ABSTRACT

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This dissertation explores three different relevant questions in political economy. Chapter 1 is devoted to understanding why populist-outsider candidates get elected, and what conditions may favor/hinder their electability. The results show that countries with a higher income and wealth concentration are more likely to elect populist outsiders than countries where income and wealth are more equally distributed. It is also shown that elections with a runoff also are less likely to bring these populist outsiders into office.

Chapter 2 in turn explores the role of the middle class in moderating political outcome in a framework where money and votes play two distinctive roles in the election process. In this chapter, a three-class model of heterogeneous agents is developed in which groups affect policy outcomes through their voting behavior and contributions to political campaigns, and where income inequality can lead to extreme policy outcomes. Increasing the size of the middle class reduces the likelihood of

extreme policy outcomes, as does a richer middle class. This result highlights the importance of a large and strong middle class for political stability.

Finally Chapter 3 looks at the question of why inequality has remained persistently high in Chile despite its success in reducing poverty and achieving high growth for two decades while having a mostly pro-poor structure of public expenditures. We show that the key factors explaining this persistent inequality have been a low level of fiscal expenditures caused by low tax revenues that have not permitted enough public investment in human capital and R&D.

THREE ESSAYS IN POLITICAL ECONOMY.

By

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Dedication

To Maggie, because she had the patience to live through this PhD with me, for her support and understanding.

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Chapter 1: Why do Populist-Outsiders get Elected. A Model of Strategic Populists

1. Introduction

There is a long history of populist governments in Latin America and elsewhere in the world. A few recent examples of so called populist governments include the following countries and periods: Peru 1985-1990, Ecuador 2000-2001 and 2006-present, Venezuela 1999-present, Argentina 2003-present, Italy 2000-2006, and Thailand 2001-2006, amongst others. These governments share amongst other things the fact that they came to power through the democratic system in fair elections. However many of them have to leave office before the end of their constitutional term, since usually by the end of the term(s) the situation in the country is worse off than when it began (Dornbusch and Edwards, 1989).

Another common feature in many circumstances, especially in recent Latin America, is that the elected government is not only considered populist but it is also led by an outsider candidate. An outsider is defined as a candidate that runs for office who is not part of the traditional party system in the country. Recent examples of outsiders in Latin America would be Alberto Fujimori and Ollanta Humala in Peru, Lucio Gutierrez and Alvaro Correa in Ecuador, Hugo Chavez in Venezuela and Fernando Lugo in Paraguay. The governments of Lula da Silva in Brazil, Morales in Bolivia and Vasquez in Uruguay are harder to classify as purely outsiders, since in each of

these cases the party or parties that support these candidates have long been part of the political establishment even though they might have had very little power. Moreover, in each of the former examples, the coalitions were built around the candidate himself, while in the latter it seems that the coalitions were built up prior to choosing a candidate.

Populists and outsiders are also more likely to arise where democracy is weak or is perceived not to work well. Democracy in Latin America is perceived overall as weak, with high levels of corruption, little or no accountability, and unequal distribution of rights (Tedesco, 2004; Taylor, 2004). There is also evidence that politics in Latin America are driven by *Client-ship* relations. In this sense there are groups (special interest, *elites* or others) that are organized to obtain favors in exchange for their political support. These kinds of relations have been observed both in democratic and non-democratic regimes (Taylor, 2004).

Populist governments or movements are far from exclusive to Latin America. Both Mussolini and Hitler were considered populists in their time, as was Huey Long in the US at about the same time. Moreover, during the 1960's and 1970's leftwing populist movements were quite powerful throughout Europe. Currently in Europe the populist movements are closer to the right-wing agenda though. A few recent examples would be Berlusconi in Italy, Le Pen's National Front in France, the late Pim Fortyun's in the Netherlands and the Austrian Freedom Party (Mudde, 2004).

The rise of outsiders also occurs in the developed world, where outsiders have been elected and more recently have affected the outcomes of elections. Recent cases in the US that are worth mentioning are independent candidates Rose Perot and Ralph Nader in the 1992 and 2000 presidential elections respectively (Abramson, et. al., 1995). Le Pen in France also might have affected the outcome of the 2002 presidential election.

It is not so easy to explain why populists and outsiders are elected once we assume voters are rational. In order to get voters to elect these candidates even knowing the risk implied by their election, voters must have some sort of preference for these candidates. I will pose that outsiders are elected or brought into the system due to a failure to deliver welfare improvements by the insiders (i.e. the traditional parties). This may be explained by insiders being captured by the elites or certain special interest groups. Moreover, this failure enables the outsider to rise and since he does not face credibility issues (at least not from being in power previously), he can make more promises (that he may not be able to fulfill) than the traditional parties can.

In this chapter I will explore the following questions. Why are populist outsider candidates elected, over and over again, even when their governments are less than successful? How and why do outsiders become part of the political game? How can they exist in equilibrium? The rest of the chapter is organized as follows. In section 2 I will review the literature on populism and propose a working definition of populism. Section 3 presents a model of political competition between insider parties and a

populist outsider. Section 4 presents the main results of the model. Section 5 presents some extensions of the basic model and finally Section 5 concludes.

2. What is Populism?

Perhaps one of the hardest tasks in political science and economics is to find a good definition of populism. Populism is often confused for demagogy. Mudde (2004) distinguishes two dominant interpretations of the term populism. The first refers to an "…emotional and simplistic discourse, that is directed at the 'gut feelings' of the people." (Mudde, 2004). The second interpretation refers to opportunistic politicians/policies that aim to please the people/voters rapidly.

In a way this definition could include a politician only concerned with short-run political advantage (eg. lowering taxes just before elections). However both these definitions are far from comprehensive and they do not capture the full sense of what is typically known as a populist government/movement. Therefore Mudde defines populism "…as an ideology that considers society to be… separated into two homogeneous and antagonistic groups, 'the pure people' versus 'the corrupt elite'…" (Mudde, 2004). This definition is consistent with definitions that call populism as the expression of the "general will" of the people (in a way such as the tyranny of the majority) in contrast with the idea of democracy as a bargaining process (Crick 2005).

The term 'populism' originates from the Populist Party in the United States, circa 1880-1906 (Szasz, 1982). This movement grew originally as a response to economic

hardship during the period of 1886-1897 in the agriculture states of the south and western United States. The movement was composed at first by small farmers on the north-south axis that goes from eastern Montana and the western Dakotas to New Mexico and Texas.

The party gained momentum given the feeling of disconnection between rural farmers and political parties in Washington. This attracted new voters and hence the party ran on issues that ranged from prohibition and direct election of senators, to women's suffrage and the supervision of large corporations. Populists had two common denominators (i) they wanted to "restore the power to the people" and (ii) they were driven by demands for social change derived mainly from the economic depression of 1893-1897 (Szasz, 1982)[1].

In the political science literature populism has usually been used to describe the regimes that governed Latin America in the middle of the twentieth century. Conniff (1982, 1999) describes the Latin American version of populism as a grand coalition of workers and industrial bourgeois led by a charismatic leader. The populist runs under a platform of reform, usually running against the local elites that own the land, with promises of either: (i) new jobs and higher wages via industrialization of the country; or (ii) political reform and political access to disenfranchised groups (e.g. free and fair elections, granting women the right to vote, universal suffrage, etc). This

[1] The other case of populism in the US is Huey Long, the Governor and Senator from Louisiana who would have ran for president in 1936 but was killed before he had the chance. His main political agenda was the restitution of a nation of equals, and he proposed for example a guaranteed universal minimum income and 100% taxes on all income over 1 million and all inheritances over 5 million (Szasz 1982).

model fits well prior to the 1960's, describing rulers such as Yrigoyen and Peron in Argentina, Alessandri, Ibañez and the Popular Front in Chile, Lazaro Cardenas in Mexico, Vargas and Goulart in Brazil and although never elected, Haya de la Torre in Peru[2].

It is worth noting that another common denominator was that these coalitions were an alternative response towards the threat of socialism (or more precisely communism) in many countries. The main goal of the movement was to transition towards a modern society in which landlord elites would eventually give up power (to the industrial bourgeois) while the urban industrial workers would have better paid jobs, higher incomes and consequently a better life. It is important to state that inequality more than poverty played a fundamental role in setting the conditions that allowed the coalition to be built, since the main goal was to redistribute power and/or income. Dornbusch and Edwards (1989) and Sachs (1989) also stress that poverty and income inequality played a significant role in the run up to elections in which populists came in power.

Dornbusch and Edwards (1989, 1991a) henceforth D&E, describe economic populism (or more precisely macroeconomic populism) as a government that prioritizes income redistribution policies over efficiency and growth policies[3]. However in their own description of the "populist" governments in Chile under

[2] The list of potential populists is very large indeed; they include candidates from most Latin American countries including Argentina, Brazil, Chile, Ecuador, Mexico, Panama and Venezuela.

[3] Stokes (1999, 2001), uses basically the same distinction, but she names them, security oriented policies versus efficiency oriented ones.

Allende and Peru under Garcia, they explain that these governments were elected in part to respond to dissatisfaction with growth performance, high levels of poverty, and unequal distribution of income. They also recognize that the "economic teams" that took office in these governments wanted to achieve growth with redistribution. According to D&E the main reason that the populist program failed was "bad economics", since policymakers did not recognize that their program was infeasible. The issue is that their assumptions about idle capacity, decreasing long-run costs and inflation were wrong.

Rioja and Glomm (2003), Dal Bo and Dal Bo (2004), Mejia and Posada (2007) and Campante and Ferreira (2007) have all used a similar concept of populism. In all of these papers the main goal of populists is more redistribution towards a certain group (usually the poor), and/or no concern for budget deficits.

It is interesting to note that even if D&E are right about the failed nature of the economic programs of both governments, when the government was campaigning for office it actually believed that the program was achievable. It might be the case that the party running for office had "bad" economists, but they cannot be portrayed simply as mere opportunists; they really thought that they could achieve both high growth and a more equal society. In this sense it might be the case that they were naïve, or more precisely, that their policies may have had a chance to succeed but didn't[4].

[4] An interesting comparison that comes to mind is that of export-led growth (ELG) versus industrialization by substitution of imports (ISI) policies since the 1960's. When looking at the data we

Kaufman and Stallings (1991) describe populism as economic policies designed to achieve both political and economic goals. According to their definition these governments rely on price controls, income redistribution and run fiscal deficits to achieve their goals. For Chile they identify two periods: Ibanez 52-58 and Allende 70-73. However, Drake (1991) argues that Allende does not fit the pattern in the sense that his policies went much further, too encompass not only income redistribution, but also redistribution of property and more generally wealth. Drake (1991) argues that even though the programs of socialists and populists overlapped in many cases, in the case of Allende it was the former that predominated rather than the latter.

Another important feature of populism is charisma (Conniff 1982, 1999). Within the political science framework we could call this "quality of the politician". Not all populists were elected (most notoriously Haya de la Torre in Peru), and many elected ones ended their government prematurely, usually in some sort of political crises. But one common denominator was that most if not all populists were able to bring the masses towards them and lead them to the polls.

In the more recent literature Weyland (1999, 2002) describes what he defines as *neopopulism*, which is a combination of neoliberal policies and a populist or

observe that countries that undertook ISI policies grew faster than countries that undertook ELG during the 1960's and 1970's while this was reverted since the 1980's (Carbaugh, 2005). Consequently when asked in the late seventies about the best strategy for growth it might have been the case that ELG policies were not the first choice.

charismatic leader. The main exponents of this strand were Fernando Collor de Melo in Brazil, Carlos Menem in Argentina, Alberto Fujimori in Peru and Carlos Perez in Venezuela. All of these have in common that they ran as populists and later enacted neoliberal reforms[5]. It is worth noting though that Collor de Melo ran on a neoliberal platform while the rest actually ran closer to a left-wing platform and once elected enacted neoliberal reforms. According to the liberal populism literature (Roberts, 1995), this was possible given that social institutions were weak and allowed for a clientelistic approach by the charismatic leader, and this would be "populism". Choi (2005) explores a similar argument for the recently overthrown government in Thailand and concludes that the populist government in Thailand has its origins in inequality rather than an institutional issue.

This economic version of populism can also be defined as ex-post populism, since it basically tries to explain the effects of the policies put in place after the populist has come to power. On the other side, the political science perspective has in a sense tried to understand ex-ante populism, concerning how populists get elected. This paper will attempt to explicitly model ex-ante populism in an economic framework, and also to some extent, given the definition of populism (in terms of political strategy) I use, bring together both concepts in one framework[6].

[5] According to Stokes (1999, 2002) these are actually policy switchers. At least in the case of Menem, according to Stokes, they only ran a left wing platform to be able to win, but they always had planned to undertake neoliberal reforms. This would in turn be a case of opportunistic politicians that "lies" in order to get elected. There is a narrow line between this and a demagogue.

[6] I thank Daniel Mejia for this distinction.

All of the above said, it is time to present my definition of a populist. I will define a populist as a politician that has the following four characteristics:

i.) As a politician he/she behaves opportunistically, motivated by being in power, but uses elections to achieve his goals.

ii.) He targets certain groups to rally around him.

iii.) He promises redistribution (of income, wealth or power) to the groups in the coalition.

iv.) He is a charismatic leader, and uses his charisma to get votes.

Out of the four characteristics, the latter is the one that makes a populist really different from a traditional politician. The idea is that populists use their charisma to attract voters, instead of using other formal political mechanisms. This is, he will not care about appealing to special interest group that may contribute money to his campaign, since he would not use it[7].

3. The Model

This model has two types of voters. First there is a fraction (1-α) of *impressionable* voters modeled in the spirit of Baron (1994), as a continuum of voters of mass 1-α that are distributed uniformly in preferences for policy platforms 'τ', along the [0,1]

[7] Berdugo (2006) uses a similar characteristic in a signal-extraction model where charisma and quality of the politician are correlated but not individually observable and shows that charisma may increase the capacity of politician to get elected and commit to certain platforms. Kartik and McAfee (2007) use "character" instead of charisma, where character is desired by voters, and show that non-character candidates choose policies such that the probability of being elected is at least as big as a candidate with character.

interval. For tractability I assume that a platform is one-dimensional. These voters receive (dis)utility from three things: policies implemented by the winning candidate, quality or appeal of the candidate and the cost of going to the polls. Voters thus have the following utility function if they decide to vote[8]: $U^i(vote) = \underset{k}{Max}\left(\frac{F(\theta^k + M(\tau^k))}{(\tau^i - \tau^k)^2}\right) - c^i$, where c^i is the cost of voting for voter *i*, which for now I assume constant and equal to c[9]; τ^i and τ^k are the most preferred platform for voter *i* and the announced platform by candidate *k* respectively; $F(\cdot)$ is an increasing and concave function; M are the campaign contributions received by *k* that will depend on the announced platform τ^k, while θ^k is a random variable representing the charm, charisma or appeal of the candidate. F represents a mapping from charm or advertising into perceived quality. I assume that quality in itself is not observable, but charisma and money expenditures are; and charisma and money are positively correlated with quality of the candidate[10]. If the voter does not vote his utility is $U^i(no\ vote)=0$. An important assumption in this model is that not all voters vote. The

[8] The particular form of the utility function is used to obtain close formed solutions. In particular all is required from the utility function for the results to prevail is that it is increasing in charisma and money and decreasing in cost of voting and distance to the implemented platform. This generates that the voting outcome of impressionable voters in terms of the share of votes is a closed interval in the [0,1] line. An alternative specification that would not alter the main results would be to assume the following utility function: $U^i(vote) = \underset{k}{Max}\left(\frac{1}{(\tau^i - \tau^k)^2} - c\left(\frac{1}{F(\theta^k + M(\tau^k))}\right)\right)$, where money now affects the cost of voting (with c now the cost function of voting) and not the platforms themselves.

[9] The cost of voting may include the registering to vote, work days lost and/or other costs. Therefore it may vary across individuals or groups. In particular it could account for disenfranchised groups (e.g. poor voters, racial minorities, etc.).

[10] In this context I am also including candidates with high charisma/charm and significant expenditure. Higher charm would attract voters to the polls, and campaign expenditures are assumed to better convey the message. This is, candidates with low expenditure cannot convey their positions so clearly as candidates with higher expenditures. We are modeling campaign expenditures as informative about the quality of a candidate in the spirit of Coate (2004) and Prat (2002).

preferences presented here are similar to those proposed by Schachar and Nalebuff (1999) in the sense that candidates can use money to influence voter turnout. They are also standard in the public choice literature where voters derive utility from winning.

Candidates need either charm or money (or both) to get voters to vote. Charisma is exogenous while money depends on campaign contributions by *non-impressionable* voters, which in the rest of the paper will be named contributors[11]. I assume that there is a fraction α of these voters that contribute funds to the campaign of either candidate, depending on the proposed platform and their preferences. All contributor voters contribute a fixed amount of money *M* to one candidate. This assumption is used to avoid the collective action problem that arises from marginal contributions. This result could arise endogenously assuming a group utility rule such as the one presented by Coate and Conlin (2004), in which all members of each coalition contribute the same amount.

Contributors' policy preferences are also distributed uniformly in a subset of the continuum [0,1], particularly in the interval $[\tau^c-\beta, \tau^c+\beta]$, where τ^c is the most preferred platform of the median contributor.

Assumption 1: $\tau^c > ½$. This is the median contributor will be always located to the right of the median voter.

[11] We could also think of these as SIGs in the spirit of Grossman and Helpman (1994).

This assumption will induce the outsider later on to choose a platform on the left side of the political map, since as we will see traditional parties will need be choose a platform closer to the median contributor, which as just mentioned is right-of-center[12]. Figure 1 summarizes the distribution of preferences by voters.

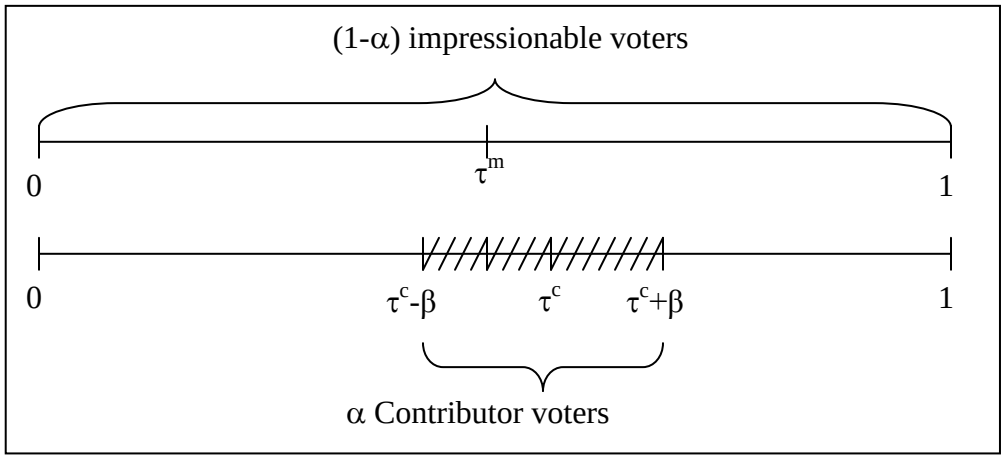

Figure 1: Voters Characteristics

Contributors participate in two stages. In the first stage they decide to contribute M to the party that proposes a platform closest to their own. In the second stage they vote for whoever they contributed. Contributor *j* thus decides to contribute M_j according to the following rule:

$$M_j(R,L) = \begin{Bmatrix} (M,0) & if & \left|\tau^j - \tau^R\right| < \left|\tau^j - \tau^L\right| \\ (0,M) & if & \left|\tau^j - \tau^R\right| > \left|\tau^j - \tau^L\right| \\ (\frac{M}{2},\frac{M}{2}) & if & \left|\tau^j - \tau^R\right| = \left|\tau^j - \tau^L\right| \end{Bmatrix}$$

[12] All results are maintained if I assume that the contributors are skewed to the left of the median voter. The only difference will be that the outsider would choose the "other" extreme to propose his platform.

In the second stage contributors now vote in the same way as they contributed and all of them vote. Under these assumptions, party R will obtain contributions in the amount of $M^R = \frac{\alpha M}{2\beta} \int_{\frac{\tau^R+\tau^L}{2}}^{\tau^C+\beta} d\tau = \frac{\alpha M}{2\beta}\left[\tau^C + \beta - \frac{\tau^R+\tau^L}{2}\right]$ and party L will obtain $M^L = \alpha M - M^R$, if this is an interior solution. Otherwise we may obtain $M^L=\alpha M$ and $M^R=0$, or $M^L=0$ and $M^R=\alpha M$.

Candidates/Parties

There are two parties *R,L* that only care about being in power. Each party draws a candidate with a given amount of charisma θ^R or θ^L simultaneously and independently. Charisma is private information for each party. Parties then announce a platform τ (henceforth τ^R or τ^L) under which they run. There is a third *outsider* candidate drawn by nature, endowed with charm θ^{OUT}. θ^k is drawn in each case from a distribution with CDF $\Omega(\theta^k)$, $\theta^k \in [0,\infty), \forall k$. As mentioned earlier, given that $\tau^c>\tau^m$ this will induce the outsider to choose a platform to the left of R and L, thus generating a left wing outsider. The case for a right wing outsider will be analogous, but with the roles of party R and L reversed, and it requires assuming $\tau^c<\tau^m$.

Assumption 2 (no crossing over): I assume that the following condition is always true: $\tau^R \geq \tau^L$. This is party R always chooses a platform equal to or to the right of party L, and vice versa.

This assumption is used to rule out left wing platforms by right wing parties and is useful to simplify the analysis. We can have convergence but no crossing over.

