political-economy literature on education (Saint-Paul and Verdier 1993; Perotti 1993; Fernandez and Rogerson 1995) that elucidate how redistributive politics under democracy determines aggregate investment in human capital. The purpose of this chapter is to analyze the theoretical implications of these models for other institutional frameworks. It extends their logic to nondemocratic institutions to derive predictions with which to make comparisons across types of regimes.

In the absence of a common good, any solution -democratic or not- to the heterogeneity of interests around policies entails a particular distribution of policy costs and benefits. Since the choice of policies creates distributional conflicts, competing groups have strong incentives to use all resources at their disposal to shape such distribution to their advantage. Thus the relative strength of social groups in the political process have a major impact on final outcomes. If the type of political regime shifts the balance of power among these groups or resolves who dictates policies as

argued in the previous chapter, political institutions should play a crucial role in explaining why some governments implement more ambitious education programs than others.

From this causal mechanism, we cannot generate however hypotheses about regimes and human capital without knowing the policy preferences of agents. It is not possible to draw a general theoretical expectation regarding the relationship between institutions and human capital that can be valid across distinct relevant situations. Since institutions determine which group sets the policy, the effect of regimes on educational outcomes depends on the preferences of the particular group in power. In turn, these preferences are likely to change with certain conditions. In the formal models analyzed below, it is examined how per capita income and wealth inequality influence on the utility of individuals and therefore on their most desire education-related program. Only if it is known the exact state of these two exogenous factors, we can define the structure of individual preferences and accordingly develop hypotheses about the expected education outcomes in different institutional scenarios. In addition, as agents adjust their optimal policies to changes in conditions, then the expected policy and its subsequent results in human capital accumulation under a particular institutional framework will alter accordingly.

An expanding program of formal schooling may have distribute consequences that not always go in the same direction. In some specific contexts, a policy aimed to promote the accumulation of human capital may induce a distribution of resources from the rich to the poor. Yet, in other contexts, increasing the rate of human capital stock may require a concentration of resources in a small sector of society so that at least some individuals can afford the costs of schooling. It will be shown below that the precise direction of the redistribution implied by the education-enhancing policy hinges on various pieces: the policy design affecting human capital, the presence of fixed costs of education, and the economic conditions under

which policies are taken.

But human capital accumulation may also produce social benefits that can be grasped by all individuals including the non-educated ones. For instance, as mentioned in the Introduction to this thesis, a better-educated population may speed the adoption of new technologies or skilled workers may raise the productivity of their less educated co-workers. Do these side-effects of human capital alter the nature of the distributional conflict around education-related policies? The answer relies on whether agents internalize such gains, that is, whether they incorporate these spin-off benefits in their utility function. The second model examined in this chapter does this by assuming the existence of externalities. As will be seen, the fact that education creates positive externalities does not eliminate the possibility that a policy conflict emerges. Individuals, when defining their induced-policy preferences, will assess whether the gains obtained from allowing other groups to get educated compensate the costs associated with such educational-enhancing program. But certainly there are scenarios in which those groups bearing to a large extent the fiscal burden of policy are more willing to promote human capital accumulation precisely because of its positive externalities.

A final point about the assumptions of the formal models is worth noting. Educational choices of individuals are driven completely by economic forces. The costs and benefits of schooling are assumed to be exclusively economic. In particular, in the last two models examined below, it is assumed that the gain from education takes the form of increased earnings and that there are some fixed costs of education that may prevent certain income groups from investing in human capital. Moreover, these models assume that the benefits of education are higher than its costs, and thus the unique force determining whether individuals get educated is whether they have sufficient funds at their disposal. To simplify the modeling of individual educational decisions, cultural or other

demand-side factors that could shape agents' schooling choices are not considered in the formal models.

This chapter is organized as follows. The next section examines a formal model that rests on the standard view of redistribution along the lines of Meltzer and Richard (1981) but in which the instrument of redistribution is public education instead of income transfers. Section 3.2 focuses on a model which emphasizes the role of human capital externalities in determining the equilibrium size of government redistribution when individuals are liquidity-constrained and face both imperfect capital markets and fixed costs in their educational investments. Section 3.3 highlights the excludability of educational subsidies. The model considered in this section analyzes the political-economy factors that explain human capital accumulation when public expenditure on education can be targeted towards certain income groups. Finally, section 3.4 concludes with a comparison of the predictions obtained across models.

3.1 Public Education as an Instrument of Redistribution

The first model analyzed is the one from Saint-Paul and Verdier (1993).[1] the main purpose of this model is to question the conventional idea that the combination of democracy and inequality is bad for growth. According to the standard approach, when collective decisions are taken through majority voting and income distribution is rightward skewed, the decisive voter will favor certain redistribution of wealth, generating adverse incentives for investment. By considering a model in which the instrument of redistribution is public education, Saint-Paul and Verdier come to the conclusion that even if increased inequality may imply pressures for higher

[1]Saint-Paul, G., and T. Verdier. (1993). "Education, Democracy and Growth." *Journal of Development Economics* 42: 399-407.

taxes, this policy does not need to have an undesirable effect on growth. In fact, whenever the proceeds from taxation are used to fund public education -increasing thus the stock of human capital- income inequality might promote growth instead.

The structure of their model is the following. Consider a non-overlapping generation model in which an individual i of generation t lives one period and has one child. There is a continuum of agents within each generation, and total population in each generation is normalized to 1. Individuals differ in their endowment of human capital h_{it}, which is the only source of income inequality. Each individual i cares about his own consumption c_{it} and the human capital of his child h_{it+1}, so that he maximizes a utility function $U(c_{it}, h_{it+1})$, which is increasing and strictly concave in each of its argument. The production function of human capital is

$$h_{it+1} = \delta(1-z)h_{it} + \delta g_t, \tag{3.1}$$

where $1-z$ is the exogenously determined amount of time parents devote to the transmission of human capital to their children; g_t is the size of publicly provided schooling at time t and $\delta \geq 1$ is a productivity factor capturing the extent to which public and private education contribute to the human capital stock of a particular member of the younger generation -note that they are assumed to generate the same productivity. Note also that public education is supplied in an equal way, so all agents receive always an uniform amount of public schooling regardless of their parents' income.

In this model, human capital is the only factor of production, so

$$Y_t = H_t. \tag{3.2}$$

Y_t is total output, and H_t the total amount of human capital actually used in production, i.e. $H_t = z\int_0^1 h_{it}di = z\hat{h}_t$, where $\hat{h}_t$ is the mean of the distribution of skills in generation t. Equation 3.2

implies that the wage per unit of human capital is one, and hence the income of an individual i is equal to her human capital endowments multiplied by the time she devotes to work, namely, $h_{it}z$. Public education is financed by a proportional income tax τ_t and is equally distributed among individuals, so that consumption c_{it} is equal to $h_{it}z\left(1-\tau_t\right)$ and the educational subsidy g_t each child obtains amounts to $\tau_t z\hat{h}_t$.

I now turn to the political equilibrium analysis. The only choice variable is the tax rate, which completely determines consumption, public education and the aggregate level of human capital of the younger generation given the exogenous parameters z and δ. Moreover, since tax revenues are allocated by a per capita educational transfer to all agents, a higher tax rate implies also a greater human capital stock h_{it+1} for each i. The preferred policy τ_{it}^* of each individual i is given by

$$\begin{aligned} \tau_{it}^* &= \arg\max U(c_{it}, h_{it+1}) \\ &= \arg\max U\left[h_{it}z(1-\tau_t), (1-z)\delta h_{it} + \delta\tau_t z\hat{h}_t\right]. \end{aligned} \tag{3.3}$$

From the first order condition (and from an assumption that U is a homothetic function)

$$\tau_{it}^* = \max\left\{0, \tau\left(h_{it}/\hat{h}_t\right)\right\}, \tag{3.4}$$

being $\tau\left(h_{it}/\hat{h}_t\right)$ the solution of

$$\frac{U_h'(\tau)}{U_c'(\tau)} = \frac{h_{it}}{\delta\hat{h}_t}, \tag{3.5}$$

where U_h' and U_c' denote the partial derivatives of the utility function with respect to human capital and consumption.

Examining closer the implications of (3.5) for policy preferences, notice first that as $\frac{U_h'}{U_c'} = F\left(\frac{h}{c}\right)$ and $F'(.) < 0$, an increase of the

actual tax rate will ultimately reduces $\frac{U'_h}{U'_c}$ by raising the human capital-consumption ratio, $\frac{h}{c}$. Therefore, as we move up along the income distribution -greater h_{it}-, the tax rate that satisfies equation 3.5 becomes smaller. The intuition for this result is the following: since everyone gets the same amount of public education but its price in terms of the consumption parents must give up is increasing in their income, this tax-education financing scheme involves a redistribution from the rich to the poor. Because of these distributional consequences, relatively wealthier people will prefer then a lower tax rate. In addition, the utility return obtained from public schooling decreases with individual earnings because, on the one hand, human capital yields decreasing returns in utility and, on the other, the offspring of parents with higher amounts of endowments start from the beginning with greater human capital due to the private transmission of education. As a result, $\tau\left(\frac{h_{it}}{\hat{h}_t}\right)$ is a negative function of $\frac{h_{it}}{\hat{h}_t}$.

Consider first the political-economic equilibrium reached under democracy, where everybody votes and the mechanism used to decide policy is the majority rule. Since individual preferences satisfy the single-crossing property, the voting equilibrium is given by the preferred tax rate of the person with the median income in the distribution, h_{mt}. Furthermore, the more unequal is the income distribution, the higher the level of taxation. Suppose that individual endowments h_{it} are distributed log-normally according to $h_{it} \sim LN\left(\hat{h}_t, \sigma^2\right)$, where σ^2 is the variance of the log of incomes. Then income *equality* can be seen alternatively as $\Delta = \frac{h_{mt}}{\hat{h}_t} = e^{-2\sigma^2}$, which is inversely related to the variance. A mean preserving spread of income -a spread keeping the mean of the distribution constant- will make the median voter poorer relative to the average. Thus, and as equation 3.5 tells us, this increase in inequality will be translated into a higher actual tax rate, more government expenditures in education and a larger average stock of human capital of the

younger generation, $\hat{h}_{t+1}$. These predictions are summarized in Table 3.1.

Table 3.1: Predictions from Saint-Paul and Verdier (1993)

Regime	Tax Rate/Human Capital	$\frac{\partial \tau}{\partial \Delta}, \frac{\partial \hat{h}_{t+1}}{\partial \Delta}$
Democracy	$\tau_D/\hat{h}_{D,t+1}$	$-$
Left Dic	$\tau_L/\hat{h}_{L,t+1}$	$-$
Right Dic	$\tau_R/\hat{h}_{R,t+1}$	$+$

Note: Δ indicates economic equality.

What should we expect to occur in right-wing and left-wing dictatorships compared to democracy? As mentioned earlier, the analytical strategy followed here so as to distinguish among autocratic institutional settings is to assume a different objective function of dictators. By definition, the person who decides policy in wealth-biased regimes tries to promote the interests of those types wealthier than the mean of the distribution, whereas left-wing or "populist" dictators maximize the welfare of individuals located in lower positions than the median. Given such classification, the political implications derived from applying this model to non-representative systems are straightforward.

Ceteris paribus, and assuming that the median voter wants a certain level of public education, then in right-wing dictatorships, as only the utility of the more affluent groups of the society is taken into account, the level of taxation, τ_R, government spending and the average stock of human capital, $\hat{h}_{R,t+1}$, are expected to be lower than in democratic institutions. Moreover, increased inequality would reduce political support for public education. This is because the constituency of wealth-biased regimes becomes richer, and thus the cost to them of non-private schooling raises at the same time that their gains go down. For exactly opposite reasons, we should observe that governments in left-wing dictatorships en-

act higher tax rates and provide more education to all agents than in democracies. Like in the democratic case, inequality is predicted to exert a positive effect on taxes and human capital accumulation when the Left governs unconstrained. Consequently, the expected differences across regimes are: $\tau_L > \tau_D > \tau_R$ regarding policy, and $\hat{h}_{L,t+1} > \hat{h}_{D,t+1} > \hat{h}_{R,t+1}$ for education outcomes.

3.2 Income Redistribution and Human Capital Investment: The Positive Externalities of Education

The model studied in this section (Perotti 1993)[2] considers education as a discrete choice. In this paper, Perotti analyzes the impact of inequality on investment in human capital -the source of growth- when the degree of redistribution is determined by majority vote. He solves for the political equilibria that may emerge in democratic institutions under different configurations of income distribution and per capita income. In contrast to the previous model, here public policy redistributes only income and then individuals decide whether or not to get educated. Furthermore, there is a fixed cost of investing in human capital and a positive externality from education.

Here is the essence of the model. There are two periods and three groups: rich, middle and poor distinguished by their pre-tax income $y_R > y > y_M > y_P$, where y is average income. Each group represents a fraction λ_i of the population, and $\lambda_i < 0.5$, $i = R$, M, P. So the median income is in the middle class and is initially below the mean. There is no capital market, no discounting and there are some costs in collecting taxes -avoiding thus the possibility of a corner solution in the equilibrium tax rate, namely $\tau = 1$.

[2]Perotti, R. (1993). "Political Equilibrium, Income Distribution, and Growth." *Review of Economic Studies* 60: 755-76.

In period 1, individuals can either invest a fixed amount $e = 1$ in education (paying a cost of 1) or not. All investment must be financed out of post-tax earnings and benefits the investing person with a constant increase of her second-period income, $\delta > 1$. Since $\delta > e$, all individuals will want to invest in human capital. There is also a social return to education in the sense that the income of all individuals in period 2 is increased by an amount equal to μE, where μ is a positive coefficient and E is the proportion of agents who decided to be educated in period 1.[3]

In the first period, individuals have to make also a collective decision over the degree of redistribution. Taxes are proportional to pre-tax income and the revenues collected are allocated through an equal transfer across individuals. In period 2, agents consume. They have preferences over consumption $c_{i,t}$ in period 1 and 2, so that the indirect utility function of an agent belonging to group i is:

$$U = y_i (1 - \tau) + \left(\tau - \tau^2\right) y - e + (y_i + \delta e + \mu E), \tag{3.6}$$

where τ refers to the actual tax rate, $-\tau^2 y$ captures the efficiency cost of taxes, and $(y_i + \delta e + \mu E)$ represents second-period income, which includes earnings in the preceding period plus all educational returns.

In the absence of capital markets, agent i will invest in education if her post-tax first-period income is higher than 1 -the cost of education. The size of transfers determines therefore how many

[3]Note that the aggregate-human capital measure E is not equivalent to that of the previous model, $\hat{h}_{t+1}$. As seen before, $\hat{h}_{t+1}$ refers to the aggregate *level of education* attained by the younger generation. In that model, education was a continuous variable and individuals were allowed to make marginal decisions pertaining whether to obtain a little more of education. By contrast, in Perotti's model, individual-educational decisions are discrete choices: either you invest a fixed amount in human capital or not. Therefore, E refers to the *proportion of educated people* in the population.

people acquire education and which groups will eventually get educated. Thus, and as the proportion of people investing in human capital increases the income of all is in second period, when making their proposals individuals must take into account how fiscal policy would affect the other agents' educational choices. For that reason, it is convenient to discuss briefly the relationship between the level of taxation and the fraction of the population that eventually becomes educated.

The first thing to note is that this relationship depends upon the average income in economy. In a wealthy economy, characterized by $y_R > y > y_M > 1 > y_P$, the rich and the middle class can afford the cost of education. Yet the poor may acquire some formal schooling if and only if the actual tax rate is high enough to make their post-tax income greater than 1. Consider now a very poor economy defined by $y_R > 1 > y > y_M > y_P$. Since per capita income is lower than the cost of education, agents with pre-tax earnings less than one will remain unskilled despite government redistribution. Moreover, by reducing the wealth of all individuals above the mean, the effect of taxes is largely to hurt potential investors instead. Hence, public redistribution may encourage the accumulation of human capital when the economy is rich enough, whereas it may hinder investment in poor countries.

In the remainder of this section, I solve for the political equilibria of the model under different institutional settings. To that end, it is necessary to know beforehand what is the desired tax rate of each income group. This is found by maximizing (3.6) with respect to τ, which yields:

$$\tau_i = \max\left\{0, \arg\max U\left(c_{i,1}, c_{i,2}\right)\right\}, \tag{3.7}$$

where $c_{i,1}$ and $c_{i,2}$ are consumption in period 1 and 2 respectively. To start with, for each individual i there is a optimal tax rate at which post-tax income during period 1 is maximized, that is

$$\tau_i^* = \max\left\{0, \frac{1}{2}\left(1 - \frac{y_i}{y}\right)\right\}. \tag{3.8}$$

We see from equation 3.8 that τ_i^* is a decreasing function of $\frac{y_i}{y}$, hence $\tau_P^* > \tau_M^* > \tau_R^* = 0$. Yet, as the actual tax rate determines how many individuals are able to invest in human capital, which in turn alters second-period income via the educational externality, μE, it may be the case that τ_i^* does not maximize *overall* utility. If the optimal tax rate during period 1 (τ_i^*) prevents certain groups from acquiring education -reducing thereby future income-, then when making her proposal individual i has to compare her global utility at $\tau = \tau_i^*$ with that from setting a redistribution program consistent with human capital accumulation. Her final choice will be the policy that yields the highest total gain. This point will be clearer below when studying particular cases distinguished by the economic conditions under which agents decide policy.

The level of taxation actually enacted in each type of regime depends upon (i) the objective of who dictates policy and (ii) initial conditions in economy. The first question has already been answered by assuming that governments in different political systems try to promote the interests of different social classes. So in order to learn the expected pattern associated with a certain institutional framework, we can just focus on how the person who controls decision power determines the tax rate that maximizes his supporters' welfare without having to care about the other classes' preferences. And it is precisely during this process of finding out the ideal point of the decisive actor when initial economic conditions start playing a crucial role. Particularly, here I explore the impact of average income and inequality on policy preferences.

It was argued before that the degree of redistribution promoting investment in human capital varies with the wealth of the economy. Thus, when the human capital-enhancing tax rate is at odds with first-period optimal taxes, per capita income defines the nature of

the dilemma confronted by the decisive actor: whether she has to trade higher or lower taxes (than her preferred ones) for a larger stock of human capital. In light of the different economic positions of potential investors, the short-run optimal degree of redistribution could be too excessive in poor economies but insufficient in rich ones in order to increase human capital. As will be shown later, inequality affects directly how politically-dominant groups resolve this dilemma.

3.2.1 Rich Economy

Let us examine first what would it happen in a rich economy (i.e., $y_R > y > y_M > 1 > y_P$). Under this state of the economy, only the middle class and the wealthy can afford education without government transfers. The central question for human capital accumulation is then the education of the poor. Hence one should expect that among wealthy countries the larger the size of public redistribution, the higher the aggregate level of human capital in the society. Suppose that $\underline{\tau_P}$ is the smallest tax rate at which the poor reach a post-tax income equal one. This tax rate is the smaller root of the solution to $y_P(1-\tau) + \left(\tau - \tau^2\right) y - 1 = 0$. Assume further that $\underline{\tau_P}$ is a feasible choice in that there are sufficient resources to provide the lower class with formal schooling and to pay the cost of collecting taxes.

I consider first the case in which conflicts over policies are resolved by majority voting and everybody votes. The policy eventually reached through this political method, as Perotti shows, corresponds always to the median voter's ideal point, who is too the median income in the economy.[4] Thus it is sufficient to analyze the middle class's preferences in order to determine the equilibrium outcomes in democratic institutions.

As pointed out earlier, τ_M^* constitutes the best choice for the

[4]For a proof of this result, see Perotti (1993).

present consumption of the middle class. If $\tau_M^* \geq \underline{\tau_P}$, then this policy is also consistent with the accumulation of human capital, maximizing thus overall utility. However, if $\tau_M^* < \underline{\tau_P}$, a y_P type will not acquire education at τ_M^* and accordingly a conflict between first and second-period optimal taxes arises. The median voter faces a intertemporal trade-off. If she proposes $\underline{\tau_P}$, the poor get educated and her next period income goes up due to the externality effect. Yet she loses a certain amount of consumption in the short run relative to τ_M^* by having to intensify the degree of taxation. Whether the gain from setting $\underline{\tau_P}$, that is the externality return, compensates the ensuing reduction in first-period consumption will depend on income distribution; a factor determining the amount of first-period consumption losses.

In this model, total income is distributed among three groups within which all individuals obtain the same level of income. This means then that inequality is completely accounted for by the between-group dispersion. One simple and convenient way of measuring inequality in this context would be making pairwise comparisons between the income of the three types of earners. The convenience of using this particular method is that when studying the consequences of a mean-preserving spread it enables us to be more precise about the impact of inequality by identifying where exactly in the distribution the dispersion has occurred, which will be shown to be central for the results.

There are three possible comparisons to make so as to asses the inequality degree of a certain allocation: first, to look at the distance between the poor and the middle class, keeping the income of the rich constant -let this be denoted by $\Delta_{PM|R} = \frac{y_P}{y_M}$; second, concentrating on the ratio of the middle class to the rich, given the income of the poor -which is denoted by $\Delta_{MR|P} = \frac{y_M}{y_R}$; and finally to look at the gap among the rich and the poor, fixing the income of the middle class -denoted by $\Delta_{PR|M} = \frac{y_P}{y_R}$. Note that the higher

these income ratios, the more *equal* the society would be.[5]

Back to the dilemma the median voter is to deal with, and focusing on $\Delta_{PM|R}$ as the relevant *equality* measure, the basic idea is that an increase in inequality may reduce the median voter's incentives to educate the poor. In a very unequal economy, the middle class will have to pay more in taxes to fully reap the gains stemming from the education of low-income types. First, since the latter become poorer, the transfer they need to afford education $(1-y_P)$ would be larger and so would $\underline{\tau_P}$. Second, as middle-income taxpayers are wealthier, their taxable income goes up and therefore for a given tax rate the absolute amount of income taken away from them increases too. As a result of both forces, the cost of subsiding the education of the lower class clearly raises from the perspective of a y_M individual inducing her to choose unambiguously $\tau_M^* < \underline{\tau_P}$, so that the less affluent groups of the society cannot invest in human capital. On the contrary, in a more equal society, exactly the opposite occurs. The same two forces operate as well but now in reverse directions making more likely either $\tau_M^* \geq \underline{\tau_P}$ or that the middle class might prefer $\underline{\tau_P}$ if $\tau_M^* < \underline{\tau_P}$ (see Table 3.2).

What patterns are nondemocratic institutions expected to bring about? In "populists" autocracies, dictators never confront a trade-off. The tax rate that maximizes the welfare of the poor during period 1, τ_P^* is also the optimal one for their future consumption. As by assumption $\underline{\tau_P}$ is a feasible choice in a wealthy economy, then it must be true that $\tau_P^* \geq \underline{\tau_P}$. In other words, by enacting their first-period most-advantageous policy, the poor will be able to afford education and hence it should be expected that under left-wing dictatorships all groups will undertake their investments, regardless of income inequality. With respect to wealth-biased regimes, notice

[5] In his paper, Perotti only makes the comparative statics of the equilibrium with respect to the distance between the middle class and the poor. To stress the differential impact of inequality depending upon where in the distribution the dispersion occurs, I make the comparative statics regarding the three income ratios defined above.

Table 3.2: Predictions from Perotti (1993). Rich Economy

Regime	$\boldsymbol{\Delta}_{PM\|R}$	Tax Rate	Human Capital (E)	$\frac{\partial\tau}{\partial\Delta_{MR\|P}}$	$\frac{\partial HC}{\partial\Delta_{MR\|P}}$	$\frac{\partial\tau}{\partial\Delta_{PR\|M}}$	$\frac{\partial HC}{\partial\Delta_{PR\|M}}$
Democracy	equal	τ_M^* ($\geq \underline{\tau_P}$) or $\underline{\tau_P}$	$\lambda_R + \lambda_M + \lambda_P$	$-$	$-$	$+$	$+$
	unequal	τ_M^* ($< \underline{\tau_P}$)	$\lambda_R + \lambda_M$				
Left Dic		τ_P^*	$\lambda_R + \lambda_M + \lambda_P$	0	0	$-$	0
Right Dic	equal	$\underline{\tau_P}$	$\lambda_R + \lambda_M + \lambda_P$	$+$	$+$	$+$	$+$
	unequal	$\tau_R^* = 0$	$\lambda_R + \lambda_M$				

Note: τ_i^* for $i = R$, M, P refers to optimal taxes during first-period for each group. $\underline{\tau_P}$ is the smallest tax rate at which the poor reach a post-tax income equal one. The λ_i's represent the fraction of each class in the population and HC refers to Human Capital.

that the person with the decision power always has to meet a similar dilemma the median voter faced in democracies. If he opts for a policy paying attention merely to his constituency's first-period consumption, i.e. $\tau_R^* = 0$, the rich will have to accept some income losses in the long run.

Does income inequality have any bearing on the way right-wing dictators resolve this dilemma? Like in the case of wealthy democracies, here the effect of a income spread -again, a larger gap between the median and the poor, given the income of the rich- is mainly to discourage governments from carrying out a policy that would promote human capital expansion. Again, as the poor will need a greater transfer to afford education, high-income individuals will have to sacrifice more present consumption for the former to get educated. Certainly, the fact that the middle class becomes wealthier means that the rich must bear a lower share in financing the education of the less affluent groups of the economy. But still well-off people will have to pay more since taxation necessarily increases due to the impoverishment of low-income agents.

Comparing predictions across political regimes, we may establish the following conclusions -see columns 3 and 4 in Table 3.2. "Populists" dictatorships tend to redistribute more than any other regime allowing the poor to invest in human capital, so that we should observe that everyone gets educated in wealthy countries with authoritarian governments controlled by the Left. Recall that $\tau_P^* > \tau_M^* > \tau_R^* = 0$ and $\tau_P^* \geq \underline{\tau_P}$. In more equal societies, democracies approach the educational pattern of the previous regime. When the middle class is poorer and the poor are better off, the median voter may support higher taxes up to the point low-income types can afford the cost of education, and thus one should observe that under this political-economic context all social classes get educated as well.

In a more unequal economy or equivalently when the distance between the median and the poor enlarges, the decisive voter in

democracy may worse off enacting the human capital-enhancing policy since its costs to her have increased. As a result, only the middle and high income types are expected to obtain formal schooling. Finally, right-wing regimes' educational performance is predicted to approach that of democracies. Only if the ex-ante distribution of income is equal enough, the poor could invest in human capital. Otherwise it is too costly to the rich to endorse a redistribution package that enables low-income individuals to meet the expense of education. However, since the cost of setting $\underline{\tau_P}$ is always higher for the wealthy than for the middle class, the value of $\underline{\tau_P}$ at which "wealth-biased" policymakers may want to promote human capital must be lower than that of their democratic counterparts, given a fixed externality return. Put it in another way, the minimum level of income equality necessary for the poor to get educated has to be greater in right-wing regimes than in democracies.

So far I have focused on $\Delta_{PM|R}$ when exploring the impact of income inequality on the equilibrium outcomes under different institutional arrangements. Yet, if inequality is assessed by looking at $\Delta_{MR|P}$ or $\Delta_{PR|M}$ instead, the hypotheses put forward up to now change a lot. To be sure, the mechanism through which inequality shapes the incentives of governments in promoting human capital is always the same no matter what particular measure is adopted: variations in the income distribution only affect the cost of educating the poor. But whether this cost increases or decreases from the standpoint of a particular group rests on where in the distribution the dispersion occurs. For that reason, it is important to analyze how institutions and the politically relevant actors respond alternatively to changes in $\Delta_{MR|P}$ and $\Delta_{PR|M}$.

As pointed out earlier, $\Delta_{MR|P}$ quantifies the distance between the middle class and the rich for a given income of the poor and for a given average. The smaller this distance, the higher the value of $\Delta_{MR|P}$, and the more equal the economy would be. For the

purposes at hand, the key consequence of an increase in equality in this part of the distribution is that the middle class has to bear a increased burden in subsidizing the least well-off people' investment, whereas the rich' contribution declines. This is so because the taxable income of middle and upper earners goes up and down respectively with equality - and remember that taxes are proportional to income. It is reasonable to think therefore that while the middle class is less prone to supporting the human capital-enhancing policy, the more affluent groups of the society are more disposed to do so.

Accordingly, among wealthy democracies tax policy and human capital should be negatively affected by the level of equality between the middle class and the rich, and positively related in wealthy right-wing dictatorships. Yet if the poor manage to invest under the latter institutions, then they also should get educated under democratic ones given that, once more, it is always the case that taxes are more costly to the upper class than to the median voter. Do "populists" dictators react in any way to changes in $\Delta_{MR|P}$? As shown in columns 5 and 6 in Table 3.2, there is no reason to expect any adjustment at all. Since the lower class's initial economic position remains unchanged, so does its first-period optimal tax rate, and thus everyone can still afford education.

Taking into consideration $\Delta_{PR|M}$ as the relevant equality indicator, a more equal economy would be characterized by a higher concentration of incomes around the mean. As before, the response of governments to a more imbalanced income distribution may be contingent on the politics of the alternative institutional arrangements in place. When the decision-making process sticks to democratic rules, increased equality has a positive effect on equilibrium outcomes -see columns 7 and 8 in Table 3.2. Notice that the argument stated before to explain how wealth-biased regimes respond to variations in the gap between the middle class and the poor holds here. The idea is that low-income types now require a smaller de-

gree of public redistribution in order to invest in human capital so that the middle class is to pay less for these investments to take place.

Likewise, under wealth-biased regimes income equality generates upward pressures on taxes and human capital. Right-wing dictators are induced to increase taxation, first, because the poor need a lesser amount of transfer. And second, because as the rich fall closer to the middle class, their contribution to financing public education would be smaller. Finally, faced with an increased equality, "populists" dictators are expected to cut down the degree of taxation -as a consequence of their constituencies' improved material conditions, which leads by (3.8) to a lower τ_P^*-, yet the rate of human capital accumulation should remain constant, as it is still true that this tax rate must be equal or greater than $\underline{\tau_P}$.

3.2.2 Poor Economy

Consider now the case of a poor economy (i.e. $y_R > 1 > y > y_M > y_P$). Since average income is located below the cost of education, those individuals with sufficient resources to afford education on their own -namely the rich- are the only potential investors in economy. Instead of promoting investment of relatively poorer individuals, here the size of government redistribution is hypothesized to harm the investment ability of high-income agents by reducing their income. Hence, the best scenario for human capital accumulation takes place when the latter are wealthy enough and taxes are bounded to a low-value range. Note that if $y_R < 1$, all regimes will eventually arrive at a similar equilibrium in which nobody can acquire formal schooling. Assume from now on that $y_R > 1$. Suppose also that $\tilde{\tau}_R$ is the highest tax rate at which the post-tax income of the rich is equal to the price of education.[6]

Let us examine the political-economic equilibrium in democratic

[6]This tax rate is the larger root of $y_R(1-\tau) + \left(\tau - \tau^2\right) y - 1 = 0$.

institutional frameworks, which as stated earlier corresponds always to the median voter's ideal policy. For the sake of clarity, imagine for instance a society starting with an unequal distribution of income. I concentrate first on the distance between the middle class and the poor, given the income of the rich, which has just been assumed to be greater than one. So this economy is characterized by a mass around high income, a mass just below the mean and a mass of very poor.

Under this configuration of the income distribution, in which the median voter is close to the mean, and noting that there are some efficiency costs of collecting taxes, she may favor a limited degree of taxation such that $\tau_M^* \leq \tilde{\tau}_R$. If that is the case, then the pivotal voter's political decision problem is solved: her desired tax rate does not prevent the rich from investing in human capital increasing accordingly future growth.

Imagine that for some reason inequality decreases in the sense that the gap between the middle class and the poor shrinks. As the decisive voter gets poorer, she will want to tax away more income of the rich. Consequently, it is possible that now the rich cannot invest in human capital at the median voter's preferred policy so that the latter faces again a intertemporal trade-off. However, the nature of the dilemma has changed. Now she must trade *less* redistribution during first period for more long-term consumption. Income inequality will determine once again the net benefit to the median voter from deviating from her first-period optimal tax rate.

In a poor democracy, unlike what occurred in its wealthy counterpart, the less favorable configuration of below-the-mean income distribution for investment is an equal allocation of resources. The basic idea behind this hypothesis is very simple: as an increase in equality implies that the pivotal voter gets poorer, the net transfer she can get from redistribution increases and also her post-tax income is maximized at a higher tax rate. Therefore, other things equal, it becomes more costly to her to limit taxes so that high-

income individuals can still afford education. In sum, increased equality not only leaves the decisive voter in a quandary but it also makes her less prone to promote human capital accumulation (see Table 3.3).

Regarding nondemocratic institutions, it is clear that the person who controls political power in a rightist autocracy always defends a zero tax rate. This is so because it enhances both the short-run welfare and the investment ability of his supporters.

In contrast, populists dictators will always redistribute some income of the rich. Moreover, if their constituency's ideal policy, τ_P^* is greater than $\tilde{\tau}_R$, then they will confront the aforementioned trade-off. Yet, a lower dispersion of income below the mean may induce them to reduce taxation so that the upper class can afford education. Since the poor's starting economic position improves with equality, the net gain they obtain from redistribution goes down, and so does their preferred tax rate. As a result, they will have to sacrifice less post-tax income in order to reap the benefit from the education of the rich. But if the latter get educated indeed in leftist dictatorships, they should be able also in democracies given that restraining taxes is under any condition less costly for the middle class than for the lower class.

Having determined the policy equilibria in each type of regime, the predicted differences across political systems can be summarized as follows -see Table 3.3, columns 3 and 4. First, unlike other regimes, wealth-biased dictatorships are expected to preserve the initial allocation of resources so that the more affluent members of the society can invest in human capital. Under these institutional settings, inequality is hypothesized to have no impact on fiscal policy and educational outcomes.

Second, in more unequal economies, whenever faced with a trade-off, the decisive voter in democracy seems to be more willing to trade a moderate level of taxation for more future consumption, whereas "populists" dictators tend to impose their desired policy at

Table 3.3: Predictions from Perotti (1993). Poor Economy

Regime	$\Delta_{PM\|R}$	Tax Rate	Human Capital (E)	$\frac{\partial\tau}{\partial\Delta_{MR\|P}}$	$\frac{\partial HC}{\partial\Delta_{MR\|P}}$	$\frac{\partial\tau}{\partial\Delta_{PR\|M}}$	$\frac{\partial HC}{\partial\Delta_{PR\|M}}$
Democracy	Equal	$\tau_M^*(>\tilde{\tau}_R)$	0	$\lessgtr 0$	$\lessgtr 0$	$+$	$-$
	unequal	$\tau_M^*(\leq\tilde{\tau}_R)$or $\tilde{\tau}_R$	λ_R				
Left Dic	Equal	τ_P^* (or $\tilde{\tau}_R$?)	0(or λ_R?)	$+$	$-$	$\lessgtr 0$	$\lessgtr 0$
	unequal	τ_P^*	0				
Right Dic	Equal	$\tau_R^*=0$	λ_R	0	$-$	0	$-$
	unequal	$\tau_R^*=0$	λ_R				

Note: $\tilde{\tau}_R$ is the highest tax rate at which the post-tax income of the rich is still greater than the price of education.

the expense of educational attainment -note that income inequality means that the lower class becomes poorer increasing the cost of letting the rich invest. Of course, the opposite results are predicted in more equal societies. While a less dispersion of income undermines the median voter's incentives to undertake a redistribution program such that the upper class can still obtain education, it makes leftist authoritarian rulers more disposed to do so.[7] Therefore, human capital accumulation should be negatively affected by income equality across democracies but positively affected under left-wing dictatorships.

Making comparative statics with respect to one of the other two measures of income equality, $\Delta_{MR|P} = \frac{y_M}{y_R}$, the expected patterns of most institutional settings completely change. Other things equal, when the distance between the middle class and the rich is smaller, an important obvious consequence is that the human capital-enhancing tax rate ($\tilde{\tau}_R$) declines, increasing thus the cost of allowing the rich to be educated in those regimes in which politically-dominant groups usually sustain preferences for greater government redistribution. To reap the social returns of education, those groups now must sacrifice a extra amount of today's consumption by having to impose a more restricted level of taxation.

By virtue of this mechanism, a dictator maximizing the welfare of low-income earners would be more prone to opt for the most advantageous short-term policy of his supporters. It should be the case then that in poor leftist autocracies the more equal the economy, the lower the net gain their political supporters obtain from the investment of the wealthy. And, above a certain point, the degree of taxation should be subjected to positive jumps, reducing subsequently the human capital stock.

In addition, a more balanced income distribution among high

[7]However, if it is the case that the fiscal policy implemented in democratic institutions actually impedes high-income agents to acquire education, one should observe the same in "populists" regimes, ceteris paribus.

and middle types means that the median voter profits less from the redistributive game so that her optimal taxes during first period decline. Hence she will have to give up less post-tax income in period 1 in order to seize the educational externality. However, due to the previous offsetting effect (the decline of $\tilde{\tau}_R$), it is hard to predict what would be the respond of democratic governments to increased equality, as shown in columns 5 and 6 in Table 3.3. Unless the causal impact of these two competing pressures can be measured separately, the net effect of an increase in $\Delta_{MR|P}$ will be indeterminate.

With regard to wealth-biased regimes, the only variable that might change with equality is human capital accumulation. Taxes remain constant but for high enough values of $\Delta_{MR|P}$ it may be the case that the income of the rich falls to a level at which they cannot afford to be educated.

