

**Essays on the Political Economy of Redistributive
and Allocation Policies in Competitive
Democracies**

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ABSTRACT

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This dissertation investigates the political incentives for redistribution of income and allocation policies in competitive democracies. In Chapter 2, I examine incentives for political redistribution through in-kind transfers. By analyzing the political game between office-motivated politicians and self-interested citizens, I first show that in economies with competitive markets in-kind transfers are not required. Politicians can win elections targeting groups of voters with differential cash transfers. However, in-kind transfers arise in the presence of externalities in consumption. In that case, targeting groups of voters with in-kind rather than cash transfers allows politicians to attract simultaneously voters in additional groups with the same amount of resources. Politicians undertake political redistribution depending on the expected electoral returns obtained from targeting both cash and in-kind transfers into different groups. Furthermore, electoral competition leads the economy to achieve Pareto efficient allocations that markets cannot reach. Politicians internalize the presence of external effects when competing for marginal voters who could swing their vote.

In Chapter 3, this dissertation investigates the politicians' incentives to pursue income redistribution when governments are constrained to levy taxes on labor income

and this creates distortions. Politicians who strive to be elected may strategically redistribute through in-kind rather than cash transfers and overprovide consumption of goods. I show that the overprovision of in-kind transfers reduces the disincentive effects of taxation in labor effort and enlarges the pool of resources for political redistribution. As a result, politicians are able to implement larger redistributive transfers and improve the well-being of swing voters. Hence, electoral competition for pivotal voters provides politicians incentives to implement redistributive schedules that reduce distortions in labor markets and improve the efficiency of the taxation system

In Chapter 4, I investigate the effect of ideological preferences over the public provision of goods on the scope of government and the political redistribution of income. I first point out that the presence of both ideological politicians who compete for office and electoral uncertainty generates a partisanship effect. In particular, I show that pro-market (right-wing) politicians commit to lower public provision of goods and taxation schedules that implement larger income inequality than pro-government (left-wing) politicians. Furthermore, I find out that the public funding of goods through income taxation confers an electoral advantage to pro-market ideological positions. In fact, pro-market politicians can court moderate pro-leftist voters by promises of higher income which pro-government politicians are not willing to fund completely. As a result, right-wing party exhibits larger chances of winning elections and its proposal supports lower ideological sacrifice than the left-wing party

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Chapter 1

Introduction

“For any policy, efficiency is a good place to start, but alone is not adequate because of distributional judgments”. Kenneth J. Arrow

1.1 Motivation and Research Questions

Democratic governments raise taxes over income in order to fund cash transfers and public provision of goods and services such as health care, education or national defense. Overall, the average size of redistributive and allocation policies in the OECD represents around 40% of GDP.¹ How are these significant policies chosen? Governments that implement economic policies are composed of politicians who are elected by citizens through elections. Furthermore, it is crucial to consider that citizens and politicians exhibit conflicts of interests and heterogeneity of tastes on policies. On the one hand, citizens care about their own economic well-being and therefore support taxation policies that redistribute income towards them. On the other hand, individuals may hold different preferences regarding the extent of public provision of goods. Hence, the conflict emerges as to decide the size of provision and who should bear the cost of funding these goods. Furthermore, politicians might compete for power because of the rents associated to holding office. As an alternative,

¹See OECD Economic Outlook 2010 for a detailed discussion on that evidence.

conflict among politicians could raise by different views of how society should operate.

The existence of these conflicts of interests raises political constraints and democracies have to solve them through mechanisms of collective choice (Drazen, 2000). Hence, this dissertation examines how representative democracies make redistributive and allocation policy decisions in the presence of political constraints. Furthermore, this thesis investigates the implication of political mechanisms of collective choice on economic outcomes.

The thesis starts by investigating the political incentives to modify the distribution of income generated by competitive market economies. In fact, the analysis focuses on the political choice among different policy tools to redistribute income. In particular, next chapter asks whether politicians do need to provide goods rather than fund cash transfers to redistribute income among groups of voters. The chapter also examines how political redistribution of income is affected by the presence of external effects and equity concerns.

The funding of redistribution through labor income taxation generates distortions and deadweight losses. How does it affect the scope of government? Chapter 3 investigates the effect of output losses on the extent of political redistribution. Furthermore, it analyzes whether distortions affect the political composition of redistributive transfers.

An appealing research of this dissertation lies in the normative analysis of the political allocations. Indeed, I examine the effect of electoral competition on allocative efficiency. In particular, do politicians have incentives to implement efficient allocations? Why? Under what circumstances might efficiency be achieved? The analysis focuses on the ability of political mechanisms to correct market imperfections and to increase the efficiency of the taxation system.