The parties' problem is therefore to choose their platform τ^k to maximize their probability of being elected, which can be defined for *L* as:

$$\Pr(L \text{ is elected}) = prob(V(L) > V(OUT)) \wedge prob(V(L) > V(R))$$

where *V(k)* is the fraction of votes that candidate *k* receives. This is the sum of votes by impressionable V^I and non impressionable voters V^C. From impressionable voters, k receives:

$$V^I(k) = \int_{\underline{\tau}}^{\bar{\tau}} dG(\tau) = G(\bar{\tau}) - G(\underline{\tau})$$

where $\underline{\tau}$ and $\bar{\tau}$ represent voters that are indifferent between two candidates or between voting or not, or a corner voter (0 or 1) and G(x) is the CDF of the *impressionable* voters[13]. Non-impressionable voters vote according to their contributions and therefore split between R and L in the same fractions as they split contributions. Thus, $V^C(R) = \frac{1}{2\beta}\left[\tau^C + \beta - \frac{\tau^R + \tau^L}{2}\right]$, and $V^C(L) = 1 - V^C(R)$ [14].

Finally total votes for candidate *k* are given by: $V(k) = \alpha V^C(k) + (1-\alpha)V^I(k)$. Figure 2 presents two examples of the votes received by each candidate for a given

[13] I have defined a more general case for the distribution but I will still assume a uniform distribution.
[14] This is the result of the interior solution. For corner solutions *$V^C(R)=0$ or 1*, and consequently *$V^C(L)=1$ or 0* respectively.

platform choice for each of them. The left panel shows the case in which everyone votes, while the right panel shows a case in which some voters abstain. Votes for the outsider, L and R are given by the red, light and dark blue intervals respectively. The top [0,1] line represents the impressionable voters, while the $[\tau^c-\beta, \tau^c+\beta]$ interval represents contributors.

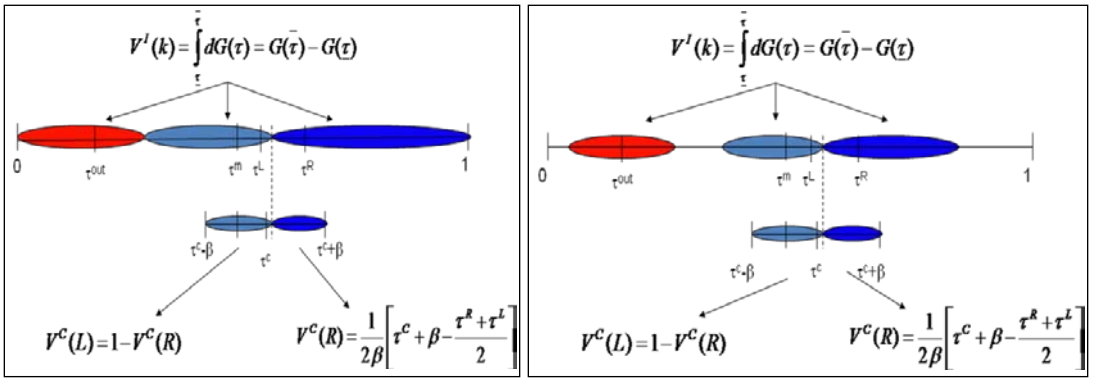

Figure 2: Examples of Voting Outcomes

Timing

The timing of events is as follows:

1. Charisma for each party candidate is drawn by nature.
2. Parties announce their platforms (τ^R and τ^L) to maximize their votes given their beliefs about the charisma of each candidate.
3. Contributor voters contribute to either party candidate, knowing only τ^R and τ^L.

4. An outsider is drawn by nature with θ^{OUT}, and chooses his platform τ^{OUT} without observing contributions for other candidates in order to maximize his votes.
5. Elections are held, voters vote and the candidate or party with the most votes wins and takes office.

Definition 1: A political equilibrium in this model consists of a pair of strategies $(\tau^R(\theta^R), \tau^L(\theta^L))$ such that each party maximizes its expected votes considering the expected θ^{OUT} and the other party's platform. The concept of equilibrium is Perfect Bayesian Equilibrium (PBE).

We can easily observe that the platform choice of each party will depend on the charisma of the candidate. The more charisma the candidate has, the less money he will need to "buy votes". The result arises from the fact that charisma and money are perfect substitutes in attracting votes. For candidate *R*, his share of votes is determined by the following expression[15]:

$$V(R) = \frac{\alpha}{2\beta}\left[\tau^C + \beta - \frac{\tau^R + \tau^L}{2}\right] + (1-\alpha)\left[\left(\frac{F(R)}{c}\right)^{1/2} + \frac{\left(F(R)/F(L)\right)^{1/2}}{1+\left(F(R)/F(L)\right)^{1/2}}(\tau^R - \tau^L)\right] \qquad (1)$$

Candidate R will thus choose τ^R as to maximize the expected value of the RHS of (1). Note that (1) does not depend on the platform of the outsider. As observed in Figure 2a, the outsider in this model only fights over votes with Candidate *L* as we have

[15] I am assuming that party *R* does not reach further than voter with $\tau^i=1$. If he does, then he would try to move as far to the left as possible, in order to increase his votes on that side, of course up to τ^C.

assumed the outsider locating to the left of *L*. Thus *R*'s only has to fight over votes with *L* not the outsider. For simplicity, we analyze first the optimal behavior of *R* and after that the optimal behavior of *L*, which as will be seen is only a minor extension of *R*'s.

From assumption 1 we know that *R* always set its platform equal to *L* or to the right of *L*. Given τ^L choosing to the right of τ^L has two effects. First *R* obtains fewer resources since it is straightforward to note that $\frac{\partial M(R)}{\partial \tau^R} = \frac{-\alpha M}{4\beta} < 0$. Moreover candidate *R* will also lose non-impressionable voters since $\frac{\partial V^N(R)}{\partial \tau^R} = \frac{-\alpha}{4\beta} < 0$. However, candidate *R* will gain votes from his right side by moving away from the *L* platform. Depending on the level of resources (charisma plus money) *R* will retain a smaller or larger share of the votes "to his left" assuming L's platform is fixed[16]. The net effect will depend on the amount of charisma θ^R, and other parameters. In particular we have:

$$\frac{\partial V(R)}{\partial \tau^R} = \frac{-\alpha}{4\beta} + (1-\alpha)\left\{\frac{-\alpha M F'(R)}{8\beta}\left(\frac{F(R)}{c^{-1}}\right)^{-\frac{1}{2}} - \frac{\alpha M F'(R)}{8\beta}\left[\frac{(\tau^R - \tau^L)}{(F(L)F(R))^{\frac{1}{2}}}\right] + \frac{\left(\frac{F(R)}{F(L)}\right)^{\frac{1}{2}}}{1+\left(\frac{F(R)}{F(L)}\right)^{\frac{1}{2}}}\right\} \qquad (2)$$

The first term corresponds to the non-impressionable voters that R loses. The first term in brackets correspond to the impressionable voters *R* loses due to lower money.

[16] In fact votes that lie between τ^L and τ^R will be allocated to each candidate depending on their overall resources.

The other two terms in bracket correspond to the impressionable voters *R* wins/loses when she separates from *L*, leaving a gap between them. From the above expression and taking as given α, β, c, M, θ^L, τ^L, we can find $\tilde{\theta}$ such that $\forall \theta^R > \tilde{\theta}$, $\tau^R(\theta^R)$ will be increasing in θ^R. This will be valid over some range of platforms, depending on the precise shape of *F*, and it requires assumption 2. By the same token, $\forall \theta^R \leq \tilde{\theta}$, $\tau^R(\theta^R) = \tau^C$ [17,18].

Assumption 2: I will assume that if $\tau^R = \tau^L = \tau$, then candidate L will get the non-contributor votes from the left of τ, and R will get the votes to the right[19].

Assumption 2 is only needed to ensure the next result and the one just mentioned, but it is not needed for the rest of the paper.

Proposition 1 (charisma leads to extremism): The more charisma a party candidate has, the more he or she will move to the extreme. This is, more charismatic leaders in both parties will choose platforms farther to the left or right of the median contributor.

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[17] In fact the optimal strategy would be $\tau^R(\theta^R) = \tau^L$, but this could violate assumption 1 since it could be the case that in expectation party R chooses a value to the left of τ^C, and later party L choose τ^C.

[18] In fact it may be possible that at some level of $\theta^R = \overline{\theta}$ voter "1" is indifferent between voting for R or not voting, therefore $\forall \theta^R > \overline{\theta}$ we have that the optimal strategy will be to move back to the center.

[19] This assumption enables both candidates to choose the median contributor. Otherwise if both converge, by the fact that they are exactly the same to all non contributor voters, this would mean that all of them would vote for whoever has the highest charisma, while the other candidate would only receive contributor votes.

Proof: Using assumption 2, from (2) we know that $\frac{\partial V(\tau^R)}{\partial \tau^R} > 0$ only if the third term in brackets is large enough to cancel the other terms in the expression which are all negative. This will only occur if $\theta^R > \tilde{\theta}$. Thus having a higher θ^R *or* θ^L leads to choosing a platform to the left and right of τ^C respectively. ■

Corollary 1: Candidates with no charisma converge to τ^C. If party candidates do not have charisma (or cannot use it), then they will converge to the platform of τ^C.

Proof: This is a direct consequence of proposition 1. ■

Let's now consider party *L*. The most interesting case is when there is a voter indifferent between *L* and the Outsider, i.e. a case where L and the outsider are fighting for votes like in Figure 2a. If this set were the empty set, then the analysis is exactly the same as for *R*, but in the other direction. Otherwise candidate L obtains the following share of votes:

$$V(L) = \frac{\alpha}{2\beta}\left[\frac{\tau^R+\tau^L}{2} + \beta - \tau^C\right] + (1-\alpha)\left[\frac{\tau^L+\tau^R\left(\frac{F(L)}{F(R)}\right)^{\frac{1}{2}}}{1+\left(\frac{F(L)}{F(R)}\right)^{\frac{1}{2}}} - \frac{\tau^L+\tau^{OUT}\left(\frac{F(L)}{F(O)}\right)^{\frac{1}{2}}}{1+\left(\frac{F(L)}{F(O)}\right)^{\frac{1}{2}}}\right] \qquad (3)$$

Expression (3) is similar to (1). However the second term in (3), which accounts for the impressionable vote share of *L*, reflects the fact that L will face competition on both margins and thus is *ceteris paribus* smaller than the similar term in (1).

Following the same analyses done for Party R, I can now look at the effect of L choosing a platform to the left of or equal to τ^R. Therefore I calculate the following derivative:

$$\frac{\partial V(L)}{\partial \tau^L} = \frac{\alpha}{4\beta} + (1-\alpha)\left\{ \frac{1+\left(\tau^R - \tau^L\right)\left(\frac{\alpha M}{8\beta}\frac{F'(L)}{(F(L)F(R))^{1/2}}\right)+\left(\frac{F(L)}{F(R)}\right)^{-1/2}}{\left(1+\left(\frac{F(L)}{F(R)}\right)^{1/2}\right)^2} - \frac{1+\left(\tau^{OUT} - \tau^L\right)\frac{\alpha M}{8\beta}\frac{F'(L)}{(F(L)F(O))^{1/2}}+\left(\frac{F(L)}{F(O)}\right)^{-1/2}}{\left(1+\left(\frac{F(L)}{F(O)}\right)^{1/2}\right)^2} \right\}$$

With some algebra we can also find a $\tilde{\theta}$, such that $\forall \theta^L > \tilde{\theta}$, $\tau^L(\theta^L)$ will be decreasing in θ^L. This will be valid over some range of platforms and depending on the precise shape of *F*. By the same token, $\forall \theta^L \leq \tilde{\theta}$, $\tau^L(\theta^L) = \tau^C$. Note however that the exact effect of moving the platform will not only depend on the value of *L*'s own θ^L, but also on the value of θ^{OUT}. The higher θ^{OUT} is, the lower the benefits from moving to the left for *L*.

Given these assumptions we can now solve for the outsider. In the next proposition I will find the optimal strategy of the outsider, given his information set. By construction I have assumed that outsiders do not have access to contributors. Therefore their optimal strategy will be to get as many impressionable voters as possible. The share of votes for the (left-wing) outsider is given by the following expression:

$$V(OUT) = (1-\alpha)\left\{\min\left(\tau^{OUT} + \frac{F(\theta^{OUT})}{c}, \tau^e\right) - \max\left(\tau^{OUT} - \frac{F(\theta^{OUT})}{c}, 0\right)\right\} \quad (4)$$

The term minimized in the brackets represents the share of vote to the right of the outsider, while the term maximized in brackets subtracts any votes that the outsider may not get on her left. If everyone on the left votes for the outsider, then the second term is zero. Finally τ^e satisfies the following condition: $\frac{\tau^e - \tau^{OUT}}{\tau^L - \tau^e} = \left(\frac{F(O)}{F(L)}\right)^{1/2}$.

Therefore $\tau^e = \frac{\tau^{OUT} + \left(\frac{F(O)}{F(L)}\right)^{1/2} \tau^L}{1 + \left(\frac{F(O)}{(F(L)}\right)^{1/2}}$, and the objective function of the outsider is to maximizes his (expected) votes (expected RHS of 4), given his own charisma and given the platforms chosen by *R* and *L*. This leads us to proposition 2.

Proposition 2: The optimal strategy for the outsider is to set a platform τ^{OUT} such that corner voter 0 is just indifferent between voting and not. Let this platform be τ^*. This platform is the best response given the strategies set by the insider candidates.

Proof: I can show that choosing τ^* will yield the highest possible share of votes for the outsider given the strategies of the other candidates. Assume the outsider chooses a platform slightly to the right of τ^*, say $\tau^{**} = \tau^* + \varepsilon$. The indifferent voter on the left side is given by the following condition: $\tau^i = \tau^{**} - \left(\frac{F(\theta^{OUT})}{c}\right)^{1/2} = \tau^* + \varepsilon - \left(\frac{F(\theta^{OUT})}{c}\right)^{1/2}$, but the indifferent voter under τ^* is zero, so we know that $0 = \tau^* - \left(\frac{F(\theta^{OUT})}{c}\right)^{1/2}$, therefore $\tau^i = \varepsilon > 0$. By moving to the right of τ^*, the outsider loses a fraction $\varepsilon > 0$ of voters.

On the right side the indifferent voter now is given by the following condition: $\tau^j = \min(\tau^* + \varepsilon - \left(\frac{F(\theta^{OUT})}{c}\right)^{1/2}, \tau^e)$, where τ^e represent the indifferent voter between the outsider and the candidate from party L. If the two candidates do not intersect voters then the outsider candidate gains the same fraction of votes on the right as the ones he lost on the left. Conversely if they do intersect, then the outsider will lose a fraction of votes to the L candidate.

Finally if the outsider chooses a platform slightly to the left of τ^*, such as $\tau^{***} = \tau^* - \varepsilon$, then his voting share will be reduced, since the indifferent left side voter will be less than zero (that is $\tau^i = \varepsilon < 0$). On the right side, he may gain a fraction of voters if his voters were previously intersecting with candidate L's voters, but he would earn fewer votes than the ones he lost on the bottom. If τ^e was not active, then he would only lose votes.

Therefore choosing τ^* is the best response and given the strategies by insiders, dominates all other possible choices.■

This strategy will imply that in general $\tau^* < \tau^m$. The outsider will choose a platform to the left of the median voter.

Corollary 2: *Centrist populists*. Although most populist will choose extreme platforms, we show that the more charisma a populist has, the more he can move towards the center.

Proof: Just by observing the fact that $\tau^* = \left(\frac{F(\theta^{OUT})}{c}\right)^{1/2}$, we can calculate $\frac{\partial \tau^*}{\partial \theta^{OUT}} = \frac{1}{2}\left(\frac{c}{F(\theta^{OUT})}\right)^{1/2} \frac{F'(O)}{c} > 0$. Therefore more charisma will mean the populist can build a bigger coalition, and this will be done by a choosing a more centrist platform, while still getting votes from the far left.■

4. Results and Analysis

The simple framework described above yields some interesting predictions concerning the results of elections. In particular the composition of the electorate will matter in determining who wins the election.

Proposition 3: An increase in the fraction (α) of contributor voters reduces the probability of election of an outsider in two different ways:

a) Higher α strictly reduces the share of impressionable voters.

b) Higher α increases contributions for party candidates.

Proof: For the first part, a higher α strictly reduces the pool of potential voters for the outsider as it can be seen directly from (4). For the second part of the proof

using the expression for τ^e we have $\frac{\partial \tau^e}{\partial \alpha} = \frac{\frac{\partial K}{\partial \alpha}(\tau^L - \tau^{OUT})}{(1+K)^2}$, where K=$\left(\frac{F(O)}{F(L)}\right)^{1/2}$, and

so the sign of $\frac{\partial \tau^e}{\partial \alpha}$ will be the same as the sign of $\frac{\partial K}{\partial \alpha}$, where:

$$\frac{\partial K}{\partial \alpha} = \frac{-M}{4\beta}\left(\frac{F(O)}{(F(L)}\right)^{1/2}\frac{F'(L)}{F(L)}\left\{\frac{\tau^R + \tau^L}{2} - (\tau^C - \beta)\right\} \qquad (5)$$

which is negative as long as the halfway point between R and L is a contributor, since *F(·)* is an increasing function. The reason for this is that an increase in the share of contributors α reduces the share of votes the outsider receives if there are initially voters that are indifferent between the outsider and L. In such case an increase in α causes these previously indifferent voters to favor L due to the higher contributions received by L. ■

Corollary 3: A country with higher concentration of wealth is more likely to elect outsiders than a country with more equal distribution of wealth.

Proof: This follows directly from proposition 3 if we assume that a lower α implies that wealth is more concentrated. ■

This result arises from the fact that a higher concentration reduces total contributions, and therefore the share of votes by insiders. An alternative would be to keep (αM) constant and then allow α to change but keeping total contributions constant. In this

case there is still a reduction in the probability of electing an outsider with higher α[20]. However the effect now comes only from the first effect, the fact that a higher α implies that there are fewer "impressionable" voters that the outsider can lure, therefore reducing his/her "base" and consequently his/her share of votes as well. Another interesting corollary is that if we assume that economic crises can shift people from one group to another, say by reducing α, then the model would predict that an outsiders' chance to get elected increases during a crisis.

The model predictions are explained basically by the following issues. First, consider the constraints faced by both insiders and the outsider. Insiders are constrained in their platform choices, since they need to obtain contributions to finance their campaign. In this context both parties fall in a trap, where even if they wanted to move further towards the median voter, they would lose contributions and hence they would not be able to get out their message. The problem is that insiders must care more about contributions than about the citizens' preferences, and this arises from the fact that without money it is harder to run a campaign, unless the insider has a very high level of charisma.

On the other hand, the outsider is constrained by his endowment (of charisma, charm, etc). He is free to choose any given platform, but cannot control his endowment or

[20] Yet another possible assumption is that contributors give a fixed "share" of their income. If we keep the average income constant Y, then an increase in α must decrease the relative income of the rich in order to maintain the average income. Let $M=\gamma y_r$ where γ is the share of income devoted to contributions and $y_r>1$ is the income of the rich, and assume $y_p=1$ is the income of the poor. Then $Y= \alpha y_r+(1- \alpha)$ and $M=\gamma[Y-(1- \alpha)]/\alpha$. Now $\alpha M=\gamma[Y+\alpha-1]$, and $\frac{\partial(\alpha M)}{\partial \alpha} = \gamma >0$. Thus a rise in α, maintaining average income constant, this just increasing inequality, still increases total contributions, and therefore reduces the chances of re-election of the outsider.

raise campaign contributions. He/she chooses the platform that yields him the highest possible share of impressionable votes, but this is not always enough to get elected.

Now consider a variation in the game presented above in which there is an additional stage in the model, just before elections, where traditional parties in fear of losing to the outsider agree to share government in some way[21]. In this scenario the results depend on certain assumptions we make on what can each party do. I assume that once a candidate chooses his platform, he cannot deviate from this commitment. This assumes the candidates care about credibility. In this sense, it can be argued that a candidate would be accused of "flip-flopping", lose his credibility and consequently potential voters if he changes his platform. I also assume that voters vote sincerely in this part of the game[22]. [23]

Thus the game changes in the following way. After the outsider is selected, the party candidate with lowest charisma drops out and the other party candidate retains his/her previous platform which will be denoted by *P*; and I will assume that the money spent on the other candidate is passed on to the other candidate[24]. That is: $\tau^P = \tau^R$ if $\theta^R > \theta^L$ and $\tau^P = \tau^L$ otherwise and $M^P = M^R + M^L$. Under these conditions we can posit the next result.

[21] In order for this to occur at least one of the parties must perceive a very large disutility from electing the outsider.
[22] This is only necessary for the corollary not for the proposition.
[23] We can think of this as assuming there is a runoff between the outsider and one of the other two parties.
[24] Recall that parties wish to maximize votes, and combining the money from both candidates implies that the higher charisma candidate in general attract more votes.

Proposition 4: If one traditional party candidate drops out of the election, the probability of electing an outsider is reduced.

Proof: The proof is done in two parts. I first show that P will have higher votes than either party candidate before. Then I show that the share of votes to the outsider will not increase enough to increase the probability of election.

From the share of votes each party receives, the traditional party *P* will now get the votes from both sides, such that his/her expected share of votes V^P will be: $V^P = \alpha + (1-\alpha)\left\{\min(\tau^P + \left(\frac{F(P)}{c}\right)^{1/2}, 1) - \max(\tau^P - \left(\frac{F(P)}{c}\right)^{1/2}, \tau^e)\right\}$, which is greater than the share of votes *R* and *L* initially had, since now candidate P has all contributor voters plus votes form the other party candidate.[25] The exact share of votes from the other party candidate depends on the specific choice of platform and specific charisma, but it is always larger than the previous case.