To conclude with this model, I briefly examine the impact of $\Delta_{PR|M}$ on policies and outcomes. As we can see in Table 3.3, columns 7 and 8, the fact that the gap between the poor and the rich narrows generates identical results as before but for different regimes. The argument just developed for left-wing autocracies applies now for democracies and the other way around: what has been said for democratic cases holds here for "populists" dictatorships. Therefore, while democratic rulers are expected to increase taxes when income distribution is more concentrated around mean, it is unclear how left dictators will react to that. Finally, in right-wing regimes, equality produces the same effects as before and for the same reasons.

3.3 Income Redistribution and Human Capital Investment: The Excludability of Educational Subsidies

This section deals with the model of Fernandez and Rogerson (1995).[8] These authors analyze how the interactions between income distribution, economic development and democratic institutions explain the extent to which education is subsidized, which in turn determines not only the proportion of the population that invests in human capital, but also the identity of investing groups. As in the preceding models, this model considers only the impact of the institutional dynamics engendered in democracies. Its main innovation is that policy benefits are not distributed equally among all individuals. While taxes are proportional to income, transfers take the form of an educational subsidy that is received only by those individuals who eventually decide to go to school.

Here are the essentials of the model. There are two periods and three groups of agents: R, M and P differentiated by their initial income $y_R > y > y_M > y_P$. Total population is normalized to 1. The fraction of the population belonging to group i is denoted by λ_i and let ρ_i represent the proportion of educated members in group i. People care about their private consumption during the two periods and there is no discounting.

In period 1, each agent decides whether to invest a fixed amount of human capital. The educational decision is a discrete choice that takes value 1 if an agent obtains education (paying a cost e), 0 otherwise. Education benefits only the investing person by increasing her second-period income. If an agent i get educated, then in the next period her income will be $f(y_i)$. If she remains unskilled, then she will earn a second-period income y_i. It is assumed throughout that $f(y_i) - e > y_i$, assuring that all individuals want to receive for-

[8] Fernandez, R., and R. Rogerson. (1995). "On the Political Economy of Education Subsidies." *Review of Economic Studies* 62: 249-62.

mal schooling. In contrast to the model just discussed, the fact that a individual invests in human capital does not produce any positive externality on the other agents' welfare. In period 2, individuals consume.

There are no capital markets and since the affordability of education is the only reason of whether an individual will be able to acquire education, first-period income constitutes a key determinant of individual choices. Another factor encouraging investment is the extent to which education is publicly financed. In this model, a proportional tax τ on period-one income is used to partially subsidize educational costs and tax revenues are allocated only among those who eventually get educated. Therefore an member of group i will invest if and only if

$$(1-\tau)\, y_i - e + s(\tau) \geqq 0, \tag{3.9}$$

where $s(\tau)$ is the government subsidy.

To establish the expected degree of taxation emerging in each type of regime -which ultimately determines the size of educational transfers and the fraction of the society investing in human capital-, first we have to solve for the desired policy of each income group. As just mentioned, the tax-transfer scheme of this model departs from a standard redistributive program in that, although everyone contributes to sustain public schooling with a proportion τ of their incomes, transfers are targeted at those who actually go to school. Hence, when making their proposals, individuals must figure out not only the tax-induced subsidy but also, using equation 3.9, whether or not they will be qualified to receive it. Before specifying policy preferences, it is necessary then to analyze the relationship between fiscal policy, the government transfer and the proportion of people that obtains education.

With a tax rate τ, the revenues collected are equal to $\tau \sum \lambda_i y_i = \tau y$, where y is average income. The subsidy assigned to each person who get educated is

$$s(\tau) = \frac{\tau y}{N(\tau)}, \tag{3.10}$$

where $N(\tau)$ represents the mass of people investing in education. Note that $s(\tau)$ and $N(\tau)$ should be mutually consistent in the sense that for a given tax rate, $N(\tau)$ brings about a certain $s(\tau)$ and this $s(\tau)$ makes it possible that exactly a mass of $N(\tau)$ can meet the expense of education. To determine consistently the values of these two variables we solve:

$$Max\, j\, s.t:\, (1-\tau)\, y_j - e + \frac{\tau y}{\left(\sum_{i<j} \lambda_i\right)} > 0, \tag{3.11}$$

where i and j are equal to 1 (representing the rich), 2 (standing for the M group) and 3 (for the poor). Given this j, we then find the greatest value of $\rho_j \in (0, 1]$ such that

$$(1-\tau)\, y_j - e + \frac{\tau y}{\left(\sum_{i<j} \lambda_i + \rho_j \lambda_j\right)} \geqq 0. \tag{3.12}$$

Thus $\rho_j(\tau)$ corresponds to the fraction of members in group j that becomes skilled when τ is enacted.[9] From (3.11) and (3.12), it is clear that if an individual of type j manages to pay for education, then so do all individuals of type i for all $i < j$, i.e. if an agent of the middle class can invest in education, so can all high-income agents. Finally, if $0 < \rho_j(\tau) < 1$, a member from group j must

[9]For the sake of clarity, we illustrate this relationship with an example. Suppose that the actual tax rate is τ. If everybody went to school then the subsidy would be: $s_1 = \tau y$. Imagine that individuals with low incomes cannot afford to be educated given s_1 because $(1-\tau)y_P - e + s_1 < 0$. As a result, they do not obtain education, do not receive the subsidy and the actual subsidy goes up, $s_2 = \frac{\tau y}{\lambda^R + \lambda^M} = \frac{\tau y}{1-\lambda^P}$. Therefore τ implies an educational transfer $s_2 = \frac{\tau y}{1-\lambda^P}$ and only the rich and middle class can invest in human capital.

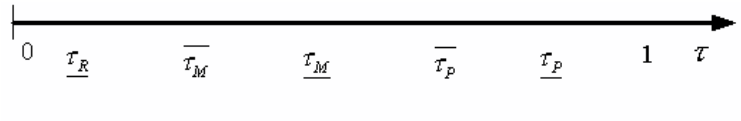
just be able to afford to be educated, i.e. $e - s(\tau) = (1 - \tau)\, y_j$. Whenever that happens, it is assumed that a proportion of people $\rho_j(\tau)$ is randomly selected from group j.

Having determined the per student subsidy, $s(\tau)$ and the ρ_i's implied by each τ, each individual when computing her ideal policy tries to maximize her consumption in both periods, that is,

$$EU_i(\tau) = (1 - \tau)\, y_i + \rho_i(\tau)\,[s(\tau) - e + f(y_i)] + (1 - \rho_i(\tau))\, y_i. \tag{3.13}$$

As $\rho_i(\tau)$ is a random variable, this equation expresses an expected utility. Notice that if equation 3.9 is not satisfied for an agent i given the tax rate and the subsidy, then her expected utility is equal to $(1 - \tau)\, y_i + y_i$: she pays taxes but does not get anything in return. In short, she is financing the education of other agents.

Figure 3.1: Fiscal Policy Space



To simplify the characterization of the EU_i's, let $\overline{\tau_i}$ be the maximum value of $\tau \in [0, 1]$ at which $\rho_i(\tau)$ is equal to zero. If $y_i > e$, let $\overline{\tau_i}$ equal zero. Thus $\overline{\tau_M}$ refers to the maximum tax rate at which it is still not feasible for any member of the middle class (and also of the poor) to be educated. Lastly, define $\underline{\tau_i}$ as the smallest value of $\tau \in [0, 1]$ at which $\rho_i(\tau) = 1$. Figure 3.1 portrays the relative positions of these tax rates in the one-dimension policy space and for the general case. Taking into account these definitions, Fernandez and Rogerson introduce Proposition 1 that provides a complete description of how the EU_i's respond to increased taxation.

Proposition 1.

i $EU_i(\tau)$ is continuous and $EU_i(0) < EU_i\left(\underline{\tau_i}\right)$ for $\underline{\tau_i} \in (0,1]\,\forall i$.

ii $EU_R(\tau)$ is increasing and concave on $\left[0, \underline{\tau_R}\right]$, linearly increasing on $\left[\underline{\tau_R}, \overline{\tau_M}\right]$ with marginal utility of $\left(\frac{y}{\lambda_R}\right) - y_R$, linearly decreasing on $\left[\overline{\tau_M}, \underline{\tau_M}\right]$ with marginal utility $y_M - y_R$, linear on $\left[\underline{\tau_M}, \overline{\tau_P}\right]$ with marginal utility of $\left(\frac{y}{\lambda_R+\lambda_M}\right) - y_R$, linearly decreasing on $\left[\overline{\tau_P}, \underline{\tau_P}\right]$ with marginal utility $y_P - y_R$, and linearly decreasing on $\left[\underline{\tau_P}, 1\right]$ with marginal utility $y - y_R$.

iii $EU_M(\tau)$ is linearly decreasing on $[0, \overline{\tau_M}]$ with marginal utility of $-y_M$, increasing and concave on $\left[\overline{\tau_M}, \underline{\tau_M}\right]$, linearly increasing on $\left[\underline{\tau_M}, \overline{\tau_P}\right]$ with marginal utility of $\left(\frac{y}{\lambda_R+\lambda_M}\right) - y_M$, linearly decreasing on $\left[\overline{\tau_P}, \underline{\tau_P}\right]$ with marginal utility of $y_P - y_M$, and linear on $\left[\underline{\tau_P}, 1\right]$ with marginal utility of $y - y_M$.

iv $EU_P(\tau)$ is decreasing on $[0, \overline{\tau_P}]$ with marginal utility of $-y_P$, increasing and concave on $\left[\overline{\tau_P}, \underline{\tau_P}\right]$, and linearly increasing on $\left[\underline{\tau_P}, 1\right]$ with marginal utility of $y - y_P$.

The first thing to be noted is that the utility functions of individuals may have more than one maximum. And as the desired policy of any group necessarily corresponds to a local maximum of its $EU_i(\tau)$, then there may be more than one candidate for the preferred tax rate. To identify such potential candidates we can use Proposition 1.

Consider first the utility of the rich. Over the interval $\left[0, \underline{\tau_M}\right]$, the tax rate that maximizes expected utility is $\overline{\tau_M}$. On the one hand, between zero and $\overline{\tau_M}$, utility always increases with taxes. Initially increased taxation makes possible that a larger proportion of high-income individuals could afford education, provided

that $\underline{\tau_R} > 0$. After all of them get educated, higher taxes will increase their first-period consumption since more resources are being extracted from the other classes to finance the education of the rich -recall that only the rich receive the educational transfer. On the other hand, $EU_R(\tau)$ is always decreasing all over the range $\left[\overline{\tau_M}, \underline{\tau_M}\right]$. For a marginal increase of the tax rate, the subsidy increases by y_M and the tax payment of a high-income agent increases by y_R, yielding a marginal utility $y_M - y_R$.[10] In sum, if a wealthy type had to select a policy among all alternatives between 0 and $\underline{\tau_M}$, she would opt for $\overline{\tau_M}$.

Over the range $\left[\underline{\tau_M}, 1\right]$, if $\left(\frac{y}{\lambda_R+\lambda_M}\right) > y_R$, then $\overline{\tau_P}$ is the tax rate that maximizes utility in such interval and it is also a local maximum of $EU_R(\tau)$. First, at any tax rate between $\underline{\tau_M}$ and $\overline{\tau_P}$, tax revenues are allocated only among the middle class and the rich since the less affluent members of the society still cannot meet the expense of education. Thereby a marginal increase in taxes makes the subsidy goes up by $\frac{y}{\lambda_R+\lambda_M}$, and if that is greater than y_R (the marginal increase in the tax payment), then the expected utility of the rich is always increasing throughout $\left[\underline{\tau_M}, \overline{\tau_P}\right]$. Second, over the range $[\overline{\tau_P}, 1]$, $EU_R(\tau)$ is always decreasing. The basic idea is that now income redistribution approaches a standard scheme in which wealthier agents help cover the educational costs of relatively lower-income individuals. Consequently, $\overline{\tau_P}$ would be the policy selected if the rich were to choose a tax rate between $\underline{\tau_M}$ and 1. Yet for that

[10] Recall that for any tax rate between $\overline{\tau_M}$ and $\underline{\tau_M}$, the middle class is just able to pay the price of education, so

$(1-\tau)\, y_M + s(\tau) - e = 0.$

Solving for the subsidy, we obtain

$s(\tau) = e - (1-\tau)\, y_M.$

Substituting this equation into the expected utility of the rich, we get

$EU_R(\tau) = (1-\tau)\, y_R - (1-\tau)\, y_M + f(y_i).$

Therefore, with a marginal increase of the tax rate, utility will decrease by

$\frac{\partial EU_R}{\partial \tau} = y_M - y_R.$

to be the case, it is necessary that $\left(\frac{y}{\lambda_R+\lambda_M}\right) > y_R$, otherwise their utility would be always decreasing in that range.

Regarding the expected utility of the middle class, there are three possible values of τ at which $EU_M(\tau)$ may be maximized: 0, $\overline{\tau_P}$ and 1. Firstly, if the actual policy is equal to or less than $\overline{\tau_M}$, middle-income agents cannot afford to be educated and hence do not acquire the government subsidy. But as they do contribute in financing public schooling, it follows that they would prefer a tax rate of zero to any one equal to or less than $\overline{\tau_M}$. Secondly, over the range $\left[\overline{\tau_M}, \underline{\tau_P}\right]$, $\overline{\tau_P}$ is the tax rate that maximizes utility and represents thus a local maximum of $EU_M(\tau)$. Between $\overline{\tau_M}$ and $\overline{\tau_P}$, the expected utility of the middle class always increases with taxes. At first, increased taxation makes it more likely that a middle type can invest in human capital, i.e. ρ_M gets larger. Once all members of the middle class obtain education -that is, at $\underline{\tau_M}$- their utility keeps growing up to $\overline{\tau_P}$ given that the marginal increase in the subsidy $\frac{y}{\lambda_R+\lambda_M}$ is necessarily greater than their marginal tax payments, y_M inducing thus a larger first-period consumption. On the other hand, when some members of the lower class start going to school, $EU_M(\tau)$ declines with taxation. Following a similar argument as in footnote 10, over the interval $\left[\overline{\tau_P}, \underline{\tau_P}\right]$, the utility middle-income agents obtain from a marginal increase in taxes is $y_P - y_M$, which reduces their overall expected utility.

Finally, if $y > y_M$ -which usually is true for most actual income distributions- then 1 is also a local maximum of $EU_M(\tau)$ in the range $\left[\underline{\tau_P}, 1\right]$. Throughout this policy interval, y_M individuals' utility is always increasing since, at the margin, they get a subsidy y, which is higher than what they have to pay, y_M.

Focusing lastly on the expected utility of the poor, it is easy to see that if the less affluent members of the economy were to decide among those policies at which they still cannot pay the cost of education, i.e. $[0, \overline{\tau_P}]$, they would choose a tax rate of zero - utility always decreases throughout that interval. Yet, once they

get qualified to receive the government subsidy -and noting that $EU_P(\tau)$ always increases over the ranges $\left[\overline{\tau_P}, \underline{\tau_P}\right]$ and $\left[\underline{\tau_P}, 1\right]$-, they would prefer a tax rate of one. With a complete redistribution of resources, low-income individuals maximize their expected utility as the income transfer they obtain, y is greater than their tax payments, y_P. Summarizing, the possible candidates for the desired policies of each social class are $\tau_R = \{\overline{\tau_M}, \overline{\tau_P}\}$ for the rich, $\tau_M = \{0, \overline{\tau_P}, 1\}$ for the middle class, and $\tau_P = \{0, 1\}$ for the poor.

I now turn to the equilibrium analysis in different institutional settings. The degree of taxation implemented in each type of regime depends upon (i) the objective of who dictates policy and (ii) the particular states of the economy. Economic conditions crucially matter for equilibrium taxes because, by restricting the model's parameters, they determine which desired policy candidate maximizes overall utility. Political regimes are defined as usual. In "populists" autocracies, dictators care only about the welfare of individuals located in the lower tail of the wealth distribution. In right-wing dictatorships, policymakers follow the favorite policy of the rich. And, in democracy, political decisions are made by majority vote.

Fernandez and Rogerson analyze only those cases in which $\lambda_i < 0.5$ for all is -thus the sum of any two groups encompasses a majority of voters-, and consider that for a tax rate τ to be a majority voting equilibrium it must win against all alternatives. As a result, they show that at least one of the EU_i's has a local maximum at τ. Another important point is that there is no guarantee that the equilibrium tax rate corresponds to the median voter's ideal policy given that individual preferences do not always satisfy the conditions ensuring such outcome -i.e. the single-crossing property. Yet it turns out that in most cases in which there is an equilibrium, the middle class is a member of the winning coalition.

3.3.1 Poor Economy

Consider first a poor economy characterized by $\frac{y}{\lambda_R+\lambda_M} > e > y > y_M > y_P$ and $y_R > e$. In words, under these economic conditions only the rich manage to pay educational costs with their own earnings. Average income is less than the cost of education, so that there are no sufficient resources in the economy for everyone to acquire education. But the middle class will be able to invest in human capital as long as a certain level of wealth redistribution is undertaken.

In poor countries, left-wing dictatorships are expected not to pursue a positive tax rate. From Proposition 1.(i), we know that for zero to be the global maximizer of EU_P it is necessary that there is no a tax rate at which all members of the poor can invest. As $e > y$, this necessary condition is satisfied, and thus zero may constitute the most desired alternative. Yet it remains to determine whether the economy is wealthy enough to send at least a proportion of members from the lower class ρ_P, along with the rich and the middle class, to school. Let further assume however that even if that were the case, this fraction is so small that a y_P agent would be worse off if it were enacted the degree of taxation needed to allow those poor individuals to afford education.[11] It follows then that the welfare of low-income types would be maximized at a zero tax rate. And as a result, we should observe that solely the rich get educated under left-wing regimes.

In right-wing autocracies, both $\overline{\tau_M}$ and $\overline{\tau_P}$ may emerge as the equilibrium policy. After imposing the aforementioned restrictions concerning the wealth of the economy, the two tax rates that may maximize the welfare of the rich are still feasible choices. The lack

[11] That is, $EU_P(\tau) < EU_P(0)$ where $EU_P(\tau) = \rho_P[f(y_P)] + (1-\rho_P)[(1-\tau)y_P + y_P]$ and $EU_P(0) = 2y_P$. Solving the above inequality for ρ_P, we obtain

$\rho_P < \frac{2y_P}{f(y_P)+\tau y_P - 2y_P}$,

which must hold for the assumption just made to be true.

of resources, therefore, is not a binding constraint for right dictators when deciding among their supporters' preferred policies. Nevertheless, additional conditions must be provided to state which tax rate will be eventually implemented. These conditions refer to income inequality, and as shown below, they determine first whether $\overline{\tau_P}$ is a local maximum of EU_R and, in that case, what policy yields the highest benefit to the rich.

According to Proposition 1, $\overline{\tau_P}$ is a policy candidate for the rich if and only if $y_R < \frac{y}{\lambda_R+\lambda_M}$. This inequality simply says that, at the margin, the subsidy a high-income individual receives to cover partially her educational costs must be greater than what she has to pay in taxes. Otherwise, enacting $\overline{\tau_P}$ reduces her first-period consumption and hence there is no point of supporting it.

Rewriting this requirement in terms of the distance between the income of each group, we find that

$$\frac{(y_R - y_M)}{y_P}\frac{\lambda_M}{\lambda_P} < 1. \tag{3.14}$$

So the relative economic positions of groups as well as their relative proportions in the population define the conditions under which the most affluent members of the society profit from a redistribution program that extracts as many resources as possible from the poor and incorporates the middle class in the allocation of tax proceeds. Hence income inequality is a decisive factor to take into account so as to know when $\overline{\tau_P}$ will be a policy candidate. Note that when equation 3.14 does not hold, $\overline{\tau_M}$ automatically becomes the unique maximizer of the expected utility of the rich: it is in their interests to limit the degree of taxation so as to prevent the middle class from obtaining the subsidy, even though a smaller wealth amount can be now extracted from the lower class.

As before, I will explore in turn the impact of an income spread between the poor and the rich, $\Delta_{PR|M}$, among the middle class

and the rich, $\Delta_{MR|P}$, and lastly among the middle class and the poor, $\Delta_{PM|R}$.[12] But before proceeding to this task, and in order to understand the causal links behind the hypotheses that follow, it is convenient to be more precise about the costs and gains to high-income agents of setting $\overline{\tau_P}$; something that is not spelled out in the Fernandez and Rogerson' paper.

To keep matters simple, imagine an economy with only three individuals with income $y_R > y_M > y_P$. A right-wing dictator, seeking to maximize the welfare of the rich, has to decide whether to impose a proportional income tax τ such that tax revenues are split equally among the two persons with the highest income (or a tax rate equal zero otherwise). This decision depends upon whether the amount of income taxed away from the rich type, τy_R is lower than the transfer she receives $\frac{\tau y_R + \tau y_M + \tau y_P}{2}$. Thus if $\frac{\tau y_R + \tau y_M + \tau y_P}{2} - \tau y_R > 0$, or equivalently, if

$$\frac{\tau y_P}{2} > \frac{\tau y_R - \tau y_M}{2}, \tag{3.15}$$

then τ will be implemented.

By examining closer equation 3.15, we see that the direction of the wealth redistribution involved in this tax-transfer scheme is actually twofold. On the one hand, there is a net transfer of resources from the poorest person to the middle and rich individual. In this distributional game, the person with the highest income is a net winner: she obtains half of the total income taken out of the poorest agent. The term on the left-hand side of (3.15) captures that, which can be interpreted as the gain the most affluent agent derives from enacting policy τ. On the other hand, as the rich and middle individuals both contribute to tax revenues with an

[12] Unlike this thesis, the work of Fernandez and Rogerson does not examine the differential impact of wealth inequality when it occurs in different parts of the distribution. It focuses instead on the proportions that some income groups like the poor represent in the population.

equal proportion of their earnings and the collected proceeds are shared equally among them, there is also a redistribution from the wealthiest person to the middle type. Here the rich individual loses part of her income, which may be thought of as the cost to her of policy τ -that is captured by equation 3.15 in its right-hand side. Therefore, the wealthiest person will support τ as long as what she gets from the poorest one is larger than her net transfer to the middle agent.

Now we are in a better position to understand how income inequality determines whether or not $\overline{\tau_P}$ is a policy candidate. If inequality is defined by the distance between the rich and the poor, we should expect that in a very unequal society high-income individuals do not want to share the proceeds from taxation with the middle class. That is what (3.14) leads us to conclude. By equation 3.15, we know why this is the case. Since the income of the poor is lower, extracting resources from them becomes less profitable. In addition, as the rich are wealthier, incorporating the middle class in the winner side of the redistributive game is more costly from the viewpoint of a y_R individual. Both mechanisms unambiguously induce high-income agents to support a inferior tax rate $\overline{\tau_M}$ that excludes the middle class from education. And, therefore, only the rich are expected to invest in human capital under these inequality conditions.

The same hypothesis comes out when the gap between middle and high-income groups is taken into consideration. As displayed in equation 3.14, as inequality increases in this part of the wealth distribution, right-wing authoritarian rulers should be less prone to adopt $\overline{\tau_P}$. The idea is that the cost to the rich of setting $\overline{\tau_P}$ (i.e. the transfer to the middle class) gets larger because both the income of the former has increased and that of middle earners has fallen. So, again, we should observe that under these inequality conditions only the rich get educated.

By contrast, a change in the distance between the middle class

and the poor produces an ambiguous effect on the net benefit high-income individuals derive from $\overline{\tau_P}$. For instance, increased equality among these two groups leads to an increase of the net transfer the upper class has to give to the middle class. Yet the amount of income that can be extracted from the poor goes up given that their material conditions have improved. As both forces run in opposite causal directions, the overall impact of income inequality on policy preferences remains indeterminate.

So $\overline{\tau_P}$ constitutes a policy candidate under "wealth-biased" regimes only when the economy is equal enough -except for the latter case. However, it is still true that $\overline{\tau_M}$ is also a local maximum of $EU_R(\tau)$. The rich always benefit from the tax-transfer scheme enforced by $\overline{\tau_M}$ no matter what circumstances occur. In order to see then which tax rate will arise in equilibrium, one needs to compare their induced expected utilities. A high-income individual will prefer $\overline{\tau_P}$ if and only if $EU_R(\overline{\tau_P}) > EU_R(\overline{\tau_M})$, that is

$$(1-\overline{\tau_P})\,y_R+\frac{\overline{\tau_P}y}{\lambda_R+\lambda_M}-e+f(y_R) > (1-\overline{\tau_M})\,y_R+\frac{\overline{\tau_M}y}{\lambda_R}-e+f(y_R) \tag{3.16}$$

or if

$$y_M - y_P + \overline{\tau_P}(y_P - y_R) - \overline{\tau_M}(y_M - y_R) > 0. \tag{3.17}$$

Once again, the relative economic positions of groups play a crucial role in ordering policy preferences, so that the tax rate put into practice will depend ultimately upon income inequality. To know what conditions favor that $\overline{\tau_P}$ is the most desired alternative, I will examine how the term on the left-hand side of equation 3.17 responds to increased equality. Let's call this term the function g, so

$$g(y_R, y_M, y_P) = y_M - y_P + \overline{\tau_P}\,(y_P - y_R) - \overline{\tau_M}(y_M - y_R). \quad (3.18)$$

As this function increases, the utility derived from $\overline{\tau_P}$ grows in comparison to the gain generated by $\overline{\tau_M}$, encouraging right dictators to opt for the former. Now consider, for instance, a mean-preserving change in $\Delta_{PR|M}$, that is, in the ratio of the poor types' income to the income of the rich. How does the function g react to that? Answering this question requires evaluating the total differential of g when only y_P and y_R are allowed to change, namely

$$dg = \frac{\partial g}{\partial y_R} dy_R + \frac{\partial g}{\partial y_P} dy_P, \quad (3.19)$$

which yields[13]

$$dg = (\overline{\tau_M} - \overline{\tau_P}) \left(dy_R - \frac{\lambda_P}{\lambda_R} dy_P \right). \quad (3.20)$$

Therefore, in more equal societies, it should be in the interest of the most affluent members of the economy to enlarge the size

[13] Here are the details used to calculate (3.19). First, take the partial derivative of g with respect to y_R using (3.18). This yields
$\frac{\partial g}{\partial y_R} = (\overline{\tau_M} - \overline{\tau_P})$.
In order to evaluate $\frac{\partial g}{\partial y_P}$, note that
$\frac{\partial g}{\partial y_P} = \frac{\partial g}{\partial y_R}\frac{\partial y_R}{\partial y_P} = (\overline{\tau_M} - \overline{\tau_P})\frac{\partial y_R}{\partial y_P}$.
As we are dealing with a mean-preserving change in the distance between the rich and the poor keeping everything else constant, it has to be the case that
$dy = 0 = \frac{\partial y}{\partial y_R} dy_R + \frac{\partial y}{\partial y_P} dy_P$,
where $y = \lambda_R y_R + \lambda_M y_M + \lambda_P y_P$. Then
$dy = 0 = \lambda_R dy_R + \lambda_P dy_P$,
which implies that
$\frac{dy_R}{dy_P} = \frac{\partial y_R}{\partial y_P} = -\frac{\lambda_P}{\lambda_R}$.
Putting all pieces together, the result in (3.20) is obtained.

of income redistribution even though that would imply sharing tax revenues with relatively poorer individuals. When income equality increases or, equivalently when y_P goes up - so dy_P is positive-, and y_R decreases -so dy_R is negative-, it follows from (3.20) that the function g should increase as well (recall that $\overline{\tau_P}$ is greater than $\overline{\tau_M}$). Hence it can be claimed that increased equality among low and high-income individuals makes $\overline{\tau_P}$ not only a policy candidate but also the one actually enacted in right-wing regimes.

A similar conclusion is arrived at if it is considered instead a change in $\Delta_{MR|P}$. In this case, by using the same procedure as before, the total differential of g -when only y_M and y_R can change- is equal to $(\overline{\tau_M} - \overline{\tau_P})\left(dy_R - \frac{\lambda_M}{\lambda_R} dy_M\right)$. So, once more, as the gap between the middle class and the rich get smaller, right authoritarian rulers would rather to raise the degree of taxation up to the point at which for any further increase in taxes some members of the poor may be able to afford education. All these hypotheses are summarized in Table 3.4.

Finally, it is not possible to predict what would it happen if there is some variation in the distribution of income below the mean. Depending on the particular values of parameters, the impact of a decline in the distance between the middle class and the poor may be totally different. As a result, there is no prediction that can be made for the general case.[14]

Let's examine the political-economic equilibria emerging in democracy. To do so, it has to be determined previously the middle

[14]The problem is that in the differential of
$dg = \frac{\partial g}{\partial y_M} dy_M + \frac{\partial g}{\partial y_P} dy_P = \frac{\partial g}{\partial y_M} dy_M + \frac{\partial g}{\partial y_M} \frac{\partial y_M}{\partial y_P} dy_P$
$= \frac{\partial g}{\partial y_M}\left(dy_M - \frac{\lambda_P}{\lambda_M} dy_P\right)$,
where
$\frac{\partial g}{\partial y_M} = 1 + \frac{\lambda_R y(2y_M - e - y_R) + \lambda_R^2 (e y_R - y_M^2)}{(y - y_M \lambda_R)^2}$,
we do not know the sign of $\frac{\partial g}{\partial y_M}$, unless we identify the parameters values. Note that, in evaluating this derivative, the effect of y_M on $\overline{\tau_M}$ has been taken into account since, by using equation 3.12 in the text, $\overline{\tau_M} = \frac{e - y_M}{\frac{y}{\lambda_R} - y_M}$.

Table 3.4: Predictions from Fernandez and Rogerson (1995). Poor Economy

Regime	$\Delta_{PR\|M}$	Tax Rate	Human Capital	$\frac{\partial \tau}{\partial \Delta_{MR\|P}}$	$\frac{\partial HC}{\partial \Delta_{MR\|P}}$	$\frac{\partial \tau}{\partial \Delta_{PM\|R}}$	$\frac{\partial HC}{\partial \Delta_{PM\|R}}$
Democracy	equal	$\overline{\tau_P}$	$\lambda_R + \lambda_M$	$+$	$+$	$\lessgtr 0$	$\lessgtr 0$
	unequal	0	λ_R				
Left Dic		0	λ_R	0	0	0	0
Right Dic	equal	$\overline{\tau_P}$	$\lambda_R + \lambda_M$	$+$	$+$	$\lessgtr 0$	$\lessgtr 0$
	unequal	$\overline{\tau_M}$	λ_R				

Note: $\overline{\tau_i}$ is the maximum value of τ at which nobody from group i can invest in human capital.

class's ideal policy. In poor economies, the most desired policy of a middle-income individual is $\overline{\tau_P}$. First, as she prefers the tax rate that allows all members of her class to be educated, i.e. $\underline{\tau_M}$, to any lower one, and as utility always increases between $\underline{\tau_M}$ and $\overline{\tau_P}$, it is evident that she will support $\overline{\tau_P}$ over any less-intensive redistributive policy. Second, $\overline{\tau_P}$ is preferred to any higher tax rate. Recall that the economy is not wealthy enough to provide education to everyone, so at $\overline{\tau_P}$ the only effect of an increase in taxes is that some poor agents may receive the educational transfer. And since, according to Proposition 1, that reduces the utility of middle-income individuals, they have good reasons to oppose such upsurge in taxation.

Taking into account group preferences, the majority voting equilibrium is expected to change with income inequality. There are two relevant scenarios to be distinguished. Under equal conditions (either if one considers $\Delta_{PR|M}$ or $\Delta_{MR|P}$), $\overline{\tau_P}$ wins against all alternatives in pairwise comparisons.[15] Both the rich and middle class prefer $\overline{\tau_P}$ to any other option, so that they will be able to form a stable coalition in favor of it. In unequal conditions, the actual tax rate should be zero. Now the most preferred policy of the rich is $\overline{\tau_M}$, while the other groups still sustain the same preferences. Obviously, zero beats $\overline{\tau_M}$ given that the middle class and the poor desire no taxation at all to any policy at which both groups pay taxes but do not get anything in return. In addition, as in very unequal societies high-income individuals are worse off enabling the middle class to get educated, a political alliance between the rich and the poor will come out in order to promote a zero tax rate against $\overline{\tau_P}$.[16]

[15] By focusing on the relative fraction of each group λ_i in the population, Fernandez and Rogerson come to the opposite conclusion that inequality favors the adoption of $\overline{\tau_P}$. They explore the political implications of economic inequality through changes in λ_i, whereas this work focuses on the existing income differences among groups.

[16] As in the case of right-wing dictatorship, the impact of increased equality

Comparing the political-economic equilibria across regimes, one may draw the following conclusions -see Table 3.4. In those poor countries in which the gap between lower and upper-income earners -or between the rich and middle class- is very large, we should not observe any difference among types of regimes regarding human capital: only the most affluent members of the society get educated. Yet right-wing dictatorships, unlike other types of regime, tend to impose a certain degree of taxation so as to finance partially the education of the rich.

In more equal countries, democratic and "wealth-biased" regimes are expected to display identical patterns in both human capital accumulation and income redistribution. For the very interest of the rich, right dictators are more prone to increase taxes up to $\overline{\tau_P}$, so that the middle class will be able to afford education. Likewise, in democracy a stable coalition between high and middle-income agents arises in support of a redistribution program that extracts as many resources as possible from the poor and enables the middle class to invest. "Populist" autocracies, however, should continue to show the same pattern as before.

Therefore, by focusing on $\Delta_{PR|M}$ or $\Delta_{MR|P}$, income equality is hypothesized to have a positive impact on tax rates and human capital in democratic and right authoritarian institutions. Yet, in leftist dictatorships, we should observe that governments do not respond in any way to increased inequality. Due to the wealth of economy, the poor people have already a unique ideal policy. Hence there is no room for the ex-ante income distribution to shape policy preferences.

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between low and middle-income agents on equilibrium outcomes is indeterminate due to its ultimate unknown effect on the rich' preferences.

3.3.2 Rich Economy

In a rich economy, characterized by $y_R > y > y_M > e > y_P$, there is more than sufficient resources to send everyone to school. The upper and middle class have enough money to pay the cost of education but the poor need certain level of public financing in order to invest in human capital.

Under these economic conditions, it is expected that "populists" autocracies carry out a complete redistribution of income. It is clear that a left dictator will enact at least a degree of taxation that enables the poor to afford education. Yet the reason why he is expected to accomplish an equal allocation of resources is that increased taxation, once all poor agents get educated (i.e. at $\underline{\tau_P}$), exerts a positive effect on their first-period consumption. Note that this model assumes that taxation does not produce deadweight loses. Since the marginal increase in the government transfer, y, is greater than a poor individual's marginal tax payment, y_P, her disposal income increases with taxes and is maximized at $\tau = 1$ -notice that the subsidy is an income transfer, so it can be used for consumption after the cost of education has been covered.[17]

With regards to right-wing regimes, they should display basically the same patterns as in the case of poor societies. First, as the wealth of economy makes no difference in the policy preferences of the rich, both $\overline{\tau_P}$ and $\overline{\tau_M}$ -the possible local maximum of EU_R- may eventually occur in equilibrium. Yet income inequality will determine which policy will be actually put into practice.

A more balanced income distribution between low and high-income individuals, or between the rich and middle class, induces right policy makers to opt for a tax rate at which public revenues

[17] Remember that at $\underline{\tau_P}$ all members of the lower class are able to afford education, but they exhaust all their resources in investing in human capital so that their first-period consumption would be $\left(1 - \underline{\tau_P}\right) y_P - e + \underline{\tau_P} y = 0$. If taxes keep growing, it is clear that this equation starts being positive since $y > y_P$, and it is maximized at $\tau = 1$.

have to be shared with the middle types. Note that whenever the rich profit from setting $\overline{\tau_P}$ -which is true in more equal countries as seen earlier-, they will prefer it given that $\overline{\tau_M} = 0$ -recall that $y_M > e$. Another important point worth mentioning is that increased taxation does not have any impact on human capital accumulation: only the rich and middle class invest in human capital no matter what policy is enacted. Taxes do not serve to help the "uneducated" poor to pay the costs of education but just to redistribute income toward the most affluent groups of the society. Table 3.5 displays these predictions.