Last chapter considers that citizens and politicians might exhibit different ideological positions on the extent of government provision of goods. These goods must

be funded through income taxation and therefore it emerges a suggestive interaction between ideological and distributive conflict. How do democracies solve the simultaneous presence of both conflicts? This chapter analyzes the effect of both conflicts on the scope of government and the distribution of income. Furthermore, the presence of partisan politicians allows us to examine whether ideological positions affect the extent of competition between political parties.

1.2 Modeling

In order to investigate the political incentives for redistribution and allocation policies, I build different electoral competition models. Each model exhibits particularities to analyze specific research questions. Nevertheless, theoretical models share a common structure, and that is why the present dissertation analyzes similar policy choice problems from different perspectives.

I consider economies in which citizens belong to groups that are associated to levels of gross income obtained by individuals in a market economy. Income is formalized as either a fixed endowment or the result of labor effort decisions.

Through an electoral process citizens choose a government to rule economic policy. In particular, I examine polities in which government can redistribute income among groups through income taxation and group-specific transfers. Transfers can take the form of both cash and in-kind transfers. By in-kind transfers, Public Economics refers to government expenditures intended to provide the consumption of specific goods, regardless of whether production is public or private. Furthermore, I analyze the case in which governments fund the uniform provision of goods with revenues raised by income taxation. When income is considered as a fixed endowment, taxes and expenditures do not distort economic decisions. Nevertheless, when labor effort choices determine income, the analysis takes into account that taxation introduces frictions and creates income losses.

The government is elected from two political parties that compete for office. I consider the possibility of both office-motivated and ideological politicians. In the first two chapters, politicians uniquely care about the spoils of office. In the last chapter, partisan politicians hold different ideological views on the extent of public provision of goods. Regardless of their motivation, politicians can credibly commit to policy platforms. Therefore, the party that attracts the larger number of votes (i.e. majority voting) wins elections and implements the announced economic policies.

Individuals care about the net income, which results from taxation, and the consumption of goods that might be subject to public provision. I assume that all individuals share a common self-interested goal: citizens prefer to pay lower taxes and receive more transfers to increase their own economic well-being. Thus, there emerges a distributive conflict because of the possibility of income redistribution.

On the other side, one of the crucial elements of this dissertation is the different assumptions on citizens' preferences over the consumption of goods subject to government intervention. I examine three cases that imply a different economic nature of these goods. I first consider that individuals only value the effect of goods consumption on their private well-being. In that case, these goods are analyzed as pure private goods. Later, I examine the case in which individuals also care about the consumption levels of the goods in other groups of citizens. Therefore, I introduce a public good component because these goods exhibit some degree of non-rivalry. Finally, I investigate the situation in which individuals uniquely care about the level of public provision of goods but not on the effect on their own economic well-being. In this case, goods are non-rival and non-excludable (i.e. pure public goods).

The undertaken analysis does not impose severe constraints on policy tools and works in a multidimensional policy space. The problems associated to existence of equilibrium in high-dimensional policy spaces are well-known (Plott, 1967). However, probabilistic voting models have been proposed as simple useful devices to tractably handle political equilibria with multidimensional policy space (Coughlin,

1992; Persson and Tabellini, 2000). I adopt two types of probabilistic voting electoral competition models. On the one hand, I introduce in a competitive market economy a stochastic partisanship probabilistic voting model based on Lindbeck and Weibull (1987). In this case, individuals have biases towards fixed ideological positions of political parties that are not related with economic policy. On the other hand, I present a stochastic preference probabilistic voting model. In this kind of models, individuals and politicians hold heterogeneous partisan preferences on economic policy. Furthermore, following Enelow and Hinich (1989), both probabilistic voting models consider the presence of aggregate uncertainty regarding electoral outcome. In the three chapters, this randomness is introduced through a stochastic relative valence of politicians competing for office.

1.3 Chapters and Basic Results

The models proposed along this dissertation provide new insights on the effects of political incentives on redistributive and allocation policies.

1.3.1 Chapter 2: Political In-kind Redistribution

In chapter 2, I examine the incentives for political in-kind redistribution. The common view in political economy literature sustains that in-kind transfers emerge as a political instrument to redistribute income among groups of voters (Fernández and Rogerson, (1995); Epple and Romano (1996a,b) and Levy (2005)). Nevertheless, my research shows that those results are driven by severe policy constraints imposed to ensure the existence of equilibrium.

I find out that politicians have incentives to undertake political redistribution of income and modify a competitive market allocation. However, politicians can win elections targeting only differential cash transfers across groups of voters. Hence, a pure redistributive motive does not explain the use of in-kind transfers by politicians.