If the outsider faces the candidate from the L party, then he/she will obtain at most the same share of votes, or if the additional money buys enough votes for *P*, then the outsider may even see his/her vote share reduced. To see this recall from (4) that $V(OUT) = (1-\alpha)\left\{\min\left(\tau^{OUT} + \frac{F(\theta^{OUT})}{c}, \tau^e\right) - \max\left(\tau^{OUT} - \frac{F(\theta^{OUT})}{c}, 0\right)\right\}$. Now an increase in money for *L* will only affect this expression through a change in τ^e.

[25] Note that $F(P) = F(\theta^P + M^P)$, where M^P may include donations from both *R* and *L* or alternatively only the donations that *R* or *L* had before the other candidate dropped out, and $\theta^P = \max(\theta^R, \theta^L)$.

Given $\tau^e = \frac{\tau^{OUT} + \delta^{OL}\tau^L}{1+\delta^{OL}}$, where $\delta^{OL} = \left(\frac{F(O)}{F(L)}\right)^{1/2}$, an increase in money for *L* reduces the term τ^e, since $\frac{\partial \tau^e}{\partial M^L} = \left(\frac{\tau^L - \tau^{OUT}}{\left(1+\delta^{OL}\right)^2}\right)\frac{\partial \delta^{OL}}{\partial M^L}$<0. This is true since $\frac{\partial \delta^{OL}}{\partial M^L}$ <0 and $\tau^L > \tau^{OUT}$.

If, on the other hand the outsider faces the candidate from the R party, then he/she could theoretically increase the share of votes, since τ^R is further away from τ^{OUT} compared to τ^L. However, any increase in the vote share for the outsider would be marginal as it can only go from V(OUT)= τ^e to V(OUT)= $\left(\tau^{OUT} + \frac{F(\theta^{OUT})}{c}\right)$ if *R* cannot reach any voter *L* reached before. This increase in voting will smaller than the increasing in voting for R, since R's vote share is increased to capture votes on both sides of his/her platform. If there is no indifferent voter between the outsider and candidate R, then in fact R has doubled his/her votes. Otherwise, the increase will be less than double, but significantly larger than the increase for the outsider. Thus the probability of electing the outsider is reduced. ■

Corollary 4: A country with a runoff election has a lower probability of choosing an outsider than a country with a "first past the post" election rule.

Proof: This follows directly from proposition 2 if we assume that a runoff is equivalent to having a candidate drop out of the election, with the additional requirement of sincere voting in the first round. ■

Finally I consider the impact of the bias in preferences of the median contributor compared to the median voter. I summarize this result in the following proposition:

Proposition 5 (Elite vs "the people"): If the preferences of the median contributor are further away from the median voter, then the outsiders odds of winning increases.

Proof: The proof follows from the expressions for the share of votes that each candidate obtains. In particular if both party candidates converge to the median contributor, but this contributor is more skewed to the right, then if the outsider has a high draw of charisma, he has more space towards the middle before he has to compete for votes against L, increasing the odds of winning. ■

This last proposition to some extent may reflects in part the feeling in Latin America that outsiders have a better chance when traditional parties are not delivering what is expected from them. In effect if traditional parties become more biased, then the populist-outsider is indeed in a better position to win the election. If in addition we conjecture that charisma also measures some desired quality and furthermore

conjecture that corruption by politicians may diminish charisma for *both* parties, then the outsider have an even better chance of winning the election.[26]

5. Comparing Populism in Europe and Latin America[27]

One interesting feature of modern populism is that most populist movements in Europe have a "right-wing" platform while most populist movements in Latin America appear to be running on a "left-wing" platform. Mudde (2004), Adams (2003) and Taggart (2004) document the following "right-wing" populist movements in Europe during the last 15 years: Le Pen's National Front in France; Fortyun's in Netherlands; the FPO in Austria; Berlusconi's *Forza Italia* in Italy; and other small parties in Switzerland, Norway, Denmark and Germany.

Although these parties or movements are not the same, they all follow certain patterns, such as the appeal to "the people", the nationalistic themes (in this case mostly as euro-skeptics) and general distaste for "the elites". Moreover their appeal is mostly seen as right-wing at least regarding their stand on immigration and integration with the rest of Europe. European populists typically argue that existing redistribution benefits (illegal) immigrants and government bureaucrats (which may be considered the elite) at the expense of the average "national citizen", and propose a reversal of such redistribution.

[26] There is at least anecdotal evidence that corruption may have an overall negative effect on democracy itself, since voters may attach beliefs of corruption to *all* parties, and not only to the one(s) in power.
[27] I thank Filipe Campante for suggesting looking at this issue.

In contrast when looking at the Latin American version of populism in Argentina, Bolivia, Ecuador, Peru and Venezuela we observe a different version of populism, more in the spirit of Dornbusch and Edwards (1989), directed at re-nationalizing the privatized public enterprises, agrarian reform and generally a taste for extreme left-wing policies of redistribution. Their desired redistribution therefore goes from the wealthy land-owner elites or foreign corporations towards "the poor" which coincides with "the people" in their case.

The framework proposed in this paper can explain the emergence of both types of populism. In fact if we conjecture that the elites are actually located "left-of-center" in Europe while "right-of-center" in Latin America, then the conundrum is resolved, since the model predicts populism arising from the opposite side. The main issue is to understand and explain *why* the elites would be located in different places. I have proposed above that the elites perhaps are not the same in both cases. In Europe populism represents a backlash against immigration and government bureaucrats since the former have access to the welfare state and therefore increase the tax bill, while the latter would increase the tax bill directly as well. This proceeds from the fact that taxes are already very high in Europe and significant redistribution already occurs. In Latin America by contrast populism is typically directed against the "traditional parties", which have ties to the economic elite as thus obtain favors for them.[28] In this case government bureaucrats are seen as part of the same economic

[28] The exception is that in Argentina the populist movement has always been against the land-owner elite.

elite, and given the high levels of poverty and inequality prevailing in the region, it is no surprise that populism looks for more redistribution of wealth, via nationalization of firms or expropriation of land.

6. Extensions

This section contains a few extensions of the basic model and future ideas for changes or additions to the model that could help understand other populist phenomena.

Populist Parties or Populist Strategies

First consider the following variant in which there is only one traditional party running for the election. Moreover I will assume that the other "traditional" party decides to run a "populist" strategy, such that we will now have parties T (for traditional) and P (for populist). [29] In this context the optimal strategy for party T will always be to choose the platform preferred by the median contributor, since this will maximize her number of votes. Moreover, party P will always choose a platform such that voter 0 is indifferent just as the outsider would.

In this two party system the odds of winning the election depend on the draws of charisma, but also on the institutional conditions. For example, changes in the shares

[29] The idea is that party P chooses not to accept contributions and thus is "freed" from elite to choose any platform they want.

of contributors or total contributions will affect the number of votes. A higher share of contributors increases the share of votes of T, while more skewed contributors increase votes for P. If contributions are reduced, for example due to economic crises, then party P has a higher probability of winning.

Campaign Finance Reform

Another extension deals with either capping contributions, or public funding of elections. Either institution will cause a reduction in the probability of electing an outsider. However the consequences of any particular reform are not straightforward, and will depend on the assumptions we build into the model. For example if we decide to cap contributions this would have the following effects. Parties would be able to "buy" fewer votes using their money, but their optimal level of charisma above which they choose to depart from the center will be decreased. In effect, from equation (2) we can observe that a lower level of maximum M will affect the optimal level of charisma for moving away from the median voter. In this context, with campaign contribution caps, parties will converge to median contributor less frequently than under no contribution caps.

The other possibility is for publicly financing campaigns. Under this model if we assume that all parties get a minimum amount of money from public financing, then this would generate the following results. Traditional parties would not change their behavior other than increasing the threshold level of charisma for moving away from

the median contributor. The argument is the same line of reasoning as in the previous case but now party candidates in a sense start with a higher level of the initial charisma-money endowment.

The more interesting case combines both features: campaign limits with public funding. In this scenario, both candidates may diverge from the median contributor since their optimal strategy can now be to cater to contributors just enough to obtain the maximum permitted. They will still choose their platform such that it will be most preferred platform of *some* contributor, but not the *median* contributor. The argument for candidate *R* is as follows. She chooses a platform such that she gets exactly the contributions needed to complete the cap. If she moves from there to the left, then she loses some money and therefore voters. If otherwise she moves to the right, she does not get more money since she cannot receive any more, and thus loses voters given that L will have a closer platform to hers. Therefore her optimal strategy is to choose a platform just sufficient to complete her cap.

Endogenous Contributions

One limiting feature of the model presented here is that contribution levels are exogenously identical for all contributors. An interesting extension is therefore to allow the level of contributions to be varying and endogenous. This requires certain changes in the model. We now have to model contributors in a more sophisticated way, and this will bring some problems. The first issue that arises is the free rider

problem. Given that I have assumed a continuum of contributors, if I allow them to choose a level of contributions, they will always choose zero, since the "individual effect" of choosing zero does not affect total contributions. To overcome this issue we need therefore to make some additional assumptions. I assume that each contributor will contribute a given amount depending on the distance from the platform proposed by the candidates. Therefore his contributions will be given by the following expression: $M^i = \max(\overline{M} - \varpi(\tau^k - \tau^i)^2, 0)$. So he will contribute up to $\overline{M}$ to the candidate that is closest to him, and the amount contributed will be reduced if the candidate chooses a platform away from his most preferred one[30]. Depending on the parameters we can obtain different total profiles and optimality conditions for the parties. If ϖ is very high, then there will be contributors that will not give money, since the distance effect will dominate. Otherwise if ϖ is low, it may be that all contributors give some money, but the ones closest to the candidates give the most.

The optimal behavior of parties will also depend on these parameters. A low ϖ will generate a profile of contributions closer to the case of a fixed amount, while higher values may shift optimal platform choice away from the median contributor. An interesting case, for example, is if we assume that the median contributor and median voter coincide, and that contributors and voters are equally distributed. In this context if there is no outsider, the optimal strategy for both candidates will be to choose a

[30] This profile of contributions can also be obtained by assuming that contributors belong to a group (of similar preferences), and they all follow the optimal rule, otherwise if they deviate they get socially punished with a big enough cost that it would make it too costly to deviate. This kind of behavior is similar to the one modeled by Coate (2005).

platform such that the extreme voter on their side just votes for them[31]. In this case more charisma will play the same role as for the populist, meaning it will drive them to the center, while less charismatic candidates will move to the extreme.

The middle class

Given that the Dornbusch and Edwards (1991) definition of populism relies on redistribution, we can infer that higher levels of poverty or more income inequality may lead towards populism. I have shown in a very simplistic form the role of inequality, and given that I only model two groups of people this is also a proxy for poverty. This simplification, although useful for capturing some features, is perhaps very naïve. To overcome this we might want to model other voters explicitly. One alternative is modeling the middle class. In the next chapter of this dissertation I add a group of voters that is neither impressionable nor contributors, and similarly distributed in the [0,1] line such that we can enrich the analysis from the income distribution perspective.

7. Conclusions

The history of populist and outsider governments in the world is probably far from over. In fact in recent years we have seen an increasing number of populist-outsiders

[31] The argument is the same as for the outsiders, choice. Moving towards the center will give them neither more money nor consequently more votes.

who have come into power. This chapter presents a simple theory that attempts to explain why populists are successful in running for office.

The chapter presents a model of political competition in which two parties and an outsider run for office. The main results of the model show under what circumstances an outsider is more likely to succeed. I have shown in a simple framework how income distribution and electoral institutions and preferences can play a role in facilitating or not the election of populist candidates. The implications of the model are yet to be tested empirically.

Chapter 2: The Effects of Income Distribution on Electoral Outcomes: the role of the middle class

> *"Thus it is manifest that the best political community is formed by citizens of the middle class, and that those states are likely to be well-administered in which the middle class is large, and strong... (f)or the addition of the middle class turns the scale, and prevents either of the extremes from being dominant". Aristotle, Politics (306 BC)*

1. Introduction

There is ample anecdotal evidence that indicates that a larger and stronger middle class is associated with more political stability and less extreme policies. Among the few attempts to explore this question empirically, Easterly (2001) finds that a stronger middle class (measured as the share of national income going to quintiles 2, 3 and 4) has a positive effect on democratic stability, by increasing political freedoms (civil liberties and political rights) and reducing the number of revolutions and coups and changes to the Constitution.

To add some additional evidence for policies within a democracy I present some preliminary results from analyzing voting behavior from the US Congress. Taking the square of Poole and Rosenthal's DW nominating score for the 106th Congress as

measure of policy extremism, I regress this variable against certain district characteristics, particularly the size of the middle class in the district, which is computed from the Summary File 3 of the 2000 US Census[32]. My results, summarized in Table 1, show that the size of the middle class seems to play an important role in reducing extreme policy outcomes[33].

Table 1: Regression Results: Dependent Variable: Square of DW Nominate Score (Poole & Rosenthal) for 106th Congress

	(1)	(2)	(3)
Middle Class Size	-0.283*	-0.508***	-0.304*
	[0.162]	[0.167]	[0.178]
Log of Median Income	0.036	0.048	0.053
	[0.036]	[0.035]	[0.035]
Democrat		-0.062***	-0.069***
		[0.014]	[0.014]
% of Black Population			0.149***
			[0.049]
Constant	0.058	0.158	-0.084
	[0.313]	[0.307]	[0.315]
Observations	437	437	437
R-squared	0.01	0.05	0.07

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

[32] The DW nominating score measures on a [-1,1] scale how liberal/conservative is each Representative in that Congress, based on his voting record. A value of zero is a moderate, while -1 indicates extreme liberal and 1 extreme conservative. The middle class is measured as the share of population that is not poor and has a household income below $200,000.

[33] Unfortunately I cannot test for the relative strength of the middle class with this procedure since the Census results are top-coded at $200,000.

Hence the evidence seems to suggest that the middle class reduces policy extremism. But why does the middle class reduce extremism? A simple answer is that the middle class is a large and homogenous group that can either vote/contribute as a bloc to get their preferred policies, which would lie between those preferred by poor and rich groups. The problem with this answer is that it is based on the assumption of ideological homogeneity of the middle class. And as I show in Table 2, according to the 2004 Annual National Elections Study the average value of the liberal-conservative self identification is very similar for each income group[34] [35]. Table 2 also indicates that the standard deviation of preferences, shown in parentheses, is similar for each group[36]. So the middle class does not seem to have preferences that necessarily lie between the rich and the poor, which gives us the following puzzle: If the middle class is not homogenous why do they moderate policy outcomes?

[34] The liberal-conservative self identification consists in asking citizens to ideologically self locate themselves on a 7 point scale from extremely liberal to extremely conservative.

[35] Gertais (1998) divides the middle class into at least two distinctive groups (and in some cases three) in terms of their political alignment, clustering the groups by professions.

[36] I also cannot reject the equality of means and of standard deviation for each sample. The results hold for other thresholds of income and for other similar questions in the survey.

Table 2: Political Ideology by Income Group 2004

Group	Mean Political Ideology (Std. Dev.)	Income threshold	No. Obs.
Low income	0.50 (0.24)	y<24,999	151
Middle Income	0.54 (0.22)	25,000<y<89,999	434
High Income	0.55 (0.26)	y>90,000	192
All Groups	0.54 (0.24)	All reported	777

Source: ANES (2004)

In this paper I present a three class model of elections. The setup is characterized by a middle class with heterogeneous preferences which may be similar to other income groups; where contributions by rich individuals may have more impact on policies than contributions by the middle class; and where participation rates may vary with income. Despite these "disadvantages" I show under which conditions a larger or more powerful middle class generates less extreme outcomes, measured as policy deviations from the median voter's most preferred policy.

The model relies on campaign contributions and voting as two ways of influencing candidate's policy proposals. In particular, the model endogenously generates two opposing forces, where money from campaign contributions drives policies towards the extremes of the policy spectrum, while votes have the opposite effect of driving

policies towards the center. The interaction of these two forces will generate different policy outcomes given different distributions of income.

The results indicate that the middle class is relevant as a force towards centrist policies, playing three distinctive roles in mitigating extreme outcomes. The first and obvious role is that a larger middle class implies more votes; and if, as documented in the literature (e.g. Wolfinger and Rosenstone, 1980), participation rates vary with income, a larger middle class increases the power of votes relative to money. The second role is less obvious: an increase in the strength of the middle class may actually reduce contributions per-se, or the relative power of contributions compared to votes. Finally, in an environment where I allow the rich group to be biased, both a larger and richer middle class bring policies closer to the center, by bringing the money induced "political center" closer to the median voter's preferred policy.

The rest of the paper is organized as follows. Section 2 presents the literature that most closely relates to this paper. In section 3 the benchmark model is set up. Section 4 looks at changes in income distributions in the basic framework. Sections 5 and 6 introduce alternative specifications and discuss these results. Finally section 7 concludes.

2. Related Literature

This paper relates to two different strands of the literature. First it is related to literature that looks at the effect of the income distribution on elections in general and

policy outcomes in particular. Within this strand this paper is related more closely to the literature on the effects of the middle class on policy outcomes. The paper also is related to the literature on how contributions affect electoral outcomes. This paper falls closer to papers that look at how money affects policy positions/outcomes of elections.

Within the first strand, the literature often argues that a large middle class is a necessary condition for political stability and democracy (e.g. Lipset, 1959). From the political perspective, the middle class serves as a buffer between the rich and the poor, hence promoting higher stability in democratic regimes, or facilitating transitions to democracy as modeled by Acemoglu and Robinson (2006). The middle class in this view is necessary for stability since they crave freedoms of speech and expression, but do not want major expropriation of private property that would come from a revolution. Thus the middle class will support the establishment of a democracy, and will be willing to redistribute some income to the poor to avoid a revolution and to obtain economic and political freedoms in exchange. In this way they become a buffer between the rich and the poor. There is certainly some empirical support for this view. As mentioned earlier Easterly (2001), while studying the so-called middle class consensus, finds that a stronger middle class also has a positive effect on democratic stability. Unfortunately Easterly (2001) only focuses on a proxy for middle class strength while assuming its size is constant[37].

[37] Other studies define the middle class in different ways, but do not attempt to explore the effects of the middle class on policy outcomes. For example Birdsall et al. (2000) has a framework to look at changes in the size of the middle class, defined as the group with income between 75%-125% of the median per capita income of a country. Banerjee and Duflo (2008) define the middle class as the group

In addition in this story, political stability is threatened mostly by the demise of democracy itself and Easterly (2001) only tangentially looks at the stability of policies or stability within the democratic system.

In general the literature has made few attempts at looking at the effect of the middle class on policy outcomes. Most papers that look at the effects of the income distribution rely on some version of the Meltzer & Richards (1981) model to look at the effects on redistribution policies. Borck (2007) summarizes the results of this kind of model under the basic framework and several extensions. These models ask if higher inequality leads to more or less redistribution of income via taxes and government spending. The basic framework predicts higher inequality leading to higher redistribution, but there is little empirical support for this prediction in the papers Borck surveyed. This motivates alternative explanations of why inequality does not lead to higher redistribution.

The main alternative explanations rely on one of the following ideas:

1. Political participation is different for different income groups, either because of differences in voting patterns or due to contributions that may end up weighting votes differently.(Benabou, 2000; Rodriguez, 2004; Campante, 2008).

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that has income between US$2-US$10 a day PPP for a group of low and middle income countries. Both of these definitions focus on the size but not on the strength of the middle class.

2. Redistribution is via taxes which can be avoided/evaded, and thus the actual redistribution is less than the "desired" redistribution. (Borck, 2003; Rodriguez, 2004; Roine 2006).
3. Citizens do not want redistribution of income since they believe in the potential of upward mobility (POUM) hypothesis, and therefore high taxes may affect one in the future (Benabou and Ok, 2001; Harms and Zink, 2003; Bartels, 2007).

While all these are plausible explanations they do not look explicitly at the middle class and its role. There are a few exceptions. For example, Harms and Zink (2003) numerically show how the middle class can tip the scale of redistribution one way or the other. Zink (2005) shows how the middle class can in fact prevent higher economic growth and equality, by constraining access to higher education for the poor, since this policy increases the returns from education for the middle class. Gruner and Schils (2007) present a three class model to look at redistribution policies in which the middle class becomes the pivotal group favoring more or less redistribution depending on the benefits it entails to them as a group. Finally Roemer (2001) presents a model in which the middle class can affect policies (tax and spending) by becoming the pivotal group in a three class framework, and thus bring policies in line with their own preferred platforms.

One important problem with all of these models is that they either assume that the middle class can be reduced to a representative agent, or alternatively that the middle

class consists of a group with similar policy preferences, which in most cases "lie between the rich and the poor". As was mentioned above, the evidence indicates that the middle class is not necessarily homogenous in policy preferences. The second problem with this literature is that it does not directly explore the two different margins that may define a middle class: its size and its strength. By size I mean the fraction of middle class citizens, and by strength I mean the income of the middle class relative to the rich. Why do we want to look at these two different margins? If the middle class only participates in politics by voting, then the size of the middle class may be enough to explain the effect they have on electoral outcomes. A small middle class would thus have fewer votes and therefore would have to compromise policies into some other coalition to obtain some policy benefits. A large middle class in contrast may be able to obtain the policies they prefer without compromising them. However if the middle class can also affect policies by contributing to political campaigns, then a small but rich middle class may have a significant effect on the policies offered by politicians and the consequent electoral/policy outcomes.

The second strand of the literature that this paper relates to concerns the effects of contributions on electoral outcomes. The literature on campaign contributions is needless to say extensive. Grossman and Helpman (2001), Persson and Tabellini (2000) and Mueller (2003) provide summaries of the effects of contributions on electoral outcomes.