Before proceeding to the equilibrium analysis in democracies, let us examine the middle class's preferred policies. The first thing to be noted is that $\overline{\tau_P}$ continues to be a policy candidate: it generates the highest utility compared to that of any tax rate between zero and $\underline{\tau_P}$ (the minimum tax rate at which all members of the poor get educated). In addition, as the economy is wealthy enough to send everybody to school, one is also a local maximum of EU_M. By Proposition 1, if $y_M < y$, the welfare of a middle-income individual increases with taxes once all poor agents invest, and is maximized over this policy interval at $\tau = 1$. Therefore, when making her proposal, a y_M agent faces a dilemma between restricting the degree of taxation so that the poor are excluded from obtaining the subsidy versus increasing the size of government redistribution -so that she gets a greater income transfer from the rich- but having to share tax revenues with more individuals. Of course, she will prefer the policy that produces the greatest benefit to her. Thus her policy proposal will be $\overline{\tau_P}$ if and only if $EU_M\left(\overline{\tau_P}\right) > EU_M\left(1\right)$, that is

$$\left(1-\overline{\tau_P}\right) y_M + \frac{\overline{\tau_P} y}{\lambda_R + \lambda_M} - e + f\left(y_M\right) > y - e + f\left(y_M\right), \quad (3.21)$$

or if

Table 3.5: Predictions from Fernandez and Rogerson (1995). Rich Economy

Regime	$\Delta_{PR\|M}$	Tax Rate	Human Capital	$\frac{\partial \tau}{\partial \Delta_{MR\|P}}$	$\frac{\partial HC}{\partial \Delta_{MR\|P}}$	$\frac{\partial \tau}{\partial \Delta_{PM\|R}}$	$\frac{\partial HC}{\partial \Delta_{PM\|R}}$
Democracy	equal	$\overline{\tau_P}$ or 1	$\lambda_R + \lambda_M$ or $\lambda_R + \lambda_M + \lambda_P$	$-$	$-$	$+$	$+$
	unequal	1 or NE	$\lambda_R + \lambda_M + \lambda_P$ or ?				
Left Dic		1	$\lambda_R + \lambda_M + \lambda_P$	0	0	0	0
Right Dic	equal	$\overline{\tau_P}$	$\lambda_R + \lambda_M$	$+$	0	$\leqslant 0$	0
	unequal	$\overline{\tau_M} = 0$	$\lambda_R + \lambda_M$				

Note: NE means No Equilibrium.

$$e - y + (1 - \overline{\tau_P})(y_M - y_P) > 0. \tag{3.22}$$

Equation 3.22 provides the conditions under which it should be in the interest of middle-income agents to pursue $\overline{\tau_P}$ instead of a complete redistribution of wealth. Some of these conditions refer to income inequality and, in particular, the economic position of the middle class relative to the mean appears to be a key determinant of its decisions. It is easy to see from (3.22) that when the income of a y_M individual is sufficiently high, limiting taxes so that she gets the most out of the poor is better for her than confiscating all resources and include the poor in the distribution of benefits. Hence, as shown below, any mean-preserving change in income inequality that makes the middle class more affluent may wane its support for increased redistribution.

Consider first an increase in the distance between y_M and y_P. To see how that affects policy preferences, let's call the term in the left-hand side of equation 3.22 the function q, so

$$q(y_M, y_P) = e - y + (1 - \overline{\tau_P})(y_M - y_P). \tag{3.23}$$

Taking the total differential of q, we find that as the economic gap between the middle class and the poor gets wider, the function q increases by $(1 - \overline{\tau_P})\left(dy_M - \frac{\lambda_P}{\lambda_M} dy_P\right)$. So it is possible to conclude that the larger the distance between these two groups, the better the case for $\overline{\tau_P}$ being the most preferred policy of middle-income individuals. Likewise, when $\Delta_{MR|P}$ increases, the latter will be more prone to support a limited tax rate that exclude the poor from education. The reason for this result is that further equality in this part of the income distribution will make a y_M type richer, which in turn increases the function q by $(1 - \overline{\tau_P})dy_M$. Finally, any variation in the ratio of the poor' income to that of the rich produces an undetermined effect on preferences. Note first that $\Delta_{PR|M}$ influences q only through y_P. The problem lies then in

that we do not know how the function q responds to changes in y_P.[18]

Having determined each group's ideal tax rates, we have all pieces to proceed to the equilibrium analysis in democracy. As it can be seen in Table 3.6, the fact that the preferences of certain classes are affected by income inequality means that the majority voting equilibrium varies with inequality as well. Furthermore, fiscal policy is expected to be adjusted differently depending upon where in the distribution the dispersion occurs.

If we concentrate on the distance between the rich and the middle class, inequality is positively related with the degree of taxation. In those democracies with larger income disparities, the preferred policy of middle types will be one; so a steady pro-more-redistribution coalition will arise between them and the poor in support of a even allocation of resources. When high and middle-income individuals are closer, $\overline{\tau_P}$, sustained by the more affluent groups of the society, beats any other proposal.

By contrast, income inequality between the middle class and the poor may be inversely related with the level of taxes. In unequal societies, the existence of a voting equilibrium is a function of the rich' preferences. If their desired policy is $\overline{\tau_P}$, then they along with the middle class may enact it. But if they favor $\overline{\tau_M} = 0$ instead, then there would not exist any equilibrium.[19] In more equal

[18] Taking into account the effect of y_P on $\overline{\tau_P}$, the partial derivative of q with respect to y_P is

$\frac{\partial q}{\partial y_P} = \frac{y(\lambda_R+\lambda_M)(y_M+e-2y_P)+(\lambda_R+\lambda_M)^2(y_P^2-ey_M)}{[y-y_P(\lambda_R+\lambda_M)]^2} - 1.$

So unless we identify the parameters values, the sign of $\frac{\partial q}{\partial y_P}$ is unclear.

[19] In this situation, group preferences would be the following:

Rich: $\overline{\tau_M} = 0 > \overline{\tau_P} > 1$

Middle: $\overline{\tau_P} > 1 > 0$

Poor: $1 > 0 > \overline{\tau_P}$

where $>$ means "is preferred to." Given these preferences, voting leads to a majority cycle. In pairwise elections, $\overline{\tau_P}$ wins against 1, then 1 wins against 0, but 0 wins against $\overline{\tau_P}$. Therefore, a majority voting equilibrium does not exist

Table 3.6: Equilibrium Policy in Rich Democracy

Conditions		Policy Preferences			Equilibrium
		Rich	Middle class	Poor	
$\Delta_{PR\|M}$	equal	$\overline{\tau_P}$	$\overline{\tau_P}$ or 1	1	$\overline{\tau_P}$ or 1
	unequal	$\overline{\tau_M} = 0$			1 or NE
$\Delta_{MR\|P}$	equal	$\overline{\tau_P}$	$\overline{\tau_P}$	1	$\overline{\tau_P}$
	unequal	$\overline{\tau_M} = 0$	1		1
$\Delta_{PM\|R}$	equal	$\overline{\tau_P}$ or $\overline{\tau_M} = 0$	1	1	1
	unequal		$\overline{\tau_P}$		$\overline{\tau_P}$ or NE

democracies, however, it will be accomplished a total redistribution of wealth. Since both the poor and the middle class prefer this policy over all possible ones, they can enforce it through majority voting. Consequently, it is possible to observe a systematic increase in taxation as the gap between y_M and y_P shrinks.

Taking into account $\Delta_{PR|M}$ finally, it is hard to predict how democratic governments will react to increased inequality. Regardless of the initial wealth distribution, more than one tax rate may emerge in the steady state. As seen in Table 3.6, this result stems from the fact that the preferences of middle-income earners are unpredictable.

After examining the equilibrium outcomes in each type of regime, it can be claimed that the particular institutional framework in which political decisions are taken makes a difference for both the degree of taxation and human capital accumulation. Comparing education patterns across political regimes -see Table 3.5-, we find that while "populists" dictatorships tend to send everyone to school, "wealth-biased" autocracies are expected to exclude the poor from

with such structure of preferences.

education. Moreover, these differences should remain constant under any configuration of the ex-ante income distribution. In other words, inequality is predicted to have no impact on human capital in none of these political systems.

Yet democracies are expected to approach the pattern of left or right wing dictatorships depending upon income equality and in which part of the distribution the contraction occurs. Ceteris paribus, in those countries characterized by a low dispersion between y_M and y_R, democracies should display the same outcomes as right-wing dictatorships. On the contrary, we should observe that democratic institutions, like left-wing regimes, enable all income groups to be educated as the middle class and the poor get closer. However, if $\Delta_{PR|M}$ is considered instead, we do not know if the lower class will eventually invest in human capital whatever the inequality conditions are.

3.4 Comparing Across Models

In this section, I go over the main results of previous sections and try to discern the substantive reasons behind the divergent predictions arrived at on the basis of each of these models. For the purposes of comparison, I will start by discussing Saint-Paul and Verdier' contribution separately, although some linkages are set with the other proposed explanations. Then a more integrated-systematic comparison will be made between the last two models due to their similar structures, which makes them particularly appropriate for a meaningful comparative analysis.

In line with the conventional approach to redistributive politics, the political decision to be taken in Saint-Paul and Verdier' model was a proportional income tax with which to fund an equal amount of public education for all citizens. As this policy implies that relatively wealthier agents finance part of the education of poorer ones, the latter tend to support higher taxes and more gov-

ernment spending on education than the former. This preferences' configuration, along with the definitions given of different types of regimes, brought about divergent educational patterns among political systems. Left-wing autocracies were predicted to show the highest level of education attained by a particular generation, while right-wing dictatorships the lowest one. In turn, the accumulation of human capital in democracy was expected to be somewhere in between.

Another important conclusion drawn from this model is that this institutional ranking should remain constant under any economic background. Given that whatever the degree of inequality or that of economic development individuals with more human capital endowments always prefer a smaller size of publicly provided schooling than those with fewer assets, one might expect that the relative performance of institutions -which translate the preferences of certain economic groups into policy- constantly shows "populists" autocratic governments at the top of the aggregate-educational-attainment distribution followed by democratic ones, and "wealth-biased" dictatorships at the bottom.

Yet income inequality amplifies the educational differences among regimes. In particular, the distance between democracy and left-wing regimes, on the one hand, and right-wing political systems, on the other, get larger as income distribution spreads out. The reason for that result lies on the fact that the effect of inequality on equilibrium outcomes is contingent on the particular institutional framework in place. While both democratic and populists governments respond to increased inequality by raising taxes and spending more resources on education -since their politically dominant groups or decisive voter becomes poorer-, "wealth-biased" regimes do the opposite -as a consequence of their supporters' improved economic positions. Therefore, it may be claimed that the more imbalance the income distribution, the larger the differences among regimes.

Compared to the other models, the main lesson of this work is that when education policy involves a cost-benefit scheme that systematically benefits relatively poorer agents at the expense of wealthier individuals, it may be reasonable to think that policy preferences will follow the above structure. Thus, and given the proposed classification of regimes, not only political systems would exhibit distinct educational profiles, but also the aforementioned ranking should prevail no matter what economic conditions happen to be. Changing the cost-benefit allocation among social groups will alter their policy preferences and equilibrium outcomes. For instance, if the education of the poor generates positive side-effects on well-off agents' income (which is the case in the presence of human capital externalities), then the latter may favor policies that redistribute income to people facing financial constraints in their investments. As a result, regimes might reach similar levels of human capital accumulation.

There is an important shortcoming of the Saint-Paul and Verdier' model that concerns how social classes determine their indirect preferences over policies, and ultimately the actual educational patterns of regimes. The assumption that all individuals receive a uniform amount of public education regardless of their wealth seems to be at odds with the empirical evidence. It is well-known that the middle class is by far the group that benefits the most from publicly provided schooling. If we incorporate this fact through, for example, making possible that the distribution of policy benefits can be targeted at certain groups, then predictions may completely change. Now the preferred degree of taxation may not diminish monotonically with individual incomes. Actually, as demonstrated in the last model, there are situations in which the less affluent groups of society are expected to want less taxes and education subsidies than wealthier ones, leading to a reversal of the previous performance ranking of institutions.

I now turn to an analysis of the hypotheses advanced from the

models of Perotti and Fernandez & Rogerson. This analysis will be carried out in turn for rich and poor countries.

3.4.1 Rich Economy

As defined in both models, in a rich economy there are enough resources to send everyone to school. To invest in human capital individuals must have sufficient assets to pay the fixed cost of education. All members of middle and high-income groups can afford it by their own, but the poor need some publicly allocated transfers of income to do so. It follows then that redistributive politics, when it has actual consequences on educational outcomes, can make a difference only in the education of the lower class. And also that among wealthy countries the single source of cross-national variation in human capital accumulation must be whether or not the poor get educated.

So here the relevant theoretical questions would be under what conditions may it be reasonable to expect that low-income types can afford education? In what economic-institutional contexts are governments expected to reallocate income in such a way that enables the former to do so? As shown below, the predictions one may develop from these two models sometimes diverge and, when they are the same, they may be driven by different political economy mechanisms.

Let us start with right-wing regimes. As seen in Table 3.8, while according to Fernandez and Rogerson' framework rightist dictators will never enforce a policy that would help the poor become educated , following the logic of Perotti's one a more balanced income distribution may lead "wealth-biased" regimes' supporters to promote such policy. Since in Perotti human capital creates positive externalities, there might be situations in which the social return produced by the investment of the poor compensates the short-term consumption losses the rich have to bear in subsidizing low-income types' education. In particular, it turned out that equality

in any part of the income distribution makes that to be the case. Whether because it reduces the size of the transfer the poor need to afford education -since they are better off- or makes smaller the rich' contribution -since their taxable income goes down-, the cost of educating the former clearly declines with income equality from the standpoint of a y_R individual. Hence, in very equal societies, rightist autocratic governments tend to raise the degree of taxation so as the poor can invest in human capital.[20]

In contrast, if the proportion of educated people in the population does not have any side-effect on individual incomes -as it is assumed in the model of Fernandez and Rogerson-, then there is no point for the rich to make any transfer to the poor. Actually, the very fact that in this model the lower class can be excluded from education, and thereby from the distribution of public subsidies, may lead the wealthy to be in favor of a moderate tax rate to extract resources from the poor rather than to help them overcome the cost of education. As discussed in the previous section 3.3, income equality between the middle class and the rich, or between the poor and the rich, induces right-wing dictators to impose such redistributive scheme.

Consider now left-wing regimes. From Tables 3.7 and 3.8, we see that when policymakers take their decisions considering only the welfare of the poor, both models predict that the latter get educated under any configuration of the income distribution and, except for some instances in Perotti's model, taxes do not change with inequality. In wealthy countries, there are enough resources to send the poor, along with the other classes, to school. So populist dictators will enact at least the necessary redistributive package for low-income agents to invest in human capital given that in both models individuals profit from their own education. Once

[20]Note however that if the poor cannot invest in democracies, neither can they under "wealth-biased" systems since it is always the case that educating the poor is more costly to the rich than to the median voter.

Table 3.7: The Effect of Inequality on Taxes and Human Capital. Rich Economy

Model	Regime	Income Equality					
		$\frac{\partial \tau}{\partial \Delta_{PM\|R}}$	$\frac{\partial HC}{\partial \Delta_{PM\|R}}$	$\frac{\partial \tau}{\partial \Delta_{MR\|P}}$	$\frac{\partial HC}{\partial \Delta_{MR\|P}}$	$\frac{\partial \tau}{\partial \Delta_{PR\|M}}$	$\frac{\partial HC}{\partial \Delta_{PR\|M}}$
Perotti	Democracy	$+$	$+$	$-$	$-$	$+$	$+$
	Left Dic	$-$	0	0	0	$-$	0
	Right Dic	$+$	$+$	$+$	$+$	$+$	$+$
F-R	Democracy	$+$	$+$	$-$	$-$	$\lesseqgtr 0$	$\lesseqgtr 0$
	Left Dic	0	0	0	0	0	0
	Right Dic	$\lesseqgtr 0$	0	$+$	0	$+$	0

Note: F-R refers to the model of Fernandez and Rogerson.

the poor become educated, they would continue to support any increase in taxation that makes their post-tax revenue greater. If taxes are nondistortionary, their disposable income will always be maximized at $\tau = 1$. This is the case of Fernandez and Rogerson. With costs of collecting taxes -as supposed in Perotti-, then their optimal tax rate (τ_P^*) will be lower than one and decline with their income as indicated by equation 3.8. Therefore any variation in the distribution of wealth that involves an improvement of the poor' economic position is expected to be negatively related with the degree of taxation.

Let's examine finally democratic regimes. When the size of redistribution is chosen by majority voting, most of the hypotheses relating to the inequality conditions under which the least well-off people manage to invest are the same in both frameworks. The smaller the gap between low and middle income individuals, or the larger the gap between the rich and the middle class, the more likely

Table 3.8: Tax Rate and Human Capital by Regime and Income Inequality. Rich Economy

Model	Regime	Income inequality			
		$\Delta_{PM\|R}$		$\Delta_{MR\|P}$	
		Equal	Unequal	Equal	Unequal
Perotti	Democracy	$\tau_M^*(\geq \underline{\tau_P})$ or $\underline{\tau_P}$, $\lambda_R + \lambda_M + \lambda_P$	$\tau_M^*(< \underline{\tau_P})$, $\lambda_R + \lambda_M$	$\tau_M^*(< \underline{\tau_P})$, $\lambda_R + \lambda_M$	$\tau_M^*(\geq \underline{\tau_P})$ or $\underline{\tau_P}$, $\lambda_R + \lambda_M + \lambda_P$
	Left Dic	τ_P^*, $\lambda_R + \lambda_M + \lambda_P$	τ_P^*, $\lambda_R + \lambda_M + \lambda_P$	τ_P^*, $\lambda_R + \lambda_M + \lambda_P$	τ_P^*, $\lambda_R + \lambda_M + \lambda_P$
	Right Dic	$\underline{\tau_P}$, $\lambda_R + \lambda_M + \lambda_P$	$\tau_R^* = 0$, $\lambda_R + \lambda_M$	$\underline{\tau_P}$(or $\tau_R^* = 0?$), $\lambda_R + \lambda_M(+\lambda_P?)$	$\tau_R^* = 0$, $\lambda_R + \lambda_M$
F-R	Democracy	1, $\lambda_R + \lambda_M + \lambda_P$	$\overline{\tau_P}$ or NE, $\lambda_R + \lambda_M(+\lambda_P?)$	$\overline{\tau_P}$, $\lambda_R + \lambda_M$	1, $\lambda_R + \lambda_M + \lambda_P$
	Left Dic	1, $\lambda_R + \lambda_M + \lambda_P$	1, $\lambda_R + \lambda_M + \lambda_P$	1, $\lambda_R + \lambda_M + \lambda_P$	1, $\lambda_R + \lambda_M + \lambda_P$
	Right Dic	?, $\lambda_R + \lambda_M$	?, $\lambda_R + \lambda_M$	$\overline{\tau_P}$, $\lambda_R + \lambda_M$	$\overline{\tau_M} = 0$, $\lambda_R + \lambda_M$

Continued on Next Page...

Table 3.8: Tax Rate and Human Capital by Regime and Income Inequality. Rich Economy –Continued

Model	Regime	Income inequality	
		$\Delta_{PR\|M}$	
		Equal	Unequal
Perotti	Democracy	$\tau_M^*(\geq \underline{\tau_P})$ or $\underline{\tau_P}$, $\lambda_R + \lambda_M + \lambda_P$	$\tau_M^*(< \underline{\tau_P})$, $\lambda_R + \lambda_M$
	Left Dic	τ_P^*, $\lambda_R + \lambda_M + \lambda_P$	τ_P^*, $\lambda_R + \lambda_M + \lambda_P$
	Right Dic	$\underline{\tau_P}$, $\lambda_R + \lambda_M + \lambda_P$	$\tau_R^* = 0$, $\lambda_R + \lambda_M$
F-R	Democracy	?	?
	Left Dic	1, $\lambda_R + \lambda_M + \lambda_P$	1, $\lambda_R + \lambda_M + \lambda_P$
	Right Dic	$\overline{\tau_P}$, $\lambda_R + \lambda_M$	$\overline{\tau_M} = 0$, $\lambda_R + \lambda_M$

Note: F-R refers to the model of Fernandez and Rogerson.

the poor get educated. Yet the causal mechanisms behind these associations are completely different. The reason of that lies on the models' different modeling strategies regarding whether there are human capital externalities and costs of collecting taxes, and whether all agents participate in the distribution of policy benefits.

Along the lines of the Meltzer-Richard' classical approach to redistribution, in Perotti everyone pays a proportion τ of their income in taxes and the proceeds collected are distributed as a per capita transfer among all citizens. Increased taxation produces efficiency costs, which avoids that all individuals below the mean prefer a fully equal allocation of resources. Moreover, it makes preferences over the level of taxes a decreasing function of individual incomes. Hence not only the middle class will always favor a lower taxation than the poor, but also it is possible that a conflict between its desired tax rate and the human capital-enhancing one may arise.

Or, put it in another way, it is possible that in some circumstances educating the poor may involve some income losses to middle types.

However, as there exist human capital externalities, the median voter may still get a net benefit from letting the least affluent group of the society to acquire education even if a certain amount of consumption has to be sacrificed in the short run. Whether that is the case or not will depend upon the initial distribution of income. Income inequality plays a crucial role here because it determines how costly it is to the decisive voter that the lower class can eventually go to school. In particular, any change in the ex-ante wealth distribution that increases the income of the poor or reduces that of the middle class will lower this cost inducing her to propose the necessary tax rate that enables the poor to do so.

In Fernandez and Rogerson, the middle class does not obtain any gain from the low-income types' educational investment. But the education of the poor neither imply any cost to a y_M individual. Quite the opposite, since there are no deadweight losses of raising taxation, in rich economies the middle class always gets a positive transfer with a complete redistribution of resources, which on the other hand would help the poor to be educated. Yet as this model allows for the possibility that certain groups can be excluded from obtaining the publicly allocated subsidy, middle-income individuals find it profitable as well a limited tax rate that would impede a y_P agent to invest in education. They will choose the policy that gives them the highest post-tax income. As seen in the previous section 3.3, if the distance between low and middle income agents (or between the rich and the middle class) is sufficiently small (or large), they will prefer $\tau = 1$ and thereby form a coalition with the poor in support of this policy. Otherwise, excluding the latter from education may become the majority voting equilibrium sustained by the two most affluent classes of the economy -recall however that when $\Delta_{PM|R}$ is low there may not exist any equilibrium.

Having determined the predicted policy outcomes in each type

of regime, we see in Table 3.8 that the educational differences among institutions turn out to be very similar in the two analytical frameworks when equality conditions are defined by $\Delta_{MR|P}$. In relatively unequal societies, while democracies and left-wing dictatorships allow the poor to invest, in "wealth-biased" regimes only the members of high and middle income groups get educated. In equal societies, democratic systems approach the pattern of rightist autocracies, and both types of authoritarian regimes are expected to perform as in unequal economies.

If we focus on $\Delta_{PM|R}$ instead, both models predict that in those economies characterized by a more imbalance income distribution, only in left-wing dictatorships the poor will afford education. Yet when the gap between the latter and the middle class diminishes, we find divergent predictions. Whereas according to Perotti's model, one should observe that all political systems enable low-income individuals to become educated, in line with Fernandez and Rogerson the lower class get educated just under democratic and left autocratic institutions.

Finally taking $\Delta_{PR|M}$ as the relevant equality measure, the relative performance of regimes in Perotti is exactly the same as in the previous case. However, following the logic of Fernandez and Rogerson, we do not know what to expect given that equilibrium outcomes are unpredictable under democracy.

3.4.2 Poor Economy

In a poor economy, average income is below the cost of education, so there are no sufficient resources in the economy for everyone to invest in human capital. The rich are the only group that can afford education by their own. Yet while in Fernandez and Rogerson' model, income redistribution may enhance the middle class to do so as well, in Perotti's one taxes endanger the investment ability of high-income individuals.

In the latter model, increased taxation always implies larger in-

come transfers from the rich to relatively poorer agents. Therefore, and given that per capita income is lower than the price of education, the size of redistribution may prevent the rich from investing rather than enabling individuals below the mean to afford education. By contrast, in Fernandez and Rogerson, there is a range of tax values at which redistributive policy produces a higher concentration of resources in the more affluent groups of the society. So at that range, not only the rich will still get educated, but also the middle class may now be able to invest in human capital.

Let us start by examining wealth-biased regimes. From Tables 3.9 and 3.10, according to Perotti's model, governments in these political systems always pursue a zero tax rate since it improves both the short-run welfare and the investment ability of their supporters. Income inequality has no bearing on policies, but yet it may hinder investment by reducing the income of individuals in the upper tale of the wealth distribution. In Fernandez and Rogerson' framework, however, right-wing dictators are expected to carry out a moderate redistributive program so that at least one of the other two classes contributes to cover partially the costs of the education of the rich. As postulated earlier, the higher the degree of equality between the middle class and the rich (or between high and low income agents), the larger the incentives wealth-biased rulers have to increase taxation in order to extract as many resources as possible out of the poor.

Regarding "populists" autocracies, the equilibrium policy under the framework of Fernandez and Rogerson will be always $\tau = 0$, so that only high income types can acquire education. This is so because the poor will never get educated despite government redistribution, but they will have to finance the education of other agents if any positive tax rate is enacted. However, following the premises of Perotti's model, left-wing dictators try to reallocate certain amount of resources toward their own constituencies through fiscal policy. Nevertheless, as taxation may reduce the welfare of the poor in

Table 3.9: The Effect of Inequality on Taxes and Human Capital. Poor Economy

Model	Regime	Income Equality					
		$\frac{\partial \tau}{\partial \Delta_{PM\|R}}$	$\frac{\partial HC}{\partial \Delta_{PM\|R}}$	$\frac{\partial \tau}{\partial \Delta_{MR\|P}}$	$\frac{\partial HC}{\partial \Delta_{MR\|P}}$	$\frac{\partial \tau}{\partial \Delta_{PR\|M}}$	$\frac{\partial HC}{\partial \Delta_{PR\|M}}$
Perotti	Democracy	$+$	$-$	$\lesseqgtr 0$	$\lesseqgtr 0$	$+$	$-$
	Left Dic	$-$	$+$	$+$	$-$	$\lesseqgtr 0$	$\lesseqgtr 0$
	Right Dic	0	0	0	$-$	0	$-$
F-R	Democracy	$\lesseqgtr 0$	$\lesseqgtr 0$	$+$	$+$	$+$	$+$
	Left Dic	0	0	0	0	0	0
	Right Dic	$\lesseqgtr 0$	$\lesseqgtr 0$	$+$	$+$	$+$	$+$

Note: F-R refers to the model of Fernandez and Rogerson.

the long run (due to the presence of an educational externality), it is possible that in some circumstances they may prefer to restrict the degree of redistribution so as the rich can undertake their investments. As discussed before, income equality (or inequality) between the poor and the middle class (or between the latter and the rich) induce "populists" incumbents to promote human capital accumulation at the cost of their constituencies' short-term consumption.[21]

Finally, consider the political equilibria reached when collective decisions are made by majority voting. As derived from Perotti's assumptions, taxes are expected to increase as $\Delta_{PM|R}$ or $\Delta_{PR|M}$ get larger, reducing so the proportion of educated people in the population. The idea is that it becomes more costly to the median voter to limit taxation so as the wealthy can invest in human capital

[21]Note however that if high-income individuals do not get educated under democratic institutions, one should observe the same under left-wing regimes.

when equality increases in these income intervals of the distribution. Following Fernandez and Rogerson, the middle class always prefer to raise taxation up to $\overline{\tau_P}$ because with this fiscal policy middle types not only will get educated, but also they will maximize their present consumption. Yet whether this policy is finally enacted will depend on the preferences of high income individuals. In very equal societies (either if $\Delta_{PR|M}$ or $\Delta_{MR|P}$ is considered), an electoral coalition formed by the rich and the middle class arises in favor of $\overline{\tau_P}$, and accordingly one should observe that both income groups get educated. In very unequal societies, as the rich are now worse off sharing the policy benefits with the middle class, $\tau = 0$ becomes the equilibrium tax rate and so only y_R individuals can invest in human capital.

Table 3.10: Tax Rate and Human Capital by Regime and Income Inequality. Poor Economy

Model	Regime	Income inequality			
		$\Delta_{PM\|R}$		$\Delta_{MR\|P}$	
		Equal	Unequal	Equal	Unequal
Perotti	Democracy	τ_M^* ($> \tilde{\tau}_R$), 0	τ_M^*($\leq \tilde{\tau}_R$) or $\tilde{\tau}_R$, λ_R	?	?
	Left Dic	τ_P^* (or $\tilde{\tau}_R$?), 0(or λ_R?)	τ_P^*, 0	τ_P^*, 0	$\tilde{\tau}_R$, λ_R
	Right Dic	$\tau_R^* = 0$, λ_R	$\tau_R^* = 0$, λ_R	$\tau_R^* = 0$, λ_R or 0	$\tau_R^* = 0$, λ_R
F-R	Democracy	?	?	$\overline{\tau_P}$, $\lambda_R + \lambda_M$	0, λ_R
	Left Dic	0, λ_R	0, λ_R	0, λ_R	0, λ_R
	Right Dic	?	?	$\overline{\tau_P}$, $\lambda_R + \lambda_M$	$\overline{\tau_M}$, λ_R

Continued on Next Page...

Table 3.10: Tax Rate and Human Capital by Regime and Income Inequality. Poor Economy –Continued

Model	Regime	Income inequality	
		$\Delta_{PR\|M}$	
		Equal	Unequal
Perotti	Democracy	τ_M^* $(> \tilde{\tau}_R)$, 0	$\tau_M^*(\leq \tilde{\tau}_R)$ or $\tilde{\tau}_R$, λ_R
	Left Dic	?	?
	Right Dic	$\tau_R^* = 0$, λ_R or 0	$\tau_R^* = 0$, λ_R
F-R	Democracy	$\overline{\tau_P}$, $\lambda_R + \lambda_M$	0, λ_R
	Left Dic	0, λ_R	0, λ_R
	Right Dic	$\overline{\tau_P}$, $\lambda_R + \lambda_M$	$\overline{\tau_M}$, λ_R

Note: F-R refers to the model of Fernandez and Rogerson.

Part II

Data and Empirical Evidence

Chapter 4

The Ideology of Dictatorships: An Empirical Assessment

To test the empirical implications of the models analyzed in the previous chapter -and thus discriminate between these different formal approaches-, I now turn to describe the data used in the subsequent econometric analyses. This chapter is devoted to describe the new database that I have created on the ideological orientation of dictatorships. The rest of the data used in the empirical analysis will be described in the next chapter.

Communist regimes, initially seen as the most ideological instances of dictatorships, eventually lost their ideological fervor. First, these regimes began to rely more on the use of terror. Then, with the end of the terror and purges of Stalin, communist regimes instituted "goulash communism," relying more on the material basis of consent to maintain support. Communist absolute systems are not the only dictatorial examples preoccupied with rents and spoils. Reports of the millions stolen and distributed by dictators like Ferdinand Marcos in the Philippines or Mobutu in Zaire, rein-

force the popular notion that dictators are motivated solely by just money and power.

The academic literature similarly is concerned with the rent-seeking behavior of dictatorial leaders. Formal theories of autocracies usually specify rent-seeking in the objective functions of their rulers (e.g., Grossman and Noh 1990, Wintrobe 1990, Bueno de Mesquita *et al.* 1999). The literature comparing the behavior of democratic and dictatorial governments frequently focuses on the lack of accountability and kleptocratic nature of the latter (McGuire and Olson 1996).

Yet dictators may appeal to certain constituencies. Dictatorial regimes often encapsulate or incorporate groups within society to serve as their bases of support (O'Donnell 1979, Linz 1973). In exchange for their cooperation, these groups certainly receive spoils. However they may demand more than just monetary compensation; they may pressure also for real policy concessions (Gandhi 2004). Which groups are coopted and what type of policy concessions are made by the regime may hinge on its ideology. And even if interest groups do require just spoils in exchange for their cooperation, their demand for rents implies redistribution from someone else. In any case, it is reasonable to think that the regime's ideology determines who win and who loses in resolving distributional conflicts.

Therefore, despite the popular and scholarly focus on rent-seeking as a motivation and tool of dictators, I believe that the ideology of dictators is just as important, if not more so. Questions about types of policies and outcomes that generate distributional tensions such as education-related policies, can be better answered if we know something about the ideology of these rulers. This line of reasoning is consistent with the vast literature that uses indicators of the ideological stance of democratic governments to account for welfare spending programs or the political management of the economy. Knowing something about the ideology of dictatorial leaders will allow us to investigate such questions for dictatorships.

In this chapter, I introduce a measure about the ideology of dictatorships for all dictatorial regimes that have been existed all over the world from 1960 to 1996. The measure indicates whether dictators are located on the "left," "center," and "right" of the left-right continuum. The organization of this chapter is the following: I first discuss conceptually what these terms mean for the purposes at hand and then provide the details on how I determine the ideological positions of dictators. From secondary sources, I found several indicators of 1) the ideological orientation of the dictator and his ruling party, and 2) policies that are orthogonal to the domestic policy space. In section 4.3, I discuss those problematic cases in which these indicators do not point to the same conclusion and the decisions regarding them. Finally, I offer some descriptives of the data.

4.1 Ideology and Dictatorships

In light of the theoretical classification of dictatorships proposed in this thesis, ideally we would want to empirically distinguish dictatorships in terms of their core constituency's social class background or in terms of the initial preferences that their rulers or government parties have on redistribution and income equality. Yet, to address this question directly may be so hard that eventually it may become an impossible task. Therefore, as it is nearly always the case in empirical studies, we have to rely on some good proxies.

I decide to use the ideological location of regimes on the Left-Right spectrum as a proxy of their social basis of support and their political agenda regarding redistributive policy. When the ruling party is described as a right-wing group or when it announces a socialist platform, I believe that these statements imply different initial preferences over the size of redistribution it desires to pursue in government. In particular, it is assumed that those dictatorships advocating a leftist or socialist program will wish to increase redis-

tribution; I call them left-wing or "populists" dictatorships. In contrast, it is assumed that a rightist dictator would rather preserve the status quo (i.e. the initial allocation of resources) than enact any purely income redistributive package.

The existing literature about the ideology of dictatorships is very limited. There is a few number of studies on this subject and, more importantly, they do not theoretically and empirically cover the issue in a proper way. As discussed in Chapter 2, most theoretical works on the social basis of dictatorships make gross simplifications such as the assumption that all dictatorships promote the interests of the rich, that is that all nondemocratic regimes are right-wing ones (Acemoglu and Robinson 2006; Wacziarg 2001; Bourguignon and Verdier 2000). Empirically, the current literature focuses on a few, select cases like the work of Rouquie (1984), which studies right-wing military regimes in Latin America. But it has not been done a systematic and quantitative analysis aimed to discriminate between distinct ideological types of dictatorships.

One reason that may explain why the literature is short of a systematic coding of the dictatorial governments' ideology is the existence of conceptual and operational difficulties. Unlike in democracies where parties issue platforms, many dictators often either 1) do not have parties, or 2) if there are parties, they may be epiphenomenal vehicles for the dictators. Yet that is not always the case. There are a number of dictators who rule with a stable party that has an apparatus and militants who demand that platforms and statements be issued and followed. Even if this is not the case, I find some indicators of the ideology of dictators.

4.2 Operationalization

The measure of the ideology introduced in this chapter indicates whether dictators are located on the "left," "center," and "right" of the Left-Right continuum. For the purposes of operationalization,

the sample of dictators is based on the dichotomous classification of regime developed by Przeworski *et al.* (2000) and includes all country-year dictatorships in the world from 1960 to 1996. According to Przeworski *et al.*, for a political regime to be democratic, it must meet the following rules: (1) "the executive must be directly or indirectly elected in popular elections and must be responsible only directly to voters or to a legislature elected by them," (2) "the legislature must be also elected" and "there must be more than one party." (pp. 19-20). All cases that do not satisfy these rules are defined as dictatorships. Using the information available about when each dictator came to power and for how long they remained in power, I define a spell of dictatorship by the length of the tenure of each dictator.[1] The same ideology is coded for the length of each dictatorial spell.[2]

Before proceeding to the description of the indicators used to classify nondemocratic regimes in terms of their ideology, two points are worth noting. The first one deals with the secondary sources employed in the coding. History is often subject to interpretation. To insure consistency of judgments, I adhere to the predominant source used for this database, namely, the various versions of the *Political Handbook of the World* edited by Banks *et al.* (various years). Second, our ultimate goal is to know what the effect of regime ideology is on domestic policies, such as educational programs or redistribution. For that reason, we should avoid tautological classification which would entail looking at domestic policies to

[1]Note that I do not define a dictator's tenure as a dictatorial "regime." Following this rule would lead to nonsensical labels, such as Brezhnev regime, an Andropov regime, a Chernenko regime, etc...

[2]I attempted to track shifts in ideology within the tenure of a single dictator since our sources occasionally indicated changes, for example, from "Marxist-Leninism" to the "center-left" (e.g., in Africa after the end of the Cold War). Yet, I decided not to track these shifts via a finer-grained classification because I could not be certain that such a subtle shift in one country would be equivalent to the same type of shift as described in another country.

classify ideology which would then be used in a test of its impact on domestic policies.

Therefore, the indicators used to capture the ideological orientation of regimes fall into two categories: 1) direct indicators of ideology and 2) policies -that orthogonal to the domestic policy space. From the sources, I have gathered information about each of these indicators. I collect as much information as I can on each category. What is remarkable is that the indicators are fairly consistent in pointing to the same conclusion. Each is discussed in turn.

4.2.1 Direct Ideological indicators

Direct ideology indicators are available for both the dictator and the ruling party. These indicators can be one of three kinds: statements (issued by either the subject or our sources), genealogy, and actions.

Statements

For each dictatorial spell, I look at the statements and actions of the effective head of government and the ruling party (if there is one). In the vein of efforts to code the ideological orientation of democratic governments, such as the *Party Manifestos Project* (Budge 1992; Budge *et al.* 1987), I look for official statements made by either the head or the ruling party. For the latter, I examine the names and any platforms that are issued. I adhere mostly to statements made by the heads or parties themselves, but occasionally I must resort to judgments made by the main sources. This is why I prefer to stick to my primary source.

Therefore, in determining the ideology of dictators, I first consider any description, statement, or announcement of the ruler's ideological position issued by Banks *et al.* (various years). From these statements, I classify the ideology of the head as Left, Right, and Center, using the following rules:

- Left: for dictators announcing a Marxist, Marxist-Leninist, or Socialist platform, Soviet or Chinese-style program. I also include in this category all heads of state that are described (or whose regimes are described) as left-wing, left-of-center, socialist, linked ideologically with the Communist bloc or advocating a model of "revolutionary populism" (e.g., Jerry Rawlings in Ghana).