In particular the model of this paper fits within the tradition of models where contributions lead towards more extreme outcomes. There are many models in the literature (e.g. Austen-Smith 1987; Ball (1999); Ben-Zion and Eytan 1974; Bental and Ben-Zion 1975 and Welch 1974, 1981 are a few examples) that capture this idea of money driving policies away from the ideological center. Mueller (2003) has a good summary of the forces involved. However most of these models assume that those with money have a preference that is located in the extreme, rather than deriving this result endogenously. Special interest group models such as those presented in Grossman and Helpman (2001) are a particular case. Coate (2004a, 2004b) also presents models where the money is located towards the extremes of the political spectrum. Glazer and Gradstein (2005) present a model in which they endogenously derive that citizens located at the extremes contribute more than those in the center. The form of the utility function is crucial for generating this outcome. In fact as will be seen, the model I present does not require those at the extreme to contribute more to obtain divergence from the center.

In summary this paper allows us to fill the following gaps in the literature. Concerning the first strand of the literature, the model presented here generates the result of a middle class generating policy closer to the center of the political spectrum without assuming that the middle class is ideologically "in the political center". The model also allows us to distinguish between two characteristics of the middle class, its size and its strength as their effects on the policy outcomes. With regard to the second strand of the literature the model presented in this paper allows us to obtain

the result of money driving policies to the extremes, without assuming that the money is located in the "political extremes".

3. Benchmark Model

I first set up a simple model where money and votes interact to determine optimal policy platforms, where agents differ only in policy preferences. I will later introduce income differences and look at the effect of changes in the distribution.

Voters/contributors

The setup follows the probabilistic voting model framework. The voter has single peaked policy preferences τ^j over policies τ drawn from a uniform CDF $F(\cdot)$ over the interval [0,1]. The voter observes two candidates' policy proposals and chooses to contribute or not to each of them based on the policies proposed by each candidate and their own preferred policy. I'll assume that contributions from an individual contributor j to candidate k (which is the candidate closest to her preferred policy) are given by the following function:[38]

$$m^j = w - c\left|\tau^j - \tau^k\right| + \beta\left|\tau^j - \tau^{k\prime}\right| \qquad (1)$$

[38] One way of rationalizing this framework is to think that voters are political consumers and as such decide to consume political goods as proposed by Ansolabehere, et al (2003). These goods may be voting and contributing to campaigns. Let voters dispose of a certain amount of resources w to consumption of political goods. If voting is costly in the sense that voting for candidates with policy platforms that are further away from the ones preferred by the voter is costlier, then contributions will have the same shape as described in (1).

given platforms τ^k and $\tau^{k'}$ proposed by parties k and k′, where $(w+\beta)$ is the maximum amount someone would ever contribute.[39]

I assume that both *w* and β can be increasing functions of income y, thus w′(y)>0 and $\beta'(y)>0$. All voters/contributor initially are assumed to have the same income *y*. The contribution function has the following properties:

a) It is decreasing in the distance between the policy proposed by the candidate and the most preferred policy of any citizen.
b) It increases with the distance between the two candidates.
c) It is increasing in *w*, where $w'(y)$ can be thought of as the fixed marginal propensity to contribute.

Note that b) directly generates an incentive for candidates to differentiate from the other candidate, driving policies away from each other as a centrifugal force. This is captured by the parameter β.

I will show in Proposition 1 how a) can increase the centrifugal force. This is captured by the parameter *c*. So we can think that contributions have two components: a fixed amount *w* that does not depend on the proposed policies and a variable amount (which can be positive or negative) that depends on the platforms

[39] This is the amount someone with most preferred policy $\tau^j = 0$ would choose to contribute to the party that proposed $\tau^k = 0$ assuming the other party chooses $\tau^{k'} = 1$.

proposed by the candidates. The fixed portion will actually drive policies towards the center as a centripetal force as we will see in Proposition 3. We now turn to what candidates do.

Candidates

Candidates propose policy platforms τ^k and $\tau^{k'}$ and run for office. Denoting the two parties as *R* and *L*, I'll assume for simplicity that $\tau^R \geq \tau^L$. Candidates differ only in their policy platforms; thus all agents with $\tau^j < ((\tau^R+\tau^L)/2)$ will contribute/vote for *L*, while all agents with $\tau^j > ((\tau^R+\tau^L)/2)$ will contribute/vote for *R*. Therefore for a voter with income *y* we have that total expected contributions for each party are given by:

$$M^L(\tau^R, \tau^L) = \int_0^{\tau^{bar}} \left[w - c\left|\tau^j - \tau^L\right| + \beta|\tau^R - \tau^L|\right] dF(\tau^j)$$

$$M^R(\tau^R, \tau^L) = \int_{\tau^{bar}}^{1} \left[w - c\left|\tau^j - \tau^R\right| + \beta|\tau^R - \tau^L|\right] dF(\tau^j)$$

Where $\tau^{bar} = \frac{\tau^R+\tau^L}{2}$ and integrating the expressions yields the following two contribution functions:

$$M^L(\tau^R, \tau^L) = w(\tau^{bar}) + \frac{\beta}{2}[(\tau^R)^2 - (\tau^L)^2] - \frac{c}{2}\left[(\tau^L)^2 + \left(\frac{\epsilon}{2}\right)^2\right] \qquad (2)$$

$$M^R(\tau^R, \tau^L) = w(1 - \tau^{bar}) - \frac{\beta}{2}[(\tau^R)^2 - 2(\epsilon) - (\tau^L)^2] - \frac{c}{2}\left[(1 - \tau^R)^2 + \left(\frac{\epsilon}{2}\right)^2\right] \qquad (3)$$

With $\epsilon = \tau^R - \tau^L$. Therefore total contributions for each candidate are a function of the platform choices by both candidates and the behavioral parameters *w*, *c*, and β. Ceteris paribus increasing *w* or β will increase total contributions, and an increase in c will decrease total contributions. A higher w implies a higher propensity to contribute regardless of the candidates, while a higher β represents the marginal distaste for the "other" candidates policy. Finally a higher *c* means a higher marginal distaste for the contributor's preferred candidate.

I will assume for now that contributions do not affect electoral outcomes directly, but rather are pocketed by the candidate[40]. This is done for illustrative purposes, since we allow for contributions to play a more significant role in a following section. Hence candidates will be office motivated but will also desire contributions. Thus the objective function for a candidate from party k is to maximize her expected utility:

$$U^k = W(M^k) + \Omega \cdot V^k \qquad (4)$$

with *W* a function that maps expected money into the utility function with $W'>0$, Ω are office derived benefits and V^k is the probability of being elected. Then substituting *R* and *L* for *k* the respective utility functions for each candidate are given by:

[40] Glazer and Gradstein (2005) present a model in which candidates seek to maximize contributions rather than just votes.

$$U^R = W(M^R) + \Omega \int_{\tau^{bar}}^{1} dF(\tau) \tag{5}$$

$$U^L = W(M^L) + \Omega \int_{0}^{\tau^{bar}} dF(\tau) \tag{6}$$

To keep things simple I assume that *W(M)=M* for the rest of the model; thus money is quasilinear in this utility function. This assumption allows us to obtain some interesting closed form solutions and does not affect the substance of the game or the main results. The reason is that as long as money increases the utility of the candidate she has an incentive to move her platform such to maximize the amount of money she receives. This changes only qualitatively if we choose a more sophisticated form for *W(M)*.

Benchmark: Median Voter Theorem (MVT)

Lets first look at the case in which money doesn't affect the utility of candidates, i.e. *W(M)=0*. Given that each voter has single peaked preferences and assuming everyone votes, the unique equilibrium is the median voter theorem. This is, both parties converge to the median voter ($\tau^L=\tau^R=1/2$), this platform is implemented and each party is elected with probability one half. The proof is trivial since this game is the classic Hotelling-Downsian model.

Only money matters (extremism)

Now assume the opposite case where only money matters to candidates, not the election's outcome. In this setting the second argument in (5) and (6) is shut down (or Ω=0) and thus candidates only want to maximize monetary contributions. This yields the following result.

Proposition 1: If w<c+β then policies will be polarized when candidates only care about maximizing contributions.

Proof. Taking first order conditions for (2) with respect to τ^L and imposing maxima conditions, we get the following reaction function for L[41].

$$\tau^L(\tau^R) = \frac{2w+c\tau^R}{4\beta+5c} \quad (7)$$

and similarly for R, taking the partial derivative of (3) with respect to τ^R, we obtain:

$$\tau^R(\tau^L) = \frac{4\beta+4c-2w+c\tau^L}{4\beta+5c} \quad (8)$$

Combining (7) and (8) we obtain the following optimal platforms for each candidate:

[41] Second order conditions for maxima hold since $\frac{\partial^2 U^k}{(\partial\tau^k)^2} < 0$ for k=R,L.

$$\tau^L = \frac{2w+c}{4\beta+6c} \quad (9)$$

$$\tau^R = 1 - \frac{2w+c}{4\beta+6c} \quad (10)$$

If $w-\beta<c$ then $\tau^L<1/2$ and $\tau^R>1/2$ so that money generates a desire to locate away from the center. Note that this holds even assuming that if candidates converge to the same platform they still receive money. On the other hand, if $w-\beta>c$ then $\tau^L>1/2$ and $\tau^R<1/2$, thus violating the condition that $\tau^R \geq \tau^L$. Hence in that case money does not exert a polarizing force[42]. ■

The intuition behind the result is that as the candidate moves away from the center (holding the other candidate's platform constant), two things occur. First extreme contributors will increase their contributions since they are now "closer" to the candidate's platform, while centrist contributors will reduce their contributions since they are now further away from the policy proposed by the candidate. Second, as the platform choice of the candidate moves away from the "other" candidate, the highest contribution by any contributor increases.

[42] In what follows I will refer to polarizing or centrifugal forces interchangeably. The idea is that when money makes candidates move away from each other it acts as a centrifugal force; bringing thing away from the center. Pure voting on the other hand will act as a centripetal force bringing candidates closer to the political center (or median voter).

Figure 3 shows the profile of contributions for different choices of L, assuming R chooses $\tau^R = 1/2$. In Figure 4, the purple area on the right represents the loss of contributions from moving away from the center (from $\tau^L = 1/2$ to $\tau^L = 0.4$) while the red area on top represents the gains from moving away from the center. As can be observed, in this figure the gains from moving away from the center offset the losses.

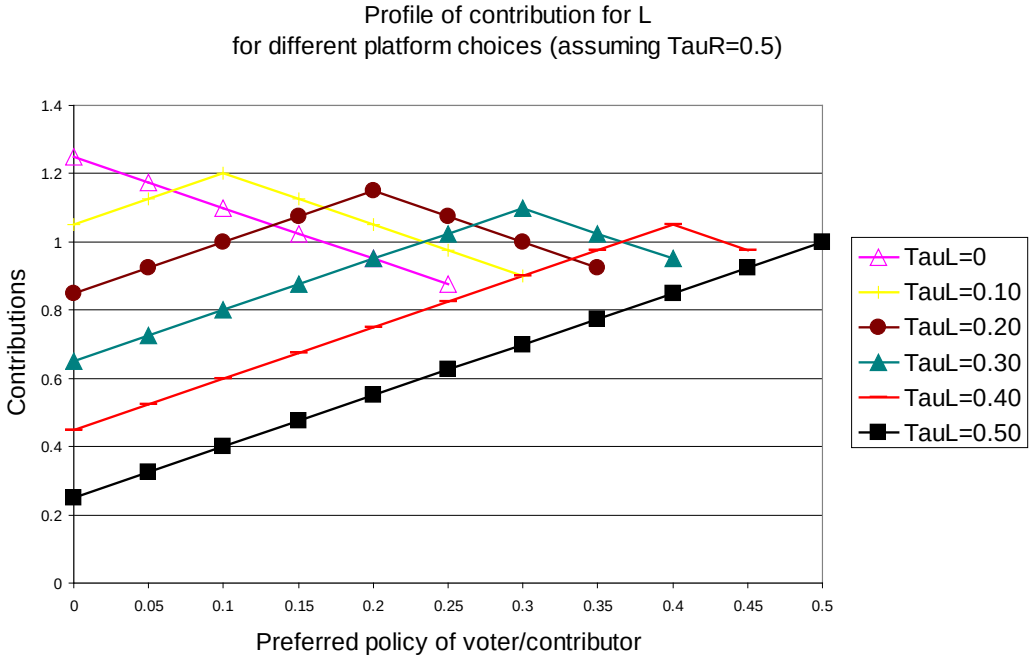

Figure 3: Profile of contributions for L from each contributor

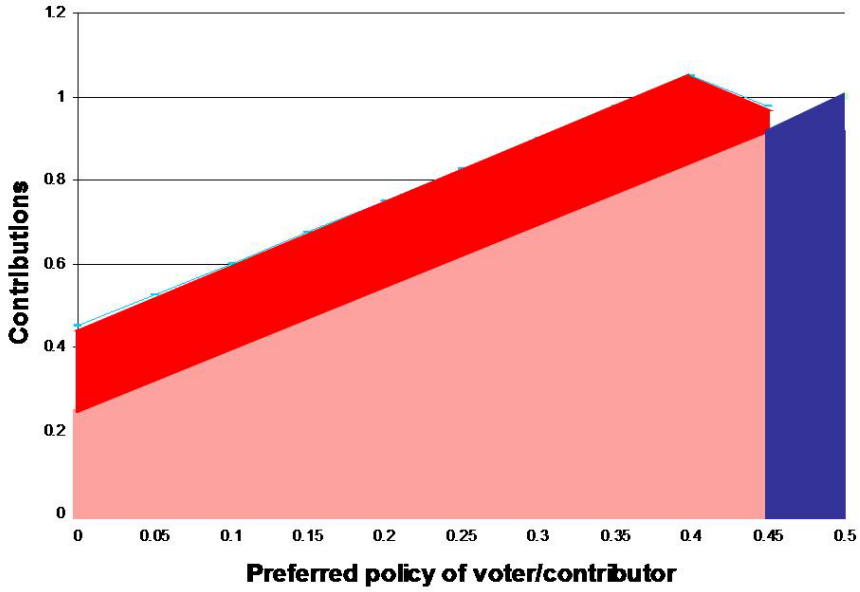

Figure 4: Total Money Contributions for L Choosing τ^{L}=0.5 or τ^{L}=0.4

In the case in which the contribution rate falls slowly (i.e. small *c*) with the distance between candidate and voter, moving away from the center will not yield significant additional contributions[43]. However if c is large, then moving to the extreme increases contributions by those contributor closer to the edge, while reducing those from contributors in the center. The condition $w-\beta<c$ ensures that the gains from moving to the extreme more than offset the losses from moving in that direction. The reason for this is that the rate at which contributions are falling by moving away from the center is outweighed by the increase in the contributions received from all contributors now that candidates begin to differentiate. Note that although assuming $\beta>0$ (meaning that candidates can get more money by making themselves different

[43] Think of the extreme with $c=\beta=0$. Everyone contributes the same, so there is no gain from moving away from the center.

from each other) increases the centrifugal force of money, it is actually not necessary to achieve the policy differentiation. Thus even if $\beta=0$ we can obtain the policy differentiation if $w<c$.

Combining money and votes.

We now combine money and votes and observe both effects interacting with each other. Under certain parameter values more money implies stronger centrifugal forces, while more votes always imply stronger centripetal forces. Thus candidates *R* and *L* solve (5) and (6) to generate:

$$\frac{\partial \mathrm{U}^{\mathrm{R}}}{\partial \tau^{\mathrm{R}}} = \frac{\partial \mathrm{M}^{\mathrm{R}}}{\partial \tau^{\mathrm{R}}} - \frac{\Omega}{2} \qquad (11)$$

$$\frac{\partial \mathrm{U}^{\mathrm{L}}}{\partial \tau^{\mathrm{L}}} = \frac{\partial \mathrm{M}^{\mathrm{L}}}{\partial \tau^{\mathrm{L}}} + \frac{\Omega}{2} \qquad (12)$$

The solution to (11) and (12) will yield policy or best response functions $\tau^R(\tau^L)$ and $\tau^L(\tau^R)$ such that each candidate will have an optimal policy choice for each policy the other party chooses. The equilibrium policies are given by:

$$\tau^L = \frac{2(w+\Omega)+c}{4\beta+6c} \qquad (13)$$

$$\tau^R = 1 - \frac{2(w+\Omega)+c}{4\beta+6c} \qquad (14)$$

which are equivalent to (9) and (10), except that they include the value of being in office. This generates the second result.

Proposition 2: Policies will be closer to the center as the value of being in office increases.

> *Proof*. This arises directly from expressions (13) and (14), in which a higher value for office Ω implies a platform closer to the median voter. ■

As expected we have to opposing forces to deal with. On one hand money plays a centrifugal role (assuming of course $w-\beta<c$), while votes play a centripetal force. We get policy divergence from the center if and only if $w+\Omega-\beta<c$. So in order to have divergence from the center, c now has to be larger than if candidates only care about money.

Proposition 3: A higher fixed amount of contributions w induces convergence to the center.

> *Proof*. This arises directly from expressions (13) and (14), with contributions w bringing the platforms closer to the median voter. ■

The result is entirely explained by the fact that if contributions are fixed, then there is no incentive (gain) to move away from the center. When w is high, money behaves

like votes, in which all citizens have the same influence, so that the median voter theorem is more likely to hold.

This result might be counter-intuitive, but recall that money induces more extreme platforms only if $w-\beta<c$. Thus increasing w will imply less deviation from the median voter. However it must be noted that we are keeping β and c constant. Note that if the variable components of contributions (β and c) change then this drives policies towards the extreme. Thus we have

$$\frac{\partial \tau^L}{\partial \beta} = -\frac{2(w+\Omega)+c}{(2\beta+3c)^2} < 0 \qquad (15)$$

$$\frac{\partial \tau^L}{\partial c} = \frac{\beta-3w}{(2\beta+3c)^2} \gtreqless 0 \qquad (16)$$

where (15) is always negative while (16) is negative *iff* $\beta<3w$. Thus an increase in the rate at which contributions decrease with policy distance c will drive policies to the extreme if and only if the value of $\beta \in [w-c, 3w]$. The lower bound comes from Proposition 1, while the upper bound arises from (16).

So in summary we know that under certain conditions money will drive policies to the extremes. If contributors value differentiation (β) more, then we have more extreme outcomes. An increase in the fixed part of contributions w achieves the opposite effect. Finally the rate at which contributions decrease plays the same role as differentiation in the sense that higher rates of decrease mean that differentiation is more likely.

We can now turn to distributive issues to look at the effects of the distribution of income on the outcome of policies.

4. Distributional issues

In this section I proceed in the following way. I introduce the income distribution by generating three different groups of income which I will denote as poor with a population share α_p; middle class (share of α_m) and rich (share of $\alpha_r=1-\alpha_p-\alpha_m$). Each group has average incomes of $y_p<y_m<y_r$ respectively. In order to simplify notation I assume that $y_p=\phi y_m$ and $y_m=\delta y_r$. Moreover I assume that α_r remains constant, so changes in the distribution will come from either changing average income differences (δ or ϕ) or substituting poor for middle class agents (α_p for α_m). Finally I assume that all income groups share the same distributions of policy preferences $F(\tau)$.

The rest of the model remains the same; candidates choose a policy platform and voters contribute and vote for the candidate closest to their most preferred policy. I am interested in looking at changes in the distribution holding average income constant, so any changes assume that the average income y does not change. I do this by scaling all incomes such that y remains constant, as it is shown below.

Income affecting contributions

Arguably income could affect all three parameters in the individual contribution function (*w, β* and *c*). To keep things relatively simple I assume that income can affect the "fixed portion" *w* of contributions or the variable component *β*. Given these assumptions we can rewrite expressions (2) and (3) such total contributions for both candidates will now be given by:

$$M^L(\tau^R, \tau^L) = \widetilde{w}\tau^{bar} + \frac{\widetilde{\beta}}{2}[(\tau^R)^2 - (\tau^L)^2] - \frac{c}{2}\left[(\tau^L)^2 + \left(\frac{\epsilon}{2}\right)^2\right] \quad (17)$$

$$M^R(\tau^R, \tau^L) = \widetilde{w}(1-\tau^{bar}) - \frac{\widetilde{\beta}}{2}[(\tau^R)^2 - 2(\epsilon) - (\tau^L)^2] - \frac{c}{2}\left[(1-\tau^R)^2 + \left(\frac{\epsilon}{2}\right)^2\right] \quad (18)$$

Where $\widetilde{w} = \alpha_p w_p + \alpha_m w_m + \alpha_r w_r$, and $\tilde{\beta} = \alpha_p \beta_p + \alpha_m \beta_m + \alpha_r \beta_r$, represent the weighted average of "fixed" and variable contributions respectively and where $w_p(y_p) < w_m(y_m) < w_r(y_r)$ and $\beta_p(y_p) < \beta_m(y_m) < \beta_r(y_r)$ correspond to fixed and variable contribution parameters from each income group and which will be increasing in income. Solving the optimal location problem for each candidate yields the following new optimal policy platforms:

$$\tau^L = \frac{2(\widetilde{w}+\Omega)+c}{4\widetilde{\beta}+6c} \quad (19)$$

$$\tau^R = 1 - \frac{2(\widetilde{w}+\Omega)+c}{4\widetilde{\beta}+6c} \quad (20)$$

Using (19) and (20) we can look at comparative statics of how changes in the distribution of income affect policy platforms. I assume total average income of the economy remains constant using the following procedure. Denote the average income y. Then:

$$y = \alpha_p y_p + \alpha_m y_m + \alpha_r y_r = \alpha_p \phi \delta y_r + \alpha_m \delta y_r + \alpha_r y_r \qquad (21)$$

and let:

$$\Delta = \alpha_p \phi \delta + \alpha_m \delta + \alpha_r \qquad (22)$$

Therefore we can rewrite the average income of each group as:

$$y_r = \frac{y}{\Delta}; \quad y_m = \frac{\delta y}{\Delta}; \quad y_p = \frac{\phi \delta y}{\Delta} \qquad (23)$$

In this way changes that affect any parameter of the model will be offset by adjusting the parameter Δ to keep average income constant. For example a change in α_m, will be accompanied by a change in α_p to keep total population constant, but also by a change of these two parameters in Δ to keep average income constant.