- Right: if the dictator or his rule is described as conservative[3], right-wing, right-of-center, or anti-communist (e.g., Leabua Jonathan in Lesotho or Felix Houphouet-Boigny in Ivory Coast).

- Center: for dictators who are defined as centrist.

I use similar criteria to determine the ideological position of the ruling party:

- Left: for parties defined as socialist, communist, Marxist-Leninist, leftist, or left-of-center. I also include in this category those parties dedicated to the "socialist revolution" or committed to "scientific socialism."

- Right: for parties described as conservative,[4] rightist, or right-of-center. I also code as rightist those parties that are defined as anti-communist or anti-socialist (e.g., Liberia during the True Whig Party's rule).

- Center: for parties defined as centrist.[5]

[3]I noted that Banks *et al.* use the statement "conservative" not only to describe an ideological position in the Left-Right dimension, but also to identify those leaders or ruling parties that seek to maintain a traditional structure of power, certain types of customs or a religious-oriented government. When that is the case, I do not consider these statements as an indication of the ideological orientation of dictators.

[4]See the previous footnote.

[5]There are parties, such as the PAIGC in Guinea-Bissau, that are committed

Genealogy

If no official statements or platforms are indicated in the main sources, I examine the "genealogy" of either the dictator or the ruling party. Regarding the head of the regime, if I can attribute no official statements to a given dictator, but know that he is the hand-picked successor of a dictator who declared, for instance, a Marxist-Leninist state, I assume the present dictator is a leftist.[6]

I follow a similar process with ruling parties. However, in this case there is greater genealogical variation. One possibility is whether the ruling party was formed by the merger of other parties whose ideologies are identified (from an earlier democratic or dictatorial period). Then I take the latter's ideology as a proxy for the ideological orientation of the ruling party.[7]

Another possibility arises when the government party is a coalition or a front of parties. In these cases, I take into account the ideology of the leading or dominant party within the coalition. For instance, during the tenure of Nicholas Grunitzky in Togo, there was a government coalition of four parties but the main party of such coalition (the Democratic Union of Togolese People) is, according to Banks *et al.*, a conservative party. When there is no information on that, then I look at the ideological orientation of minor political groups and code it as long as all of them share the same ideology.

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to the principle of "democratic centralism" but regarding to the structure of the decision-making process or the power structure within the party. These cases are not considered as taking a centrist position in the Left-Right scale.

[6]This assumption would be more problematic if we were trying to develop a finer-grained classification. Then, for example, the degree to which a successor is extreme left, left, center-left, etc. . . when his predecessor is an extreme leftist, would be difficult to assess. But since I am interested in placing dictators within fewer and more sharply defined categories, I find this assumption less problematic.

[7]Unless, of course, the original members parties sustained different ideological positions.

Alternatively, if the ruling party or what was the ruling party forms a coalition or merges with other parties, I code the ideology of the resulting group or coalition as a proxy for that of the ruling one. South Korea's Democratic Justice Party (DJP), for example, was the government party while Chun Doo Hwan was in power. After Chun's rule ended, the DJP merged in 1990 with two other groups to form a new party, the Democratic Liberal Party (DLP), that belonged to the International Democratic Union (an international organization of center-right parties, see below). Hence, I consider the DJP a rightist group.

Actions

Finally, both dictators and ruling parties take some actions that I consider as equivalent to "ideological statements." For the dictators, themselves, I consider actions of two kinds.

First, sometimes a dictator, before or after his rule, organizes a political party to compete in elections or to oppose a new autocratic regime. His party is obviously not the ruling party because the dictator is out of power. But if we know the ideological orientation of his party from its statements or platforms, I consider it an indicator of the dictator's own ideology. Ian Smith in Zimbabwe, for example, led the Conservative Alliance of Zimbabwe (CAZ) to oppose the Mugabe regime. Although I could not identify Ian Smith's ideology directly from statements or platforms issued during his rule, I define him a rightist dictator based on the ideological orientation of the party he headed later on.

Second, the predominant sources used provide little direct information about the ideology of most monarchs and some military dictators. For these rulers, however, I have some information on their prime ministers or other cabinet members who manage the daily affairs of state. If a dictator consistently appoints prime ministers or other cabinet members with known and similar ideological affiliations (based on their parties), then I take ideological persua-

sion of the ministers to be an indicator of the dictator's own views on the grounds that a dictator would not entrust the running of the country to ministers with views so different from his own.

Ruling parties can also make "ideological statements" by taking certain actions. In particular, they may join international party organizations, which tend to be associated with a particular position on the Left-Right continuum. I take into account any type of membership whether the party is a full, consultative or observer member. Parties are classified then according to the following rule:

- Left: for parties that belong to the Socialist International (SI) or the Communist International.
- Right: for parties that belong to the International Democrat Union, IDU (or any of its regional associations) and the Liberal International, LI (or any of its associated organizations).

In sum, the direct ideological indicators pertain to the dictator and the ruling party and are of three types. Table 4.1 summarizes them.

4.2.2 Policies

In addition to the direct ideological indicators, I have decided to fill in the gaps by looking at some "policies." When I could not find data for any of the above indicators, then I draw relevant information from certain policies. These "policies" should be pure expressions of ideology in that they are not the product of too much constraint. Austerity measures, for example, do not fulfill this requirement since leftist regimes may be forced to enact them as well even if these policies are not in line with their ideological preferences. On the contrary, for instance, banning certain types of parties can be pretty much done freely by dictators and thereby provide some indication of their orientation.

Table 4.1: Direct Ideological Indicators

	Heads	Ruling Party
Statements	• Proclamations issued by the dictator (e.g., declares a "Marxist-Leninist state") • Labels regarding dictator or his supporters (e.g., "right-wing," "centrist," or "Maoist")	• Statements and platforms of the ruling party or its leaders • Labels regarding the ruling party or its leader and supporters
Genealogy	• Ideology of successor or predecessor if direct, intended succession can be established	• Ideology of parties that merged to make up the ruling party • Ideology of parties that form a front with the ruling party
Actions	• Ideological orientation of parties formed by the dictator when out of office • Ideological orientation of prime minister appointed by the dictator	• Membership in international party organizations (e.g., Socialist International, International Democratic Union)

Accordingly, the "policies" considered here include constitutional provisions, proscriptions on political parties and types of media censorship. Each is discussed in turn.

Constitutional provisions

There are certain constitutional provisions that are clearly ideological statements. In most cases, these statements are particularly useful to identify leftist regimes. It seems that left-wing regimes are more likely to proclaim their ideological orientation in Constitutions than right-wing dictatorships. Yet I consider certain provisions such as if there are wealth requirements for voting or for being a candidate as an indication of a rightist regime.[8] So I check through Banks *et al.* to find any constitutional provision relevant for our purposes and classify regimes according to the following rules:

- Left: for regimes that in their constitutions define the country as a "socialist" or "democratic socialist state," or if their constitutions provide for a "socialist" or "communist system of government."

- Right: for regimes that establish property requirements in order to vote or qualify as candidate.

Proscription of parties

The second type of policy is related with those actions aimed to control political opposition. If a dictator has banned some, rather than all, parties, which parties are illegal may be helpful for identifying his regime. In particular, when the regime proscribes the

[8] I have not found any constitutional statement implying a center ideological orientation.

formation of communist or left-wing groups[9] but recognizes other political parties, I take that as an indicator of a rightist dictatorship. It is true that left-wing regimes sometimes ban leftist parties because they want to monopolize their side of the ideological spectrum. However, I have found that in this case, usually leftist dictatorships tend to forbid the organization of any party and form a one-party state. They follow in the example of Lenin (1921) who argued that the dictatorship of the proletariat could not be established without a revolutionary party that monopolized the political space.[10]

For operationalization purposes, this indicator takes the form of a dichotomy variable with value 1 for all those cases in which there is a ban on left-wing parties while it is allowed other opposition groups to function. These cases are seen as examples of rightist regimes. And it takes the value 0 for the remaining cases, including one-party states, dictatorships that prohibit all political activity or regimes that do not establish any legal restriction on party formation. Observations within the last category are not identified with any ideological position in the Left-Right dimension. Finally, missing data represents those regimes for which I have no information on party legislation.

Yet there are special cases that need further consideration. First, sometimes the regime proscribes all political activity but there is some especial emphasis in banning or persecuting the Communist party. For example, in Greece after the 1967 military coup, all political activity was proscribed but the Communist-front party was

[9]I do not consider armed or terrorist groups as political parties. So this variable applies only to communist or other left-wing parties, but not to armed revolutionary groups.

[10]In addition, by doing a cross-check with the overlap of this policy measure and the direct ideological indicators, it turns out that 79 percent of all dictatorial cases that ban left-wing parties while allowing other opposition groups to function are right-wing regimes. Interestingly enough, I did not find any dictatorship that proscribes only rightist political groups.

officially disbanded (Banks *et al.* 1970: 131). It seems that the military was particularly concerned with repressing the communist and other radical left-wingers. In fact, the communist leaders fled the country and were strongly persecuted, whereas members of more center or right-wing parties stayed in the country even involved in politics. I believe that this is still an indication that the regime has taken a rightist ideological position -and thus I code these cases as 1 in the "proscription of parties" indicator-.

Second, it is possible that political parties are not officially banned but certain regulations at work get to disqualify some of them. For instance, before the 1985 elections in Liberia, the main opposition parties with broad popular support were disqualified to present candidates. In particular, the reason for disqualifying the UPP (United People's Party) was its leader's "socialist leanings" (Banks *et al.* 1998: 547). I decide to codify as rightist (code 1 in the variable "proscription of parties") all dictatorships that enact any type of restriction on left-wing groups (while allowing other parties to operate) on the grounds of its socialist or leftist orientation.

Media censorship

Another useful indicator could be censorship of the media. In Banks *et al.*, sometimes we found information about the political affiliation of the newspapers the regime has suppressed or allowed to function. If the dictatorship suppresses newspapers with left-wing political affiliation, while tolerating more conservative media (for example, Greece after the 1967 military coup), then I consider this policy as coming from a right-wing non-democracy. And the other way around, if conservative media are censored while leftist one are still in function, then the dictatorship is coded as a leftist regime.

4.3 Problematic Cases

The procedure used to establish the ideology of dictatorships is first to look at the direct ideological indicators and codify dictatorial regimes according to the information they provide (and as explained above). Second, if it is not possible to discern the ideological orientation of these regimes via such indicators, then I turn to the aforementioned policies to fill in the gaps. As shown in the next section, in most cases in which regimes could be classified in terms of their ideology, the information employed came from the direct ideological indicators.

In applying this procedure, it is very remarkable that the indicators are fairly consistent in pointing to the same conclusion. However, there are some cases where the evidence is mixed, and thus a decision is required. Particularly, there are two main cases in which there is a contradiction regarding the information offered by the direct ideological indicators. In the first place, we find the case of the National Democratic Party (NDP) in the Arab Republic of Egypt that, on the one hand, belongs to the Socialist International but, on the other hand, was established by Anwar el-Sadat as a centrist political group (Banks *et al.* 1993: 243; Banks *et al.* 1998: 281-282). The origins of this party can be traced back to the rule of Gamal Nasser. Nasser become president of the Republic on June 23, 1956. One of his main goal was the creation of a single mass organization to support the government and its policies. Following unsuccessful experiments with two organizations, the Arab Socialist Union (ASU) was established as the country's sole political party in December 1962. Its statutes described the organization as the "socialist vanguard" charged with safeguarding and furthering the "socialist revolution" (Banks *et al.* 1970: 370).

With the death of President Nasser on September 28, 1970, power was subsequently transferred to Vice President Anwar el-Sadat. "Prior to the legislative election of October 1976, President

Sadat authorized the establishment of three 'groups' within ASU [the leftist NPUA, the centrist EASO, and the rightist FSO] which presented separate lists of Assembly candidates." In 1978, "President Sadat announced the formal abolition of the ASU... and the establishment of a new centrist group which, on August 15, was named the National Democratic Party (NDP)" (Banks *et al.* 1997: 246). Yet this party is a full member of the Socialist International. Drawing additional information on other criteria can help us to resolve this mixed evidence. Indeed there are constitutional provisions that point to a leftist orientation of the regime. The 1971 Constitution defines Egypt as "an Arab Republic with a democratic, socialist system." Moreover, the 1980 constitutional amendment under the tenure of Sadat designated the country as "socialist democratic." Based on the affiliation of the ruling party to the Socialist International and these constitutional provisions, the dictatorial years under the Sadat's rule has been classified as left-wing.

In the second place, we find the case of the United National Party (UNP) which was the ruling party of Sri Lanka during the tenure of Junius Richard Jayawardene. According to Banks *et al.* (1993: 784), this organization is a democratic-socialist party. But yet it is a member of the International Democrat Union, an international organization of center-right parties. This contradiction has been resolved by assuming that joining to this international organization is a more direct indicator of the regime's ideology than a scholarly judgment since it is based on the actions undertaken by the ruling party itself. Therefore, the UNP was considered a right-wing party.

4.4 The Data

After describing the process of collecting information and construction of the database on the dictatorships' ideology, I show in this

section some descriptive statistics to have a sense of the data. The sample of dictatorships is based on the dichotomous classification of regime developed by Przeworski *et al.* (2000). The data cover the period from 1960 to 1996 and a worldwide sample of countries. As explained in Section 4.2, the ideological orientation of dictatorships are captured through two types of indicators: *direct ideological indicators*, which refer to statements or descriptions issued by Banks *et al.* regarding the ideology of the dictator or the ruling party and to the "actions" undertaken by them. These are the primary indicators considered. And *policies indicators*, which provide ideological information based on certain measures related with "constitutional provisions," "proscription of parties" and "media censorship." Then a procedure was defined to classify regimes in terms of their ideological position in the Left-Right dimension. Table 4.2 shows the ideological distribution of these regimes.[11]

Table 4.2: Distribution of Dictatorships by Ideology

	Undecided	Leftist	Rightist	Centrist	Total
Cases	629	1590	1280	11	3510
Percentage	17.92	45.3	36.47	0.31	100

According to Przeworski *et al.* (2000), the total number of country-year dictatorships in the world from 1960 to 1996 is 3513.[12] Looking at Table 4.2, we see that more than 80% of cases can be actually classified in terms of their ideology. Most of them are located on the left, in particular, 45.3 percent, while 36.47% of dictatorships maintain a right-wing orientation according to the

[11]This table is based on both types of indicators. See Appendix A, for a complete presentation of these data.

[12]I have used the updated version of the ACPL database (Przeworski *et al.* 2000) that goes to the year 2000. The three missing observations in Table 4.2 are El Salvador 1960-61 and Argentina 1962. The sources used did not provide any information about what happened in these countries during that years.

data. "Centrist" regimes represent, however, a very small percent, 0.3. Finally, the "undecided" category is a residual group containing those cases for which the information collected is not indicative of any ideological orientation of their regimes.

The data displayed in Table 4.2 are based on both direct ideological statements (either of dictators or their ruling parties) and certain types of "polices." Considering only those regimes whose ideology is identified directly from the dictators' political announcements or the government party's platforms -or from other direct ideological indicators-, the ideological distribution of regimes reveals some changes (see Table 4.3).

Table 4.3: Distribution of Dictatorships by Ideology (Direct Ideological Indicators)

	Undecided	Leftist	Rightist	Centrist	Total
Cases	783	1579	1137	11	3510
Percentage	22.31	44.99	32.39	0.31	100

In this table, observations classified only by the policies they enact enter into the "undecided" category. As Table 4.3 indicates, if we focus on regimes for which it is easy and straightforward to determine their ideology, still a 77% of all dictatorships take a position in the ideological dimension. The proportion of left-wing autocracies remains roughly the same but that of rightist diminishes. In 143 observations earlier classified as rightist dictatorships, decisions were made upon the policy indicators, whereas the corresponding number of leftist cases is only 11. The conclusion that immediately comes to the fore is that it is much easier to detect dictators who sustain a leftist orientation than those advocating a right-wing political program. This is so because left-wing authoritarian leaders are more willing to openly declare their ideological leanings than their rightist counterparts.

To see how the ideological distribution of non-democracies changes

over time, Table 4.4 shows the raw numbers and the proportion of each ideological type by decade. The first thing to be noted is the steady decrease of the percentage of rightist regimes over time: while they represent a 43% of all autocracies in the world at the beginning of the period, at the mid-90s they represent less than 30%. This trend is also confirmed in Figure 4.1, which disaggregates by year the same proportions.[13] To be sure, the proportion of right-wing dictatorships starts at first increasing until 1966, and from then on it experiences a almost constant decline up to the end of the series. Yet, as Figure 4.1 indicates, right-wing regimes is the type of dictatorship most frequently observed in the period from 1966 to 1974.

Table 4.4: Ideological Distribution of Dictatorships by Decade

	Undecided	Leftist	Rightist	Centrist	Total
1960s	120 (14.9%)	337(41.9%)	347(43.1%)		804
1970s	178(16.8%)	454(42.9%)	420(39.7%)	6(0.5%)	1058
1980s	169(16.1%)	535(51.1%)	342(32.7%)		1046
1990-96	162(26.9%)	264(43.8%)	171(28.4%)	5(0.8%)	602
N	629	1590	1280	11	3510

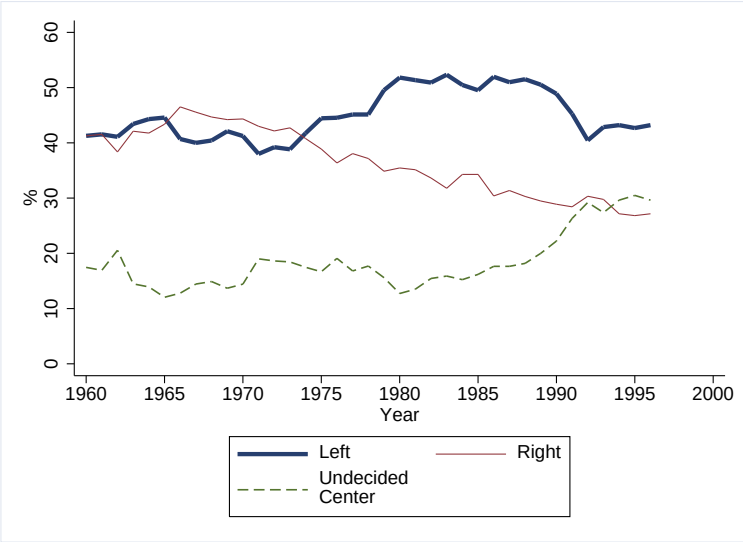
Note: Numbers in parenthesis are row proportions.

The percentage of leftist dictators, on the other hand, remains over 40% throughout the period covered by this study and, taking the whole decade of the 80s, more than half of country-year dictatorships were leftist (see Table 4.4). A graphical inspection of the more detailed evolution portrayed in Figure 4.1 reveals that up to 1974, the proportion of left-wing autocracies stays around 40% with some variations in either way. Thereafter, it continually grows reaching a level over 50 percent during the 80's. However,

[13] In Figure 4.1, the "undecided" and "center" types have been collapsed into one group.

from 1990 on, we observe substantial declines in the number of leftist regimes, which can be attributed to the end of the Soviet Union and its patronage.

Figure 4.1: Type of Non-democratic Regimes as a Percentage of All Dictatorships in the World

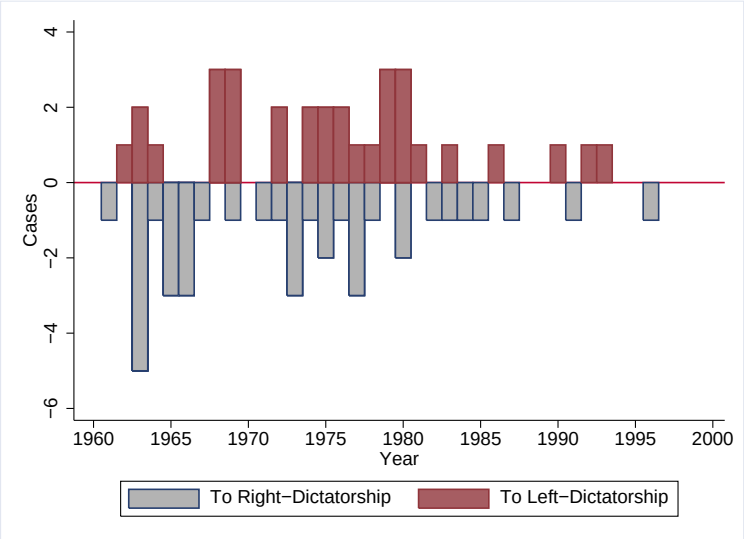


Regarding the chronological evolution of the proportion of the "undecided" category and the few center autocracies, we see in Figure 4.1 that it usually moves in a range from 12% to 19% until 1989. The increasing tendency during the mid-90s rightly implies a further difficulty to determine the ideological orientation of dictators during these years.

In order to examine whether the post-1960 emergence of more ideological types (i.e., left and right wing dictatorships) has followed a temporal pattern, Figure 4.2 presents the annual frequency of transitions to leftist and rightist autocracies.[14]

[14]Note that the transitions of some left and right-wing regimes occur before

Figure 4.2: Transitions to Left and to Right Dictatorship by Year



The overall picture shows that regime changes have taken place for the most part before 1980. From this year, we observe that the number of transitions to both types of dictatorships drops significantly.[15] Between 1961 to 1969, there were more countries making transitions to right-wing autocracies than to leftist regimes.[16] In particular, there were fifteen autocratic transitions to the right and ten to the left. Rightist dictatorial changes occurred mainly in Latin America (e.g., Guatemala, Ecuador, Dominican Republic and Honduras all make a transition to right-wing regimes in 1963. Brazil in 1964, and Argentina in 1966), and in South East Asia (Philippines in 1965, Indonesia in 1966 and Cambodia in 1969). Leftist dictatorial transitions were largely experienced in Africa (e.g., Congo in 1963, Sierra Leone in 1968, and Sudan, Somalia and Libya in 1969), and in other regions although not as often (for instance, Myanmar in 1962, Syrian Arab Republic in 1963, Bolivia in 1964, and Peru and Panama in 1968).

Between 1970 to 1979, there were the same number of transitions (13) to the left and to the right. However, a regional pattern can be seen. Of the seven regime changes that came about in Latin America, five were rightist (Bolivia in 1971, Honduras in 1972, Uruguay and Chile in 1973, and Argentina in 1976) and two leftist (Nicaragua and Grenada in 1979). Most of the African transitions were to the left, like Benin in 1972, Ethiopia in 1974 or Seychelles in 1977, and only one to the right (Niger in 1974). In contrast, the new autocracies that came in Asia do not seem to concentrate on one side of the ideological spectrum: there were seven right-wing transitions (for instance, Sri Lanka, Thailand or Pakistan in 1977) and four leftist (Cambodia and Laos in 1975, or

1960 (e.g., all Eastern European communist countries), and thus they are not counted in Figure 4.2.

[15]The total number of transitions during the entire period studied is 69: 51 took place before 1980 and 18 thereafter.

[16]This may explain in part the increasing trend of the proportion of right-wing regimes in the mid-60s observed in Figure 4.1.

Bangladesh in 1972). Finally, between 1980 to 1996 there were nine regime changes to the right, but also nine to the left. And figures are less clear-cut in the differences across regions.

A key conclusion is derived from the facts displayed in previous graphs. As indicated in Figure 4.1, although both ideological types represent similar proportions in the entire sample of autocracies at the beginning of the period, during the 1980s the percentage of "populist" regimes increases considerably while that of their rightist counterparts do not stop decreasing until the end of the series. Yet, we have just observed in Figure 4.2 that, during the whole period under study, there were more transitions to right than to left-wing dictatorships. To make sense of this apparent contradiction, one is lead to conclude that the stability of regimes should diverge across their ideological orientation. In other words, right-wing autocracies should have been experienced more breakdowns than leftist ones. Indeed, Table 4.5 indicates that this in fact the case.

Table 4.5: Transition between Political Regimes

Transition from:	Transition to: Dem	Left	Right	U&C	Total	Cases	Probability
Dem	-	9	18	13	40	1995	0.02
Left	20	-	7	16	43	1550	0.0277
Right	27	8	-	16	51	1256	0.0406
U&C	22	15	12	-	49	616	0.0795
Total	69	32	37	45	183	5417	0.0337

Note: U&C refers to the "Undecided" and Centrist categories.

Table 4.5 is a transition matrix presenting the number of transitions from each type of regime (including democracy and "undecided & center" autocracies) to each of the others.[17] As this table indicates, democracy is the most stable regime in the sample -it has

[17]The numbers in the "Probability" column refer to the probability of facing

a 2 percent chance of experiencing a change to a different regime. Interestingly enough, rightist autocracies emerge more often, actually twice as much, than leftist ones when democracy is overthrown. Confirming the intuition explained in the previous paragraph, a right-wing dictatorship has a 4 percent chance of transforming into a different regime, which compares with 2.7 percent for "populist" autocracies. Yet, both ideological types show similar transition patterns regarding the political institutions that tend to succeeded them.

Table 4.6: Ideological Distribution of Dictatorships by Region

Region	Undecided	Leftist	Rightist	Centrist	Total
Sub-Saharan Africa	355 (25.6)	624(45.1)	405(29.2)	1(0.07)	1385
South Asia	67(47.2)	3(2.1)	72(50.7)		142
East Asia		106(62.7)	63(37.3)		169
South East Asia	4(1.4)	147(50.1)	142(48.5)		293
Pacific Isl.&Oceania	62(69.7)		27(30.3)		89
Middle East&NA	27(7.2)	198(53.1)	148(39.7)		373
Latin America	23(7.1)	117(36.1)	179(55.3)	5(1.5)	324
Caribbean	6(8.1)	39(52.7)	29(39.2)		74
Eastern Europe&SU	29(7.8)	326(87.2)	14(3.7)	5(1.3)	374
Industrial countries		2(3.2)	60(96.8)		62
Oil countries	56(24.9)	28(12.4)	141(62.7)		225
N	629	1590	1280	11	3510

Note: Numbers in parenthesis are row proportions. NA and SU refer to North Africa and Soviet Union respectively.

Finally, looking at the ideological distribution of regimes by region (see Table 4.6), systematic regional differences can be seen. Eastern Europe and East Asia are the regions with the highest percentages of leftist autocracies. Sub-Saharan and North African, and South East Asian countries display similar patterns: left-wing dictators have controlled political power more often than their rightist

a transition, which is the result of dividing the "Total" number of transitions by the "Number of cases" observed for each regime in $t-1$.

counterparts. That seems to be true especially in the Sub-Saharan and North African regions. In contrast, right-wing dictatorships have prevailed in almost all Industrial nations (i.e., Spain, Portugal and Greece) and in most Oil countries. In addition, the proportion of rightist non-democratic governments in Latin America and South Asia has been higher than that of leftist ones. A final comment is that it is harder to identify the ideological orientation of regimes in South Asian countries and, especially, in the Pacific Islands.

Chapter 5

A Statistical Analysis on the Role of Political Regimes

5.1 Introduction

The empirical literature assessing the effect of political regimes on education typically reports an advantageous position of democratic institutions in the formation of human capital. Starting with the undoubtedly-realistic assumption that some degree of government involvement is required for a broad popular participation in the educational system, quantitative as well as historical case analyses usually find empirical support for the idea that democratic politics induces governments to implement more comprehensive educational policies reaching a larger segment of the population. Although they stress unlike theoretical mechanisms and study different dimensions of aggregate educational investment, there seem to be a growing consensus on the positive impact of democracy.

From a historical perspective, an arguable piece of evidence is the concurrence of expansions in education and reforms that en-

hanced the political voice of previously excluded groups across the Americas (Mariscal and Sokoloff 2000). The extraordinary literacy and schooling progress that took place in North America (Canada and the United States) during the first decades of the nineteenth century coincided in time with major political changes to do away with voting privileges. Moreover, the early development of tax-supported free schools in these two countries contrasts very much with the experience of the rest of American nations, where important breakthroughs in the expansion of schooling were not carried out until the late 1800s. This backward educational position of Latin America has been grounded also on the extent of political inequality that prevailed in these nations at that time (Mariscal and Sokoloff 2000). Voting rights were restricted to a elite of wealthy and propertied men so that they were powerful enough to block public initiatives of investment in primary schools, which would particularly benefit the poor while allocating the costs disproportionally on the shoulders of the rich. Thus, the extension of the suffrage has been related to the evolution of schooling institutions within nations and to the variation in educational standards across countries.[1] Yet, a simple correlation over time or among countries does not necessarily mean a causal association. It may be the case that these political and educational secular developments were both parts of a broader process driven by other economic or political forces.

Turning to the more contemporary quantitative findings, in an attempt to explain the substantial differences of primary school enrollment among developing countries from 1960 to 1987, Brown (1999) detects a statistically significant relationship between democ-

[1]Lindert (2004, Chapter 5) also proposes this line of reasoning, along with other explanations, to make sense of the secular growth in education within European countries. He points out that significant government efforts in this policy area before 1914 often followed key democratic changes in the electoral process. See Galor and Moav (2006) for an opposing interpretation of the timing of educational and political reforms in some European nations.

racy and primary education which subsides as per capita income levels increases. Lake and Baum (2001) and Wacziarg (2001), exploiting a broader sample that mixes developed and developing countries, find that democratic institutions appear to outperform their authoritarian counterparts in the provision of public secondary schooling.

Similar conclusions are reached by many studies on the determinants of public expenditure on education. They use government spending figures instead of educational outcomes as a proxy of the degree of public commitment to human capital investment and distribution. In the Latin American context, Kaufman and Segura-Ubiergo (2001) undertake a time-series cross-sectional analysis of the changes in several categories of social spending over the period from 1973 to 1997. Despite the reported downward pressures of globalization on social budget, transitions to democracy are associated with notable and quick increases in the amount of tax-based resources committed to human capital formation. In addition, democratic regimes tend to generate in the long run an expansion of the educational budget.[2] For the African region, Stasavage (2005) has found that those executives elected in multiparty competition are more responsive to social groups'demands that entail an upsurge in total government spending on education.

Scholars have also paid attention to how the education budget is allocated between different levels of formal schooling in different institutional settings. The motivation underlying this research rests on the implied distributional consequences of particular allocations. It has been argued, for example, that funding priorities towards higher education relative to primary benefit disproportionally middle and upper class students since they are much more likely to receive the former than lower-income individuals. On the other hand, dedicating a larger share of the total schooling resources to

[2]Brown and Hunter (2004) reports analogous results for the Latin American region.

primary is deemed as a more effective policy to enhance educational equality: it is a direct instrument of economic redistribution from the rich to the poor.

The prediction usually asserted in the literature is that democratically elected politicians, by being more responsive to the less affluent groups of the society than autocrats, are expected to prioritize basic formal schooling in the distribution of the education budget. Brown and Hunter (2004) corroborate this hypothesis with a sample of seventeen Latin American countries between 1980 and 1997. There is also supporting evidence when data from other regions are used instead. For instance, Stasavage (2005) found a positive relationship between multiparty competition and spending in primary education in a sample of African countries.[3]

This small but growing body of empirical research suffers, nevertheless, several methodological problems that may question its own findings. The main problematic issue refers to the democracy counterfactuals used in the comparative analysis. In their attempt to reveal the policy consequences of regimes, scholars typically compare democracies with an undefined category which includes, depending on the particular database employed, all countries whose process of selecting rulers does not satisfy some criteria such as contested elections or alternation in government, or whose institutional settings do not place much constraints on chief executives. Others use continuous measures based on the degree of civil and political rights protection. Autocracy becomes thereby a negative indeterminate category embracing many different institutional frameworks

[3]His argument, however, is based on a redistributive conflict between urban groups -who are more concerned about funding in secondary schools and universities- and rural communities -that can benefit the most from primary public provision. Now political institutions affect the relative influence of these groups in politics. While urban interests have a larger capacity to challenge rulers in autocratic African regimes, democratic governments are more inclined to accommodate the demands of rural groups since they constitute the majority of the society in most African countries.

and types of authoritarian regimes. By being so, it is almost impossible to come out with an unique explanation of what occur in all autocratic experiences. In contrast, since all democracies share as a minimum some regulated institutions like contested elections, their actions or policies are more predictable in comparison with the apparently more erratic behavior of dictatorships.[4] This in turn may bias statistical results in the former's favor. My point is that while the electoral dimension constitutes a first step in classifying political systems, it is not enough to make undemocratic types equivalent. And this lack of specification is hardly inconsequential, at the very least it blurs theoretical inferences making causal mechanisms unclear.

This question is particularly important if there are some relevant features for predicting policy that cluster autocracies in different types. I claim that the ideological orientation of dictators, by serving as a proxy of their policy preferences, is a key feature that influences policy-making and thus has to be taken into account. To see this, let us review one of the most recurrent theories that points out a positive impact of democracy on human capital. Its argument emphasizes a power-distribution mechanism of institutions: whereas democratic systems enhance the political strength of the poor to enforce their redistributive demands for an universal public system of education, dictatorial governments mostly accommodate the interests of the rich who prefer a low state involvement in educational provision. In this account, whenever there is some sort of restricted access to the political process, it is always assumed that the people being excluded are the less affluent groups of society. This conjecture, although may accurately describe some historical experiences like the European nineteenth-century limited

[4]Indeed, the standard deviation in many country-level distributions of policy outcomes, including of course education, is usually higher for the group of dictatorships than among democracies.

democracies, is not necessarily true.[5]

A dictatorial regime may, a priori, appeal to different social groups to build its basis of support. If those groups have conflicting preferences, then separating autocracies along the lines of which preferences they represent is crucial. Otherwise, we are mixing cases of very different nature whose effects may cancel each other out, making almost no sense to compare the aggregate outcomes of this combined autocratic category with those of democracies. Accordingly, the statistical analysis undertaken in this chapter is based upon an ideological classification of non-democratic regimes. In view of the divergent patterns that appeared in each ideological type, empirical findings come eventually to justify the convenience of using this classification.

There is another notable difference between the empirical approach used in the existing literature and the one employed in this thesis. The majority of the preceding studies empirically test a direct effect of democracy and do not explore interactions with other causal factors. Given their theoretical arguments regarding the impact of political regimes,[6] the empirical implication is that the type of political system exerts a direct influence on educational indicators so that the institutional variable should enter into the regression independently of other conditions. On the contrary, my argument proposes that the causal channel of political institutions run through how they process economic conditions. As conflicting groups adjust their policy preferences to changes in per capita income and wealth inequality and institutions translate such preferences into public policies, then the responses of governments to increases in these two factors differ across political regimes. This means then that the impact of political regimes is conditional on

[5]Actually, if we accept the ideological position of governments as a proxy of their social class constituencies, right-wing or wealth-biased autocracies are less frequent than left-wing or populist ones during the postwar period as shown in the previous chapter.

[6]For a review of these theories, see Section 2.2 in Chapter 2.

economic development and inequality. Accordingly, the empirical implication of this line of reasoning is that the institutional variable interacts with these factors in the explanation of the divergent educational patterns of countries.[7]

In the remainder of the chapter, I test with quantitative data the hypotheses developed in this thesis. More particularly, the subsequent empirical analysis try to discriminate between the last two formal models studied in Chapter 3. Using different econometric models and an ideological classification of dictatorships, I evaluate the conditional impact of political institutions and check the causal links whereby regimes shape human capital investment. A special emphasis is placed on the question of whether governments in different institutional settings respond in different ways to increases in conditions like income inequality and economic development. Next section discusses the dependent variable and introduces the set of indicators employed to measure it. Section 5.3 examines the impact of political regimes conditional on per capita income through an over-time analysis. It will be shown that the effect of per capita income on education is mediated by the institutional framework at place. Then Section 5.4 studies the hypotheses regarding the differential impact of income equality given per capita income and political regimes.

5.2 The Dependent Variable

The purpose of this research is to explain the substantial variation across-countries and over time in the accumulation rates of human capital. Besides aspects of the economic structure, my interest is to prove that politics and, in particular, the type of institutions that

[7] In Chapter 3, where a set of formal models were examined, I mainly focused on the interaction between institutions and wealth inequality. In this chapter, as shown below, I establish more precisely the theoretical grounds of the interaction between regimes and economic development.

shapes decision-making process has an important role to play in understanding why some nations invest more in human capital than others. So this study operates at an aggregate level of analysis and thus the operationalization of the dependent variable must provide a indicator based on national figures.

The acquisition of skills or human capital can be secured mostly via on-the-job training or through formal education. The choice of concentrating on education has been taken for two reasons. For one, it is much easier to collect and measure the amount of human capital accumulated through education at a national level than to aggregate all individuals' skills attained at work. Two, because government policies are directly and strongly related with the educational performance of countries,[8] making the link from political institutions to human capital clearer. Therefore, once the focus is on formal schooling and after considering the direct effects of economic conditions, the empirical task of this chapter is to provide evidence on the arguments developed before about why some governments launch more ambitious investment programs on education than others.

Among the possible indicators that evaluate the educational investment of countries, our dependent variable, I decide to use data on enrollment rates. Before discussing more on this variable, let me argue why I disregard other indicators used in the literature. One possibility would be to consider the stock of human capital in the economy by examining the average number of years of schooling in the population from certain age (typically 25) and older. This option, however, has been abandoned because government actions and political regimes affect this stock measure precisely through enrollment rates, a flow variable. Moreover, the causal impact of institutions on the educational aggregate stock is, at best, very difficult to infer since the latter is the combined result of political

[8] After all, formal education and in particular primary and secondary schooling is publicly financed in most countries.

initiatives taken through decades during which transitions from one regime to another may have occurred.[9]

Another indicator widely employed in the empirical research is public expenditure on education. The problem is that this variable is hardly a direct proxy of actual investment. Although a priori they may capture the degree of government support to human capital, expenditures figures are distorted by patterns of corruption (Baum & Lake 2003) and punish more efficient institutions in the provision of public education. Those countries able to devote a smaller amount of funds in order to reach a certain level of schooling attendance would be deemed as less committed to human capital accumulation when in fact they are using resources more efficiently. Despite everything, a genuine goal of this study is to account for the observed patterns of educational performance of countries.

The use of schooling enrollment rates mitigates such causal and measurement problems. As these rates constitute a flow variable referring to educational policy outcomes, they better appraise the actual size of human capital investment. In addition, current government policies can considerably alter them and even revert the direction of past proposals so that the alleged institutional effect can be assigned to the political regime at work instead of being a joint contribution of previous institutional systems. Although it would be desirable to adjust schooling enrollment rates with some quality measures of education -so as to get a better picture of the educational performance of countries-, the lack of data for a broad

[9]Suppose that in 1972 country A is a democracy whose population has an average number of schooling years equal to X. Assume also that this country is a democracy since 1970. What we want to know is the extent to which X depends upon the political regime operating in A. The amount of human capital accumulated up to 1972 (X) captures the influence of policies adopted not only during the last two years but during a longer time period back in which a different political regime was at work in country A. Therefore, it does not make any sense to causally relate X in 1972 with a political institutional setting that has been established, in this case, two years before.

sample of countries and for a sufficiently long time period impedes undertaking this strategy.[10]

The enrollment figures employed in the over-time analysis, carried out in the next section, correspond to the combined primary and secondary rate, which comes from a database that I have assembled from two different information sources: one on how many people go to school and the other on population by age. The definition of this variable is the number of students in primary and secondary divided by the total population between 5 and 19 years old -an age bracket that, in most educational systems, approximates the official school age in these two levels of education.[11]

Population data are taken from the *Demographic Yearbook-Historical Supplement 1948-1997*published by the United Nations (2000). This collection of international demographic statistics presents population data by age in 5-year groups. To construct enrollment rates in primary and secondary, I use the figures for the 5-9, 10-14 and 15-19 age groups. Data on the number of students are based on the *International Historical Statistics* series compiled by Brian Mitchell. Although these historical series report students figures separately for each level of education, here I decide to combine

[10]Up to now the best indicator used in the literature to measure the quality level of schooling is the test scores in international exams of cognitive achievement. One example is the Program for International Student Assessment (PISA) set up by the OECD in 1998 covering mainly middle and high income countries. For the purposes at hand, the most important problems of using these data are that they include a reduced number of countries and data cover usually the decade of the 90's.

[11]Although almost all empirical studies on enrollment rates use the *World Development Indicators* (World Bank), which is the most comprehensive international database based on Unesco, I decide not to use it as the central data set of the over-time analysis because its time coverage is more limited. It provides national observations on an annual basis from 1980 and onward. But before this year, data points cover only the years 1960, 1965, 1970 and 1975. The new database that I have constructed covers annually the whole period from 1960 to 1996.

the data for primary and secondary.

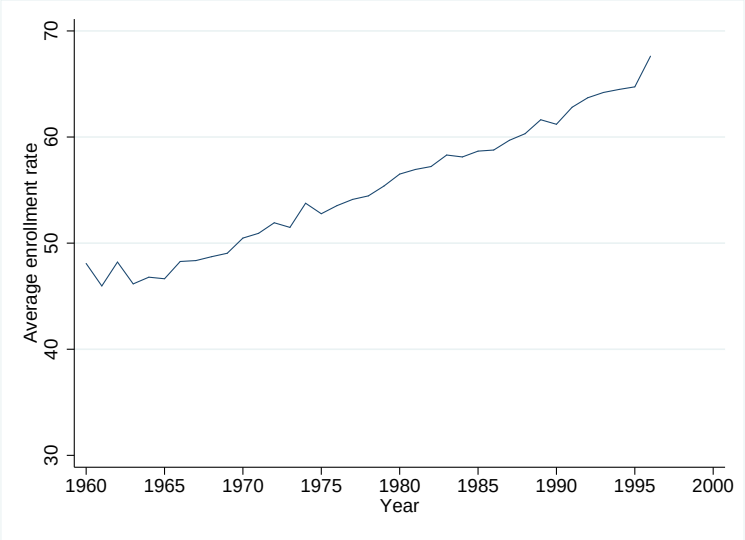
The main purpose of this decision is to remove artificial changes in single time series produced by reforms in the educational system affecting the official school age in these levels. Since the available population data are not adjusted by such reforms but they refer always to the aforementioned age groups, then any school reorganization that alter the grades comprised in primary and secondary will be reflected in the separate enrollment rate series. Suppose that we decide to examine secondary schooling and thus we only consider the 15-19 age group as the most approximate school-age group in secondary. Now imagine that a reform changing the number of years in high school is implemented. This will obviously affect the number of students, but also the enrollment rate since the reference school-age group has not been adjusted -it continues to be the population between 15 and 19 years old. If we were to focus on one level of education over time, then such reform–induced changes in enrollment rates would be wrongly considered in the statistical analysis as real variation to be accounted for by other explanatory factors. Combining both schooling levels, however, eliminates this problem.

After merging the data sets on population and number of students, the resulting variable (ENROLL) provides information on enrollment rates for 153 countries from 1960 to 1996. It is an unbalanced panel of countries with a total of country-year observations equal to 3577. On average, a country is observed 23 years.

Before undertaking a formal statistical analysis of the theoretical propositions on investment in human capital, it is convenient to know the scope of the variation in this dependent variable. To see the time variation, Figure 5.1 shows how the world average enrollment rate (in both secondary and primary) has changed since 1960. Taking the whole set of countries, while in 1960 around 48 children out 100 with school-age were acquiring on average some pre-university formal education, by the mid 1990s this number el-

evates to 67 resulting in an increase of 40 percent.

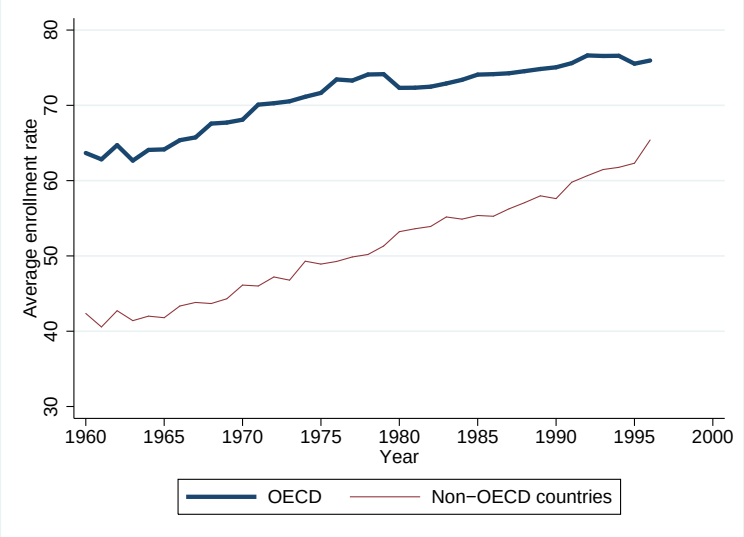
Figure 5.1: Average Enrollment in Primary and Secondary (All Countries)



This large and growing tendency of human capital investment is apparent across countries with different positions in the world income distribution. As seen in Figure 5.2, both OECD countries and the rest of the world seem to be subject to the same time forces promoting education. The two groups of nations exhibit substantial improvements in schooling provision, despise their different levels of income. Another fact worth noting is that the upward trend of the less developed countries appears to be steeper, which suggests that a catching up process and, therefore, a reduction of the existing gap have taken place throughout the period covered by this study.

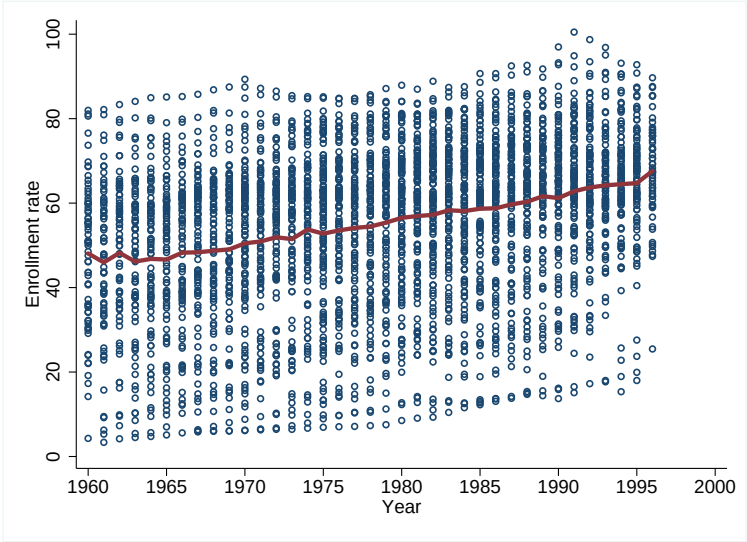
In spite of such common increasing tendency, much variation across countries remains. To see this, Figure 5.3 displays the international distribution of school enrollment for the entire 1960-1996

Figure 5.2: Average Enrollment in Primary and Secondary (OECD Countries and the Rest of the World)



panel. For each year, data points representing country figures are drawn around the mean value (indicated by the thick line). As shown in the graph, the differences among nations are quite large. For instance, in the 1985 cross section, the mean value of the enrollment rate is 58.7 with a standard deviation of 17.7 and a range from 12.3 (in Mali) to 90.7 (in New Zealand). Overall, the range of the variable is considerably wide going typically from less than 20 to above 80.

Figure 5.3: Cross-Country Variation of Enrollment Rates by Year



5.3 The economic-development conditional effect of political institutions: An overtime analysis

This section concentrates on the time variation of educational outcomes and explains it by exploiting information on a set of covariates from a cross-sectional time-series dataset. To expand the series as much as possible, I use the combined rate of enrollment in pre-university education (ENROLL) as the dependent variable of the statistical analysis. As explained above, this variable contains yearly information on enrollment rates in primary and secondary from 1960 to 1996 for around 153 countries. Although the amount of annual data actually available varies by country (since it is an unbalanced panel), the series of the typical nation has a time-span, on average, of 23 years in most model estimations.

The theoretical hypotheses regarding the differential impact of income inequality across political regimes are not tested in this section because of the time limitations in inequality data. As will be shown, there are usually few year-observations within most countries, which would shorten considerably the overall time length under study. And second, but more importantly, income inequality tend to be very persistent in the short run. Therefore, the empirical examination of the theoretical priors about income inequality and political institutions is left to the next section where estimation strategies exploit mainly variation across countries.

Apart from understanding the dynamics of education outcomes and identifying other explanatory forces, the subsequent overtime analysis based on this panel dataset does allow us to test other crucial empirical implication of the analytical models. This is the causal effect of political institutions conditional on economic development. So I focus here on the interaction between regime type and per capita income (as a measure of development) and try to find out whether institutions show different patterns in the relationship

between economic progress and school enrollment. But before that let us see how this hypothesis works.

5.3.1 The Question

Economic development is hypothesized to have a positive impact on education. Yet, according to the models examined in Chapter 3,[12] the implicit function relating income per capita and education is not continuous since it is assumed that, once a member of a particular class gets educated, the other individuals from the same class also invest in education. A reasonable theoretical reinterpretation of the relationship between these two variables for a typical country that both maintains the main insights of models and guarantees continuity (something needed for the statistical analysis) is portrayed in Figure 5.4 panel (a). The value "a" is defined as the threshold income separating "poor" from "rich" economies. Sticking to the definitions given in the theoretical models, at early stages of development (income values below "a"), there are no enough resources in the economy for everyone to acquire education and only the rich can invest in human capital by their own. If the potential investors in the economy are mainly the upper class, then increases in income per capita should have a relative small impact on education up to the point "a", as can be seen in the graph.[13]

To make this proposition clearer, consider what happen when economies have cross the income threshold "a". Now, the members of the middle class are able to pay their own investment so that they start to receive education. Whenever the proportion of middle-income individuals in the population is higher than that of high-income agents (which is not very unrealistic at this level of per

[12] From now on, when I refer to the analytical models of Chapter 3, I am referring only to the ones of Perotti (1993) and Fernandez & Rogerson (1995).

[13] Except for certain political economy conditions under the logic of Fernandez and Rogerson' model in which the middle class becomes also skilled thanks to educational subsidies financed by the poor.

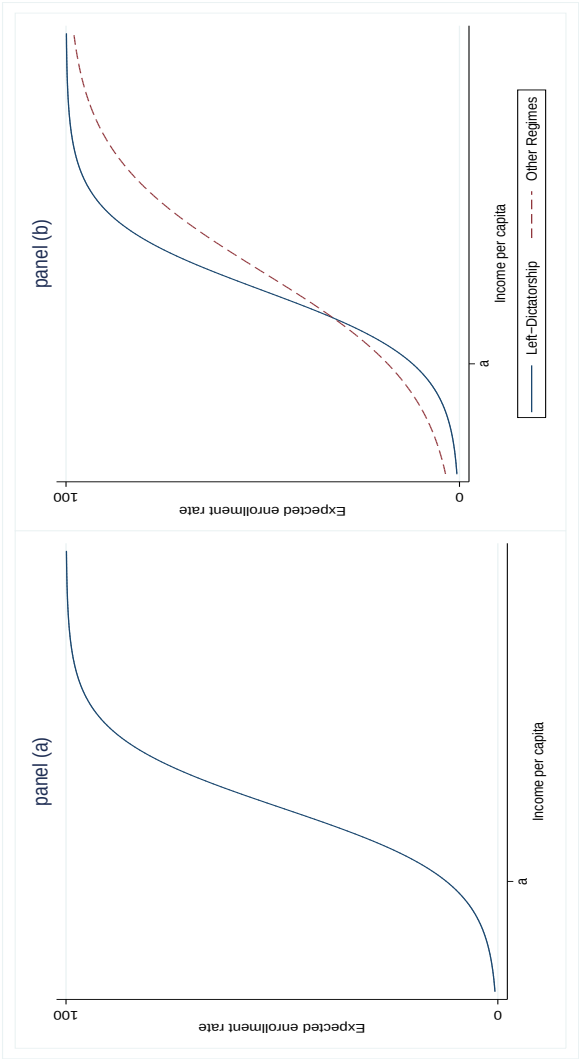


Figure 5.4: The Working Hypothesis

capita income), then we should observe a relatively abrupt increase of enrollment once the economy has passed such income threshold. Moreover, economic redistribution would determine how much the expected enrollment rate gets expanded at this point. Remember that when per capita income is above "a" (i.e. in rich economies), the poor may also obtain formal schooling as long as a certain degree of redistribution is imposed. Therefore, if governments endorse a redistribution package that allocates sufficient revenues for the poor to get educated, then such increase in schooling should be very large.

Thereafter, the positive effect of income wanes as enrollment is getting closer to its natural limit of 100 per cent. The enrollment rate may reach eventually this limit under very wealthy conditions in which, regardless of the redistribution size, all groups may be able to afford education. In sum, the relationship between income per capita and the expected enrollment rate can be plausibly approximated as a logistic function (as described in Figure 5.4 panel (a)), where the influence of income per capita is comparatively lower at very low and at very high levels of economic development.

Could we expect this association be the same across different political institutions? Or is it reasonable to expect interaction effects between institutions and the wealth of nations? According to the theory outlined in several parts of this thesis, the type of regime exerts an indirect influence on human capital investment. Instead of claiming a fixed direct impact, this thesis has been argued that the effect of institutions works via how they process or respond to other economic determinants of policy, which implies that the differences in educational outcomes among political systems (namely, the effect of regimes) vary with economic conditions. In Chapter 3, it has been broadly discussed the interaction between institutions and income inequality. In this section, however, I try to elucidate, drawing on the extensions of the analytical models made above, if governments' reactions to an increase in per capita income depend

on the institutional context.

Although using distinct modeling setups, the extensions of both formal accounts (i.e Perotti 1993; Fernandez & Rogerson 1995) predict that, on average, left-wing autocracies should accumulate less human capital than any of the other two regimes in poor countries, whereas they should have better educational outcomes than democracies and right-wing dictatorships in high-income countries. The effect of per capita income, in other words, is predicted to be larger in populist regimes than in the other political systems (see Figure 5.4 panel (b)).

The idea common to both explanations is that, in low-income nations, any policy promoting education is comparatively more costly to the poor. In Perotti, a human capital-enhancing policy implies a reduction in the level of pure-income redistribution, which is obviously more costly to the poor than to the middle class. As a result, the inequality conditions under which the externality from the investment of the rich may compensate the short-run sacrifices of regimes' constituencies are more stringent in left-wing dictatorships than in democracies. Of course, wealth-biased regimes do not redistribute at all in any circumstances and thus constitute the institutional scenario that is expected to promote the most human capital. In Fernandez and Rogerson, as it is not possible that the least affluent groups of the society can invest in education, they are worse off if a publicly provided program of subsidies that would enhance aggregate schooling is endorsed: in this case they are simply financing the education of other classes.[14] Hence we should observe that populist dictatorial governments have not a real interest in encouraging education. On the contrary, as seen in Table 3.10, there exist some inequality conditions under which democracies and right-wing dictatorships tend to approve a certain level of public financing in the form of educational subsidies so that not only the

[14]Remember that this model assumes that there is no educational externality and that transfers are received only by those who actually go to school.

rich but also the middle class can acquire education. Summarizing, if the income shares of social classes are randomly assigned to political institutions, then democratic and rightist regimes will have higher average rates of enrollment than left-wing autocracies.

However, at later stages of development -more particularly, when per capita income is equal to or greater than "a" in Figure 5.4-, government redistribution may help the "uneducated" poor to overcome their liquidity constrains in their investment in education. Leftist autocrats, by pursuing low-income individuals' interests, are inclined to implement at least the necessary level of redistribution so that all members of society become skilled. Regardless of inequality, in this institutional context a spectacular immediate increase in enrollment should occur right after income per capita has reached the wealth threshold "a". Yet the poor may not get educated in the other types of regimes. From Perotti's model, democratic politicians or rightist dictators are willing to increase the tax and transfer system in order to foster human capital but only under certain configurations of the income distribution that make the cost of educating the poor small enough from the viewpoint of the median voter or the upper class respectively. Considering the model of Fernandez and Rogerson, first it is possible the formation of democratic government coalitions in favor of a restricted redistribution policy leading to the exclusion of the poor from education and, second, right-wing autocrats do not have any incentive in facilitating school access to the least well-off. Both theoretical models therefore predict that left-wing regimes should experience, on average, a steeper increase of enrollment than their institutional counterfactuals as the economy develops.

The expected differences in outcomes between democracies and rightist dictatorships are less clear-cut. Focusing on the Perotti's setup, we can see in Table 3.10 that in poor countries wealth-biased regimes are expected to have higher enrollment rates than democracies, whereas the differences in enrollment are very small but

in favor of democratic governments in rich countries (see Table 3.8), which suggests that economic progress has a greater effect under democracies. In regard to Fernandez and Rogerson' model, in low-income countries, both types of regimes are hypothesized to produce the same outcomes in education but as the economy keeps growing democracies on average tend to raise enrollment at a higher rate than rightist autocracies.[15]

5.3.2 Data

To empirically address these theoretical hypotheses, I use a cross-sectional time-series database. It is a global sample that includes all countries for which annual information on the relevant variables is available from 1960 (or from the year of independence) to 1996. Data on the dependent variable comes from the indicator previously discussed about enrollment rates in primary and secondary education (ENROLL). This dataset is an unbalanced panel of countries, that is, the time coverage of the period under studied varies from one country to the other. For instance, while some nations have data on education for all 37 years of the period, others may have no more than four observations. Note also that the particular structure of the panel (how many countries and years have information) depends upon the set of variables under analysis. Statistical results are robust, however, to this unbalanced nature of the data. The sample includes both developed and developing countries and it has a broad representation of nations for each region of the world.

Regarding the more substantive independent variables, the indicator of political institutions rests on the dichotomous classification of democratic regimes (REGH) developed by Przeworski *et al.* (2000).[16] But the country-year dictatorships are further dis-

[15]Once again, these hypotheses rely on the assumption that inequality characteristics are randomly assigned to political institutions.

[16]Concretely, I employ an updated version of this dataset that goes to the year 2000.

tinguished by their ideological orientation exploiting the data described in Chapter 4. In particular, I use the data on the ideology of dictatorships that are based on the complete procedure explained in this chapter, that is, the data based on the two types of proposed indicators: the *direct ideological indicators* and the *policy indicators*. Considering the overlap of the ensuing institutional variable and the dependent one, the number of nations examined is around 153 yielding a total of country-years observations equal to 3577. This number drops to 3328 when the analysis is restricted to democracies, right and left-wing dictatorships.[17] As we shall see, the sample reduces a lot as other variables enter into the analysis.

With regards to economic development, I exploit data on real GDP per capita as a proxy. The source of the data is the *Penn World Table* (Heston *et al.* 2002). Among the alternative income levels, I use RGDPCH (Chain series), and the starting version used is PWT6.1. To enlarge the size of the sample as much as possible, I fill some missing data calculated from the same variable RGDPCH of the version PWT5.6. To be more precise, for the missing data in the real GDP per capita (Chain series) from PWT6.1, I use the predictions on this variable based on a regression (with fixed-country effects) on the real GPD per capita (Chain series) from PWT5.6.

Before proceeding to the estimation process, some descriptive data about the relationships of interest are presented in the next section.

5.3.3 A Preliminary Exploration of the Data

To have a sense of the data, I present in this section some descriptives preliminaries on the effect of political institutions on educational outcomes from the raw data. Focusing first on the variation

[17] That is, when those dictatorships that could not be classified in terms of their ideology or are considered centrists are excluded from the analysis.

over time, Table 5.1 shows the mean values of the combined enrollment in primary and secondary levels and its cumulative growth ("achange"), for 5-year subperiods and for different types of political regimes.[18] As can be seen in the table, average enrollment rates have increased (during the entire period) less in democratic countries than in both types of dictatorships. While the cumulative growth of education over the whole period is 9.5 percentage points under democracies, the corresponding figures for left and right-wing dictatorships are 10.6 and 14.9 respectively. In populist regimes, schooling average enrollment has expanded particularly in 1960s and 1970s (see column 7 in Table 5.1), whereas in rightist dictatorships enrollment grows steadily during the entire period except in the 1990s as indicated in the last column of the table. Looking at the institutional differences associated to the mean values of enrollment, we see that in all subperiods democratic countries tend to have, in average, greater enrollment rates than their dictatorial counterparts. In turn, left-wing dictatorships seem to outperform right-wing ones in most of the subperiods.

One is tempted to interpret these institutional differences as the effect of political institutions on education. However, this is an unconditional estimation of the impact of institutions, which can be misleading if other causal factors varies also with political regimes. In that case, institutions may be picking up the effects of other variables correlated with both political regimes and enrollment.

An obvious factor that may be driving these educational dis-

[18]Instead of using the difference between the simple year averages as a measure of the over-time change in enrollment, I follow the suggestion of Persson and Tabellini (2003: 47) that consists in estimating the cumulative growth of enrollment over a certain period by "finding the difference between the estimated coefficients on the last and the first year dummy of the period" in a regression of enrollment with year dummies and country fixed effects. According to these authors, "the country fixed effects take care of the potential problem of countries with different [enrollment] average..entering and exiting the panel at different times" (p. 47).

Table 5.1: Political Regimes and Enrollment (ENROLL) Over Time

	All regimes		Democracy		Left Dic		Right Dic	
	mean	achange	mean	achange	mean	achange	mean	achange
1960-1964	48.4	1.6	55.7	1.1	45.3	3.3	38.1	1.3
1965-1969	49.5	1.6	58.9	2.5	46.8	-1.1	40.6	2.4
1970-1974	53.6	2.2	63.2	0.9	50.9	2.2	45.2	3.4
1975-1979	55.1	1.5	65.8	1.1	51	2.6	47.8	1.6
1980-1984	58.4	1.2	67.1	0.8	52.3	0.9	54	1.4
1985-1989	60.5	0.7	67.9	0.7	53.3	0.8	55.4	1.8
1990-1996	64.1	1.2	67.7	2.1	54.1	1.3	62.8	0.04
All years	56.5	11.1	64.7	9.5	51	10.6	48.8	14.9
Cases	3328		1473		1005		850	
Countries	147		86		60		54	

Note: "achange" refers to the average cumulative change of ENROLL for different subperiods, and for the whole period in the row "All years."

parities across regimes is per capita income. On the one hand, we have seen in the Introduction to this thesis that GDP per capita is indeed positively related with enrollment rates. On the other hand, as Figure 5.5 indicates, institutions seem also to be related with per capita income. This figure shows the distribution of GDP per capita of country-year observations within each type of political institution. As portrayed in the graph, dictatorships (of both types) tend to have a lower average income than democratic countries. Most of the dictatorial cases concentrate on relatively poor intervals of income, while democratic institutions appear to spread over relative richer intervals.

Figure 5.5: The Distribution of Per Capita Income in Different Political Regimes

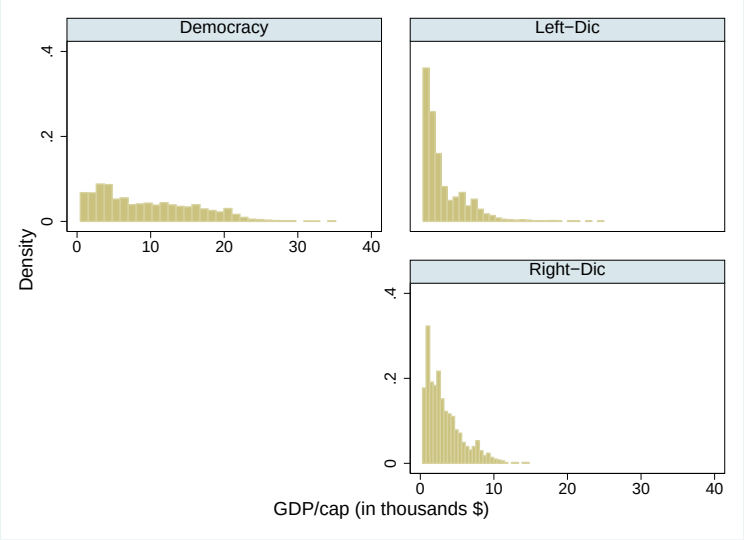


Table 5.2 offers a clearer description of the incidence of political regimes by per capita income. For several GDP per capita ranges, this table displays the observed proportion of each type of insti-

tution -taking only the sample of democracies, left and right wing dictatorships. Among very poor country-year observations (with average income less than 1000$), almost 90 percent of the cases are dictatorial systems. The proportion of democratic regimes is nearly 10 percent. This proportion increases gradually with economic development, representing more than half of the cases among observations with per capita income greater than 6000$. In very rich countries (with values of GDP per capita over seven thousands dollars), the proportion of dictatorial regimes is less than 30 percent. Therefore, this data confirms the well-known fact that the incidence of democratic institutions seem to be positively associated with per capita income. A final point that is worth noting is that both types of dictatorships seem to have a similar distribution of GDP per capita.

Table 5.2: The Incidence of Political Regimes by GDP/cap

GDP/cap	Democracy	Left Dic	Right Dic
0-1000	9.50 (46)	52.69 (255)	37.81 (183)
1001-2000	20.5 (151)	50.5 (373)	29 (214)
2001-3000	27.9 (154)	34.4 (190)	37.8 (209)
3001-4000	47.3 (187)	20 (79)	32.7 (129)
4001-5000	45.9 (142)	21.4 (66)	32.7 (101)
5001-6000	40.9 (105)	32.3 (83)	26.8 (69)
6001-7000	53.2 (99)	24.7 (46)	22 (41)
7001-	76.5 (1066)	10.5 (146)	13.1 (182)
Cases	1950	1238	1128

Note: Main figures are row proportions. Number of cases in parenthesis.

Given this relationship between political institutions and economic development, it follows that the higher educational performance of democratic regimes shown above is due in part to the effect of per capita income. So the next step is to control for this factor.

As provisional evidence for the interaction effect of per capita income and political regimes, we can take a look at Table 5.3 where the mean of enrollment is shown in several income intervals grouped by political institutions. The table reveals that, in poor countries with values of GDP per capita lower than 2000$, democracies seem to outperform the similar outcomes of the two dictatorial types. As we move to middle-income countries, we see nevertheless how the mean of enrollment under dictatorships approaches and, in the case of left-wing autocracies, even surpasses democratic standards. For instance, in those countries with GDP per capita between 2000 and 3000 dollars, the observed average proportion of students attending school is 50, 57 and 48 for democracy, left and right wing dictatorships respectively. Moreover, this highest performance of populist regimes appears to be a persistent pattern in countries with income levels lower than 6000$. By comparing the evolution of education across institutions, the figures suggest, in line with theoretical expectations, a stronger positive relationship between income and enrollment in populist regimes -up to the point of 6000$ from which democratic countries apparently take the lead again.

Yet such data need to be read with prudence. One major source of suspicion is the existence of a strong regime selection on economic development causing a nonrandom distribution of regimes across levels of wealth. Since democratic systems are positively associated with income, we observe relative few cases of poor democracies and rich dictatorships (see Table 5.2). Thus a comparative assessment of performance at the two extremes of the world income distribution can be very misleading. Not only that, as will be shown later, this selection process may distort statistical inferences regarding the different effect of economic development across regimes. In any case, these preliminary findings need further formal empirical tests that, among other things, controls for a set of alternative explanatory variables. This more careful empirical analysis is undertaken in the next section.

Table 5.3: Political Regimes and Enrollment (ENROLL) by GDP/cap

GPD/cap	All regimes	Democracy	Left Dic	Right Dic
0-1000	28.5 (296)	42.2 (23)	27.9 (149)	26.5 (124)
1001-2000	41.1 (447)	46.4 (95)	41.2 (224)	37.1 (128)
2001-3000	51.7 (357)	50.6 (90)	56.9 (118)	48.2 (149)
3001-4000	55.6 (305)	55.9 (127)	59.8 (66)	52.7 (112)
4001-5000	59.9 (252)	60.6 (103)	62.5 (60)	57.5 (89)
5001-6000	61.9 (207)	62.8 (74)	62.9 (73)	59.7 (60)
6001-7000	61.4 (151)	64 (76)	57.6 (39)	60 (36)
7001-	70 (1104)	71 (860)	66.8 (124)	65.6 (120)
Cases	3119	1448	853	818

Note: Main figures are mean values of ENROLL. Number of cases in parenthesis.

5.3.4 Estimation and Results

To test more rigorously the working hypotheses outlined before, the general strategy of estimation adopted here is as follows. Suppose that in each political regime I, policy performance (i. e. school enrollment) in country i and year t are determined by the following stochastic process:

$$Y_{it}^{I} = F^{I}(\alpha_i + \theta \mathbf{X}_{it}) + \epsilon_{it}^{I}, \qquad I = D, L, R \tag{5.1}$$

where Y represents the rate of primary and secondary school enrollment, X the vector of independent variables, $F(.)$ is a function relating expected enrollment to a combination of covariates and ϵ is a random variable capturing the influence of all unobserved factors of education. Finally, the is and ts index countries and years respectively, and I denotes the three types of institutions, that is, democracy (D) left-wing (L) and right-wing (R) dictatorships.

One advantage of working with time-series cross-section data is the possibility of using methods to control for unobserved country-

specific traits that may influence the dependent variable. Although these time-invariant characteristics of countries cannot be directly included in the set of regressors, it is possible to incorporate their effects via the introduction of a dummy variable for each country in the regression. This is the fixed-effect formulation in which group heterogeneity can be captured by differences in the constant term or, put differently, each unit has its own intercept. A very important implication of this model is that the estimation of the other parameters of interest is based on the time variation within groups. Differences among countries are totally ignored as a source of variation to identify the impact of explanatory factors. Actually, this method is equivalent to a regression replacing original data with observations measured as deviations from their country means, that is, a regression of $[Y_{it} - \overline{Y_i}]$ on $[X_{it} - \overline{X}_i]$ where $\overline{Y_i} = (1/T) \sum_{t=1}^{T} Y_{it}$, the mean over the T observations of group i and similar for $\overline{X}_i$ (Greene 2000: 561).

The general performance model of equation 5.1 uses this technique. By estimating a different intercept to each group (α_i), all country-specific determinants of education that are invariant through time are hold constant in the estimation process. In this way, we eliminate the potential bias that may emerge when such determinants are also correlated with other covariates. For instance, suppose that there are certain features of countries, say their colonial history or geographical location, that prompt them to be stable democracies. If these traits also affect educational outcomes, then omitting them from the regression will produce biased estimates regarding the impact of political regimes. In order to avoid this type of potential bias due to different unobserved group-specific factors, the model in (5.1) includes country-dummy variables into the right-hand side of the equation. So the question we ask to the data becomes whether changes in enrollment are associated with changes in X_{it} within countries.

Expanding the argument of the function in (5.1) to test the

hypotheses of the interaction effect between per capita income and political regimes on human capital, we can rewrite (5.1) as

$$Y_{it} = F(\alpha_i + \delta_1 L_{it} + \delta_2 R_{it} + \beta_1 W_{it} + \beta_2 W_{it} * L_{it} + \beta_3 W_{it} * R_{it} + \gamma \mathbf{Z}_{it}) + \epsilon_{it}, \tag{5.2}$$

where L and R are binary indicators, one for each type of dictatorship taking value 1 if an observation is a left or a right-wing autocracy respectively and 0 otherwise. W represents per capita income and $\mathbf{Z}$ a vector of control variables. Disturbances are assumed to be identical in all regimes so that $\epsilon_{it}^D = \epsilon_{it}^L = \epsilon_{it}^R = \epsilon_{it}$. As in standard applications of interactive models (Braumoeller 2004; Brambor *et al.* 2006), δ_1 (or δ_2) measures the differences in education between leftist (or rightist) regimes and democracies (the reference category) when $W = 0$. The coefficients showing whether the relationship between economic development and human capital varies across institutions are β_2 and β_3. Noting first that β_1 tells us how income is associated with education under democracy, β_2 evaluates if the responses of populist dictators to economic development are different from those of democratic politicians while β_3 evaluates the same thing but with respect to rightist dictators. If $\beta_2 = \beta_3 = 0$, then contrary to our hypotheses GDP per capita has a similar influence regardless of the institutional settings at work.

Before examining the empirical evidence, two econometric issues concerning reverse causation that could invalidate the statistical results need to be discussed. The first one consists of the potential endogeneity of economic development. One may think that school enrollment could simultaneously promote per capita income, which implies a reversal of causality from the dependent variable to this predictor that if not considered in the regression analysis then its coefficient will be inflated. However, there are reasons to argue against the strength of such reversal. While it is reasonable to expect that the stock of human capital in the workforce will de-

termine in part economic growth[19], it is harder to sustain the same expectation for enrollment rates, which informs about the percentage of young people (who are out of the workforce) that receive some kind of pre-university education. Moreover, as our concern is whether enrollment rate fosters per capita income and not economic growth, then the fact that education could expand the future total output do not guarantee that per capita income will increase too since it depends also on the population's growth. In any case, the level of enrollment in a given year is unlikely to induce greater prosperity in that year.

The second issue deals with reverse causation running from schooling to political regimes. It has been argued that a better-educated population tend to support democracy over other dictatorial alternatives. The conventional explanation, pioneered by Lipset (1960), emphasizes a culture link within the broader modernization theory: education is claimed to cause a change of individual values more consistent with standard democratic practices. The empirical evidence sustaining this idea has been based, however, on simple cross-country correlations between the educational stock in the society and the democratic nature of institutions; an evidence not robust to the application of more rigorous techniques (Acemoglu *et al.* 2005). Using within-country variation, these authors do not find supporting evidence for this relationship, which leads them to conclude that such inferences based on cross-country variation were likely biased as a consequence of the omission of fixed characteristics of countries in the statistical analysis. The cultural explanation have also been theoretically contested. In an attempt to determine the factors inducing governments to control citizens'

[19]See Barro (1997) for supporting evidence. The question on whether human capital promotes economic growth is, however, a controversial issue as shown by Pritchett (2001) and Easterly (2002), who provide evidence to the contrary. For a recent and quite complete review of the empirical literature on the macro-level relationship between (different measures of) human capital and economic performance, see Sianesi and Van Reenen (2003).

information, Lott (1999) proposes that public education may serve the interests of totalitarian rulers as a mean of indoctrination in their strategies to contain opposition. Instead of fostering democratic values, dictators may use state-managed schools to diffuse a regime-supporting ideology. Moreover, Lott finds through different statistical tests that, at higher levels of totalitarianism, indoctrination becomes a cheaper way to deter opposition compared to pure force. Apart from these theoretical and empirical reasons against a causal link from our dependent variable to institutions, some of our hypotheses would be more difficult to confirm if the culture view were true, making the potential reversal a minor problem in our case.[20]

Turning to the estimation process, we need to assume a functional form of the model described in equation 5.2 as well as a particular behaviour of the disturbances process ϵ_{it} in order to come out with a estimable equation. Different assumptions concerning both elements (F and ϵ_{it}) will thus result in different estimation models.