We now look at three changes in the distribution of income: a) an increase in the size of the middle class (while reducing the size of the poor group); b) an increase in the income of the middle class relative to the rich; c) a increase in the income of the poor

relative to the middle class. The effects of these changes are summarized by the following equations:

$$\frac{\partial \tau^L}{\partial \alpha_m} = \frac{\partial \tau^L}{\partial \tilde{w}} \frac{\partial \tilde{w}}{\partial \alpha_m} + \frac{\partial \tau^L}{\partial \tilde{\beta}} \frac{\partial \tilde{\beta}}{\partial \alpha_m} \quad (24)$$

$$\frac{\partial \tau^L}{\partial \delta} = \frac{\partial \tau^L}{\partial \tilde{w}} \frac{\partial \tilde{w}}{\partial \delta} + \frac{\partial \tau^L}{\partial \tilde{\beta}} \frac{\partial \tilde{\beta}}{\partial \delta} \quad (25)$$

$$\frac{\partial \tau^L}{\partial \phi} = \frac{\partial \tau^L}{\partial \tilde{w}} \frac{\partial \tilde{w}}{\partial \phi} + \frac{\partial \tau^L}{\partial \tilde{\beta}} \frac{\partial \tilde{\beta}}{\partial \phi} \quad (26)$$

Recall that $\frac{\partial \tau^L}{\partial \tilde{w}} > 0$ while $\frac{\partial \tau^L}{\partial \tilde{\beta}} < 0$. So we know that the net effect on policies will always be given by the struggle between the centripetal and centrifugal forces. Finally in order to make comparative statics easier I will impose the following functional forms: $w(y)=\rho y^{\lambda}$ and $\beta=\varphi w$. Thus (24) becomes:

$$\frac{\partial \tau^L}{\partial \alpha_m} = \left[\frac{\partial \tau^L}{\partial \tilde{w}} + \varphi \frac{\partial \tau^L}{\partial \tilde{\beta}}\right] \frac{\partial \tilde{w}}{\partial \alpha_m} \quad (27)$$

and we can find similar expressions for (25) and (26). The parameter φ represents the strength of the centrifugal motive of money. A high value of φ implies that higher contributions will lead towards more extreme platforms, whereas a lower value indicates the opposite.

With this in mind I look at the effects of changes in the income distribution first on contributions and later on policy outcomes.

Effect of the size of the middle class on contributions

I first look at changing the size of the middle class and its effects on contributions. Thus we look at:

$$\frac{\partial \tilde{w}}{\partial \alpha_m} = \left(w_m - w_p\right) + \left(\alpha_p \frac{\partial w_p}{\partial \alpha_m} + \alpha_m \frac{\partial w_m}{\partial \alpha_m} + \alpha_r \frac{\partial w_r}{\partial \alpha_m}\right) \qquad (28)$$

The first term in the brackets of represents the *substitution effect* from having more middle class and fewer poor agents, since an increase in α_m, will ensue a reduction in α_p of the same magnitude. The second term in brackets can also be thought as the *income effect* that arises from increasing the number of middle class citizens while keeping average income constant. If average income is held constant then an increase in the share of the middle class will decrease the per-capita income of each income group. Mechanically, since $\phi\delta<\delta$, an increase in α_m matched by an offsetting reduction in α_p increases Δ, which recalling (23) reduces y_r, y_m and y_p for a given y. The net effect on w will depend on the specific parameters of the economy. In particular, assuming $w(y)=\rho y^{\lambda}$ with $\lambda>1$ yields the following proposition[44].

Proposition 4: Increasing the size of the middle class yields more contributions iff:

$$\frac{(1-\phi^{\lambda})\delta^{\lambda}}{(1-\phi)\delta} > \lambda \frac{\tilde{\Delta}}{\Delta} \qquad (29)$$

[44] This implies that contributions behave as luxury goods with a rise in income.

where $\widetilde{\Delta} = \alpha_p(\phi\delta)^{\lambda} + \alpha_m\delta^{\lambda} + \alpha_r$.

Proof. In appendix. ■

If (29) holds then the substitution effect dominates the income effect and so a larger middle class generates a larger contributor base.

Corollary 1: Increasing the size of the middle class yields more contributions if:

a) $\alpha_m \leq \bar{\alpha}_m$

b) or $\alpha_m > \bar{\alpha}_m$ and $\delta \leq \bar{\delta}$

c) or $\alpha_m > \bar{\alpha}_m,\ \delta > \bar{\delta}$ and $\phi \geq \bar{\phi}$

where $\bar{\alpha}_m$, $\bar{\delta}$ and $\bar{\phi}$ are given threshold levels.

Proof. In appendix. ■

This corollary comes from applying comparative statics to (29). The intuition is that if the middle class is very small, then the income effect will be small, since increases in α_m will have small effects on Δ. If the middle class is large but δ is small, then the poor and the middle class will both be poor enough such that contributions from them won't matter much, again since the effect of an increase in α_m on Δ is small. Finally if ϕ is large enough then the poor and the middle class will be very similar and thus

substituting one group for the other should not have any significant effect. In all cases the intuition is basically the same: if the substitution effect is larger than the income effect, then more contributions will rise.

Next we look at the effect of the income of the middle class.

Effect of Income of the middle class on contributions

Now I take the partial derivative of *w* with respect to δ assuming that ϕ falls so that $\phi\delta$ does not change: thus the middle class incomes becomes closer to the rich and farther from the poor, while position of the poor relative to the rich remains unchanged. Therefore:

$$\frac{\partial \tilde{w}}{\partial \delta} = \alpha_p \frac{\partial w_p}{\partial \delta} + \alpha_m \frac{\partial w_m}{\partial \delta} + \alpha_r \frac{\partial w_r}{\partial \delta} \qquad (30)$$

in which we know that the second term in brackets is always positive, while the other two terms are always negative due to the income effect[45]. This expression can be rewritten as:

$$\frac{\partial \tilde{w}}{\partial \delta} = \lambda \left[\frac{(\alpha_p \phi\delta + \alpha_r)(\alpha_p w_p + \alpha_m w_m) - \alpha_m \alpha_r \delta w_r}{\Delta\delta} \right] \qquad (31)$$

[45] $\frac{\partial w_m}{\partial \delta} = \lambda w_m \frac{\alpha_p \phi\delta}{\Delta\delta} > 0.$

The sign of (31) is ambiguous. If the rich group contributes significantly more than the middle class ($w_m \ll w_r$, either due to a high income differential or large λ) then an increase in the income of the middle class may reduce total contributions. Alternatively if middle class income is already close to the rich, then increasing their income relative to the rich will increase total contributions.

Proposition 5: Increasing the income of the middle class yields higher contributions *iff*:

$$(\Delta - \alpha_m \delta)\tilde{\Delta} > \Delta \alpha_r \qquad (32)$$

Proof. In appendix. ■

The intuition is again largely the same. The condition in (32) ensures that the effect of raising middle class income offsets the effect of reducing the incomes of the rich and poor combined.

Corollary 2: Increasing the income of the middle class yields higher contributions if:

a) $\delta \geq \hat{\delta}$

b) $\delta < \hat{\delta}$ and $\alpha_m \geq \hat{\alpha}_m$

where $\hat{\alpha}_m$ and $\hat{\delta}$ are given threshold levels.

Proof. In appendix. ■

Where the intuition is now given by the fact that if δ is high then they are very similar to the rich. Thus an increase in their income will offset the reduction in the income of the rich and thus increase total contributions. However if the middle class is not so rich, an increase in their income may still increase total contributions if the middle class is large enough, therefore again increasing their income offsets the reduction in the income of the rich thus increasing total contributions.

As a matter of completeness I also look at the effect of increasing the income of the poor.

Effect of income of the poor on contributions

We look at the partial derivative of (19) with respect to ϕ, holding δ constant.

$$\frac{\partial \tilde{w}}{\partial \phi} = \alpha_p \frac{\partial w_p}{\partial \phi} + \alpha_m \frac{\partial w_m}{\partial \phi} + \alpha_r \frac{\partial w_r}{\partial \phi} \qquad (33)$$

with the first term being positive while the other two are negative. We can rewrite (33) as,

$$\frac{\partial \tilde{w}}{\partial \phi} = \lambda \left[\frac{\alpha_p w_p (\alpha_m \delta + \alpha_r) - \alpha_p \delta \phi (\alpha_r w_r + \alpha_m w_m)}{\Delta \phi} \right]$$

And again we observe that changes in the relative income of the poor may have effects in both directions. If the poor contribute very little, increasing their relative

income will reduce total contributions, while if the poor are already close to the other groups, then the opposite result might appear.

Effects of Income distribution on policy outcomes

With the previous results in hand, I can now present the following summary proposition.

Proposition 6: A larger (or richer) middle class will moderate extreme outcomes if a larger (or richer) middle class **decreases** total contributions and lower contributions lead towards less extreme outcomes (high φ).

> *Proof.* Combining a high value of φ for (27) and assuming that (29) (or (32)) does not hold obtains the result. ■

Thus when looking at the effects of the size middle class on policy outcomes, we cannot a priori pin down the effect of a larger (or richer) middle class. However for given parameters we can do so. In fact both corollaries show us that parameterizations that achieve this outcome exist. Perhaps the more difficult task is to assess if φ takes a high or low value. The empirical evidence suggests that as income rises, so does contributions but also access to information (Bartels, 2007). Thus, richer individuals tend to be more informed about politics. This would suggest that φ should be high, since the fixed part of contributions w does not depend on specific platforms while

the variable part β does. Therefore more information should only affect contributions through β, while higher income could affect both w and β.

The key observation to obtain this result is that a larger or richer middle class must make contributions less important; this is shifting the power from money to votes, and therefore make extreme outcomes less likely.

5. Distributional issues with differential voting patterns

So far we have looked at the impact of income distribution assuming that voting is unaffected by income. However there is significant empirical evidence (e.g. Wolfinger and Rosenstone, 1980 and Table 3) that suggests higher voter turnout correlates with higher income. Thus I will introduce differential voting patterns into the model. A simple way of achieving this is to assume that only a fraction of voters of each group vote. Thus let $p_p<p_m<p_r$ be the probability of casting a vote for poor, middle class and rich voters respectively, and assume that voting propensities are independent of voters' policy positions. Thus turnout will be given by $\Phi=\alpha_p p_p+\alpha_m p_m+\alpha_r p_r$, and thus the utilities for candidates R and L are now:

$$U^R = M^R + \Omega\Phi\left(1 - \frac{\tau^R + \tau^L}{2}\right) \tag{34}$$

$$U^L = M^L + \Omega\Phi\left(\frac{\tau^R + \tau^L}{2}\right) \tag{35}$$

Table 3: Voting and Contributing by Income Group (2004 Election)

Group	% Vote	% Contribute	Income threshold	No. Obs
Low income	52.9	4.6	y<24,999	151
Middle Income	73.0	6.6	25,000<y<89,999	434
High Income	75.5	18.2	y>90,000	192
All Groups	69.7	9.1	All reported	777

Source: ANES (2004)

In order to distinguish the effect of voting turnout and contribution turnout I assume that turnout only affects votes and not contributions. Thus I continue to assume that contributions follow the form of (17) and (18). Under these conditions, the optimal platform choice is given by:

$$\tau^L = \frac{2(\tilde{w}+\Omega\Phi)+c}{4\tilde{\beta}+6c} \quad (36)$$

$$\tau^R = 1 - \frac{2(\tilde{w}+\Omega\Phi)+c}{4\tilde{\beta}+6c} \quad (37)$$

Looking at (36) and (37) it is simple to observe that the effects of income distribution will now change, since the size of each group affects not only w but also Φ. However, since δ and ϕ do not affect Φ, only the impact of α_m will differ from previously. We have the following:

Proposition 7: If voter turnout is increasing in income and the benefits from holding office are large, a larger middle class (combined with fewer poor) always moderates policy outcomes.

Proof. Take the partial derivative of (36) with respect to α_m:

$$\frac{\partial \tau^L}{\partial \alpha_m} = \frac{\partial \tau^L}{\partial \tilde{w}} \frac{\partial \tilde{w}}{\partial \alpha_m} + \frac{\partial \tau^L}{\partial \tilde{\beta}} \frac{\partial \tilde{\beta}}{\partial \alpha_m} + \frac{\partial \tau^L}{\partial \Phi} \frac{\partial \Phi}{\partial \alpha_m} \tag{38}$$

Compared to (24), we note immediately that (38) has an additional term, $\frac{\partial \tau^L}{\partial \Phi} \frac{\partial \Phi}{\partial \alpha_m} = \frac{\Omega}{2\beta+3c} \frac{\partial \Phi}{\partial \alpha_m} = \frac{\Omega}{2\beta+3c} (p_m - p_p) > 0$. Thus (38) will now be positive if the benefits of holding office are large enough. Thus now a large middle class provides an explicit force through votes towards more centrist policies. ■

The intuition behind these results is that a larger middle class will now imply more votes as turnout will increase. Nevertheless a larger middle class will still affect contributions. If "fixed" contributions increase, then the voting effect is reinforced and a larger middle class induces more centrist policies. On the other hand, if a larger middle class induces less "fixed" contributions, then a larger middle class may generate a centripetal or centrifugal force. However if the benefits from holding office are large enough, the centripetal force will always dominate.

6. Extensions

I look now at two different extensions of the model. First I look at what happens when we assume that the rich group may have biased preferences, so their average bliss point is not centered at 1/2, but at some other value. Then, I explore a more sophisticated version of the model in which money affects election outcomes, rather than just enriching candidates. As we will see neither extensions overturns the basic result that a large/stronger middle class reduces extreme policy outcomes.

Biased elites

In order to keep things relatively simple, assume that both poor and middle class voters continue to have policy preferences drawn from the uniform distribution over the [0,1] interval. But now let the rich group be biased, such that they are uniformly distributed over the interval $[\tau^c-\varepsilon,\ \tau^c+\varepsilon]$, where $\tau^c \geq 1/2$ is the preferred policy of the median rich voter. Figure 5 summarizes the different types of voters and policy preference structure.

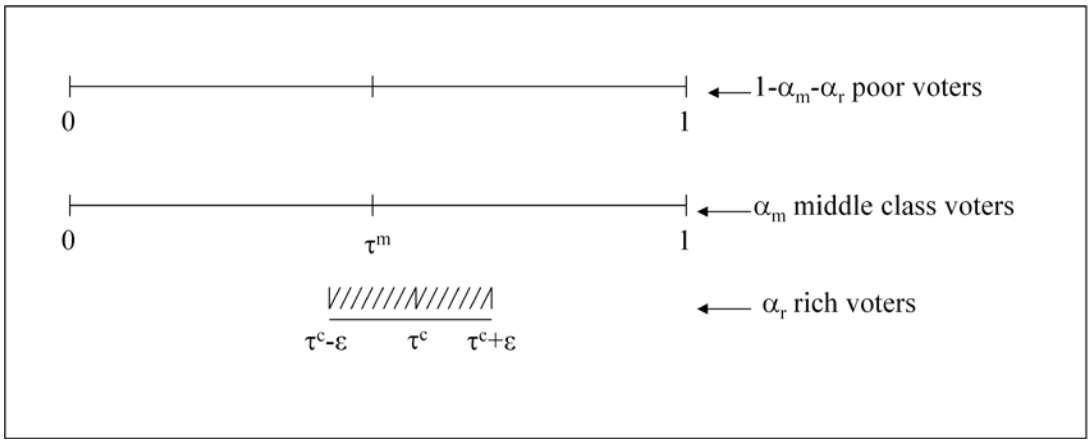

Figure 5: Distribution of policy Preferences by Income Group

Note that the median voter is now given by the following expression:

$$\tau^{mv} = \frac{1}{2} + \alpha_r \left(\tau^c - \frac{1}{2}\right)$$

Under the MVT framework with money having no effect, the result would be for candidates to converge towards τ^{mv}. However money can also play a new role, namely, to move the convergence point away from τ^{mv}. In order to capture this we need to introduce a few new elements. Let τ^{mc} be the median contributor, defined as the platform such that both candidates would obtain the same amount of money if both chose τ^{mc}. Money contributed by poor and middle class will still be governed by (2) and (3). Therefore we need only to find the money raised by the rich, which for each party will be given by:

$$M_r^L(\tau^R, \tau^L) = \frac{w_r}{2\varepsilon}(\tau^{bar} - \tau^C + \varepsilon) + \beta_r[\tau^{bar}\epsilon] - \frac{c}{2}\left[(\tau^L - \tau^C + \varepsilon)^2 + \left(\frac{\epsilon}{2}\right)^2\right] \quad (39)$$

$$M_r^R(\tau^R, \tau^L) = \frac{w_r}{2\varepsilon}(\tau^C + \varepsilon - \tau^{bar}) - \beta_r[\tau^{bar}\epsilon - \epsilon] - \frac{c}{2}\left[(\tau^C + \varepsilon - \tau^R)^2 + \left(\frac{\epsilon}{2}\right)^2\right] \quad (40)$$

Thus total contributions for each party are given by:

$$M^L(\tau^R, \tau^L) = \alpha_p M_p^L + \alpha_m M_m^L + \alpha_r M_r^L$$

$$M^R(\tau^R, \tau^L) = \alpha_p M_p^R + \alpha_m M_m^R + \alpha_r M_r^R$$

So equal money for both candidates implies that $\tau^{mv} < \tau^{mc} < \tau^{c}$ (assuming the same platform). Now if both candidates only care about maximizing contributions we can get one of two scenarios: a) Both candidates converge to the same policy platform, namely τ^{mc}; and b) both candidates choose different policies but attain the same amount of money. In this case the candidates will not be located symmetrically from the center (τ^{mv}). In fact, given that $\tau^{c}>1/2$, *R* will optimally choose some platform to the right of τ^{mc}, while *L* will choose a platform on the other side. However since only money matters, there is an incentive for candidates to move towards where the elite group is located and hence get more money from this group. Thus both candidates have a incentive to move towards the elite, and thus they will not locate symmetrically[46]. The consequence is that *R* will obtain relatively more funding from the rich group, while *L* will get relatively more funds from the middle class and poor group.

The size and relative income of the middle class play two different roles in this version of the model. First a larger middle class reduces the effectiveness of the rich, biasing the convergence platform, since one can show that $\frac{\partial \tau^{mc}}{\partial \alpha_m} < 0$. Similarly, increasing the relative income of the middle class will also generate the same effect, namely reducing the bias of the convergence platform towards the rich.

[46] If they located symmetrically with respect to the median voter, then L would be further away from the median contributor, and would receive fewer contributions. If they located symmetrically from the median rich voter, they would obtain the same amount of money from the rich group, but L would obtain more from the middle class and the poor.

Introducing votes into the model will have the centripetal effects mentioned earlier, although the convergence will be towards a policy platform between the median voter and the median contributor. The reason for this is that R will face a trade-off of moving away from the median voter towards the median contributor to get more money at the cost of losing votes. L may follow suit, and thus the new convergence platform will be to the right of τ^{mv}. We can denote this new platform τ^* and call it the effective (money induced) median voter platform.

Given this notation we can now introduce the concept of a money induced political distortion. Let $\Gamma = \tau^* - \tau^{mv}$ be the money induced political distortion. It is simple to show that income inequality will increase the political distortion.

Proposition 8: A larger or richer middle class reduces the political distortion

Proof. Taking the partial derivative of Γ with respect to α_m yields:

$$\frac{\partial \Gamma}{\partial \alpha_m} = \frac{\partial \tau^*}{\partial \alpha_m} - \frac{\partial \tau^{mv}}{\partial \alpha_m}$$

where the second term $\frac{\partial \tau^{mv}}{\partial \alpha_m} = 0$ always, since we continue to assume substitution of middle class for poor voters. Now, $\frac{\partial \tau^*}{\partial \alpha_m}$ is less than zero, since we know that $\tau^{mv} < \tau^* < \tau^{mc}$, and we know that $\frac{\partial \tau^{mc}}{\partial \alpha_m} < 0$.

In the same way we have:

$$\frac{\partial \Gamma}{\partial \delta} = \frac{\partial \tau^*}{\partial \delta}$$

since τ^{mv} is not affected by δ. Again, an increase in δ reduces τ^{mc}, since as before the relative income of the middle class will have a greater importance than the income of the rich, thus bringing τ^{mc} closer to τ^{mv}, and consequently reducing Γ. ■

The intuition is straightforward. As the middle class grows in size or income, their mean bliss-point (1/2) becomes relatively more important compared to the rich's mean bliss-point (τ^c) in determining policy outcomes.

Money affecting turnout

We now let money to affect election outcomes. I therefore modify the model so that money is used to increase voter turnout rather than just going to the candidate's coffers. Following Campante (2008) I assume that money can be used to attract voters to the polls[47]. I also assume that money only affects turnout of the poor voters. Thus,

$$p_p = P(M)$$

I further assume that candidates use money to target voters that prefer them to the other candidate, but who otherwise might not vote at all. The idea is that campaigns

[47] Nichter (2008) coins the term turnout buying in which money in politics can be used to increase turnout of "passive" supporters, which is very similar to what Campante (2008) and this paper do.

can identify potential voters and use money encourage them to vote. Of course they could target a voter with preferences closer to the other candidate, but in general this should not be the case.

Thus from now on I assume that $p_m=p_r=1$ and $p_p=P(M)$, with $P'>0$ and $P''<0$, $\lim_{M\to\infty} P(M) = 1$, and $P(0)=0$. The probability of casting a vote is increasing in money, but the marginal return is decreasing. Therefore the candidates use money to attract potential supporters (prospective voters with preferences closer to the candidate spending the money) to vote, thus increasing turnout. This implies that the utility function of each candidate is now given by:

$$U^R = \Omega\left(\alpha_p P(M^R) + \alpha_m + \alpha_r\right)\left(1 - \frac{\tau^R + \tau^L}{2}\right)$$

$$U^L = \Omega\left(\alpha_p P(M^L) + \alpha_m + \alpha_r\right)\left(\frac{\tau^R + \tau^L}{2}\right)$$

So money does no longer enter the utility function directly. Under this new framework, maximizing utility with respect to the candidates own policy implies the following result:

$$\frac{\partial U^R}{\partial \tau^R} = \Omega\left[\alpha_p P'(M^R)\frac{\partial M^R}{\partial \tau^R}\left(1 - \frac{\tau^R+\tau^L}{2}\right) - \frac{\left(\alpha_p P(M^R)+\alpha_m+\alpha_r\right)}{2}\right] \quad (41)$$

The first term represents the marginal benefits of moving "away" from the center, coming from obtaining more money that allows the candidate to increase turnout of

poor voters. The second term is the marginal cost of moving away from the center, which is given by the resulting votes lost to the other candidate. The net result will arise from the interaction of these two forces. Note that $P'>0$, and assuming $w-\beta<c$ we have $\frac{\partial M^R}{\partial \tau^R}>0$. Thus $\alpha_p P'(M^R)\frac{\partial M^R}{\partial \tau^R}\left(1-\frac{\tau^R+\tau^L}{2}\right)>0$, and $\frac{(\alpha_p P(M^R)+\alpha_m+\alpha_r)}{2}>0$. To get somewhat more clear results let us assume that $P(M)=1-e^{-M}$.

Thus with some algebra, and equating (41) to zero yields:

$$\frac{\partial M^R}{\partial \tau^R}=\frac{1}{(2-\tau^R-\tau^L)}\left(\frac{1-\alpha_p e^{-M^R}}{\alpha_p e^{-M^R}}\right)>0$$

Comparing this result with the equation that solves $\frac{\partial M^R}{\partial \tau^R}=0$ from (3), we know that now our optimal platform will be closer to the center, compared to the case where money enters directly into the candidate's utility function. Thus we have again that votes generate a centripetal effect. We therefore have the following:

Proposition 9: An increase in the size of the middle class (reducing the poor group) reduces extreme outcomes.

Proof. In appendix. ■

The intuition is the same as before: while a larger middle class can increase or decrease money it increases votes, since $p_m \geq p_p$, so if the amount of additional votes

that the middle class brings in offsets the effect of money, then a larger middle class will bring policies closer to the center.

7. Conclusions and future work

This paper presents a three class model of heterogeneous agents to look at the effects of income distribution on electoral outcomes. The model relies on campaign contributions as the mechanism by which contributors, and thus different income groups, can influence candidate's platforms and bring electoral results closer to their preferred policies. Money in this case generates a centrifugal force driving candidates away from each other. Votes as in the usual Downsian model generate the opposite effect of bringing policies closer to the center.

The middle class in this model plays a buffer role as in other models (e.g. Acemoglu and Robinson, 2006), but in this case my definition of the middle class is less restrictive since I allow for heterogeneity in policy preferences among the middle class. I am also able to distinguish between the size (in numbers) and the strength (in dollars) of the middle class.

The model also allows me to look at particular changes in the distribution of income and their effects on policy outcomes. In particular I show how a large middle class can have a positive effect in moderating electoral policies, and how the difference in income between the rich and the rest can also affect policies. In fact by doing this the model is capable of analyzing different cases of secular changes in the distribution. In

summary the paper supports the idea that both a larger and more powerful middle class can reduce policy extremism.

A theoretical extension worth exploring is to allow money to affect contributions as well (for example the proportion of contributors within a group of income), generating a bandwagon effect in which money brings more money, and thus generating a new equilibrium. Another set of extensions is to look at the effects of public financing of elections or contribution limits.

Chapter 3: Chile, the Unbearable Burden of Inequality

"Aquí hay dos Chile….y yo odio al otro"

(Response of a young demonstrator to a reporter inquiring why he was vandalizing private and public property during one of the many violent protests in downtown Santiago in 2006)

1. Introduction

While the first part of the above dramatic statement ("here we have two countries…") by a young student protester may apply to many countries, in few of them it is so obviously apparent. This is reflected in both the ample statistical evidence (to be discussed in detail in the next section) and in the normal routine of daily life in Santiago or elsewhere in the country. Chile has one of the least equal wealth distributions in the world with an estimated household income Gini coefficient of the order of 0.57 according to the most recent available estimates (CASEN, 2003). The total (after tax) income of the richest 10% of the households is larger than the total income of the poorest 80% of the households! Income differentials among the lower 80% of the population are rather modest with average income differences among deciles two to eight in all cases below 24%. However, a much bigger jump occurs between the income deciles eight and nine (51%) and a whopping 198% jump occurs between deciles nine and 10 (Figure 6) [48]. Thus the two country paradigm is

[48] Figure 6 is based on the latest fully available national household survey (CASEN), which corresponds to 2003. For 2006, only preliminary aggregate results have been released so far. The Gini coefficient released for 2006 is 0.54. Still this does not give evidence of a change in trend for

supported quite well by the statistical evidence, the "poor" and relatively egalitarian Chile comprised by 80% or 90% of the population and the remaining 10% of the population constituting the "developed" Chile[49].

The second part of the statement ("….and I hate the other one") is a corollary of the first, presumably magnified in a context of frustrated expectations. The key issue is that the two countries metaphor is not any less true today than it was at the beginning of democracy seventeen years ago. Democracy followed, coincidentally, an also seventeen year long regime that was arguably among the most repressive and pro-elite that any country in Latin America has ever experienced. As we show below, the profound wealth and income gulf existing today between the top 10% of the country and everyone else has not decreased[50].

The successive democratic governments over seventeen years have been unable and/or unwilling to reduce inequality despite a generalized perception of a society that is utterly unjust. At the onset of democracy the unequal wealth distribution was regarded merely as a result of right wing policies enacted by the dictatorial regime

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inequality. Other measures for the GINI index may vary slightly. WIDER (2007) and Chen and Ravallion (2004), which are the most comprehensive datasets on inequality although agree with a value of around 0.55 throughout our period. Another indicator of persistence in inequality is the fact that according to Chile's Central Bank data, average real wages have increased by 38% between 1993 and 2005, while real GDP has increased by 76% over the same period.

[49] Casual observation illustrates this statistical evidence. In Santiago, for example, you can travel from poor Latin America to a rich European city in less than 45 minutes (if travel congestion is not too bad) by going from the vast southern, or western, or northern edges of the city (combined population circa 5 million) to the plush "barrio alto" (population 1 million) located in part of the north east area of the city.

[50] In a recent study Sapelli (2007) shows evidence supporting a reduction in inequality for younger cohorts, which could signal that education may be playing a role in reducing income inequality. However, the results of this study must be taken with caution, since they rely on a biased sample that only includes workers from Santiago that report positive work income, thus not including unemployed workers or capital income, both of which may significantly affect income distribution.

which democracy promised to correct. A promise condensed in "growth with equality", a slogan often used by politicians in the nineties. A failure to meet this promise is leading to rising social dissatisfaction and is perhaps the most important shortcoming of what has been considered the most successful development experience in Latin America. Moreover, as a consequence of this, a cycle of increasing anger and violence which might eventually threat the very foundations of economic growth itself appears to be in gestation.

This chapter explores the sources of persistent inequality in Chile despite that the country has grown at a reasonably fast rate over an extensive period of time and despite that the structure or composition of public expenditures, more so than many other developing countries, is clearly tilted in favor of the low income classes. Furthermore, Chile represents a case where governments are relatively efficient and affected by little corruption with generally adequate institutions. Yet Chile has remained an utterly unequal society which is fully reflected in a generalized perception of unfairness among Chileans, which is also the cause of profound social discontent[51]. What then went wrong in Chile? In this paper we present an integrated hypothesis to explain this phenomenon based on the existing empirical evidence. We believe that there are important lessons emerging from this analysis that are relevant not only for Chile but also for many other developing countries especially in Latin America. The analysis is in general relevant to countries that experience reasonable

[51] According to the July, 2007 poll from CEP (2007), the three most important problems to Chileans are concerned with are: crime, health and poverty, which are compatible with the feeling of an unjust society. Moreover, the latest Latinobarometro (2007) poll also reports that only 10% of Chileans believe that income distribution is fair or very fair. Within the sample of Latin American countries only Peru and Paraguay have higher perceptions of unfairness.

growth, have relatively effective governments and yet high or worsening inequality that put in jeopardy the minimum social consensus needed for growth to continue.

2. Pattern of Growth, Inequality and Government Intervention

Income distribution has remained abysmally unequal despite that the economy has performed well. The average annual per capita growth rate was about 4% per annum over the 1990-2006 period although it showed a considerable deceleration during the second half of such period. Even more importantly, the government's modest but steady increase in the share of social expenditures in total expenditures has been insufficient to improve wealth distribution. The structure of public expenditures directed mainly to provide public and social goods, including public education and health care, rather than pro-elite subsidies (in contrast to many other countries) has been on the whole commendable. These programs have also targeted the low income strata of the population quite well. In this respect Chile's public expenditures have been much more pro poor than most other Latin American countries (López, 2003).

Figure 6 shows the pre government social subsidy income (the "autonomous income") and the post government subsidy income ("total income") by income deciles of the households. As can be seen the government social subsidies benefit the poorest deciles quite significantly as the gap between total and autonomous income is larger for the poorest deciles[52]. Similarly, ECLAC and IDB (ECLAC 2005) estimated

[52] This Figure also shows how important are the social subsidies for the income of the poor and how little a significance they have for affecting the overall income distribution.

quasi-gini coefficients for public education and health for 17 Latin American countries. Chile had by far the most progressive distribution of social expenditures. In both health and education the estimated quasi-gini coefficients for Chile in 2003 are negative (at -0.26 and -0.19 respectively) reflecting that they benefit mainly the lower income classes. In general, unlike other countries, the government in Chile has spent only a small portion of its revenues in unproductive subsidies directed to the elites.[53]

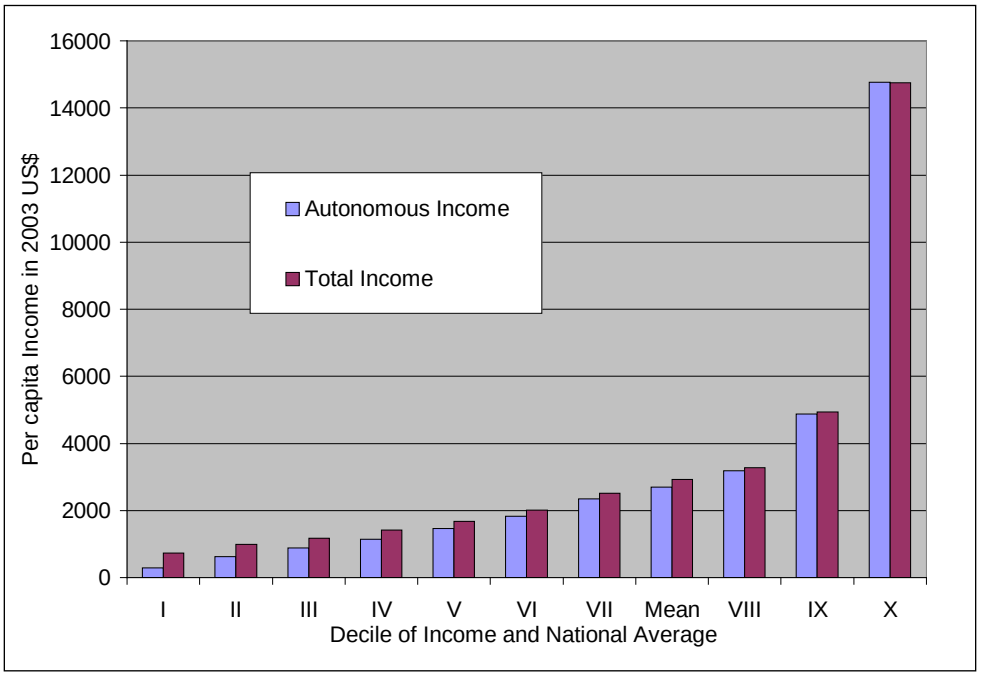

Figure 6: Chile: Income per capita by decile
Source: CASEN 2003 and own Calculations

However, the real issue has been that the *level* of expenditures in public goods has been insufficient as a consequence, as we shall see, of the rather narrow tax base which greatly constrained public revenues. The tax system has failed to feed the public sector with enough resources to enhance the scope of an otherwise almost

[53] Chile has few direct non-social subsidies. Soto (2004) estimates the value of non-social state subsidies including transfers to the agriculture sector at about 0.47% of GDP.

exemplary public expenditure system. According to IDB-ECLAC, over the period 1990-2003 total government expenditure in social public goods (education, health, social housing and anti-poverty programs) as a proportion of GDP has been below the average for Latin America in every two-year period for which it was estimated (ECLAC, 2005), despite that the government devotes the bulk of its revenues to such expenditures.

The most important social public goods that the state should provide are education and health care especially for the lower segments of the population. In the absence of state support the low income classes tend to under invest in human capital as a consequence of credit market failures (López and Galinato, 2007). In addition, the state needs to invest in knowledge and technology (R&D) and on protecting the environmental quality assets on which the private sector tends to under invest as a consequence of other market failures (Hoff and Stiglitz, 2000).

Education

The gradual but steady increase in education expenditures as a share of GDP (as shown in Table 4) , has not been sufficient to induce greater access to pre-primary education and good quality of public education thereafter for the low income classes that are most dependent on the state for their human capital investments (and which constitute the majority of the population). This has condemned an important segment of the population to under-invest in human capital and has, therefore, been an

important factor leading to the perpetuation of inequality. Additionally it has also been a factor that has conspired against economic efficiency and faster growth.

Table 4: Chile. Government Expenditure by Function 1987-2005 (% of GDP)

	1987-1989	1990-1997	1998-2005
Government and Public Services	3.0	2.0	1.4
Defense	2.9	1.7	1.6
Public Order and Safety	1.0	1.0	1.3
Economic Affairs	2.8	2.6	2.8
Environmental Protection	0.0	0.1	0.1
Housing and community affairs	0.2	0.2	0.2
Health	2.0	2.2	2.9
Recreation, Culture and religion	0.1	0.1	0.1
Education	2.7	2.5	3.7
Social Protection	9.5	7.6	7.4
TOTAL EXPENDITURE	24.2	20.0	21.4

Source: DIPRES (2006)

The failure of the government education efforts has been confirmed by the rather dismal performance of Chilean students in standardized international tests. If one controls for per capita income, Chilean students test scores are below the international norm by about 10% (Figure 7).

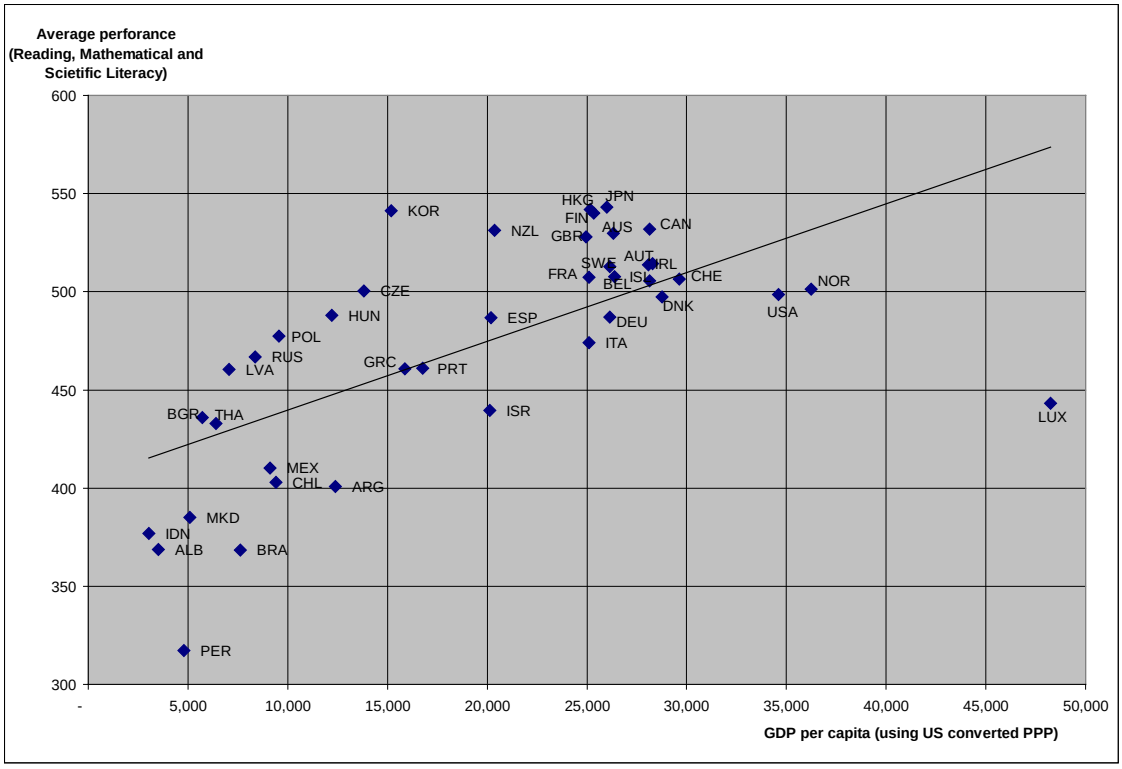

Figure 7: Score in PISA test 2000 and National Income
Source: OECD and UNESCO, 2003. Table 3.3

As shown in Figure 8 Chile is one of the countries that spend the least per student (about 50% less than Korea, for example)[54]. Moreover, this Figure illustrates an important feature: Countries that spend too little and countries that spend too much in education tend to score below the international norm represented by the upward sloping line. By contrast, countries in the middle of the expenditure spectrum tend to over perform the international norm. Out of seventeen countries that spend the mean expenditure level plus minus one standard deviation (roughly between $20000 and

[54] Importantly, the figures on expenditure per student include the private sector, which spends about 4 times more per student than the public sector. That is, the expenditure per student in public and semi-public schools, which account for more than 85% of the total student population in the country, is much less than what appears in the Figure 8. We estimate that the cumulative expenditure per student by age 15 in the public system amounts to about 11,000 US PPP, versus around 40,000 in the private sector. The average annual public expenditure per student in municipal schools was about 700 US$ in 2003, and for government-subsidized *subvencionados* schools the average public expenditure was 625 US$ (both values in current dollars) versus an estimated 2400 US$ per student spent by private sector.

$60000) only two (Italy and Portugal) have scores below the international norm. By contrast, six of the seven countries that spend less than $20,000 per student score below the norm and all countries that spend above $60,000 score below the norm as well. When the education budget is too high, technical efficiency is low because there is a tendency to spend resources in activities of a smaller and smaller marginal value. By contrast, when the budget is very low, as in Chile, there is also low efficiency for the simple reason that there are too little resources left from purely operational activities to allow sufficient investments in adequate teacher training, special education facilities, and so forth. At low levels of expenditure per student, high levels of efficiency appear to be unattainable due to lack of resources to invest in efficiency.

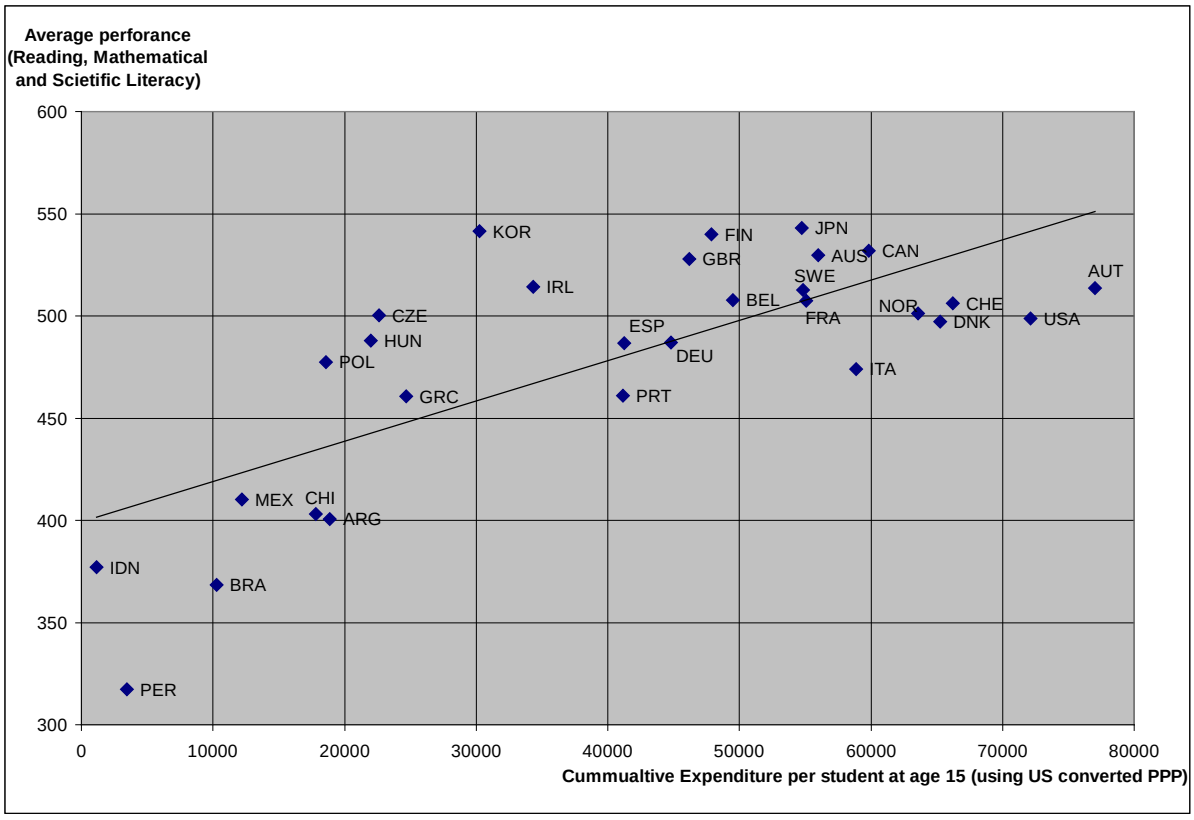

Figure 8: Score in PISA test 2000 and Cumulative Expenditure in Education
Source: OECD and UNESCO, 2003. Table 3.3

Several studies have, nonetheless, shown that the rate of return to education for Chile is relatively high although they also show enormous disparities in such returns across income groups. According to Psacharopoulus and Patrinos (2002) the returns to education were about 12% in 1989, slightly above the average of 10% for all countries surveyed[55]. Moreover, Patrinos et al (2006) shows that one additional year of education for the poorest 10% of the population increases their wages by only 7%, while it increases by 14% for the richest 10% of the population. Thus this disparity in rate of return is likely to further worsen income distribution.