Linear regression models

In the first set of models that I run, the function F in (5.2) is assumed to be linear so that the estimated equation would be:

$$Y_{it} = \alpha_i + \delta_1 L_{it} + \delta_2 R_{it} + \beta_1 W_{it} + \beta_2 W_{it} * L_{it} + \beta_3 W_{it} * R_{it} + \gamma \mathbf{Z}_{it} + \epsilon_{it}. \tag{5.3}$$

According to the hypotheses developed in Section 5.3.1, the expectations are that under poor economic conditions left-wing dictators face less incentives to promote education than their institutional counterparts while right-wing autocracies either have a

[20] Note that this view always predicts a positive association between democracy and education, whereas for example one of our interaction hypotheses predicts a higher levels of education in relatively richer left-wing dictatorships.

higher level of education than democracies -in the Perotti's setup- or show a educational pattern similar to that of the latter -in the Fernandez & Rogerson' setup. Thus δ_1 -which measures the difference in expected enrollment between democracies and left-wing dictatorships when per capita income W is zero- should be negative and δ_2 -which evaluates the same difference but between democracies and right-wing regimes- should be positive or zero.[21]

Under rich economic conditions, however, we should observe leftist dictatorships at the top of the performance institutional ranking followed by democracies and rightist autocracies at the bottom, which implies different political responses to economic prosperity depending on the institutional framework. Taking into account that the impact of per capita income is always positive, the hypotheses are that economic development has the greatest effect in populist regimes and the lowest in right-wing ones. In democratic institutions, it will increase enrollment at a rate in between the ones of both types of dictatorships. Such hypotheses suggest that the interaction term $W * L$ in (5.3) should enter the regression with a positive sign while $W * R$ with a negative one -note that the reference category in (5.3) is democracy.

To test those theoretical propositions, I first estimate equation 5.3 by ordinary least squares (OLS) with country fixed-effects (FE)[22] assuming the disturbances to be heteroskedastic and contemporaneously correlated across panels. To correct this problem, standard errors are computed using the panel-corrected standard errors (PCSE) method proposed by Beck and Katz (1995; 1996). Table 5.4 presents the results.[23]

[21] As the Undecided&Center category of dictatorship is removed from the analysis, democracy constitutes the reference group in (5.3).

[22] The F-tests against the fixed-effect specification (the null) are widely rejected and very significant. To save space, country dummies are not reported in the output tables.

[23] In the regression analyses that follows including those of the next section, six Middle Eastern oil countries (Bahrain, Kuwait, Oman, Qatar, Saudi Ara-

Column 1 reports the coefficients (and the panel-corrected standard errors in parentheses) of the most parsimonious specification which contains the key factors that proves whether the effect of per capita income (INCOME)[24] changes with institutions in the expected direction. School enrollment (ENROLL) is thus stipulated to be a function of INCOME, the two binary indicators of dictatorships (LEFT and RIGHT) and the interaction terms between these variables (LEFT*INCOME and RIGHT*INCOME). In addition, I introduces two dummies variables indicating if private (PRIVATE)

bia, and the United Arab Emirates) are excluded. The reason behind this decision is that their economies rely to a large extent on fuel exports, which distorts their pattern of economic development and government incentives to expand the access of public education (Gylfason 2001; Ross 2006). Indeed, these nations are typically very rich while their educational performance are too low for what one may expect by looking at their per capita income. Note that in the fixed-effect approach, we cannot introduce indicators measuring the economic weight of natural resources since this feature is for the most part a time-invariant characteristic of nations. Because these countries were classified as rightist absolute regimes (when the procedure described in the previous chapter pointed to some ideological orientation), excluding them from regressions works if somehow against our hypotheses. In addition, several other influential outliers are not included in the sample of the present overtime analysis: Malawi from 1994 to 1996 and South Africa from 1990 to 1996. Both countries increase spectacularly but quite unrealistically the number of students in one year. In Malawi, the schooling enrollment rate jumps from 56% in 1993 to more than 80% in 1994. Such huge increase coincides with a political transition to democracy from a right-wing dictatorship. According to several sources, the first democratic Malawian government made a strong emphasis on education during its electoral campaign. Although it actually imposed compulsory primary education, government's educational output has been widely criticized because of the lack of resources, the overcrowding in schools or the high rate of dropout (one of the largest among African countries). In the case of South Africa, enrollment expands from 73% in 1988 to 96% in 1990 and over 100% in later years. Actually, South Africa is the only country in the sample that reaches that level of education. When discussing the empirical results, I will report how they change if these observations are included.

[24]This variable enters to the regression divided by 1000, so INCOME refers to GDP per capita expressed in thousands of dollars.

or secondary vocational (VOCATIONAL) schooling are counted in the enrollment figures in order to abstract from artificial jumps in the dependent variable owing to changes in coverage.[25]

The coefficient on the INCOME variable is positive and statistically significant, corroborating the existence of a positive relationship between economic prosperity and education within democratic countries. However, looking at the value of the coefficient (1.20), economic development seems not to be very strongly associated with education. If we consider the time variation of enrollment, it takes two and half standard deviations in per capita income (a change of 5000$) to generate a increase in education of almost one standard deviation (that is, 6 percentage points). This result is very surprising in view of the much stronger impact of income usually reported in the cross-section empirical literature (see for instance Dasgupta 1993; Perotti 1996; Mingat and Tan 1998; Brown 1999). Regardless of the model specification and estimation method, most estimates in the present analysis do not show a great influence of GDP per capita in any regime, which suggests that economic development is not as an important predictor in accounting for educational changes in a given country as it is in explanations of the educational differences among nations.[26]

Turning to the institutional variables, they are all statistically significant but while the dummy indicator of left-wing regimes and its interaction with income have the expected signs, the covariates related with right-wing dictatorships do not. In line with theoretical predictions, left-wing regimes are associated with lower rates of enrollment in comparison to democracies in relatively poor countries but as the economy grows populist dictators response by increasing schooling at a higher rate than democratic politicians. Yet, and contrary to expectations, right-wing autocracies seem to have

[25]See Appendix B, for a definition of the variables used in the analysis.

[26]Easterly (1999) finds as well this shifting pattern of economic development in primary enrollment regressions.

lower levels of education than democracies under relative poor conditions. As indicated by the coefficient of RIGHT, its magnitude is even lower than that of the binary indicator for leftist absolute regimes. Also, the positive association between per capita income and education is stronger in rightist dictatorships than in democratic nations. The two basic controls, PRIVATE and VOCATIONAL, are related with significantly higher rates of enrollment as expected.

These empirical regularities could be driven however by omitted variables. One potential candidate is the percentage of rural population in the society. Without holding this determinant of education constant, there are reasons to think that the regimes-related indicators are capturing its effect.

On the one hand, it has been widely established the existence of a rural/urban gap in education even in developed countries. Both supply and demand side factors may account for this gap. On the supply side, the cost of public education can be argued to be greater in rural areas since the provision of educational services is subjected to higher economies of scale in urban locations than in more dispersedly populated rural areas. To the extent that the supply of educational services requires some investment fixed-costs, like the building of schools or teacher salaries, increasing the number of students reduces the educational cost per student up to certain point. Now rural communities may spread these initial costs of education over a lower number of students as a consequence of their less concentrated population. On the demand side, city residents face stronger incentives to acquire education because urban labor markets, dominated by the industrial and service sectors, compensate skilled employees better than agricultural labor markets where the demand of highly educated workers is lower. These two arguments point, therefore, to a negative relationship between the percentage of rural population and enrollment figures.

On the other hand, dictatorial regimes tend to have a larger size

Table 5.4: Education and the Interaction Effect of Income and Institutions. Simple Linear Regression

	(1)	(2)	(3)
Method	PCSE,FE	PCSE,FE	PCSE,FE
Dependent variable	ENROLL	ENROLL	ENROLL
LEFT	-2.80	0.58	0.10
	(1.03)***	(0.71)	(0.70)
RIGHT	-6.94	0.35	0.46
	(1.30)***	(0.62)	(0.66)
INCOME	1.20	0.32	0.41
	(0.04)***	(0.06)***	(0.07)***
LEFT*INCOME	0.57	0.76	0.82
	(0.15)***	(0.12)***	(0.13)***
RIGHT*INCOME	0.69	-0.24	-0.29
	(0.17)***	(0.11)**	(0.11)**
PRIVATE	9.72	9.51	9.48
	(1.51)***	(1.49)***	(1.50)***
VOCATIONAL	7.06	6.15	5.89
	(0.46)***	(0.46)***	(0.45)***
RURAL		-0.85	-0.83
		(0.03)***	(0.03)***
TRADE			-0.01
			(0.01)
POP14			0.02
			(0.06)
Average effect	37.84	86.62	85.16
No. Observations	3030	2881	2646
No. Countries	136	129	123
Prob>Wald Chi2	0.000	0.000	0.000

Note: Panel-corrected standard errors in parentheses. INCOME refers to GDP per capita divided by 1000. Average effect is the average value of country-specific effects (intercepts). *significant at 10%; **significant at 5%; ***significant at 1%.

of rural population than democracies all over per capita income intervals.[27] Thus it could be the case that the poorer performance of dictatorships at low income levels reflects partially the fact that dictatorial cases have a larger fraction of rural population. Moreover, as economic development shrinks this fraction and non-democratic regimes start the development process with a greater proportion, then it could be possible that an increase in per capita income causes a greater decline in the proportion of rural population under dictatorships than under democracies, which may explain in part the greater influence of economic prosperity in the former.

Column 2 in Table 5.4 shows that this is in fact the case. Once the percentage of rural population (RURAL) is introduced in the estimated equation, the educational differences between regimes vanish completely at low levels of per capita income. Economic development still have a positive, although smaller, significant impact within democratic political institutions: an increase of 5000 dollars in average income rises primary and secondary enrollment by only 1.6 percentage points. The two interaction terms have the expected signs and are statistically significant. Consistent with hypotheses, the coefficient of RIGHT*INCOME turns out negative indicating a weaker relationship between education and economic resources in right-wing dictatorships than in democracies. Yet the sum of the two parameters of INCOME and RIGHT*INCOME, which informs about the effect of per capita income in rightist autocracies, is not significantly different from zero.[28] Wealth-biased dictators seem not to open up formal schooling to lower social classes as the economy grows.

A crucial result for our theory is that populist dictatorships is

[27]Summary descriptives show that in countries with for example a GDP per capita lower than 1000$, the average share of rural population in democratic countries is 77% while in left and right wing dictatorships is 83% and 86% respectively.

[28]I calculate the standard error of this interactive effect following the method described in Greene (2000: 326).

the type of regime in which economic prosperity induces the largest increments in enrollment rates. Even after the proportion of rural population is controlled for, the coefficient of LEFT*INCOME is still positive and significant: leftist dictators tend to foster education, as a consequence of economic development, at a higher rate than democratic politicians. Looking at the sum of the corresponding parameters of INCOME and LEFT*INCOME -again this sum measures the impact of per capita income in left-wing dictatorships-, we see that an increase of 5000 dollars in the GDP per capita causes a significant upsurge of 5.4 points in the enrollment ratio. As for the control variables, the coefficient of RURAL is negative and statistically significant as expected: the larger the size of rural population in society, the lower the number of children who are enrolled in pre-university schooling. The other two controls, PRIVATE and VOCATIONAL, retain its significance levels and keep the same sign and magnitude.

In column 3 of Table 5.4, I check whether these empirical findings are robust to the inclusion of additional standard controls in the literature. The first one is the degree of trade openness in the economy (TRADE), defined as imports plus exports over GDP. One possible argument justifying its inclusion rests on both the compensation and the efficiency hypotheses of the globalization literature (Kaufman and Segura-Ubiergo 2001). Increased internationalization of the economy may create social dislocations and amplifies the degree of economic insecurity of some social groups in the population. Vulnerable economic sectors will demand in response certain protection against the risks associated with the process of trade liberalization. Yet the very process of globalization makes standard Keynesian practices of redistribution more costly to investors and producers. Rising welfare spending and the more interventionist demand-side policies are argued to hinder productivity and competitiveness in international markets (Boix 1997). There are however certain components of the public budget that are less detrimen-

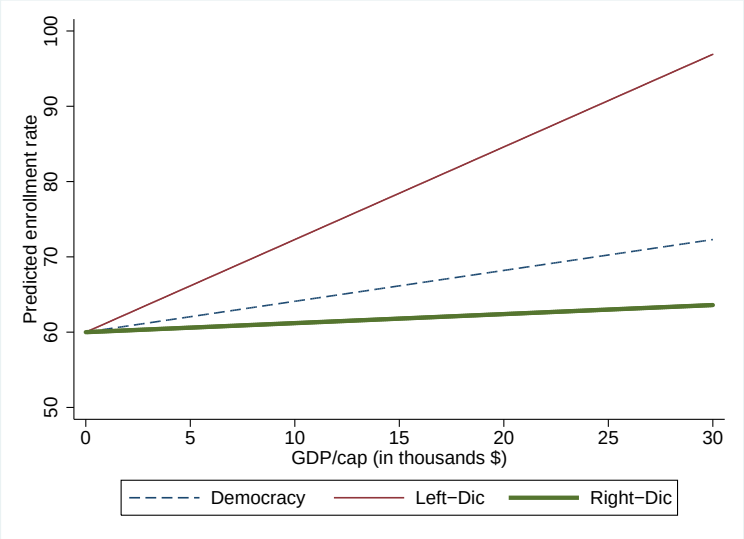
tal or even beneficial for the domestic economy (Burgoon 2001). Public policies oriented to the formation of human capital, besides their desirable consequences on the welfare of vulnerable groups, enhance productivity rates and competitiveness so that capital may even favor their adoption and pressure for expanding education and promoting the skills of the workforce. Putting all pieces together, the hypothesis is that more opened economies are more likely to enact human capital formation programs because the latter somewhat compensate social sectors negatively affected by trade liberalization, but simultaneously these compensatory programs do not have undesirable consequences on investors and producers as other welfare policies.

The second control included is the proportion of the population aged under 14 (POP14). The demographic composition of the population is an important feature shaping educational outcomes since it defines the fiscal burden required in order to reach a certain target of enrollment rate. It is reasonable to think that as the percentage of this age group increases, governments may need to devote more resources in education to ensure a chosen quantity of schooling enrollment and, therefore, the expectation is that this factor is negatively correlated with educational results. The regression results indicate, contrary to predictions, that these two covariates do not actually help to explain educational variation within countries. Although they do not have any explanatory power, their inclusion in the estimation model does not change other coefficients. If anything, the earlier pattern of the consequences of the development process on education in different regimes reveals clearer since the interaction terms and the additive parameter of per capita income increases in magnitude.

To see more clearly the substantive implications of the interactive coefficients, I use the estimates of the last model to obtain the predicted values of the dependent variable as a function of average income in different regimes. Figure 5.6 depicts the relationship

between education and GDP per capita in the three institutional categories. The constant term is normalized to be 60 per cent, which corresponds to the intercept of Venezuela. Note that choosing a different fixed-country effect does not change the portrayed relationship. According to this simulation, when the economy is very poor, the institutional setting is an insignificant predictor of enrollment rate: all institutions seem to have similar educational levels. But as the economy develops the educational differences among regimes become more apparent and increase with GPD per capita. Leftist dictators respond to prosperity by expanding education at a higher rate than democratic politicians, while right-wing rulers do not seem to react in any systematic way.

Figure 5.6: The Predicted Impact of GDP/cap on Enrollment by Political Regime



In sum, the empirical evidence confirms the existence of indirect institutional effects. Although the type of regime does not appear

to make any difference in educational outcomes at very poor levels of income, the relative performance of institutions diverges however as the economy grows in the expected way. Another central finding in accordance with theoretical priors is that the ideological orientation of dictators seems to constitute a relevant feature in explaining educational policy responses of governments. Dictatorships of distinct ideological stripes appear to take very different educational paths, so the proposed classification of dictatorships proves to be a relevant institutional distinction for the research question at hand. Moreover, the fact that their relative performances in comparison to that of democracy run in opposite directions provides empirical grounds against the strategy of grouping all dictatorial cases in one category to compare their combined educational outcomes with the democratic governments ones.

Dynamic regression

In time-series cross-section data, observations for a particular country are not usually independent. Data could be generated by a dynamic process in that the value of the regressand in a particular year depends on its past quantities. Certainly this is the case in our sample: education figures exhibit a strong correlation between observations in sequential periods. For instance, in a simple regression of ENROLL on its lagged value plus a constant, the interval estimate of the autoregressive coefficient goes from 0.94 to 0.96. It is well known that the time structure of the data, if not explicitly modeled, will be buried in the errors producing serial correlation. This in turn will make OLS standard errors incorrect. Since earlier statistical models did not take into account this dynamics in the dependent variable and did not correct for a possible autocorrelation in the errors, we need to rerun previous regressions with estimation

strategies that rightly incorporate these dynamic issues.[29]

The most simple strategy is to assume that the errors are serially correlated and include this information in the estimation process. I do this in the first column of Table 5.5. This model reproduces the last specification of the previous table but estimates it by Prais-Winsten regression (which employs the generalized least-squares method) assuming that residuals follow a common AR(1) process in all panels.[30] As before, standard errors of coefficients are calculated using PCSE and country fixed-effects are introduced in the regression.[31]

The first thing to be noted is that residuals are in fact highly correlated as suggested by the value of the estimated autocorrelation parameter Rho (0.74).[32] Considering the variables of interest, the main change in statistical results is that the coefficient for the interaction term RIGHT*INCOME loses its significance level meaning, contrary to expectations, that the positive impact of GDP per capita on education is basically the same in both democratic and right-wing regimes. Notice that such impact is statistically significant as indicated by the coefficient of INCOME. The hypothesis according to which the effect of economic development should be stronger in leftist dictatorships than in the rest of regimes is again confirmed by the data, although the real difference turns out smaller. As displayed in the output table, the remaining coefficients

[29] A graphical inspection of residuals from the last specification in Table 5.4 clearly shows a pattern of serial correlation. More formally, the Wooldridge test (Wooldridge 2002: 282-283) on these residuals cannot reject the null of no first-order autocorrelation (in Stata the implementation of this test is done with the command "xtserial").

[30] In practice, this method consists in transforming the data, with an estimate of the autocorrelation parameter, to eliminate serial correlation of the errors and then applying OLS to the transformed data.

[31] See Beck and Katz (1995) for a description of this entire statistical procedure.

[32] This estimate has been calculated using the option "tscorr" in Stata which corresponds to the time series autocorrelation calculation.

are unaffected by this time adjustment of the data.

A more appropriate strategy, proposed by Beck and Katz (1996; 2004), is to explicitly model the dynamics via the introduction of a lagged dependent variable in the right-hand side of the regression. This method can only be applied on stationary time series.[33] In the present analysis, however, several formal tests points to a non-stationary process in our school enrollment measure. As already stated, the coefficient on the lagged ENROLL variable in a simple autoregression is close to one (its point estimate is 0.95). Also, the Fisher test for panel unit roots cannot reject the null that all series of ENROLL are non-stationary (Prob>Chi2 =0.1021).[34]

In the presence of unit roots, we could alternatively treat the dynamics of the model using an error correction regression that separates short from long run impacts of the independent variables on Y_{it}. Yet I cannot implement this method since our data do not satisfy the assumption of cointegration on which the error correction model is based. A proof of the absence of cointegration is that the residuals from a regression of the dependent variable on all covariates exhibit a non-stationary pattern, as the Fisher test indicates (Prob>chi2 = 0.2002). To have an idea of the magnitude of this pattern, the autoregressive coefficient of residuals is 0.92 with a standard error of 0.007.

In the case of no-cointegrated data, the optimal dynamic model that we can fit to the data is a first-difference (FD) regression, which only accounts for short-run relationships (Beck and Katz 2004). This is a model in first-differences where the dependent variable, transformed as $\Delta Y_{it} = Y_{it} - Y_{i,t-1}$, is regressed on a first-differencing transformation of all explanatory factors, $\Delta X_{it} = X_{it} - X_{i,t-1}$. Such transformation has the immediate consequence of eliminating

[33] That is, when the stochastic process generating the time observations for each panel has constant mean and variance. A value near one on the lagged dependent variable coefficient indicates that the regressand is non-stationary or, in other words, the presence of unit roots in the data.

[34] For a description of this test, see Maddala and Wu (1999).

Table 5.5: Education and the Interaction Effect of Income and Institutions. Dynamic Linear Regression

	(1)	(2)	(3)
Method	FE AR(1)	FD AR(1)	FD Country-specific AR(1)
Dependent variable	ENROLL	D-ENROLL	D-ENROLL
LEFT	0.61	-0.07	-0.22
	(0.64)	(0.47)	(0.45)
RIGHT	0.38	-0.26	-0.22
	(0.65)	(0.38)	(0.36)
INCOME	0.36	-0.06	0.01
	(0.07)***	(0.11)	(0.10)
LEFT*INCOME	0.35	0.20	0.21
	(0.12)***	(0.11)*	(0.09)**
RIGHT*INCOME	-0.13	0.04	0.04
	(0.10)	(0.06)	(0.06)
PRIVATE	3.95	2.24	2.31
	(1.13)***	(0.95)**	(0.87)***
VOCATIONAL	4.71	3.84	3.41
	(0.55)***	(0.50)***	(0.48)***
RURAL	-0.84	-0.30	-0.29
	(0.03)***	(0.11)***	(0.11)**
TRADE	-0.01	-0.001	-0.002
	(0.01)	(0.004)	(0.004)
POP14	0.01	0.48	0.55
	(0.07)	(0.16)***	(0.17)***
Constant		0.51	0.53
		(0.07)***	(0.07)***
Rho	0.74	0.23	0.33
No. Observations	2646	2423	2423
No. Countries	123	122	122
Prob>Wald Chi2	0.000	0.000	0.000

Note: Panel-corrected standard errors in parentheses. INCOME refers to GDP per capita divided by 1000. Rho indicates the estimate of the residual autocorrelation parameter. *significant at 10%; **significant at 5%; ***significant at 1%.

the country effects. In addition, coefficients now measure to what extent changes in the covariates are associated with changes in the regressand.[35] Columns 2 and 3 of Table 5.5 present the results of applying this model to our last specification where all covariates are introduced. The results are corrected for any remaining autocorrelation left in the residuals assuming a common AR(1) process in all panels (column 2) or a different AR(1) pattern across countries (column 3).

Except for the proportion of the population aged under 14, the whole set of controls keeps their previous significance levels and their signs, although the magnitude of coefficients get reduced. Contrary to expectations, POP14 is positively related with education and its corresponding coefficient in the two models turns out significant. Acccording to the coefficiens of the two binary indicators of dictatorships, regimes do not make any difference at very low levels of economic development. Per capita income loses explanatory power in democratic institutions. It seems that, in the short-run, GDP per capita does not induce any change in enrollment rate in both democracies and right-wing dictatorships. Once again, and in line with theoretical expectations, the interaction term LEFT*INCOME is positive and significant. But the impact of economic prosperity in left-wing dictatorships (which is equal to the sum of coefficients associated to INCOME and LEFT*INCOME), is statistically significant (at 10%) only when the autocorrelation is assumed to be different across panels.[36]

[35] For a full description of the first-difference estimator in the context of panel data, see Wooldridge (2002).

[36] A similar result is obtained if the same model is estimated but without taking into account the serial correlation in the residuals.

Fractional logit regression models

In this section, I re-examine empirically the theoretical arguments through a model that assumes a logistic-type functional form (F) in equation (5.2). In earlier regressions, it was assumed that the relevant relationships between variables could be approximated by a linear function. One substantive implication of this assumption is that the determinants of education exert a constant effect throughout the domain of the function. However, as put forward in section 5.3.1, the working hypothesis points to a nonlinear association between economic development and human capital. Additionally, fitting a linear regression will not assure that predicted values satisfy the bounded nature of our dependent variable whose values are delimited between zero and 100%. Indeed, looking at the average effect in columns 2 and 3 of Table 5.4, it is pretty clear that with such a high constant term predicted values will likely exceed the upper limit of this interval.

A valid estimation strategy that takes care of these functional form-related issues is the fractional logit regression proposed by Papke and Wooldridge (1996). Briefly, this regression is a generalized linear model in which the expected value of any fractional response variable, rescaled to the interval [0,1],[37] could be modeled as

$$E(Y_{it}|\mathbf{X}) = G(\mathbf{X}\beta), \tag{5.4}$$

where $G(.)$, called the link function, is chosen to be the cumulative distribution of the logistic function and the dependent variable Y_{it} is assumed to be distributed Bernoulli. Thus

$$E(Y_{it}|\mathbf{X}) = \frac{\exp(\mathbf{X}\beta)}{[1+\exp(\mathbf{X}\beta)]}. \tag{5.5}$$

[37] In our case, we divide the enrollment rate, which is a fractional response variable, by 100 to normalize it to the unit interval.

This model always yields predicted values between 0 and 1 and ensures, in line with theoretical priors, that the effect of any covariate on $E(Y_{it}|\mathbf{X})$ decreases as $\mathbf{X}\beta \to \infty$. Equation 5.5 is estimated by quasi-likelihood methods.[38]

Table 5.6 displays the statistical results of fitting this model to our data considering two different specifications.[39] The first one reproduces the last estimated specification (see column 1). Before discussing these results in light of the main hypotheses, let us look at the effect of the control variables. As before, a higher proportion of rural population (RURAL) reduces the rate of school enrollment. Trade openness (TRADE) and the size of the population aged under 14 are (POP14), once again, irrelevant factors to understand the educational changes over time. Finally, the impact of PRIVATE and VOCATIONAL remain stable.

In regard to the more substantive hypotheses, the empirical findings seem to confirm the absence of significant educational disparities between democracies and right-wing dictatorships at any income level. Note that the estimated parameters on the additive term RIGHT and its interaction with GDP per capita are both statistically insignificant. The overall conclusion drawn from all interactive coefficients and the one on INCOME is that per capita income is positively associated with education in all regimes, but its effect is higher in left-wing dictatorships as expected.

[38]See Wooldridge (2002: 661-663) for a concise description of this method, and Papke and Wooldridge (1996) for a deeper analytical explanation and an application.

[39]Both specifications incorporate, however, country-fixed effects. As Greene has been argued (2000: 839), the introduction of country heterogeneity in a logistic regression does not entail major econometric problems. Standard errors in parenthesis are robust standard errors, corresponding to the valid estimates of the asymptotic variance of parameters discussed in Papke and Wooldridge (1996). These standard errors are estimated assuming that observations within groups (clusters) are non-independent. This adjusts the variance-covariance matrix of the estimators for the existing correlation between residuals of the same unit.

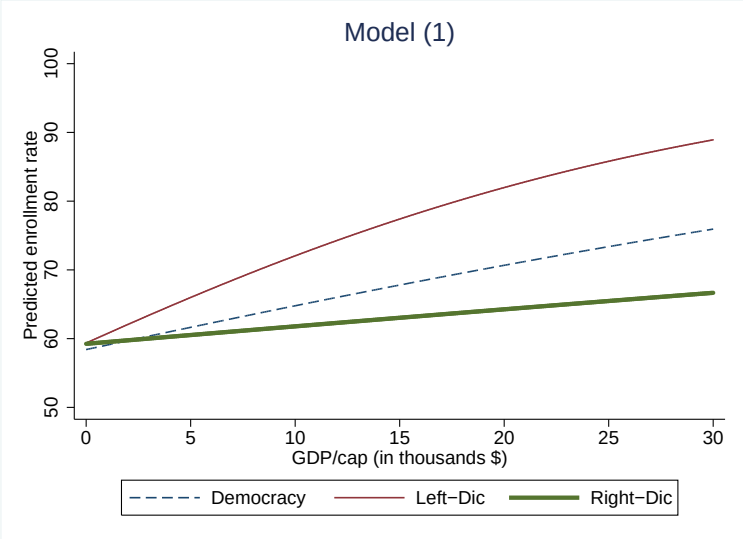
Table 5.6: Education and the Interaction Effect of Income and Institutions. Fractional Logit Regression

	(1) All regimes	(2) Only Dictatorships
Dependent variable	ENROLL	ENROLL
LEFT	0.04	
	(0.08)	
RIGHT	0.03	0.11
	(0.09)	(0.17)
INCOME	0.03	0.11
	(0.01)***	(0.05)**
LEFT*INCOME	0.03	
	(0.01)**	
RIGHT*INCOME	-0.02	-0.09
	(0.02)	(0.05)*
PRIVATE	0.42	0.36
	(0.21)**	(0.17)**
VOCATIONAL	0.27	0.11
	(0.11)**	(0.18)
RURAL	-0.04	-0.04
	(0.01)***	(0.01)***
TRADE	-0.001	-0.001
	(0.001)	(0.001)
POP14	0.003	0.02
	(0.01)	(0.02)
Average effect	1.39	1.13
No. Observations	2646	1296
No. Countries	123	81

Note: Robust cluster standard errors are reported in parentheses. The dependent variable, ENROLL, is rescaled to the interval [0,1] and INCOME refers to GDP per capita divided by 1000. Average effect is the average value of country-specific effects (intercepts). The reference group in model (2) is left-wing dictatorship. *significant at 10%; **significant at 5%; ***significant at 1%.

To clarify the size of these interaction effects, Figure 5.7 simulates the predicted enrollment rate as a function of per capita income in the three types of regimes, holding the rest of the variables at their means (PRIVATE and VOCATIONAL are set to 1, and the constant term to the average effect). In poor countries, political institutions do not differ in their educational records; all tend to have the same schooling levels. But as per capita income increases, left-wing dictatorial governments invest in human capital more than democratic or rightist dictatorial ones making their educational differences wider. Such differences, portrayed in Figure 5.7, become statistically significant when countries reach a per capita income level around 3000$ and stay significant thereafter. The divergent educational pattern of democracies and right-wing dictatorships graphed in the figure is not significant as already mentioned.

Figure 5.7: Predicted Values as a Function of GDP/cap by Political Regime



Yet these results are subjected to an important qualification. The differential impact of per capita income in democratic and leftist absolute regimes may be driven by the selection of regimes with respect to economic development. As stated above, the incidence of democracy varies positively with the wealth of nations. Since the effect of GPD per capita on enrollment is expected to wane as the economy grows, then the lower estimated effect in democratic institutions could be driven by the fact that they are usually observed in high-income levels whereas dictatorships in relatively poorer nations. This explanation does not invalidate, however, the empirical findings regarding the differences between left-wing and right-wing autocracies because the distribution of per capita income is similar in both types of dictatorship.

A more systematic comparison among dictatorial governments is made in column 2 of Table 5.6. This model replicates the previous one but excluding democratic political regimes.[40] Now the reference category corresponds to left-wing regimes, so the INCOME variable measures the impact of GDP per capita within these institutions. As seen in the table, the coefficients of this variable and the interaction term RIGHT* INCOME are statistically significant, which confirms the existence of different response patterns to economic development depending on the ideological orientation of dictators.

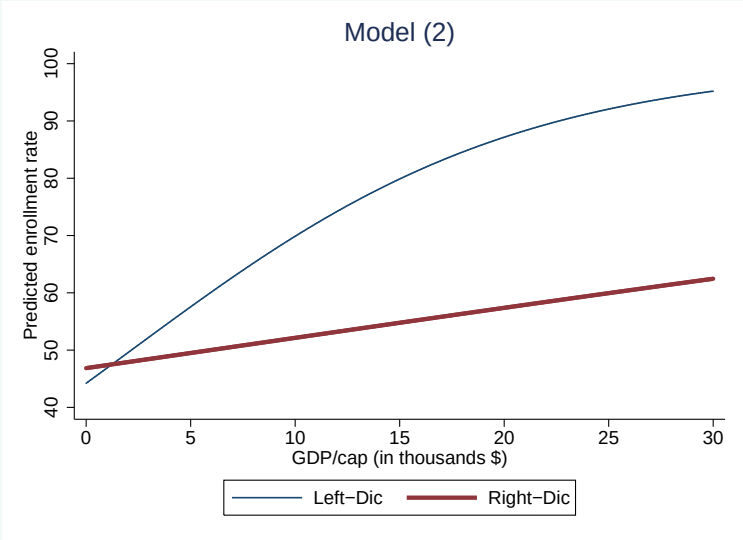
In Figure 5.8, we can see more clearly the substantive implications of these coefficients. This figure graphs the predicted values of enrollment as GDP per capita increases in the two type of dictatorships.[41] Rightist regimes seem to perform better when the

[40]To make the distribution of economic development more similar within each dictatorial group, I drop all observations from Singapore, a very rich left-wing dictatorship without a close enough rightist counterfactual to be compared with. Including this country to the analysis produces similar results.

[41]As in the previous simulation, the other continuous variables are hold at their means. PRIVATE and VOCATIONAL are set to 1, and the constant term to the average effect.

economy is poor, yet this difference is not significant. Consistent with hypotheses, the performance of leftist autocracies tend to be higher as the economy develops but this higher educational performance starts to be statistically significant from an income level around 5000$.

Figure 5.8: Predicted Values as a Function of GDP/cap by the Type of Dictatorship



To quantify the effect of per capita income in the two dictatorial categories, I use the coefficients in model (2) to compute the predicted change in enrollment when GDP per capita increases by 5000 dollars at different values of income. Table 5.7 shows these changes and their significance levels.[42] The first thing to be noted is that while populist dictators do respond to economic prosperity by increasing human capital, rightist ones do not expand educa-

[42]The other covariates are held constant at the same values as in the previous simulations.

tion as consequence of this prosperity. For instance, a change from 5000$ to 10000$ in the amount of resources per habitant of the economy induces an significant expansion in school enrollment rate of 12 percentage points in leftist autocracies, yet this same rise does not generate any significant change in education under right-wing dictatorships. In fact, all predicted educational increments are not significant in this type of dictatorship. Secondly, under left-wing autocracies, the effect of per capita income reduces in size at higher levels of income turning insignificant when the economy reaches an income value of around 20000$. This second finding therefore comes to prove the hypothesis that such effect wanes as the economy develops.

Table 5.7: The Size of the Per Capita Income's Effect on Education

ΔIncome=5000$	ΔE[ENROLL/Left]	ΔE[ENROLL/Right]
at 0	13	2.6
	(5.7)**	(4.5)
5000	12	2.6
	(3.9)***	(4.4)
10000	9.9	2.6
	(2.9)***	(4.3)
15000	7.2	2.6
	(3.4)**	(4.2)
20000	4.8	2.5
	(3.6)	(3.9)

Note: Other continuous variables are fixed at their mean values. PRIVATE and VOCATIONAL are set to 1, and the constant term to the average effect. Standard errors in parenthesis. *significant at 10%; **significant at 5%; ***significant at 1%.

5.3.5 Summary

The empirical evidence offered in this section can be summarized as follows. The effect of economic development on enrollment rates changes with the estimation method under democratic and right-wing dictatorships. Yet, consistent with the hypotheses, such effect is always positive and stronger under left-wing autocracies. This result is robust to the use of distinct econometric and specification models. In democracies, economic development increases educational outcomes except when applying first-difference statistical methods. With regard to rightist regimes, results are more volatile across the different estimation models. Either per capita income is not a relevant causal factor of education or, when it is, the relationship between these two variables resembles the pattern in democracies. In other words, when GDP per capita positively change enrollment rates under right-wing dictatorships (taking only within country variation), this association does not differ from the one predicted under democracies.

In line with the theoretical priors, the educational differences across political institutions vary as a function of economic development. This result questions the theory usually proposed in the literature that the democratic nature of institutions shapes directly the policies determining human capital. On the contrary, the present finding tend to corroborate a theory like the one provided in this thesis according to which institutions exert an indirect effect that changes with economic conditions.

In particular, the evidence shows that political regimes do not seem to have any impact in very poor countries. Although the hypothesis was that "wealth-biased" dictatorships should raise human capital accumulation more than their institutional counterparts, we can rationalize this finding with the idea that governments can do very little when there are few economic resources. At low levels of per capita income, governments may have organizational constraints to establish the basis of a comprehensive educational sys-

tem. As the economy develops, however, regimes make a difference. Consistent with the hypotheses, left-wing dictatorships appear to increase schooling enrollment at a greater rate than the other two types of political systems.

Finally, if we include the outlier observations dropped from the previous analyses, that is, Malawi from 1994 to 1996 and South Africa from 1990 to 1996, the results concerning right-wing dictatorships tend to vary. The main changes are: first, due to the Malawian cases, the binary indicator of these regimes (RIGHT) becomes negative and significant. Note that in Malawi, a very poor country, enrollment rates have reportedly increased from 56% to 80% in one year that coincides with a transition from a right-wing dictatorship to a democracy. Second, due to the observations of South Africa, the positive effect of per capita income becomes more stable in rightist autocracies and sometimes it is stronger than in democracies.

5.4 The Differential Impact of Inequality Across Institutions

The aim of this section is to test empirically the hypotheses developed in Chapter 3 that relate wealth inequality with educational outcomes of countries at different levels of economic development.[43] The relationship between these two variables, given average income, is argued to change with the type of political regime and the particular income groups affected by increases in inequality. The theoretical argument behind is based on two main points. The first one pursues the idea that the effect of inequality depends on the part of

[43]This analysis is confined to an empirical examination of the predictions obtained from the extensions of the last two models in Chapter 3. These predictions are summarized in Tables 3.7 and 3.9. Unless otherwise noted, these are the models that I refer to when talking about the formal models of Chapter 3.

the distribution in which the wealth dispersion occurs. It is not the overall configuration of income distribution what determines government's reactions to increased inequality but which social classes are impoverished or enriched as a consequence of an income spread.

To simplify the analysis, the formal models examined in Chapter 3 consider only three relevant income groups: the poor, the middle class and the rich. Given this division and to come out with clear predictions that can be compared across institutions, the comparative statics is restricted to inequality in three different locations of the distribution: an income spread between the middle class and the poor, a dispersion affecting the tails of the distribution (i.e. between the poor and the rich), and finally an increase in inequality between the middle and high-income individuals.