According to Herrera and Pang (2006) within a sample of developing countries Chile has by far the most efficient public spending in education as measured using a free disposable hull or data enveloped analysis. Thus, Chile may be near the efficiency frontier but with low scores which basically implies that is has plenty of room to increase spending in order to improve educational achievement. The argument that "we should not spend more in public education until efficiency improves" is likely to be fallacious for Chile.

In summary, it appears that poor quality of education in Chile as reflected in the extremely low performance in international tests is not due to inefficiency of the government education effort. Neither it is due to low potential rates of return to education in Chile. It simply reflects insufficient *levels* of public expenditure in education despite the government devotes a significant share of its expenditures to

[55] Using a similar approach Contreras et al (2005) find a similar return, between 11-14%, depending on the sample. Once controlling for omitted variables this value drops to approximately 9%.

education. The low level of education expenditures has been a key factor in preventing a significant expansion in the quality of human capital of the population, particularly of the poorest segments which are the ones most dependent on the state. This, in turn, has been one of the major factors explaining not only the permanence of unacceptable levels of inequality but also has reduced the overall growth potential of the economy.

The extreme levels of income inequality appear to be both a cause and an effect of the poor education performance reflected in the international tests. Figure 9 shows a significant negative correlation between test scores and the level of income inequality represented by the Gini index of income inequality. High levels of income inequality (for a given average level of per capita income) mean that a high proportion of school children must be dependent on the state for acquiring education. If the quality of education provided by the state is below that of the private sector, the negative effect of inequality on the average test scores follows. This implies that for highly unequal countries the role of the state in providing good quality education is even more crucial than in more equal societies. So the failure of the Chilean state in providing enough resources to education that would permit improving public sector efficiency is even more serious than in countries with a better distribution of income. Chile, with one of the highest levels of income inequality in the world, is right on the international norm in this respect (Figure 9). Spending too little in public or semi-public education is thus a recipe to remain in a poor education-unequal income distribution- poor education trap.

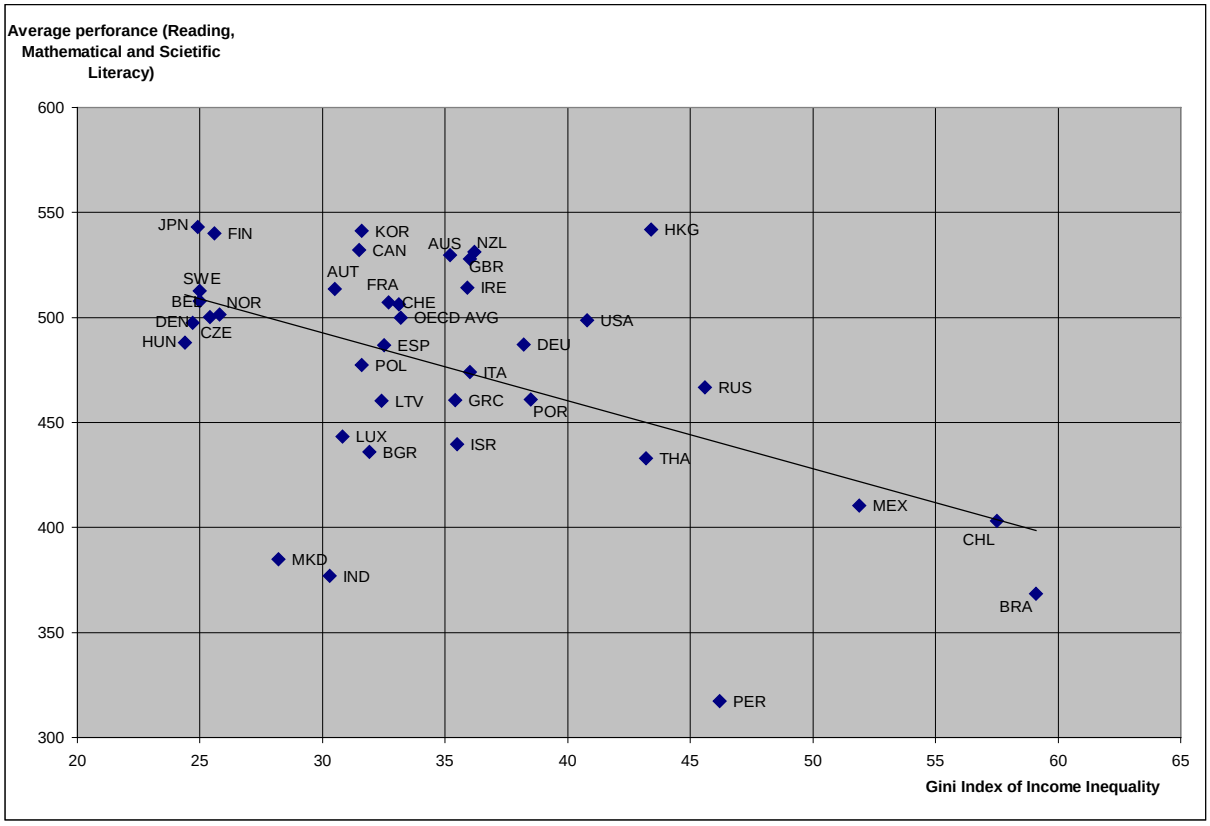

Figure 9: Score in PISA test 2000 and Income Inequality
Source: OECD and UNESCO, 2003. Tables 1.4 and 3.3

In effect in a very simple econometric exercise (see Table 5) we show that income inequality and cumulative expenditures in education are both statistically significant. We present these results also excluding the three most unequal countries in our sample and the results remain.

Table 5: Econometric estimates,
Dependent variable: Average test score in Math and Science PISA 2000

	Full Sample	Without Brazil, Chile and Mexico
GDP per capita	0.046	0.045
	[0.041]	[0.044]
Cumulative expenditures	0.066**	0.066**
in Education	[0.026]	[0.027]
Income Gini	-0.205***	-0.211***
	[0.050]	[0.072]
Constant	5.759***	5.781***
	[0.335]	[0.393]
Observations	28	25
R-squared	0.84	0.78

Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
Note: All variables in logs.

Apart from the obvious implications for equity and for the productivity of the economy, this trap has other important economic ramifications: it makes the factor endowments of the economy, in particular the natural/physical capital to human capital ratio extremely high. In an open economy such as Chile this is likely to cause an excessive specialization on sectors that are mainly natural resource and physical capital intensive to the detriment of knowledge intensive industries. If human capital or knowledge intensive industries have a greater potential for productivity growth than resource/physical capital intensive industries, this supports de Gregorio's (2005) hypothesis that '…there is much potential to increase productivity and thus income…' through investment in knowledge and human capital formation. The other side of the coin is that this has contributed to keep the economy greatly dependent on

natural resource industries. This, in turn, may severely restrict the long run growth potential of the economy[56].

Other government expenditures to palliate the effects of market failure

Chilean levels of R&D investment are very low only reaching about 0.5% of GDP, which compares poorly with other developing or low income developed countries such as Israel 4.5%, Korea 2.6%, Ireland 1,2%, China, India, Brazil, Spain and New Zealand, all close to 1% (OECD, 2003). The state spends less than 0.4% of GDP in R&D. Out of this roughly 55% is allocated towards basic research, as opposed to applied research (de Gregorio, 2005). The private sector does not compensate for the low public expenditures in R&D. Private expenditure in R&D by firms only represents 26% of the total expenditure compared with for example 70% in Sweden. This also affects the future economic growth potential, since low levels of R&D means fewer opportunities in the future for developing new businesses.

Public expenditures on enforcing environmental legislation and other environmental investments have also been low. As we discuss later, the low expenditures in enforcement has been a key factor behind the low degree of compliance with environmental regulations that studies have detected in Chile. According to DIPRES

[56] In fact Bravo-Ortega and de Gregorio (2005) find in a cross country regression that natural resource dependence is "bad" for growth. However when interacting natural resources with human capital they also find that this would overturn the result; hence countries that rely heavily on natural resources but have high human capital can in fact perform better. De Ferranti et al (2002) also suggest similarly that a resource curse may not necessarily exist and correctly show several examples of resource rich countries that have developed into high technology economies.

(2006) Chile spends about 0.1% of GDP in environmental protection. This level of expenditure would appear as clearly insufficient to cover even the most basic needs of environmental protection. In this Chile seems to be also quite behind most middle income countries.

Remaining puzzles

Despite the evident insufficiencies on the supply of important public and semi public goods the economy has been able to grow at reasonable rates mainly, as we shall see, on the basis of a constant expansion of the natural resource sector and a few other related industries. This adequate growth rate in combination with small but well targeted expenditures in social public goods have yielded an important social dividend: absolute poverty has declined significantly. In fact, as measured by head count poverty using a US$2 a day poverty line, absolute poverty was cut in half (from 38% in 1990 to 19% in 2003, Table 6). But another 30% of the population is still within 40% of the rather modest official poverty line. One needs to go to the second richest quintile to find households with per capita incomes at least 100% above the poverty line (Figure 6). Thus while poverty reduction has been impressive, keeping a large portion of the population within a short margin of a rather low poverty line appears as a modest achievement of the democratic regimes.

Table 6: Evolution of Poverty and Inequality (1987-2003)

Year	Poverty (%)	Extreme Poverty (%)	20/20 INDEX	10/40 INDEX	GINI COEF
1987	45.1	17.4	..	..	0.57
1990	38.6	12.9	14.0	3.5	0.58
1992	32.6	8.8	13.2	3.3	0.57
1994	27.5	7.6	14.3	3.5	0.57
1996	23.2	5.7	14.6	3.5	0.57
1998	21.7	5.6	15.5	3.5	0.58
2000	20.6	5.7	15.3	3.6	0.58
2003	18.8	4.7	14.3	3.3	0.57

Source: CASEN (several years)

So why a reasonable rate of economic growth combined with a public expenditure structure mainly oriented to satisfy the provision of social services and other public goods has failed to yield the other dividend, a more equitable income distribution? We show below that the main reason for this is that the democratic regimes limited themselves to mainly minor changes to the *tax system* that they inherited from the dictatorship. This has caused a narrow tax base which has severely restricted the scope of an essentially adequate pro-equality public expenditure policy and at the same time has allowed the elites to contribute very little to the development effort. The conventional wisdom has been that altering the tax level and structure are not effective mechanisms to affect income distribution. We argue below that given the existing extremely biased and generous (to the wealthy) Chilean tax system this conventional wisdom is not likely to be valid for Chile. We show that the tax system far from being distributional neutral is clearly regressive favoring a tiny fraction of the population, mainly among the very high income groups. Finally, we point that a

serious tax reform may go a long way to increase not only social equity but economic efficiency as well.

We focus on three features of the tax system which have particularly attempted against social equity, the environment and, ultimately, against the long-run growth potential of the economy: (1) Low tax revenues and an extreme dependency of government revenues on indirect taxes. (2) The preservation of a vast collection of tax loopholes (the so-called "gastos tributarios") that in 2004 amounted to close to 5% of GDP and almost 30% of tax revenues; (3) The almost complete failure by the state to share the revenues from the raw natural resources (including ore resources, fisheries, lumber, water and others) that are removed from the national patrimony.

3. Low Tax Revenues and High Dependence on Indirect Taxes

At about 16% over GDP, the total tax burden of the Chilean economy over the last few years has been quite low by international standards (OECD average: 36%; Mexico: 18%; Korea: 24%, see Table 7)[57]. Corporate tax revenues at 2.9% of GDP are one of the lowest in the world[58]. The effective corporate tax rate as a proportion of the profits of the private sector are estimated at less than 6% over the last ten

[57] Since Chile has a private social contribution scheme for pensions, we may want to remove these from the OECD calculations. In this case the OECD average tax burden would be reduced to 26% of GDP. However, this is not a fair comparison either since the Chilean government still provides some (social) pensions that are financed with general taxation.

[58] In reality, the private corporate sector pays even less, only about 2% of GDP, because part of the revenues of the state copper corporation and other state enterprises are counted as part of the corporate tax revenues. The copper state firm is taxed at a much greater effective rate than the private firms having contributed at least 1% of GDP in each year over the last 10 years.

years[59]. Similarly, personal income tax collected amounts to less than 1.6% of GDP by far the lowest among all OECD countries including middle income countries such as Mexico (5.2%) and Korea (3.2%). The natural consequence of this unusually low income and profit taxes is that the state has to greatly rely on indirect taxes as a source of revenues. In fact, the share of indirect taxes in total tax revenue has been about 68%, by far the highest among all OECD countries; the second highest is Mexico with 49% and the average OECD rate is just 32%.

Table 7: Tax structure international comparison 2002

	Total tax receipts % of GDP	**Tax structures** as % of total tax receipts						**Highest rates of income taxes**[a]	
		Personal income tax	Corporate income tax	Social security contributions		Taxes on goods and services	Other taxes	Personal income tax %	Corporate income tax %
				Employees	Employers				
Chile[b]	**16.6**	**10.0**	**17.8**	**..**	**..**	**67.8**	**4.6**	**40.0**	**17.0**
Greece	35.9	14.0	10.4	12.7	15.5	37.3	10.1	33.6	35.0
Ireland	28.4	26.2	13.1	4.5	9.6	39.5	7.1	42.0	16.0
Korea	24.4	12.8	12.8	11.1	7.7	38.8	16.8	36.7	29.7
Mexico	18.1	28.9	..	17.9	..	49.0	3.5	35.0	35.0
New Zealand	34.9	42.3	12.1	0.0	0.0	35.2	10.4	39.0	33.0
Portugal	33.9	27.6	..	27.1	..	41.1	4.2	35.6	33.0
Spain	35.6	19.4	9.1	5.6	24.9	28.6	12.4	48.0	35.0
EU average[c]	40.6	25.8	8.6	9.1	16.3	30.8	9.4	44.6	32.4
OECD average[c]	36.3	26.0	9.3	8.3	14.6	31.9	9.8	42.6	31.2

Source: OECD Tax Database and DIPRES (2006)

[a] International comparisons should also take into account differences among countries in the length of tax brackets, the amount of tax relief and rates of social security contributions. The highest rate of income tax includes temporary special surcharges. All rates include rates of state and local income taxes as reported in the OECD Tax Database.

[b] For Chile taxes on goods and services include VAT, Taxes on specific goods and Tariffs, Other Taxes include and taxes over legal transactions and other taxes. Corporate tax rate does not include an additional tax rate of 35% for foreign investors.

[c] Unweighted average.

[59] We assume that the share of capital in GDP is 0.54, and divide corporate taxes/GDP by this number to obtain the effective corporate tax rate. Some studies (eg. De Gregorio 2005) suggest using a capital share of 0.35, and an average corporate taxes over GDP of 2.9% we get an effective tax rate of 8.3%. Moreover if we only consider "private corporate taxes" taking out state owned companies this value is 5.7%.

This has not changed significantly in the past decade and a half (see Table 8). The tax structure in Chile relies heavily on indirect taxes where the VAT amounts to about 45-50% of government tax revenue. Income taxes account for another 25% (up from 15% in 1987)[60], trade taxes are down to less than 3% (from roughly 15% in 1987)[61]. Other specific taxes (fuel for transport and luxury goods) account for another 12% (down from 15%).

Table 8: Chilean Tax structure by period (in % of Total revenue and GDP)

Period	Income Tax	Value Added Tax	Tax On Specific Goods	Tax on Foreign Trade	Other Taxes	Tax/GDP
1987-1989	16.9	46.2	13.5	13.9	9.5	15.9
1990-1997	22.8	48.0	11.5	12.8	5.0	15.4
1998-2005	26.2	48.6	13.0	6.2	5.9	15.3

Source: Own elaboration based on DIPRES 2006

So the fact is that Chile has low tax revenues. There are three potential explanations for this: (1) Low tax rates; (2) Poor tax enforcement, or high evasion of taxes; and (3) Exemptions to taxes due to tax loopholes or exempted activities. Looking at each of these we observe that in fact, tax rates in Chile are not low. The highest marginal tax rate for personal income is at 40%. VAT rate is 19%, in fact high compared to other countries; corporate tax rate at 17% although lower than other countries is not as low as for example Ireland at 12.5%. Therefore we discard this as an explanation for low revenues.

[60] However income taxes may vary significantly since they include 40% taxes on profits from state owned firms including copper mining which vary significantly according to the price of copper.

[61] Currently Chile has FTA's with amongst others USA, EU, EFTA, MERCOSUR, South Korea, India, and China. In March 2007 Chile has reached an agreement to sign a FTA with Japan. This yields an effective tariff rate of less than 2%.

Chile has also reached relatively high levels of tax compliance. In 1993, estimates indicated that VAT evasion reached 23%, while other Latin American countries averaged over 30% (Barra and Jorrat, 1999). Other developed countries had both lower levels and higher levels of evasion[62]. Over the last several years tax evasion has been reduced specially in VAT, which in turn accounted directly or indirectly for about 80% of total tax evasion in the country (Barra and Jorrat, 1999). Evasion was estimated at about 20% of VAT in 1996-1999. Since 2000, new efforts have been made to reduce evasion even more. Preliminary results indicate that evasion has been reduced by 30%. Moreover, VAT evasion has dropped to only 11% in 2005 (La Nacion, 2007).

This leaves us with only one possibility. As we show below tax exemptions in the form of tax loopholes and untaxed rents of natural resources are in fact the source of low revenues in Chile.

4. Tax Loopholes and Income Distribution

A recent study by the government's tax office shows that existing legal tax loopholes are very large and tremendously regressive. Total tax loopholes amount to foregone fiscal revenues of the order of 4% of GDP and 25% of all state revenues. The most important tax loopholes are those affecting income taxes (3.3% of GDP) and the VAT

[62] Canada and the US had roughly 23% and 18%, New Zealand 5%, Sweden 5.4%, Israel 7.8%.

(0.7% of GDP). About 81% of the income tax loopholes benefits the wealthiest 5% of the population and 61% goes to the richest 1% of the population! (Table 9). That is, the wealthiest 1% of the population receives a transfer equivalent to almost 2% of GDP through this mechanism. It is hard to imagine a more regressive public policy than this. A similar though less perverse conclusion arises from analyzing loopholes in the value added tax (which constitutes almost 15% of all tax loopholes). The wealthiest quintile received more than 70% of the total value added tax benefits.

Table 9: Distribution of Forgone Personal Income Taxes for highest 5 percentiles of Income 2004

	Subtotal[f] Millions US$	P96	P97	P98	P99	P100	Subtotal[g]
Special Regimes[a]	58	0.4%	0.7%	1.3%	3.2%	38.0%	43.6%
Exemptions[b]	33	0.9%	1.4%	1.7%	3.3%	78.6%	85.9%
Deductions[c]	140	6.4%	7.3%	10.6%	18.5%	27.6%	70.4%
Tax credits[d]	121	1.6%	2.1%	3.6%	5.5%	57.4%	70.2%
Tax deferments[e]	1426	3.2%	3.4%	4.7%	7.9%	66.6%	85.8%
Total	1777	3.2%	3.5%	4.9%	8.3%	60.8%	80.7%

Source: SII, Sub direction of Studies, March 2006
Notes: Although it refers to personal income it includes forgone corporate taxes. In Chile corporate taxes count as credits for personal income taxes.
[a] This includes special regimes for small agriculture, mining, transportation and fishing industries.
[b] Activities exempted from certain taxes such as free trade zones or special areas and educational institutions.
[c] Donations to education and sport and political institutions.
[d] Credits for donations, setting up in special zones and special treatment to agriculture land and fixed assets.
[e] Deferments due to accelerated depreciation, retained profits and private pension savings plans.
[f] Only tax forgone for highest 5 percentiles of income
[g] As a % total tax personal income forgone

Of all income tax benefits, tax deferments represent the bulk of forgone taxes. Tax deferments are due to accelerated depreciation, retained and reinvested profits from small businesses, and private compulsory and voluntary pension funds tax benefits. However, the latter two only accounts for about 20% of income taxes forgone.

Using the data from these studies, plus income share data from the 2003 CASEN survey we simulate the elimination of forgone income taxes. These account for about 3.27% of GDP in 2004. Moreover, 98% of them are received by the highest quintile of income, and 80% is received by the richest 5% of the population. Roughly 90% of the total forgone taxes go to the top income decile[63]. We then subtract this income from the top decile of income and distribute it in two ways. We first assume a lump-sum transfer equal for all households (including the richest 10%). Then we try a proportional transfer using the same shares of monetary subsidies. We show that eliminating most tax loopholes can reduce inequality in a dramatic way (Table 10). Another tax reform we explore is using the proceeds to reduce other taxes. We simulate the effect on the VAT rate, of using these proceeds to reduce the VAT. The VAT rate can fall in this case from 19% to 11.5% after the tax reform[64]. We then simulate the impact on inequality of reducing the VAT rate. Although this seems to have a more moderate impact on inequality, still the most benefited from this are the poorest income groups.