The second point states that political institutions will condition the ultimate impact of a dispersion within such income intervals, given a level of per capita income. The political decisions affecting education have redistributive consequences: either if policy consists of a broad redistribution program of income (as in Perotti 1993) or if the economic benefits of policies can be targeted to certain groups (as in Fernandez and Rogerson 1995), a collective decision over them implies a redistribution of resources among individuals with different economic positions. Consequently, individuals will sustain different policy preferences and it is precisely the existence of this conflict what makes political institutions a relevant factor. They serve as a resolution mechanism of conflict through which these divergent preferences are aggregated into public policies.

As it was argued in the theoretical chapters of this thesis, the democratic method of majority voting brings, as the winning proposal, the ideal point of the median voter -who belongs to the middle class. This occurs even in the case that political parties represent social groups and care about policy choices.[44] In the absence

[44]When parties are ideological, the result of policy convergence is obtained under two conditions (Roemer 2001): the dimension of the policy space must

of electoral constraints, parties are more prone to follow their own ideological agenda in the sense of responding to their constituencies' preferred redistributive programs. In dictatorial governments, leftist political parties observe mainly the interests of low-income individuals while right-wing ones tend to support the optimal policies of the rich.

Now income inequality may affect the degree of redistribution favored by economic classes. Since it may change optimal policies of income groups in opposite directions, and given the previous discussion, political institutions are expected to condition the impact of inequality on redistributive policy and educational outcomes. Let's consider, for instance, an increase in the economic distance between the rich and the middle class. Suppose that the collective decision to be taken is a proportional income tax to finance equal transfers to all individuals and that education generates positive externalities from educated to non-educated individuals -as in the Perotti's model. Focusing on rich countries, redistribution will promote education as the poor (the only social class that does not have enough income to pay the cost of education) would be able then to overcome the fixed costs of human capital investment. Such increase in inequality will make the middle class more willing to rise the level of taxation since they become poorer, and viceversa in the case of the rich. Thus we should observe that increased inequality in this part of the distribution is positively associated with education in democratic institutions and negatively related in right-wing dictatorships (see Section 3.2 of Chapter 3 for a more detailed argument behind this hypothesis).

The empirical analysis of this section focused on the predictions obtained from the extensions of the last two models of the formal

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be unidimensional (as in our formal models) and parties must have certainty about the behavior of voters (this is also satisfied in our case since the unique feature that determines voting is the economic positions of groups, which is known).

theoretical chapter. Although they have a similar setup, they differ in two important questions: the type of policy over which individuals have to make a collective decision and whether aggregate schooling have a positive side-effect on all individual incomes. Under some political and economic conditions (defined by the political regime and average income), these models derive opposite predictions concerning the association between inequality and education. Thus the empirical examination that follows will shed some light on which of these two models get to capture the political economy mechanisms relating redistributive politics and educational outcomes.

5.4.1 Data

Turning to the data used in the ensuing analysis, I first discuss inequality measures. The relevant indicator of the economic positions of classes is their wealth but since there are few countries with data on the distribution of wealth, I use that of income as a proxy. Income inequality can be assessed by different measures. The most popular one is the Gini coefficient, a compact index that provides information on the overall degree of inequality. Yet, as hypotheses refer to variations in the income received by groups, this indicator is of little use for the purposes at hand. The same change in the Gini coefficient could hide different movements between the income shares of groups. Deininger & Squire (1996: 4) put it very clear, for instance, "a redistribution from the top to the middle class may be associated with the same change in the Gini index as an increase in the share of the income received by the bottom quintile at the expense of the middle class." Therefore, this measure does not serve us to answer our research question on whether inequality in different locations of the income distribution has a differential impact on education.

To gauge income spreads between several groups, I employ ratios of quintiles representing the poor, the middle class and the rich. More concretely, from data on income-shares by quintiles,

I first obtain the share of these classes -denoted by P, M and R respectively. For the poor, I combine the shares of the first and second quintiles (P) -which corresponds to poorest 40% of the population. For the middle class, I use the combined share of the third and fourth quintiles (M), and the richest one (5th quintile) proxies for the share of the rich (R). Once these shares has been created, then I use the ratio of P to M as a measure of the income equality between the middle class and the poor, the ratio of the two poorest quintiles (P) to the top quintile as an index of equality between the poor and the rich, and likewise for the allocation of income between middle and high-income individuals.

Data on quintile shares are drawn from Deininger and Squire' dataset (D&S 1996), updated in the World Income Inequality Database (WIID V2.0a, June 2005) by the United Nations University-World Institute for Development Economics Research (UNU-WIDER). It is the most comprehensive international dataset covering developed and developing countries. Yet it has some limitations. Its main problem, actually common to most global inequality data, is the variation in the definition of inequality-related measurement concepts that hinders comparability between countries and years (Atkinson and Brandolini 2001). Country-year figures can vary in several dimensions like data coverage -whether they have a nationwide or an urban/rural coverage-, the unit of analysis -households or individuals-, the measure of individual economic positions -whether income or expenditure- or, if based on income, whether it is measured gross or net of taxes. To ensure comparability among observations and thus reduce potential measurement errors, I select only those observations based on similar concepts. Concretely, I pick only data that refer to gross income (because our theoretical hypotheses are concerned with the pre-tax income distribution) and have national coverage.[45] Regarding the unit of analysis, both

[45]The exception to national coverage is Israel which is based upon urban coverage. However, this is a minor measurement problem since much of Israel

household and individual based cases are included in the estimation process in view of the fact that this dimension does not seem to generate significant differences in inequality data as to introduce a systematic bias in statistical results (D&S 1996: 11; Easterly 2006).

After making this adjustment on data, the total number of cases available to the analysis is reduced to 440. They covers 94 countries with an mean of 5 time observations per unit within the period 1960-1996. It is an unbalanced panel and there are several countries with only one observation. Given the time limitation of the data, and the fact that inequality is very persistent over time (D&S 1996; Moene and Wallerstein 2003), the empirical work of this section will also exploit variation across countries to estimate the relevant relationships. To have a sense of this data, Table 5.8 shows the mean and the standard deviation of each ratio of groups' income shares previously discussed. As seen in the table, the share of the poorest 40% of the population represents, on average, 43 percent of the income share of the middle class (2nd and 3rd quintiles) and 39 percent of that of the richest quintile. The average degree of equality between the middle class and the rich is much higher: middle-income groups tend to hold 86 percent of the income share received by the richest group in the economy.

Table 5.8: Summary Statistics on Income Inequality

	Mean	Standard Deviation	Cases
P/M	43.25	12.03	440
M/R	86.13	29.28	440
P/R	39.45	20.35	440

As for the dependent variable, I use data on gross school enroll-

is urban and thus this data could be used as a good approximation to national coverage.

ment in secondary (ENROLSEC)[46] from the *World Development Indicators 2000* (World Bank 2000). It is an unbalanced panel covering 169 countries from 1960 to 1996. For each country, there are 21 possible observations drawn from the years 1960, '65, '70, '75, '80-96, but the average time length of panels is about 16 years.

The advantage of using this new variable, despite the fact that it has fewer observations than the one of the previous analysis (ENROLL), is that we can make reliable comparisons between countries. The variable ENROLL that I have constructed combining primary and secondary educational levels suffers a problem of consistency across nations since the population data collected to create enrollment rates are based on definitions that varies among countries.[47] It cannot be used therefore in the subsequent estimation models that draw on both cross-sectional and over time variation. On the contrary, the secondary enrollment data from the World Bank are adjusted to ensure comparability and the fact that it has a shorter time span constitutes a minor problem now since, in any case, the inequality variables shrinks drastically the data overlap.

The reasons for studying secondary education instead of primary are, first, the greater existing variation of the former: primary education is compulsory in almost all countries and easier to enforce. In fact, from the beginning of the period educational outcomes of countries have been relatively high and similar. The educational performance regarding secondary level shows much larger

[46]The definition of this variable is total enrollment at secondary educational level, regardless of age, divided by the population of the age group that officially corresponds to that level of education. As this variable is a gross ratio, it may exceed 100% if individuals outside the age cohort corresponding to secondary are enrolled in that educational level.

[47]The most important dimension affecting data consistency is whether figures refer to *de jure* or *de facto* population. National differences with respect to this definitional issue affect cross-sectional variation and thus they may introduce a source of potential bias in regressions exploiting cross-country changes. Note that this was no a problem in the earlier analysis because it uses only time variation within countries.

national differences. For instance, in 1990 the mean value of the secondary enrollment rate is 52 with a standard deviation of 31.5 ranging from a minimum of 4.9 (Tanzania) to a maximum of 119.5 (Netherlands). Looking at all cross sections, the range of the variable usually goes from less than 6 percent to more than 80 percent. The second reason is that the cost of education, either as a direct or as an opportunity cost (foregone income), is likely higher in the case of secondary education. Remember that a crucial assumption of theoretical models is that this cost must be a binding economic constraint on educational choices of individuals.

Regarding independent variables other than inequality, most of them like average income, trade openness or some measures on the demographic composition of the population has already been described. Some new control variables, included in the subsequent regressions, are time-invariant and try to grasp some systematic influences in education from specific characteristics of countries. Unlike the empirical analyses of the earlier section, the following regressions use country differences to identify the impact of causes owing to the time limits of inequality data series. Thus we need to hold constant those national traits that could be simultaneously affecting education and other covariates.

As shown below, the most influential one turns out to be the dominant religion in the society and, in particular, the percentage of Moslems in the population. The intuition behind the connection of this religion to the educational patterns of countries is that the prevalence of the Moslem religion may be positively associated with the degree of social discrimination against women. And it is reasonable to think then that those societies where women have less social opportunities tend to under-educate them. As the dependent variable refers to total enrollment (including both male and female data), controlling for factors that determine the intensity of the gender gap in a society will be crucial so that to produce net estimates on the redistributive dynamics concerning social classes.

5.4.2 Estimation and Results

The estimation process, aimed to test the hypotheses summarized in Tables 3.7 and 3.9 of the formal chapter, is divided in three parts. Each of them deals with the effect of inequality within each of the three proposed locations of the distribution. I first focus on the inequality between the middle class and the poor, then on the economic gap between middle and high income individuals, and finally I examine the educational consequences of an increase in the ratio of the poor' share to that of the wealthy. The econometric strategy employed to test how the impact of inequality changes with average income and political institutions is the same for the three cases.

This strategy consists of estimating the interaction between inequality and GDP per capita for each political regime at a time.[48] Given a particular institutional framework, I examine how governments' educational responses to increased inequality vary with economic development. It has been abandoned the alternative of a higher-order interaction model -where binary indicators for institutions are interacted with income and inequality simultaneously-, for several reasons. Apart from the greater complexity in the interpretation of coefficients, this model would produce less reliable estimates as the multicollinearity problem often present in interactive equations becomes more severe with the number of the interaction terms. Note that the estimated equation must contain the entire set of lower-order terms (Braumoeller 2004; Brambor *et al.* 2006), the cardinality of which increases more than exponentially with the number of variables we want to interact. Thus a model in which the two dummy indicators for left-wing and right-wing dictatorships are interacted with GDP per capita and income inequality will contain at least 11 terms. When inequality refers to

[48] Recall that the predictions derived from the formal models were different for poor and rich economies.

the distance between the income shares of the poor and the middle class, for instance, the high degree of multicollinearity (there are five simple correlations between independent variables above 0.90) makes almost impossible the task of separating net effects.

In more formal terms, it is assumed that for each political regime I, secondary school enrollment Y in country i and year t is determined by

$$Y_{it}^{I} = F^{I}(\theta \mathbf{X}_{it}) + \epsilon_{it}^{I}, \qquad I = D, L, R \tag{5.6}$$

where X represents the vector of covariates, θ the set of parameters to be estimated, and $F(.)$ is a function determining the shape of the relationship between secondary education and independent variables. The stochastic part of the equation is captured by the error term ϵ. Finally, I denotes the three types of institutions, that is, democracy (D) left-wing (L) and right-wing (R) dictatorships. Expanding the argument of F so that to account for the interactive effect between per capita income and economic equality, we have

$$Y_{it}^{I} = F^{I}(\alpha + \beta_1 E_{it} + \beta_2 W_{it} + \beta_3 E_{it} * W_{it} + \gamma \mathbf{Z}_{it}) + \epsilon_{it}^{I}. \quad I = D, L, R. \tag{5.7}$$

E indicates the equality ratio: P/M, M/R or P/R. W represents per capita income and $\mathbf{Z}$ a vector of control variables. Disturbances are assumed to be identical in all regimes so that $\epsilon_{it}^{D} = \epsilon_{it}^{L} = \epsilon_{it}^{R} = \epsilon_{it}$.

The interpretation of the β's coefficients is not straightforward. β_1 measures the impact of an increase in the equality ratio in question when $W = 0$, while β_2 tells us how economic prosperity influences education when $E = 0$. As there are no cases with a zero value in either of these two factors, β_1 and β_2 have no substantive interest whatsoever by their own. In order to come out with sound inferences, these coefficients have to be considered in conjunction with β_3 -the parameter on the interaction term $E * W$-, which evaluates the effect of the combination of E and W. If our

aim is to understand the relationship between equality and education, then β_3 tell us how this relationship changes with economic development. For a given value of per capita income, the overall impact of an increase in equality will be $\beta_1 + \beta_3 W$.

Equation 5.7 is estimated by a fractional logit regression, which was described in section 5.3.4. This statistical model assumes that F is the cumulative distribution of the logistic function, ensuring that predicted values lay in the interval [0,1]. Although our dependent variable (ENROLSEC) could take values above 100% since it is gross enrollment, it is still bounded: it certainly has a lower limit of zero but it also has an inherent upper limit as enrollment cannot take infinite positive values. Such delimited nature of the response variable casts doubt on working with linear regression models in which nothing prevents from obtaining negative predicted values or unrealistic positive ones. Therefore, in order to take care of these functional-related issues, I use a fractional logit regression. The estimated equation for expected enrollment becomes then

$$E(Y_{it}|\mathbf{X}) = \frac{\exp(\alpha + \beta_1 E_{it} + \beta_2 W_{it} + \beta_3 E_{it} * W_{it} + \gamma \mathbf{Z}_{it})}{[1 + \exp(\alpha + \beta_1 E_{it} + \beta_2 W_{it} + \beta_3 E_{it} * W_{it} + \gamma \mathbf{Z}_{it})]}. \tag{5.8}$$

This equation is estimated for each political regime at time. A theoretical appealing feature of this econometric model is that the influence of covariates on the expected enrollment rate decreases as the argument of the function tends to infinity. For our relationship of interest, this means that the degree of inequality could be an irrelevant cause of education in very rich economies. Even if economic equality exerts different pressures on human capital depending on the level of prosperity in the economy, eventually it may become an inconsequential factor as per capita income approaches relatively extreme positive values. In this situation, all income groups may be able to afford education by their own.

As a methodological note, in all the following regression analy-

ses, the variance-covariance matrix of the parameters is estimated assuming that observations within countries are non-independent. This adjustment does not affect the estimated coefficients. It only corrects standard errors for a possible correlation among residuals of the same country. A final comment deals with the dependent variable. As stated before, gross school enrollment may be greater than 100%. In our case, there are in fact few observations with education data well above 100. But as the fractional logit regression requires a dependent variable within the unit interval, I assign a value of 100 to all observations with enrollment above this limit.[49]

Inequality between the middle class and the poor

Before proceeding to the discussion of the statistical results, we must know first the distribution of covariates within political regimes. This is important to know since the fact that some factors may distribute differently within institutions could impair institutional comparisons. In addition, this information helps us to determine the extent to which the statistical inferences depend on the chosen specefication model fitting to the data. Table 5.9 provides some basic summary statistics by political regime for the variables included in the subsequent regression analysis, taking only the data overlap into account.[50] In the first two rows, the mean and standard deviation of the more substantive variables are displayed. The distribution of equality between the middle class and the poor, measured by the ratio of their income shares (P/M), appears to be more or less the same across political regimes. Its average value is between 40 and 48 percent in the three types of institutions, although right-wing dictatorships show a higher degree of disper-

[49]These observations are Canada (1987-88, 1990-91), Austria 1987, Belgium (1985, '88 and '92), Bulgaria (1985-86), Denmark (1981, '87 and '92), Finland (1987 and '91), Netherlands (1983, '87 and '91), Norway 1991, Sweden 1992 and Estonia 1995. Except Bulgaria, the rest are democratic countries.

[50]For a definition of the variables, see Appendix B.

sion (17.13 as opposed to 10.43 and 13.24 for democracy and left-wing autocracies respectively). In contrast, the distribution of per capita income (INCOME) varies quite a lot between democratic and non-democratic institutions: while in the former the mean of GDP per capita is almost 12000$ (with a standard deviation of 7.17 thousands dollars), it is 4528$ and 3828$ in leftist and rightist autocracies respectively. Their corresponding standard deviations are 3.38 and 2.14 thousands dollars. Since it is crucial the sort of discrete separation between rich and poor economies for our empirical question concerning the income-conditional effect of inequality, we must keep in mind that those estimations based on democratic countries may refer for the most part to wealthy economies. Note that these numbers comprise only the cases that have information for all variables under study.

Table 5.9: Summary Statistics (P/M)

	Mean			Std. Deviation		
	D	L	R	D	L	R
INCOME	11.95	4.53	3.83	7.17	3.38	2.14
P/M	42.09	47.87	44.19	10.43	13.24	17.13
SRICH	45.89	43.92	52.68	10.25	13.54	11.29
MOSLEM	0.03	0.12	0.38	0.14	0.25	0.41
CATH	0.39	0.30	0.19	0.36	0.41	0.36
TRADE	59.63	65.54	70.34	32.97	81.12	40.65
Cases	152	47	36			

Note: INCOME is GDP per capita in thousands dollars.

The time-invariant controls seem to have a more similar distribution within democracies and populist regimes compared to that in right-wing dictatorships. An interesting pattern emerges from the table: whereas in the latter the Moslem religion is more prevalent than the Catholic one, the opposite occurs in the former po-

litical regimes. The mean proportion of Moslems in the population (MOSLEM) is much higher in rightist autocracies (0.38), but also is its standard deviation (0.41). The average percentage of Catholics is, however, lower in this type of regime (19%) than in democracies (39%) and left-wing dictatorships (30%). Regarding the income share of the rich (SRICH),[51] we see that while its variance is similar across regimes, "wealth-biased" regimes show on average a higher share. The top quintile of the income distribution tends to hold almost 53% of the total income when dictatorial governments are ideologically to the right, 44% when they have a leftist ideological orientation and 46% under democratically elected governments. Political regimes seem to differ also in the degree of trade openness (TRADE). The higher mean level of openness in leftist autocracies in comparison to democracies is driven by one single country, Singapore (observed only in 1980 and 1988). If this country is removed from the sample, the mean and the standard deviation of TRADE decline to 49.84 and 30.66 respectively.[52] Then populist dictatorships become on average the least opened economies to international trade. Their rightist counterparts, in contrast, have the highest mean value of the sample but also more variation.

Table 5.10 presents the regression results for two different specifications. In the baseline specification, model (1), GDP per capita, the ratio of the poor' income share to the one of the middle class, and their interaction are included to grasp the changing effect of inequality as a function of economic development. Additional controls are introduced. A key one is the share of the rich. The rationale for including this variable is that we need to keep the income share of the rich constant so that changes in P/M reflect actually movements between low and middle income individuals. Otherwise a variation in P/M could be as well the result of a transfer of re-

[51] The reason for including this as a control will be given below.

[52] Yet the summary information for the rest of variables, including per capita income, is practically the same.

sources between the upper class and any of the other groups. As a consequence, we could not ultimately identify which class gets richer and at the expense of what group. This is crucial since the theoretical mechanisms behind the predictions of the models involve income movements between specific groups.

The other controls are the proportion of Moslems and Catholics in the population, and decade dummies. The time-invariant religion variables are included to grasp possible influences of cultural factors on education. They could also affect the rate of female enrollment in formal schooling. For instance, one recurrent fact in the Arab countries is that gender differences in the access to education are quite large compared to other regions of the world (UNESCO 2005). On the other hand, decade dummies are introduced to account for the temporal changes in enrollment. Since the estimated regressions exploit both cross-sectional and over-time variation, and as the mean of secondary school enrollment exhibits an upward trend, it is necessary to add some time controls for these secular increases. Hence the inclusion of decade dummies, which basically control for the possibility that observations from more recent decades may have higher values in the dependent variable.[53]

As we can see in Columns 2-4 of Table 5.10, the coefficients on the religion-related factors are all negative, but only for the case of MOSLEM they reach the thresholds of statistical significance in all political regimes. The results suggest therefore that the proportion of Moslems in the population has a negative impact on education. The percentage of Catholics is also negatively associated with enrollment but its coefficient is only significant (at 10%) in rightist dictatorships. The income share of the top quintile decreases secondary education in democratic countries and it has a insignificant influence under non-democratic institutions. Turning to the key variables of interest, the interaction term (P/M)*INCOME is associated with a higher level of education when its coefficient is signifi-

[53]To save space, these decade dummies are not reported in the output tables.

cant -that is, in dictatorial institutions. The lower-order coefficient on per capita income is significant in democracies and left-wing dictatorships: but while it is positive in the former, the sign of the coefficient is negative in the latter. Yet these quantities do not have any substantive interest by their own since, as stated before, they refer to unrealistic scenarios where income equality is equal to zero.

In the next specification of the model (Columns 5-7), I add trade openness as an additional regressor. In the regression for rightist dictatorships, the results are similar but trade integration itself is not significant. The inclusion of this variable in the regression of leftist autocracies makes the coefficient on average income lose its significance level. The rest of covariates do not practically change and trade openness seems to significantly reduce enrollment rates. Regarding the regression results for democracies, several of them vary with this new specification: income equality becomes positive and significant, whereas the control variables MOSLEM and SRICH turn out not to be statistically different from zero. Looking at the coefficient on TRADE, more opened economies appear to have a positive impact on education as expected.

From the estimated parameters in the output table, we cannot know whether our more substantive hypotheses are confirmed. To test them and as this is an interactive model, it is necessary to calculate some quantities of interest and their standard errors -considering both the lower-order and the interaction terms (Braumoeller 2004; Brambor *et al.* 2006). In order to see across regimes the effect of a more equal distribution of income between the middle class and the poor conditional on economic development, Figures 5.9-5.11 clarify the substantive implications of the last specification estimates.[54] For each type of political system, they illustrate graphically how the impact of equality varies across the range of

[54]The figures have been constructed following the procedure explained in Brambor *et al.* (2006). For a more detailed explanation, see the web site http://homepages.nyu.edu/~mrg217/interaction.html

Table 5.10: Education and Income Inequality between the Middle Class and the Poor. Fractional Logit Estimates

	(1)			(2)		
	D	L	R	D	L	R
Dependent variable		ENROLSEC			ENROLSEC	
INCOME	0.177	-0.403	-0.108	0.238	-0.243	-0.092
	(0.084)**	(0.185)**	(0.119)	(0.072)***	(0.165)	(0.116)
P/M	0.029	-0.018	-0.000	0.038	-0.015	-0.001
	(0.020)	(0.034)	(0.012)	(0.022)*	(0.040)	(0.012)
(P/M)*INCOME	-0.001	0.011	0.007	-0.002	0.010	0.007
	(0.002)	(0.003)***	(0.003)**	(0.002)	(0.004)***	(0.003)**
SRICH	-0.029	-0.005	0.004	-0.016	0.004	0.009
	(0.014)**	(0.027)	(0.012)	(0.017)	(0.028)	(0.013)
MOSLEM	-1.150	-1.276	-1.837	-0.727	-1.045	-1.833
	(0.515)**	(0.679)*	(0.372)***	(0.485)	(0.571)*	(0.372)***
CATH	-0.134	-0.034	-0.694	0.118	-0.441	-0.793
	(0.312)	(0.349)	(0.403)*	(0.324)	(0.283)	(0.455)*
TRADE				0.010	-0.005	-0.003
				(0.003)***	(0.001)***	(0.003)
Constant	-0.701	-1.905	-1.544	-2.128	-2.600	-1.730
	(1.431)	(2.756)	(1.016)	(1.748)	(3.157)	(1.000)*
No. Observations	152	48	36	152	47	36

Note: Robust cluster standard errors are reported in parentheses. The dependent variable (ENROLSEC) is rescaled to the interval [0,1]. INCOME refers to GDP per capita divided by 1000. To save space, decade dummies are not shown. *significant at 10%; **significant at 5%; ***significant at 1%.

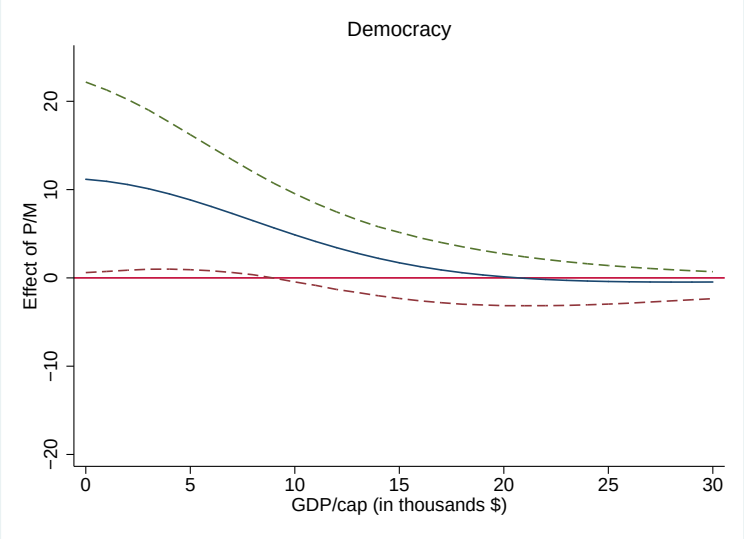
average income and whether such impact is significant. In each figure, the solid line indicates the change in education-predicted values when the ratio P/M is at its mean and increases by one standard deviation, keeping the other covariates constant at their mean values and setting the decade dummy for the 80's at 1.[55] In addition, a 90% confidence interval -denoted by the dash lines- has been drawn to grasp the degree of uncertainty around the estimated difference. When the upper and lower limits of the confidence interval are both above or below the zero line in the vertical axis, then the shown impact of equality on secondary enrollment rates is statistically significant.

Figure 5.9 shows this simulation for the case of democracy. A smaller dispersion of income between the middle class and the poor seems to have a positive influence on education in relative low-income countries. At 5000$, for instance, raising the ratio P/M by 12.4 percentage points would produce an increase in enrollment of almost ten percentage points, which implies a 13.5% increase relative to the average enrollment of the sample used in the last regression for the democratic cases (73). Yet such effect is slightly above the significance threshold for a 90% confidence interval. The magnitude of this increase reduces, however, with per capita income. When countries reach a economic level near 10 thousands dollars, income equality becomes an insignificant factor of education.

In leftist dictatorships (see Figure 5.10), increased equality between low and middle income groups does not have any impact in early stages of development. As GDP per capita rises, equality begins to be positively associated with enrollment but then the strength of this relationship diminishes steadily with the wealth of the economy. The figure suggests therefore that it is from middle

[55]The average value of P/M and its standard deviation are the ones of the pooling sample of all political regimes, that is, 43.40 and 12.38 respectively. Likewise, the means of the other variables correspond to this pooling sample.

Figure 5.9: The Effect of P/M at Different Values of Average Income (Democratic Institutions)



intervals of average income when the degree of equality may affect significantly the proportion of young people receiving secondary education.

Figure 5.10: The Effect of P/M at Different Values of Average Income (Leftist Dictatorships)

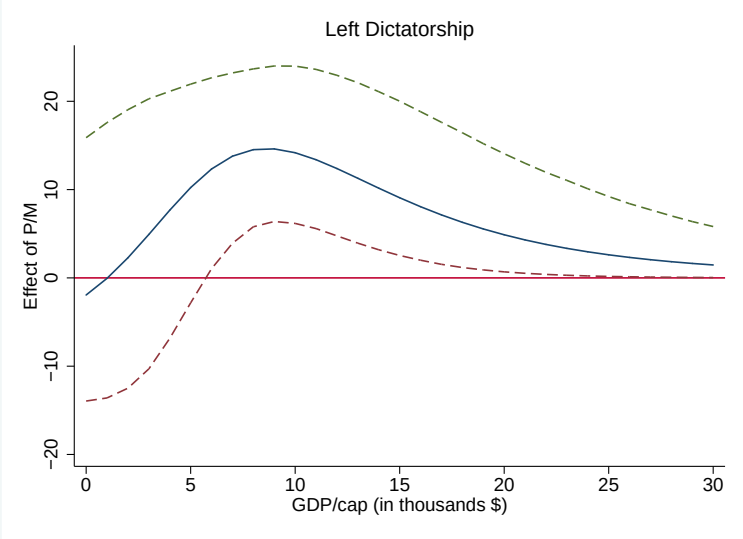
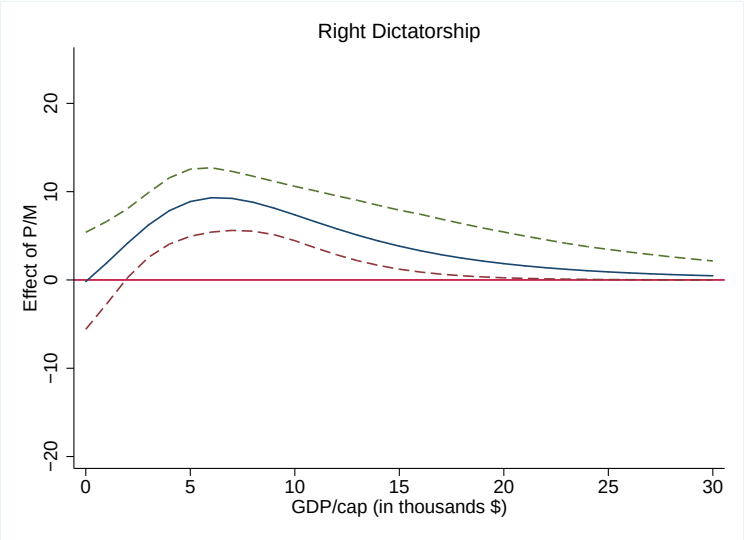


Figure 5.11 reproduces the same simulation for right-wing dictatorships. At low levels of GDP per capita, changes in the configuration of the income distribution between the middle class and the poor do not seem to have any consequence in the dependent variable. But, as in the case of leftist dictatorships, an increase in the share of the income received by the bottom two quintiles -at the expense of the middle class- starts to have a significant effect on enrollment when the economy approaches a per capita income close to 3000$. According to these estimates, its greatest effect occurs at a level of economic development near 7 thousands dollars: here a change in the ratio of P/M from 43.4 to 55.78 percentage points

expands secondary schooling by more than 9 percentage points. In relation to the mean enrollment in the sample of right-wing dictatorship used for estimation (46), this implies a nearly 20% increase -which is statistically significant even for a 95% confidence interval. Once again, as the economy continues to grow, the impact of equality reduces steadily.

Figure 5.11: The Effect of P/M at Different Values of Average Income (Rightist Dictatorships)



Before interpreting these results in light of theoretical models, two central caveats need to be made. The first one deals with the estimates instability in the regression for the sample of left-wing autocracies owing to outlier observations. Dropping the two observations of Singapore (1980 and 1988), mentioned before, makes all variables of interest insignificant. The empirical relationship portrayed in Figure 5.10 is driven thus by these two outliers. Income equality, therefore, does not appear to be systematically related

with education at any level of per capita income. The only two covariates that retain their significance levels are MOSLEM and TRADE but the coefficient on the latter shifts its sign, suggesting a positive impact of trade openness on school enrollment. There is also another limitation of the data that questions our inferences from the democracies-based regressions. The strong correlation between the incidence of democracy and economic development, as documented in Table 5.9, may imply that the estimates concerning this type of regime refer mostly to wealthy economies. The lack of sufficient democratic cases with low values of per capita income hampers the reliability of inferences we could make for such income intervals. At the very least, this calls for some prudence when it comes to making any causal claim on the relationship between equality and education in poor democratic countries. On the other hand, we could interpret these findings as an account of what actually happens in relative wealthier economies. Although the above simulations have been done for the entire range of GDP per capita, the fact that the sample of democracies comprises mainly developed countries, any significant association found in the data could solely apply to observations at such stages of economic development.

How does the evidence presented so far fit to the empirical implications of theoretical models? To what extent do previous findings discriminate between the two models? Taking the above qualifications into consideration, the regression results regarding democratic institutions could be read as supportive evidence of both models. If the significantly positive association between education and equality, portrayed in Figure 5.9, is actually describing what occurs in relative high-income countries, then this is consistent with the predictions of both models (see Table 3.7). Basically, the common idea that leads them to the same prediction is that a less dispersion in this part of the distribution increases the middle class's demands for redistribution since they are poorer.[56] In turn, redistribution

[56]See Section 3.4.1 for a more elaborate description of the mechanisms in-

will enhance enrollment by helping the least affluent groups to pay the fixed cost of education.

The insignificant effect of inequality in left-wing dictatorships -when Singapore is removed from the analysis- seems to go more in line with the setup of Fernandez and Rogerson (F&R). In wealthy countries, both models predict that populist dictators will enact at least the required redistributive policy for low-income agents to invest in human capital. So inequality is not expected to shape the proportion of people obtaining formal schooling, which seems to be confirmed by our data. In developing countries, according to Perotti's model, the cost to the poor of limiting the size of redistribution so that the well-off individuals can undertake their investments decreases with the economic position of the poor. Due to the existence of educational externalities, they should be more willing to restrict the degree of redistribution as their income share rises, suggesting a positive impact of an increase in P/M on education (see Table 3.9). However, it could be the case that in our sample there is no a sufficient number of leftist dictatorships with initial conditions above the equality threshold from which the poor find it in fact profitable to promote human capital (and thus future growth) at the expense of present consumption. If that is actually the case, then the finding that equality (P/M) is an irrelevant factor to explain human capital across average income could not be interpreted as against the setup of Perotti.

The results with respect to right-wing dictatorships are broadly supportive of Perotti's model and contradict some implications that arise from the framework of F&R. In line with the former, note that rightist dictatorial governments do not have any education-related reason for raising the burden of taxation in a poor economy. In turn, since P/M does not entail the share of the rich, any variation in this ratio should not influence enrollment as corroborated by the data. But as the economy develops, increased equality in this part

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volved.

of the distribution should foster human capital investment, which is assumed to create positive externalities. On the one hand, as long as there are enough resources in the economy to permit all groups acquire education, public redistribution will lessen the economic constraints the poor face in their investment in human capital. On the other hand, the incentives of the rich to subsidize the education of the poor are higher when the income gap between the lower and the middle class is reduced because the size of the transfer the poor need to afford education diminishes. In contrast, considering the setup of F&R, the prediction is that inequality should not affect enrollment in wealthy rightist dictatorships given that the proportion of educated people in the population is assumed to generate no social return. Therefore, the empirical pattern shown in Figure 5.11 is apparently more consistent with the Perotti's setup. In addition, it corroborates the existence of a positive externality from education or, at least, that politicians believe in its existence when taking their decisions over redistributive policies determining human capital accumulation. This claim, however, is subject to the usual caution about the few number of dictatorial cases used in the regression analysis.

Inequality between the middle class and the rich

In this section, I examine whether inequality between the middle class and the rich has any bearing on secondary school enrollment, given political institutions and average income, and whether this relationship differ from the earlier empirical patterns observed for the case of inequality between the two poorest groups in the society. The estimation strategy used to test the hypotheses is similar to the one pursued in the previous section. Based on a fractional logit regression, two different specifications are estimated: our baseline model (1) and the specification (2) containing trade openness as an additional regressor. The relevant equality ratio now is M/R and, in order for this measure to grasp real movements between

high and middle income groups, I control for the share of the poor (SPOOR). The rest of covariates are the same.

The summary information about the set of controls is as in Table 5.9. With respect to the new covariates M/R and SPOOR, some interesting differences emerge across political regimes. As indicated in Table 5.11, both the average portion of income held by the bottom 40% of the population and the mean share of the middle class relative to that of the top quintile are lower in "wealth-biased" dictatorships than in the other institutional frameworks. Under those absolute regimes ideologically oriented more to the right, the middle 40% of the distribution retains, in average, almost 67% of the wealthiest group's income. This mean ratio goes up to 86% and 96% in democratic and leftist institutions respectively. The institutional differences concerning the economic position of the poor are smaller but note that in populist dictatorships, as one may expect, the poor are better off holding a mean share of almost 19%.

Table 5.11: Summary Statistics (M/R)

	Mean			Std. Deviation		
	D	L	R	D	L	R
M/R	86.13	95.84	66.69	29.28	35.84	24.25
SPOOR	16.35	18.63	14.75	5.67	7.01	6.39
Cases	152	47	36			

Table 5.12 presents the regression results for the two specifications. Looking first at the coefficient on the control variables, we see that the negative impact of MOSLEM is robust only in rightist autocracies. After introducing trade openness, the proportion of Moslems in the population reduces significantly enrollment rates in this type of regime but not in the others. The coefficient on CATH

is insignificant across specifications and political regimes. It seems then that the percentage of Catholics in the society is a factor that does not contribute to understand the observed national differences in human capital. Trade liberalization is positively associated with education in democracies. And, as before, its apparently negative impact in leftist regimes is driven by the two outlier observations corresponding to Singapore. In fact, if this country is taken away from the analysis, the coefficient on TRADE becomes significantly positive. Finally, the income share of the poor appears to significantly foster secondary enrollment only in democracies.

If, as stated before, the estimates for democratic regimes refer for the most part to wealthy countries, then the finding according to which the economic position of low-income individuals is positively connected to human capital in democracies is more consistent with the predictions derived from Perotti's model. Given the existence of positive externalities derived from human capital, the decisive median voter in democratic nations is more prone to subsidize the education of the poor as they are better off. The reason is that they will need a smaller transfer in order to undertake their investments. Note that in the framework of F&R, the economic position of low-income groups does not shape the redistributive policy preferences of the middle class. Whether middle-income individuals may want to impose a greater redistribution package -that would help the poor to pay the fixed cost of schooling- depends only on their relative location to the mean income.[57]

Regarding the more substantive hypotheses, income equality does not seem to affect secondary education in the samples of democracies and left-wing dictatorships. In contrast, the coefficients on M/R and its interaction with GDP per capita are significant in the regression of right-wing dictatorships. To grasp better the implications of this interaction, Figure 5.12 simulates the differences in predicted values when the ratio M/R is at its mean

[57]See Section 3.3.2 for a formal proof of this statement.

Table 5.12: Education and Income Inequality between the Middle Class and the Rich. Fractional Logit Estimates

	(1)			(2)		
	D	L	R	D	L	R
Dependent variable		ENROLSEC			ENROLSEC	
INCOME	0.146	-0.036	-0.016	0.191	0.119	0.002
	(0.069)**	(0.144)	(0.118)	(0.059)***	(0.208)	(0.114)
M/R	-0.006	-0.006	-0.016	-0.007	-0.008	-0.017
	(0.012)	(0.015)	(0.009)*	(0.012)	(0.015)	(0.009)*
(M/R)*INCOME	0.000	0.002	0.003	-0.000	0.001	0.003
	(0.001)	(0.001)	(0.002)*	(0.001)	(0.002)	(0.002)*
SPOOR	0.121	0.058	0.061	0.117	0.065	0.059
	(0.046)***	(0.103)	(0.039)	(0.048)**	(0.108)	(0.039)
MOSLEM	-1.144	-0.816	-1.760	-0.705	-0.534	-1.745
	(0.492)**	(0.617)	(0.348)***	(0.462)	(0.673)	(0.351)***
CATH	-0.150	0.005	-0.514	0.126	-0.363	-0.579
	(0.312)	(0.311)	(0.355)	(0.327)	(0.377)	(0.387)
TRADE				0.010	-0.004	-0.002
				(0.003)***	(0.002)*	(0.003)
Constant	-2.316	-3.431	-1.250	-2.602	-3.504	-1.119
	(0.614)***	(0.772)***	(0.620)**	(0.638)***	(0.870)***	(0.641)*
No. Observations	152	48	36	152	47	36

Note: Robust cluster standard errors are reported in parentheses. The dependent variable (ENROLSEC) is rescaled to the interval [0,1]. INCOME refers to GDP per capita divided by 1000. To save space, decade dummies are not shown. *significant at 10%; **significant at 5%; ***significant at 1%.

and increases by one standard deviation for different values of per capita income.[58]

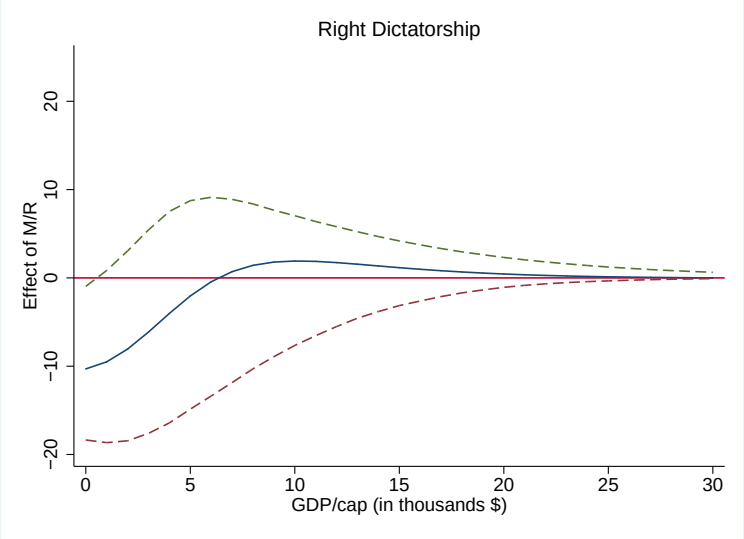
The figure indicates that when the economy is very poor, increasing the share of the middle class at the expense of the richest 20% of the population significantly decreases the fraction of people enrolled in secondary educational level. At 1000$ of average income, a one standard deviation rise in M/R shrinks the rate of enrollment by 10 percentage points. Or, in other words, it produces an almost 22% decline relative to the right-wing dictatorships' mean. However, this negative effect reduces as the economy develops and it turns even positive, although not significant, when the economy reaches a per capita income near 8000$.

Taking the predictions from the theoretical models into consideration (see Tables 3.9 and 3.7), the empirical evidence shown in the figure is more in line with Perotti's model. In less affluent countries, the models have opposite expectations: while income equality among the middle class and the rich is expected to hinder human capital in the setup of Perotti, it is hypothesized to expand education in the model of F&R. In the former, by reducing the resources of the only potential investors in the economy (the rich), increasing M/R could have negative consequences for investment. However, the fact that the redistributive policy associated with educational subsidies can be targeted to relatively wealthier groups in the model of F&R, such negative effect can be tempered by enacting a certain degree of redistribution towards better-off individuals. Actually, a smaller disparity of income between the middle class and the rich induces rightist dictators to raise taxation in order to extract as many resources as possible out of the poor.[59] If it is the case that average

[58]The procedure used in this simulation is the same as in earlier simulations. The other continuous variables are hold at their means and the decade dummy for the 80's is equal to one. The average value of M/R is 85.94 and its standard deviation 30.62. These numbers belong to the pooling sample of all political regimes.

[59]See Section 3.3.1, for an explanation of the mechanisms behind this propo-

Figure 5.12: The Effect of M/R at Different Values of Average Income (Rightist Dictatorships)



income is high enough to send the middle-income agents to school, this increased taxation will enable them to invest in human capital. Hence the positive relationship between M/R and education that is predicted from the model of F&R in rightist autocracies with few economic resources. Given these distinct expectations across models, the finding of a negative impact of equality between the higher income classes under poor right-wing dictatorships discriminates in favor of the Perotti's model.[60]

In more developed economies, that is, when the relevant question for increasing human capital depends on the education of the poor, the hypotheses of the models are also different. According to the Perotti's framework, since a smaller share of the rich reduces their contribution in financing low-income agents' investments, then an increase in M/R will induce right-wing dictators to promote the education of the poor -given the existence of positive externalities. Yet as human capital does not generate any social return in the model of F&R, rightist dictators are not expected to open up secondary schooling to the least well-off at any initial equality-related conditions. Therefore, the evidence that the effect of equality has a tendency to be positive, although insignificant, at higher levels of per capita income may be in line also with the hypothesis derived from the Perotti's setup.

Figure 5.13 shows the same simulation but using the coefficients of the regression for democracies. A lower income gap between the middle class and the wealthiest group of the society is negatively associated with secondary enrollment across all stages of economic development. Although this relationship is overall insignificant, note that the degree of uncertainty diminishes as per capita in-

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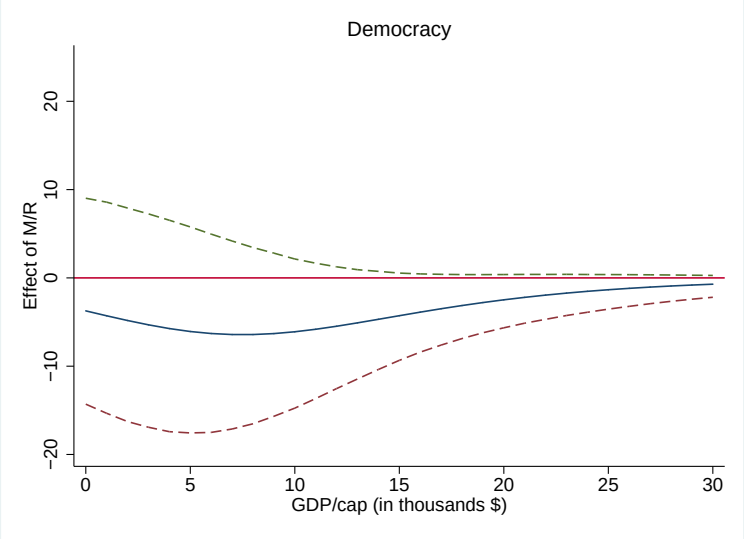
sition.

[60]This finding somewhat refutes the type of educational policy proposed in F&R. From the evidence exposed in Figure 5.12, it is not so clear that governments has the possibility to launch a publicly allocated program of educational subsidies, at least for secondary education, that redistributes the benefits mainly in favor of high-income groups.

Figure 5.13: The Effect of M/R at Different Values of Average Income (Democratic Institutions)



come increases. For instance, at 3000$, the 90% confidence interval around the predicted change in enrollment -when M/R rises by one standard deviation- has a range going from -16 to 8 percentage points. Yet at higher values of GDP per capita, say 15000$, this range goes from -10 to less than 1 percentage points, suggesting a more significant negative impact of M/R in more developed countries. In light of theoretical priors, the harmful repercussion of equality between the two upper social classes on enrollment is a finding somewhat consistent with the predictions of both models -taking into account that the empirical pattern in Figure 5.13 refers likely to wealthy countries. According to both formal frameworks, the bigger the share of the middle-income individuals in relatively richer countries, the lower the middle class's demands for redistribution programs, which in turn may hinder the human capital investment by the poor.

As for leftist dictatorships, variations in the segment of the income distribution affecting the middle class and the rich do not contribute in explaining educational differences among these regimes (figure not shown). In fact, the point estimate of the change in predicted values -given an increase of 30.62 percentage points in M/R- is zero in practically the entire range of per capita income. Although subject to the caveat about the few observations available for the analysis, this seems to confirm the hypothesis (of both models) that inequality does not have any bearing on enrollment when average income improves. Whenever the economy is rich enough to enhance the education of all social classes, populist dictators will impose at least the necessary degree of redistribution so that the poor can acquire formal schooling, and they have incentives to do so regardless of the initial distribution of income. However, the finding that increased equality does not change enrollment in poor countries contradicts the hypothesis based on the Perotti's framework according to which left-wing dictators in developing economies should be less willing to restrict redistributive taxation as the in-

come share of the rich decreases because the level of redistribution consistent with the education of the upper class must be lower. In fact, this finding is more in line with the expectation (from the model of F&R) that populist dictators, seeking to increase the welfare of the less affluent groups of society, do not have any interest in establishing a system of public educational subsidies in relatively poor nations and independently of equality conditions since this policy entails a redistribution from their constituencies to higher income groups.

Inequality between the poor and the rich

This section is aimed to test the final hypotheses concerning equality among the two groups at the tails of the income distribution. Thus the relevant equality measures introduced in the statistical analysis are the ratio of the two bottom quintiles to the richest one (P/R) and the share of the middle class (SMIDDLE). As in previous sections, I use a fractional logit regression to estimate our baseline model and the specification with trade openness included as an extra control.

Table 5.13 shows the regression results.[61] Focusing on the last specification, model (2), we see that the empirical pattern arising from the coefficients on control variables is very similar to the ones of earlier analyses, specially to the first analysis concerning inequality between the middle class and the poor. MOSLEM is negatively associated with enrollment in dictatorial regimes, but its coefficient is much more robust in right-wing dictatorships. Trade openness

[61] The descriptive data for SMIDDLE in the different institutional samples is quite similar. Its mean is between 32% (in right-wing dictatorships) and 38% (in democracy); the average share of the middle class in left-wing dictatorships is 37.4%. The mean value of P/R shows greater differences across political regimes. As one may expect, left-wing dictatorships have in average the highest ratio, almost a 50%, followed by democracies with 39% and lastly right-wing dictatorships with 31%. The degree of variation is, however, higher in leftist autocracies.

Table 5.13: Education and Income Inequality between the Poor and the Rich. Fractional Logit Estimates

	(1)			(2)		
	D	L	R	D	L	R
Dependent variable		ENROLSEC			ENROLSEC	
INCOME	0.156	0.039	0.051	0.215	0.152	0.079
	(0.058)***	(0.117)	(0.090)	(0.049)***	(0.152)	(0.086)
P/R	0.023	0.012	-0.003	0.030	0.012	-0.003
	(0.015)	(0.025)	(0.012)	(0.014)**	(0.029)	(0.012)
(P/R)*INCOME	-0.000	0.002	0.004	-0.001	0.002	0.004
	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)	(0.003)
SMIDDLE	0.028	-0.019	0.004	0.003	-0.023	-0.002
	(0.027)	(0.052)	(0.032)	(0.028)	(0.056)	(0.029)
MOSLEM	-1.147	-1.046	-1.664	-0.777	-0.812	-1.660
	(0.592)*	(0.421)**	(0.377)***	(0.587)	(0.443)*	(0.372)***
CATH	-0.044	-0.006	-0.465	0.199	-0.301	-0.560
	(0.328)	(0.213)	(0.415)	(0.341)	(0.224)	(0.450)
TRADE				0.010	-0.003	-0.003
				(0.003)***	(0.002)**	(0.003)
Constant	-2.720	-2.726	-1.468	-2.508	-2.666	-1.210
	(0.949)***	(1.107)**	(0.924)	(0.981)**	(1.097)**	(0.875)
No. Observations	152	48	36	152	47	36

Note: Robust cluster standard errors are reported in parentheses. The dependent variable (ENROLSEC) is rescaled to the interval [0,1]. INCOME refers to GDP per capita divided by 1000. To save space, decade dummies are not shown. *significant at 10%; **significant at 5%; ***significant at 1%.

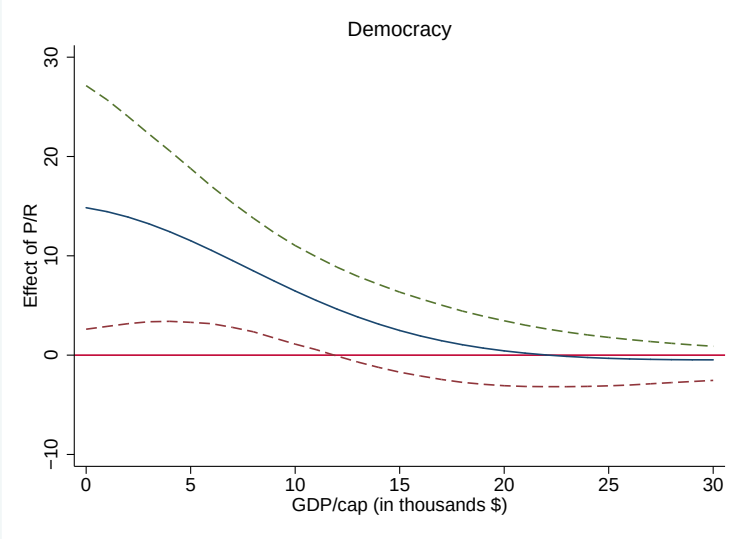
seems to foster education under democratic institutions. The negative impact of TRADE in leftist dictatorships is, as before, driven by the observations of Singapore. If these observations are removed from the sample, then the coefficient associated to trade openness turns out significantly positive. Finally, the share of the middle class (SMIDDLE) appears to be an irrelevant factor in explaining the variation of secondary enrollment in all institutional settings.

Turning to the hypotheses of interest, Figure 5.14 shows how the relationship between equality and education changes with economic development in democracies.[62] An increase in income equality between the poor and the rich generates a beneficial effect on enrollment that decreases as per capita income goes up. In view of the theoretical models, this empirical pattern seems to corroborate the expectations from F&R (see Tables 3.7 and 3.9). But if we take into account the fact that democracies are mainly observed at relative high values of GDP per capita, then the relationship portrayed in the figure tends to confirm the hypothesis, obtained from the Perotti's model, maintaining that the decisive middle-class voter in democratic governments is more prone to finance the education of low-income individuals when the economic positions of the latter sufficiently improve.

In Figure 5.15, I do the same simulation for right-wing dictatorships. In poor economies, a decline in the economic distance separating the poorest and the richest groups of the society is negatively associated, but insignificantly, with education. Yet at later stages of development, this association becomes positive and stays for a while in the border of statistical significance (at 10%). As indicated by the theoretical hypotheses (see Tables 3.7 and 3.9), the evidence exposed in the figure broadly matches the Perotti's setup

[62] As in previous simulations, this figure shows the effect of an one standard deviation increase in P/R (20.90) from its mean (39.73), keeping the rest of variables at their average levels and setting the decade dummy for the 80's at 1.

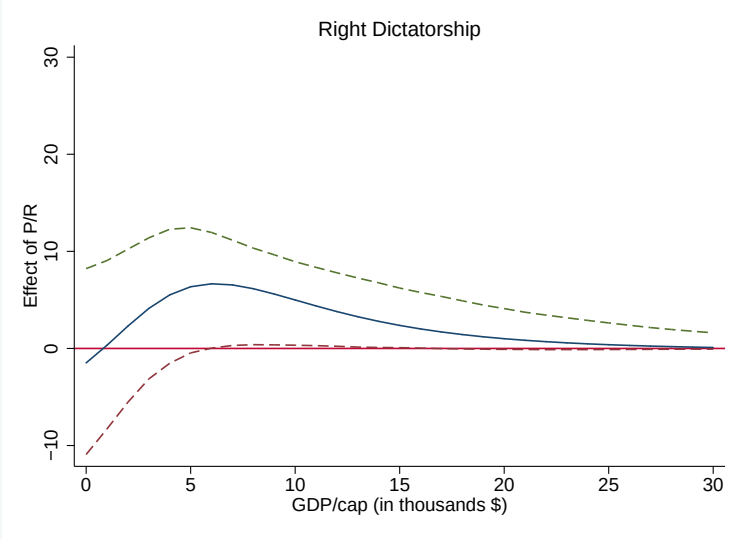
Figure 5.14: The Effect of P/R at Different Values of Average Income (Democratic Institutions)



and contradicts the model of F&R. Even if we concentrate only on the higher intervals of GDP per capita where the relationship becomes significant, this finding corroborates the hypothesis (based on the model of Perotti) according to which rightist dictators may promote human capital accumulation -when the economy is wealthy enough- as a result of an increase in equality between the poor and the rich. Note that the prediction from F&R is that income equality does not change human capital since there is no positive externalities from education and thus rightist dictators would not have any reason to increase redistribution for the poor to undertake their educational investments.

Regarding left-wing autocracies, income inequality does not seem to have any impact on education at any level of economic development (figure not shown). This result resembles the earlier ones obtained when the other equality ratios were examined. Considering the theoretical priors, the nonexistence of a relationship between inequality and education in populist dictatorships is supportive of both formal models.

Figure 5.15: The Effect of P/R at Different Values of Average Income (Rightist Dictatorships)



5.4.3 Summary

Although the small number of observations under analysis warns us against making a strong case in the statistical inference, the results found in this section provide empirical grounds for the general hypothesis that the association between income inequality and human capital is conditional on GDP per capita. Moreover, they also tend to confirm that the form this interaction between inequality and economic development takes in explaining human capital formation differs depending on political institutions and the specific part of the income distribution where inequality occurs.

On the one hand, given a particular political regime, amplifying the income gap between the rich and the middle class produces a different effect on enrollment from the one generated by, for example, an increase in the inequality between the poor and the middle class. On the other hand, for a given inequality ratio, the association between inequality and schooling rates sometimes changes with political institutions. This latter finding argues in favor of the theory proposed in this thesis that political regimes exert their influence on education by processing differently economic factors. Political institutions, as expected from the formal models, appear to condition the government's educational responses in the face of variations in income inequality.

In general, the patterns arising from the empirical evidence are more consistent with the set up of Perotti (1993). When the statistical results clearly discriminates between the predictions from the two formal models, which occurs when testing the associations in right-wing dictatorships, the findings tend to corroborate the Perotti's framework and contradict the expectations from the model of Fernandez and Rogerson. However, this conclusion is subjected to the previous caveat about the few observations available for the analysis. In addition, and as a robustness examination of these results, the inclusion of other standard controls in the literature such as the proportion of rural population in the society (RURAL) or the

percentage of the population aged under 14 (POP14) changes considerably the statistical coefficients associated with inequality and its interaction with per capita income. Overall, introducing these variables usually makes the coefficients of the substantive hypotheses loss their significant levels due to the high multicollinearity that exists between these variables about the demographic characteristics of the population and economic development in practically all regressions.

Chapter 6

Conclusions

The main goal of this thesis has been to explain the variation regarding educational outcomes observed across countries and over time since 1960 to 1996. In particular, the question was why do countries show different patterns in regards to their schooling enrollment in secondary and primary? This question seems a priori puzzling in light of the efficiency reasons given in the economic literature for expanding education to broad sectors of the society. Yet even if human capital accumulation generates desirable consequences for the economy as a whole, it has been argued in this thesis that educational-enhancing policies need to be politically sustainable. The explanation put forward in this work stressed the role of political institutions. Political regimes influence the aggregate rates of enrollment as long as social groups sustain opposing views for the type of policy to adopt. When there is a distributional conflict around policies, it is reasonable to think that individuals have different policy preferences. Given this, institutions serve as a mechanism of resolution by favoring certain interests over others.

The existing literature about the relationship between political regimes and education has usually ignored the distributional consequences entailed in the politics of education. The several studies

within this literature have mainly focused on the electoral constraints of democratic institutions that, unlike dictatorships, induce politicians to respond to the popular demands for expanding the access to education. The underlying struggle in these studies brings politicians face to face with citizens where both parts have opposing interests: politicians may want to maximize their personal rents at the expense of citizens' welfare. Yet under democracies, thanks to the electoral competition and the existence of accountability devices, rulers are to some extent compelled to accommodate the educational demands of social groups. On the contrary, dictators do not confront such institutional checks that could lead them to meet popular requests. As a result, given certain social pressures for increasing human capital accumulation, democracies should outperform dictatorial regimes.

The theoretical argument of this thesis emphasizes a different causal mechanism through which political institutions may shape educational outcomes. Starting from the idea that social groups may have distinct preferences for the education-related policy to enact, institutions function as a instrument of conflict resolution by distributing decision power among the groups in confrontation. Based on a class-model of politics, my thesis argues for a distinction among dictatorial regimes depending upon to which social class dictators appeal to construct their bases of support. It is presumed that "populist" autocracies defend the poor' interests while rightist dictators act essentially in the benefit of the more affluent groups of society. Democratic institutions, in turn, tend to carry out the most desired policy of the median voter -who belongs to the middle class.

Since groups' policy preferences are not fixed and constant across shifting economic contexts, it is expected that the effects of institutions or the educational differences between institutions change with such economic states as well. More concretely, the formal models examined in the thesis predict that the political choices of

social classes adjust to economic development and income inequality. Accordingly, institutions exert a indirect impact on education that varies with these two economic factors. Put it in another way, political regimes mediate the government's educational responses to increases in per capita income and wealth inequality. In addition, this thesis proposes and empirically tests the idea that the policy consequences of an increase in the degree of inequality may be different depending upon in which part of the distribution the dispersion occurs. A change in the economic distance between the middle class and the poor have distinct implications for policy preferences that a change in the income gap between, for instance, the middle class and the rich.

The empirical evidence offered in the statistical analysis is generally in line with the hypotheses developed. Regarding the interaction between institutions and per capita income, the effect of economic development on enrollment rates is always positive and stronger under left-wing autocracies than under the other two types of regimes: democracy and right-wing dictatorship. This empirical finding is systematically obtained regardless of the estimation method used or the specification of the econometric model. However, the impact of per capita income under democratic and right-wing political systems seems to differ according to the estimation method. When the institutional framework is a democracy, the statistical results are more stable and indicate a positive relationship between GDP per capita and enrollment rates. But in rightist dictatorships, the empirical evidence appears to be more volatile: either per capita income has an insignificant effect on education or has a significantly positive effect that does not differ from the one obtained under democracies.

All in all, and consistent with the hypotheses, the educational patterns of political institutions fluctuate as a function of economic development, which corroborates the theory proposed in this thesis according to which institutions exert an indirect influence that

changes with economic conditions. Particularly, the evidence shows that the nature of political regime does not seem to have any impact in very poor countries. As the economy grows, however, the type of political regime makes a difference in educational outcomes: left-wing dictatorships tend to increase schooling enrollment at a greater rate than the other political systems.

With regards to the hypotheses dealing with wealth inequality, the empirical results demonstrate that the relationship between income inequality and education is conditional on per capita income. In addition, they confirm that the interaction between inequality and economic development takes different directions as a function of political institutions and the particular segment of the income distribution where the increases in inequality occur. For a given equality ratio between the income shares of different social classes, the association between this factor and enrollment rates is different depending upon the type of political regime. Overall, the empirical evidence discriminates among the several formal models examined, being more in line with the general set-up of Perotti (1993). Therefore, the findings obtained in the empirical analysis prove the hypothesis that political institutions determine the educational responses of governments to variations in inequality and per capita income.

Appendices

Appendix A

Ideology Data

Ideology of Dictatorhsips. Data

Country	**Period**	**Ideology**
Algeria	1962-1991	LEFT
	1992-1996	Undecided
Angola	1975-1996	LEFT
Benin	1960-1971	Undecided
	1972-1990	LEFT
Botswana	1966-1996	RIGHT
Burkina Faso	1960-1979	RIGHT
	1980-1982	Undecided
	1983-1996	LEFT
Burundi	1962-1965	Undecided
	1966-1975	RIGHT
	1976-1986	LEFT
	1987-1992	RIGHT
	1996	RIGHT
Cameroon	1960-1996	RIGHT

Country	Period	Ideology
Cape Verde	1975-1990	LEFT
Central African Republic	1960-1965	LEFT
	1966-1978	Undecided
	1979-1980	LEFT
	1981-1992	Undecided
Chad	1960-1996	Undecided
Comoros	1975	Undecided
	1976-1977	LEFT
	1978-1988	Undecided
	1995-1996	Undecided
Congo	1960-1962	Undecided
	1963-1991	LEFT
Djibouti	1977-1996	LEFT
Egypt, Arab Rep.	1960-1996	LEFT
Ethiopia	1960-1973	Undecided
	1974-1992	LEFT
Gabon	1960-1996	RIGHT
Gambia, The	1965-1993	LEFT
	1994-1996	Undecided
Ghana	1960-1965	LEFT
	1966-1968	Undecided
	1972-1978	Undecided
	1981-1992	LEFT
Guinea	1960-1983	LEFT
	1984-1996	Undecided
Guinea-Bissau	1974-1996	LEFT
Cote d'Ivoire	1960-1996	RIGHT
Kenya	1963-1996	LEFT
Lesotho	1966-1985	RIGHT
	1986-1992	Undecided
Liberia	1960-1989	RIGHT

Country	**Period**	**Ideology**
	1990-1996	Undecided
Madagascar	1960-1992	LEFT
Malawi	1964-1993	RIGHT
Mali	1960-1967	LEFT
	1968-1991	Undecided
Mauritania	1960-1983	LEFT
	1984-1996	RIGHT
Morocco	1960-1996	RIGHT
Mozambique	1975-1996	LEFT
Niger	1960-1973	Undecided
	1974-1992	RIGHT
	1996	Undecided
Nigeria	1966-1978	Undecided
	1983-1996	Undecided
Rwanda	1962-1996	Undecided
Senegal	1960-1996	LEFT
Seychelles	1976	CENTER
	1977-1996	LEFT
Sierra Leone	1967	Undecided
	1968-1991	LEFT
	1992-1995	Undecided
Somalia	1969-1990	LEFT
	1991-1996	Undecided
South Africa	1960-1993	RIGHT
Sudan	1960-1964	Undecided
	1969-1984	LEFT
	1985	RIGHT
	1989-1996	Undecided
Swaziland	1968-1996	RIGHT
Tanzania	1961-1996	LEFT
Togo	1960-1962	Undecided

Country	**Period**	**Ideology**
	1963-1966	RIGHT
	1967-1996	Undecided
Tunisia	1960-1996	LEFT
Uganda	1962-1970	LEFT
	1971-1979	No ideolgy
	1985	Undecided
	1986-1996	LEFT
Zaire	1960-1964	Undecided
	1965-1996	RIGHT
Zambia	1964-1990	LEFT
Zimbabwe	1965-1978	RIGHT
	1979	Undecided
	1980-1996	LEFT
Dominican Republic	1960-1962	Undecided
	1963-1964	RIGHT
	1965	Undecided
El Salvador	1962-1978	RIGHT
	1979	CENTER
	1980-1981	LEFT
	1982-1983	Undecided
Grenada	1979-1982	LEFT
	1983	Undecided
Guatemala	1963-1965	RIGHT
	1982	Undecided
	1983-1985	RIGHT
Haiti	1960-1985	RIGHT
	1986-1990	Undecided
	1991-1993	RIGHT
Honduras	1963-1970	RIGHT
	1972-1981	RIGHT
Mexico	1960-1996	LEFT

Country	**Period**	**Ideology**
Nicaragua	1960-1978	RIGHT
	1979-1983	LEFT
Panama	1968-1988	LEFT
Argentina	1966-1972	RIGHT
	1976-1982	RIGHT
Bolivia	1960-1963	RIGHT
	1964-1970	LEFT
	1971-1977	RIGHT
	1978	Undecided
	1980-1981	RIGHT
Brazil	1964-1978	RIGHT
Chile	1973-1989	RIGHT
Ecuador	1963-1971	RIGHT
	1972-1978	Undecided
Guyana	1966-1991	LEFT
Paraguay	1960-1996	RIGHT
Peru	1962	Undecided
	1968-1975	LEFT
	1976-1979	CENTER
	1990-1996	Undecided
Suriname	1980-1987	LEFT
	1990	LEFT
Uruguay	1973-1984	RIGHT
Bangladesh	1971	Undecided
	1972-1974	LEFT
	1975-1981	RIGHT
	1982-1989	Undecided
China	1960-1996	LEFT
Indonesia	1960-1965	LEFT
	1966-1996	RIGHT
Iran, Islamic Rep.	1960-1996	RIGHT

Country	Period	Ideology
Iraq	1960-1996	LEFT
Jordan	1960-1996	RIGHT
Korea, South	1961-1987	RIGHT
Laos PDR	1960-1974	RIGHT
	1975-1996	LEFT
Malaysia	1960-1996	RIGHT
Mongolia	1960-1991	LEFT
Myanmar	1962-1996	LEFT
Nepal	1960-1990	RIGHT
Pakistan	1960-1970	RIGHT
	1977-1987	RIGHT
Philippines	1965-1985	RIGHT
Singapore	1965-1996	LEFT
Sri Lanka	1977-1988	RIGHT
Syrian Arab Republic	1960-1962	Undecided
	1963-1996	LEFT
Taiwan	1960-1995	RIGHT
Thailand	1960-1972	RIGHT
	1973-1974	Undecided
	1976	Undecided
	1977-1982	RIGHT
	1991	Undecided
Yemen Arab Rep.	1967-1973	RIGHT
	1974-1977	Undecided
	1978-1989	RIGHT
Bulgaria	1960-1989	LEFT
Czechoslovakia	1960-1988	LEFT
East Germany	1960-1989	LEFT
Greece	1967-1973	RIGHT
Hungary	1960-1989	LEFT
Poland	1960-1988	LEFT

Country	**Period**	**Ideology**
Portugal	1960-1973	RIGHT
	1974-1975	LEFT
Romania	1960-1989	LEFT
Spain	1960-1975	RIGHT
Turkey	1960	Undecided
	1980-1982	RIGHT
U.S.S.R.	1960-1990	LEFT
Yugoslavia	1960-1990	LEFT
Fiji	1970-1996	Undecided
Western Samoa	1962-1996	Undecided
Bahrain	1971-1996	Undecided
Kuwait	1961-1964	Undecided
	1965-1996	RIGHT
Oman	1960-1996	RIGHT
Qatar	1971-1996	Undecided
Saudi Arabia	1960-1996	RIGHT
United Arab Emirates	1971-1996	RIGHT
Afghanistan	1960-1962	RIGHT
	1963-1972	Undecided
	1973-1977	RIGHT
	1978-1991	LEFT
	1992-1996	Undecided
Albania	1960-1991	LEFT
Azerbaijan	1991	LEFT
	1992	Undecided
	1993-1996	LEFT
Bhutan	1971-1996	Undecided
Belarus	1991-1996	RIGHT
Bosnia-Herzegovina	1991-1996	Undecided
Brunei	1984-1996	RIGHT
Cambodia	1960-1968	LEFT

Country	Period	Ideology
	1969-1974	RIGHT
	1975-1996	LEFT
Cuba	1960-1996	LEFT
Equatorial Guinea	1968-1996	Undecided
Eritrea	1993-1996	LEFT
Georgia	1991	Undecided
	1992-1996	LEFT
Kazakhstan	1991-1996	LEFT
Korea, North	1960-1996	LEFT
Kyrgyzstan	1991-1996	Undecided
Lebanon	1975	RIGHT
	1976-1981	Undecided
	1982-1988	RIGHT
	1989-1996	Undecided
Maldive Islands	1965-1996	Undecided
Moldova	1991-1995	CENTER
Sao Tome and Principe	1975-1990	LEFT
Somaliland	1991-1996	LEFT
Yemen PDR	1967-1989	LEFT
Tajikistan	1991-1996	LEFT
Turkmenistan	1991-1996	LEFT
Tonga	1970-1996	RIGHT
Uzbekistan	1991-1996	LEFT
Vietnam	1976-1996	LEFT
Cyprus	1960-1982	RIGHT
Republic of Yemen	1990-1996	RIGHT
Yugoslavia2	1991-1996	LEFT
Libya	1960-1968	RIGHT
	1969-1996	LEFT
Ethiopia2	1993-1996	LEFT

Appendix B

Codebook

CATH: Percentage of Catholics in the population. Source: *Leksykon Pan'stw S'wiata* (1993) and Encyclopedia Britannica's on-line *Statistical Info for Countries*.

ENROLL: Primary and Secondary enrollment ratio. This ratio is equal to the number of students in primary and secondary divided by the total population between 5 and 19 years old. Source: United Nations (2000) and Mitchell (2003).

ENROLSEC: Secondary school enrollment ratio (% gross). Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Source: *World Development Indicators* 2000, World Bank.

GINI: Gini coefficient of gross incomes which includes market incomes plus transfers, but before taxes are taken out. The data is based upon income and national coverage (as opposed to expenditures and urban/rural coverage). Source: Deininger and Squire (1996) and UNU-WIDER (2005).

INCOME: : Real GDP per capita in constant dollars (Chain series). International prices, base year 1996. Starting source is *Penn World Table Version 6.1*; then I fill missing data calculated from

real GDP per capita in constant dollars (Chain series, international prices, base year 1985) from (*Penn World Table Version 5.6*.

LEFT: Ideological classification of dictatorships. Dummy variable coded 1 for left-wing dictatorships and 0 otherwise. It is constructed from the regime classification of REGH, so takes into consideration all democratic and dictatorial regimes. Transition years are coded as the regime that emerges that year. Source: see REGH, Chapter 4 of this thesis and Banks *et al.* (various years).

M/R: Income equality between the middle class and the rich. Ratio of SMIDDLE to SRICH. Source: see SMIDDLE and SRICH.

MOSLEM: Percentage of Moslems in the population. Source: *Leksykon Pan'stw S'wiata* (1993) and Encyclopedia Britannica's online *Statistical Info for Countries*.

POP14: Percentage of the population aged under 14 in the total population. Source: *World Development Indicators* 2000, World Bank.

PRIVATE: Dummy variable coded 1 if enrollment data (ENROLL) includes private schooling and 0 otherwise. Source: see ENROLL and Mitchell (2003).

P/M: Income equality between the poor and the middle class. Ratio of SPOOR to SMIDDLE. Source: see SPOOR and SMIDDLE.

P/R: Income equality between the poor and the rich. Ratio of SPOOR to SRICH. Source: see SPOOR and SRICH.

REGH: Regime classification as democracies and dictatorships. Dummy variable coded 1 for dictatorship, 0 for democracy. Transition years are coded as the regime that emerges that year. Source: Przeworski *et al.* (2000).

RIGHT: Ideological classification of dictatorships. Dummy variable coded 1 for right-wing dictatorships and 0 otherwise. It is constructed from the regime classification of REGH, so takes into consideration all democratic and dictatorial regimes. Transition years are coded as the regime that emerges that year. Source: see

REGH, Chapter 4 of this thesis and Banks *et al.* (various years).

RURAL: Rural population as a percentage of total population. Source: *World Development Indicators* 2000, World Bank.

SMIDDLE: Gross income share of the middle class (3rd and 4th quintiles). The data is based upon income and national coverage. Source: Deininger and Squire (1996) and UNU-WIDER (2005).

SPOOR: Gross income share of the poor (1st and 2nd quintiles). The data is based upon income and national coverage. Source: Deininger and Squire (1996) and UNU-WIDER (2005).

SRICH: Gross income share of the rich (5th quintile). The data is based upon income and national coverage. Source: Deininger and Squire (1996) and UNU-WIDER (2005).

TRADE: Total trade (imports and exports) as a share of GDP. Source: *World Development Indicators* 2000, World Bank.

VOCATIONAL: Dummy variable coded 1 if enrollment data (ENROLL) includes vocational secondary schooling and 0 otherwise. Source: see ENROLL and Mitchell (2003).

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