[63] Although we do not posses the exact figure, by interpolating the data 90% we obtain this number.

[64] Note that we are not considering additional revenue given the lower rates. The literature has argued that higher rates lead towards higher evasion, so reduction in rates should increase tax compliance and therefore offset part of the lost revenue from the lower rate.

Table 10: Income distribution before and after simulated tax reform (with equal distribution of forgone taxes)

	Q5/Q1	10/40	D10/ D1	10/ (4+5+6)	GINI
Actual Indicators (2003)	14.3	13.4	34.1	7.3	0.50
Reform with equal Distribution	12.7	12.1	28.1	6.8	0.48
Reform with Distribution same as monetary subsidies	11.0	11.3	21.2	6.7	0.47
VAT Reduction [a]	12.5				

Source: Own estimations based on CASEN (2003), SII (2006) and household savings rate obtained from Butelman and Gallego (2001).

Note: All indicators are based on *household income* rather than *personal income*; therefore the Gini coefficients reported here are lower than those reported earlier which were person based.

[a] For this exercise we use monetary income and only quintile data, since we do not have savings rate at decile level, to compare expenditures and savings. The before reform in this case only yields a Q5/Q1 of 12.7. The VAT rate is however reduced from 19% to 11.5%.

Are tax loopholes effective in promoting more investment and higher productivity?

It is extraordinary that the economic and social consequences of a government policy that allocates more than 4% of GDP and nearly 25% of government revenues to a variety of tax loopholes that benefit a small part of the richest segment of Chilean society has received almost no attention. For this reason we need to refer to studies elsewhere to obtain some insights about the efficiency impact of tax loopholes. Since these tax loopholes are targeted to special interest groups or preferential activities and since they subtract massive public resources that could be used in increasing the provision of public goods or in across-the-board tax reductions there is suspicion that may be counterproductive not only for social equity but for economic efficiency as

well[65]. Many empirical studies around the world have consistently shown that these tax incentives tend, in fact, to be ineffective in promoting investment and employment. For Israel, Bregman et al (1999) using detailed firm-level data finds that production inefficiencies in the form of over investment from capital subsidies reach up to 15%. Fakin (1995) analyzes capital subsidies for Slovenia and other parts of former Yugoslavia and also does not find evidence that tax incentives similar to those used in Chile generate higher growth; Lee (1996) for Korea, Bergstrom (1998) for Sweden, Estache and Gaspar (1995) for Brazil and Harris (1991) for Northern Ireland all reach similar conclusions. Crowding-out of private investment due to the subsidies also occurs. Though no such studies are available for Chile, it is hard to argue that the tax incentives may be any more effective in Chile than elsewhere[66].

5. Resource Dependency and Economic Distortions

Chile's economy is one of the most natural resource dependent in the world. The average share of natural resource exports in total exports amounted to 90% in the 1998-2005 period and the estimated share of natural resource dependent industries in GDP was more than 20% over the same period (Table 11). The economy relies heavily on the extraction or use of natural resources, mainly copper, fishmeal, cellulose, salmon farming and agricultural products (wine, fresh fruit and meat). The

[65] Taxes are not a means to improve distribution but rather to collect revenue, and it should be done in the most efficient manner. However the tax system should not worsen social equity, especially in countries that already have a highly concentrated distribution of wealth as in Chile.

[66] The only related study that we have found for Chile is consistent with the findings elsewhere. Bustos et al (2004) finds that a higher corporate tax rate does not affect capital accumulation in the long-run given the existence of accelerated depreciation and discount of interests from the profit base calculation.

issue is not whether resource dependency is bad or good for growth, which is an issue not yet fully resolved in the literature[67]. The key point we make is that the resource based sectors in Chile obtain large indirect subsidies that distort the structure of incentives in the economy inducing it to be even more dependent on natural resource industries[68].

Table 11: Percentage of Exports of Primary Goods[a] in GDP

Primary exports/exports	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	1980-2004
Argentina	14.5	9.1	8.6	11.9	19.4	12.7
Brazil	10.8	7.3	6.1	6.7	10.4	8.3
Chile	**32.4**	**42.9**	**40.8**	**39.5**	**44.0**	**39.9**
Greece	16.0	15.6	15.5	15.3	14.8	15.4
High income: OECD	8.1	6.0	5.5	5.4	5.8	6.2
Ireland	33.2	28.6	24.9	17.8	10.3	22.9
Korea, Rep.	5.8	4.6	3.3	4.5	5.2	4.7
Latin America & Caribbean	20.4	15.8	12.6	13.0	17.0	15.8
Mexico	19.6	18.2	11.4	10.5	9.5	13.8
New Zealand	36.4	31.0	31.7	30.2	31.4	32.2
Portugal	13.2	11.2	9.0	7.8	7.9	9.8
Spain	8.1	7.7	6.4	7.9	9.1	7.8
Upper middle income	28.3	n/a	14.8	18.5	21.7	21.5

Source: World Bank.
[a]Includes agriculture raw materials, food, fuels and ores and mineral exports

[67] There is some controversy regarding the disadvantages for economic growth and inequality that dependency on natural resource industries entails. The majority of the empirical analyses have concluded that resource dependent countries have tended to grow less and are more socially inequitable than other countries (see Barbier, 2005 for a thorough survey). What is quite clear, however, is that the potential for productivity growth is greater in knowledge intensive industries and services than in resource and pollution intensive industries. Countries that have been able to embark in the former type of industries are able to grow faster and more equitably than countries such as Chile that have locked in the latter types of industries. Moreover, even resource rich countries with high growth have only achieved this having a high initial level of human capital as well (Bravo-Ortega and de Gregorio, 2005).

[68] It is possible that part of the resource dependency may arise from external shocks driven by high commodity prices. However, Chile's dependency on natural resources has not changed significantly in the past three decades.

Resource industries generally do not pay fees or royalties for the use of the natural resource. In 2005 a small royalty was first applied only towards certain mining activity, but the rate is by far one of the lowest in the world. It applies to net profits with a rate of up to 5%, but they can be deducted to calculate income for the general corporate tax. The net royalty payments effectively amount to less than 2% of profits and less than 0.6% of the value of sales[69]. Water resources and fishing rights are grandfathered towards users through property rights and are affected by no royalties or any other special taxes, so effectively they do not pay the social cost of use.

A conservative estimate puts the *in situ* annual value of the raw natural resources extracted (the resource rents) just by the private copper mining sector (that is, excluding the state mining corporation, CODELCO) at about 2 % of GDP. As can be seen in Table 12 this estimate is based on data for the period 1997-2002, which include the lowest real prices of copper in the last 50 years (Svedberg and Tilton, 2006). The rents over the period 2003-06 which covers two "boom" years are much higher than the previous estimate, perhaps as high as 6% of GDP or even more[70].

[69] By international standards this is very low. For example, Canada varies by province with a minimum of 8% of "mine mouth value" with some provinces charging a much higher rate (IDRC, 2004); Australia also varies by region with the lowest rate of 2.5% of the sales ad-valorem; in the US, Arizona charge a 2% ad-valorem, while Nevada and Michigan have sliding scale with a 2% minimum (Otto et al, 2006). In addition, the normal corporate taxes rates in these countries are much higher than in Chile, where have effectively reached less than 15% of net profits. Even developing countries have also much higher rates. Here are some examples of "mine mouth value" rates in developing countries: Argentina 3%, Colombia 1%-12%; or other countries use gross or net sales Brazil 0.2%-3% (of net sales) Peru 1%-3% gross sales (IDRC, 2004).

[70] In 2006 for example, admittedly a year of high copper prices, the private mines in Chile declared profits of US$14.4 billion (about 10% of the total GDP of the country) out of an estimated total initial investment (mainly implemented over the nineties) of about $12 billion (Soto, 2004) and paid just US$3.3 billion in taxes, including royalty! (El Mercurio, May 31 2007).

Table 12: Private Mining Rents as % of GDP 1997-2002
(In millions of current US$ and % of GDP)

	1997	1998	1999	2000	2001	2002
Sales	4,263	3,367	4,167	5,207	5,141	4820
Operating Costs	2,235	2,279	2,741	2,907	2,896	2,856
Depreciation	1,290	1,093	848	566	698	597
Financial Costs	86	181	235	309	305	579
Taxes Due	306	99	134	167	117	86
Rents (Net Profits)	1636	808	1057	1824	1823	1299
Rents as % of GDP	2.0%	1.0%	1.4%	2.4%	2.6%	2.0%
Average rent 1997-2002	1.9%					

Source: Soto (2004) and own calculations.

It is difficult to estimate resource rents for the several other resource based industries in the economy. Over the period 1997-2002 average exports of non copper natural resources were almost 50% larger than copper exports from private mines. If we assume that rents per dollar exported are half in the latter sectors *vis-a-vis* the mining sector, we would reach an estimated rent of 1.5% of GDP for the non-copper sectors. A conservative estimate would then put the normal annual rents of privately owned resources at about 3.5% of GDP. This is probably the absolute lowest bound of the normal resource rents. For example, an authoritative source puts the value of rents for Chile in the year 2000 at 9% of GDP (Hamilton, 2006).

These rents correspond to the *in situ* value of the ore that private mining firms extract as well as the water and biological resources removed from the country's natural patrimony. Yet the natural resource based industries have been allowed to appropriate this patrimony for free. Or, equivalently, the natural resource based industries do not have to pay for one of its most important inputs, the raw natural resource that they extract and process.

This discrimination in favor of resource intensive industries is extended to environmentally dirty industries as well. While environmental norms are generally adequate in theory, its enforcement has been weak due to lack of monitoring, low budget for the environmental agencies, and lack of political clout of such agencies. Powerful business sectors have constantly used their considerable political connections and control of the media to pressure towards relaxing environmental standards arguing that environmental protection reduces economic growth. A recent report by the OECD (2005) has concluded that the absence of environmental enforcement and policy coordination is perhaps the biggest problem in this respect.

As a consequence the environmental indicators show mixed results. Chile shows some improvement in certain environmental indicators, such as air quality in Santiago and treatment of water discharges around the country (Universidad de Chile, 2000). But mineral mining in the north, extensive industrial fishing in the coast, and forestry activity and salmon farming in the south generate potentially harmful long term environmental impacts which do not seem to be adequately mitigated due to poor enforcement of existing environmental laws. Moreover, there is little hard data on the extent of the environmental damages that these industries are inducing. This lack of interest in collecting environmental data reflects the seemingly low priority that the government gives to environmental degradation. The lack of enforcement of environmental regulations constitutes yet another benefit that resource and environmental intensive industries receive.

Thus, in an economy where the role of markets is pervasive, clean non-resource (and non-polluting) dependent sectors pay the full market value for all their inputs while the dirty and resource dependent industries are able to get away without paying for a key input, the resource value and the pollution damage that they cause. Three obvious economic consequences follow from this implicit subsidy to the resource intensive and environmentally dirty industries:

(i) *Efficiency effect 1*: By failing to tax the resource rents the state deprives itself from an important relatively non-distortionary source of potential tax revenues. If these rents were taxed the state could either reduce income and other taxes that do cause deadweight losses and/or increase the provision of public goods without having to raise taxes. The net effect would be efficiency enhancing.

(ii) *Efficiency effect 2*: The fact that the resource based (and pollution-intensive) industries do not pay for part of their inputs effectively means that the structure of economic incentives is biased against the non-resource and environmentally clean activities (including services, high technology industries, and so forth) which have to pay market prices for every input that they use, thus causing misallocation of resources which leads to obvious deadweight losses for society. Moreover, allowing the resource industries to retain almost all rents and failing to internalize the environmental costs imposed by dirty industries on the rest of the economy may at least in part explain the excessive dependence of the country on

natural resource and environmentally demanding sectors. It may also smother the emergence of alternative clean, often human capital intensive industries with greater potential for productivity growth[71]. Whether or not resource dependence is deleterious for economic growth, the key issue is quite obvious*: If resource dependency is created or exacerbated by distortions that bias the structure of economic incentives in favor of such industries resource dependency is bad for efficiency and presumably bad for economic growth as well.*

(iii) *Equity effects*: Society effectively is transferring a large volume of wealth in the form of natural capital to a handful of mostly rich entrepreneurs. This contributes to exacerbate the highly unequal wealth distribution prevailing in the country and perhaps also contributes to deepen the perception of Chile as an unjust society.

6. Conclusion

Unlike many other countries, public expenditures in Chile have not been the mechanism used by the state to favor the elites. Most pro-elite biases are instead channeled through an incredibly generous tax policy which allows for enormous tax loopholes and for large rents of the resource industries to go untaxed. In the end, however, the pro-elite biases so common among many countries have the same

[71] This distortion of the public incentives against human capital-intensive industries may constitute a second blow to the development of such industries, the first one being the low endowment of human capital caused by the low investments in human capital by the state. Additionally, it may also constitute a second blow to the expansion of human capital itself as the slow development of human capital-intensive activities causes a sluggish demand for human capital and hence lowers the incentives to invest in human capital.

negative impact on equity and long-run growth that the more obvious public expenditure biases have elsewhere.

The Chilean experience suggests that an adequate public expenditure policy emphasizing the provision of public social goods could make a significant dent on poverty and promote reasonable growth. In fact composition and targeting of public expenditures in Chile has been commendable. However, such a policy by itself has been insufficient to improve income distribution and to allow for a growth rate that is sufficiently high to lead the country into genuine economic development.

The general low income and corporate tax revenues caused by low *effective* tax rates from enormous tax loopholes favoring a small elite and the failure of the state to share part of the large rents generated by the extraction of the natural capital have led to greatly restrict public expenditure. By mainly benefiting the elites, the direct impact of these policies has been to exacerbate existing inequality. The indirect effects have probably been even more important in doing the same: (1) the low tax revenues have constrained the government's budget leading to under investing in human capital among the low income classes, which are almost solely dependent on the public sector for these investments[72]. (2) These policies have also distorted incentives in favor of resource intensive industries that receive an implicit subsidy,

[72] We acknowledge the fact that human capital investments often benefit the rich rather than the poor. Therefore we explicitly call for investments targeted to these groups. In particular given the structure of educational system in Chile, this means increasing spending in public schools and/or the size of the education voucher, which are the schools attended by the low income groups.

therefore reducing incentives to invest in more knowledge intensive industries, which could in turn increase the demand for human capital. The end result is low investments in human capital among the poor and semi-poor and an economy excessively dependent on resource-intensive industries. Low human capital investments among the low income classes prevent their incomes to grow faster than the country average and the excessive dependence on resource-intensive industries causes further inequality due to the tendency of these industries to be capital-intensive and to concentrate resource rents in a few hands. Thus, both the direct and indirect effects of the tax policies point in the direction of consolidating and even worsening economic inequality.

This yields the following question. Why hasn't the government raised the tax level? We do not claim to have an answer for this, but we hypothesis that this has been partly due to lack of a consistent majority in congress necessary to push through a reform of this kind, and in part due to unwillingness within the government coalition, perhaps for electoral or ideological reasons in certain groups within the coalition. The fact is that overall taxes in Chile have remained low.

A final puzzle: why a respectable rate of economic growth has not reduced inequality? López and Torero (2007) using a sample of middle income countries (which includes Chile) show that growth itself after controlling for fiscal policies is an important factor in reducing inequality. There is clearly a missing link in the Chilean case, since growth has not reduced inequality. We hypothesize that a

combination of low human capital investment and tax related distortions that have constrained the country to excessively rely on natural resource extractive industries, are important factors behind this phenomena. It is possible that natural resource dependency, while not inherently bad for growth, is a factor that makes economic growth less effective in diminishing inequality.

The emphasis of this paper on fiscal budget constraints may seem quite irrelevant today for Chile which is currently enjoying an abundance of fiscal resources brought about by an unusually large bonanza on copper prices. If the government wanted it could now substantially increase expenditures in social goods and maintain the same degree of generosity towards the elites of its tax policy. Of course given that the copper price bonanza is unlikely to be permanent the government will not spend the temporary surpluses arising from such bonanza. The temporary nature of the current period of surpluses gives full validity to the emphasis on budget constraints that we follow in this paper.

Appendices

Proofs of Chapter 2

Proof of Proposition 4.

Starting from (28) and rearranging terms converts into:

$$\frac{\partial \tilde{w}}{\partial \alpha_m} = \left(w_m \left(1 - \frac{\alpha_m \lambda \delta (1-\phi)}{\Delta} \right) - w_p \left(1 + \frac{\alpha_p \lambda \delta (1-\phi)}{\Delta} \right) - w_r \left(\frac{\alpha_r \lambda \delta (1-\phi)}{\Delta} \right) \right)$$

Again we know that this expression is negative *iff*:

$$w_m(\Delta - \alpha_m \lambda \delta (1-\phi)) - w_p\big(\Delta - \alpha_p \lambda \delta (1-\phi)\big) - w_r \alpha_r \lambda \delta (1-\phi) > 0$$

and assuming λ>1 and introducing w(y) explicitly, this reduces to: $\Delta \delta^{\lambda}\big(1 - \phi^{\lambda}\big) - \lambda \delta (1-\phi)(\alpha_m \delta^{\lambda} + \alpha_p (\phi\delta)^{\lambda} + \alpha_r) > 0$. Denote $\widetilde{\Delta} = \alpha_m \delta^{\lambda} + \alpha_p (\phi\delta)^{\lambda} + \alpha_r$ and we obtain: $\Delta \delta^{\lambda}\big(1 - \phi^{\lambda}\big) - \lambda \delta (1-\phi)\widetilde{\Delta} > 0$ that yields the expression in (29): $\frac{(1-\phi^{\lambda})\delta^{\lambda}}{(1-\phi)\delta} > \lambda \frac{\widetilde{\Delta}}{\Delta}$. ■

Proof of Corollary 1.

The expression $\frac{(1-\phi^{\lambda})\delta^{\lambda}}{(1-\phi)\delta} > \lambda \frac{\widetilde{\Delta}}{\Delta}$, will hold if α_m is low enough. Rearranging this yields: $\bar{\alpha}_m = \delta^{\lambda-1}\left[\frac{\alpha_p \delta^{\lambda}(\phi(1-\phi^{\lambda}) - \phi^{\lambda}(1-\phi)\lambda) + \alpha_r(\delta^{\lambda-1}(1-\phi^{\lambda}) - (1-\phi)\lambda)}{(1-\phi)\lambda\delta - (1-\phi^{\lambda})}\right]$. Thus if $\alpha_m < \bar{\alpha}_m$ then it is always the case that (29) holds. We now look at the second condition. Assume therefore that $\alpha_m > \bar{\alpha}_m$. From (29) take the limit when δ→0. The RHS of (29) is always greater than 1 since λ>1 and $\widetilde{\Delta} > \Delta$. We look then at the LHS of (29), if δ→0, we have by l'hôpital's rule:

$$\lim_{\delta \to 0} \frac{(1-\phi^{\lambda})\delta^{\lambda}}{(1-\phi)\delta} = \frac{\lambda(1-\phi^{\lambda})\delta^{\lambda-1}}{(1-\phi)} = 0$$

Thus when δ→0 we have that $\frac{\partial \tilde{w}}{\partial \alpha_m}$ <0.

Finally we look at the case of ϕ. First look at the case when δ→1.

$$\lim_{\delta \to 1} \frac{(1-\phi^{\lambda})\delta^{\lambda}}{(1-\phi)\delta} = \frac{(1-\phi^{\lambda})}{(1-\phi)} > 1$$

Then we compare: $\frac{(1-\phi^{\lambda})}{(1-\phi)}$ with $\lambda \frac{\tilde{\Delta}}{\Delta}$ when δ→1. A low value of ϕ implies that $\frac{(1-\phi^{\lambda})}{(1-\phi)} \cong 1 < \lambda \frac{\tilde{\Delta}}{\Delta}$. Thus we have that a high value of δ combined with a low value of ϕ can yield $\frac{(1-\phi^{\lambda})\delta^{\lambda}}{(1-\phi)\delta} > \lambda \frac{\tilde{\Delta}}{\Delta}$. ■

Proof of Proposition 5.

Taking (31) and rearranging we obtain:

$$\frac{\partial \tilde{w}}{\partial \delta} = \frac{\lambda}{2\beta + 3c} \frac{1}{\Delta \delta} \left[\left((\Delta - \alpha_m \delta) \tilde{\mathrm{w}} - \Delta \alpha_r w_r \right) \right]$$

and using this expression and introducing *w(y)* explicitly, yields:

$$\frac{\partial \tilde{w}}{\partial \delta} = \frac{\lambda}{2\beta + 3c} \frac{w_r}{\Delta \delta} \left[\left((\Delta - \alpha_m \delta) \tilde{\Delta} - \Delta \alpha_r \right) \right]$$

which is positive *iff* $(\Delta - \alpha_m \delta)\tilde{\Delta} - \Delta \alpha_r > 0$, or equivalently if (Δ-(Δ − $\alpha m \delta \Delta > \Delta \alpha r$. ■

Proof of Corollary 2.

This proof is analytically identical to the proof of the previous corollary. ■

Proof of Proposition 9.

From (41) we know that money an increase in the size of the middle class affects both terms in brackets. The latter term will increase since the decrease in the size of the poor is multiplied by P which is always less than one. The first term will also be negative since α_p is reduced and given that $\frac{\partial}{\partial \alpha_m}\left(\frac{\partial M^R}{\partial \tau^r}\right) > 0$. Thus $\frac{\partial}{\partial \alpha_m}\left(\frac{\partial U^R}{\partial \tau^r}\right)<0$. ■

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