In order to rationalize the huge amount of in-kind transfers funded by elected politicians, I consider the possibility that goods subject to in-kind transfers exhibit non-rivalness. In particular, I introduce two types of interdependent preferences, which lead politicians to finance the consumption of particular goods. I first characterize redistributive schedules when the consumption of one group generates a positive externality for the rest of the population. Then, I explore how incentives for political redistribution are affected by the presence of egalitarian preferences on the consumption of specific commodities. The proposed model allows us to examine the factors that determine the size of in-kind transfers and how groups of citizens support the cost of funding external effects.

An appealing result of my research relies on the normative properties of the allocation that results from the political process. I show that electoral competition leads the economy to achieve Pareto efficient allocations that markets cannot reach. Politicians internalize the presence of external effects when competing for marginal voters who could swing their vote. Hence, an important contribution of this chapter relies on pointing out the role of political competition as a mechanism to increase efficiency in the presence of market imperfections.

1.3.2 Chapter 3: The Scope of Political Redistribution

The main novelty introduced in chapter 3 consists in considering that income is the result of labor effort decisions by individuals. This assumption opens the door to investigate politicians' incentives to pursue income redistribution when governments are constrained to levy taxes on labor income and this creates distortions and output losses.

As in previous chapter, politicians who strive to be elected have incentives to modify competitive market allocation. However, the scope of political redistribution is limited by deadweight losses associated to taxation. In this case, I show that politicians may strategically redistribute through in-kind rather than cash transfers.

In particular, politicians might constrain individuals to consume more in-kind transfers than the amount that they would buy in private markets if targeted resources were given in cash. That overprovision reduces the disincentive effect of taxation in labor effort and enlarges the pool of resources for political redistribution.

The model developed in this chapter characterizes the equilibrium political choice of income taxation, which is close to the optimal linear income taxation problem analyzed by Mirrlees (1971) and Stiglitz (1987). I extend this classical analysis allowing for group-specific cash and in-kind transfers. Furthermore, a crucial contribution consists in demonstrating that the implemented redistributive schedules can be the equilibrium outcome of the electoral competition between office-motivated politicians.

This chapter also examines how the political composition of redistributive spending affects allocative efficiency. Indeed, I find that electoral competition for pivotal voters provides politicians with incentives that allow implementation of redistributive schedules that reduce distortions in labor markets and improve the efficiency of the taxation system.

1.3.3 Chapter 4: Distributive Politics and Economic Ideology

Chapter 4 introduces citizens and politicians' heterogeneous ideological positions on the extent of public provision of goods. In particular, this chapter highlights that examining the ideological conflict on the role of government also requires analyzing the distributive conflict generated by the possibility of redistribution. Hence, I investigate the effect of ideological preferences on both the scope of government and the political redistribution of income.

I first point out that the presence of both ideological politicians and electoral uncertainty generates a partisanship effect in economic policies. In particular, I show that pro-market politicians announce lower public provision of goods, and commits

to taxation schedules that implement larger income inequality than pro-government politicians.

Furthermore, this chapter analyzes how the presence of partisan preferences over economic policies affects the extent of political competition between parties. An interesting result shows that the public funding of goods through income taxation confers an advantage to pro-market ideological positions. Pro-market politicians strategically target larger income to groups with higher concentration of moderate pro-leftist citizens who could swing their vote. As a result, pro-market politicians exhibit larger chances of winning elections and their policy proposals support lower ideological sacrifice than pro-government politicians.

It is important to notice the contribution of this chapter to the literature of political competition and electoral advantages of political parties. This literature introduces exogenous elements non-related to economic policy (e.g. valence and incumbency advantage) in order to create advantages in the electoral race between politicians. Instead, this chapter examines the existence of an electoral advantage that depends on chosen policy platforms and therefore it is an endogenous variable in the electoral competition game.

1.4 Methodological Contributions

1.4.1 Extending Distributive and Partisan Politics

The theoretical framework proposed in chapters 2 and 3 relies on the distributive politics workhorse model proposed by Lindbeck and Weibull (1987) and Dixit and Londregan (1996). These contributions focus on the factors that determine the political allocation of cash transfers among groups of voters. In particular, the characterization of redistribution schedules across groups must mainly consider the expected electoral returns of targeting transfers. This dissertation follows distributive politics approach and also finds that groups of voters with low income and large concentration

of pivotal voters are favored by politics. Furthermore, this thesis extends the classical framework introducing new elements that enrich the existing results in the literature.

The new components can be summarized in four elements: i) allowing redistribution through group-specific in-kind transfers in economies with competitive markets; ii) considering the presence of interdependent preferences among groups of voters (i.e. external effects); iii) introducing labor effort decisions and analyzing the effect of distortionary income taxation on political redistribution; and iv) examining ideological conflict among political agents in the presence of distributive conflict. Along the following chapters I examine with detail how these new elements affect the characterization of redistribute politics.

On the other side, the theoretical model presented in chapter 4 builds on the workhorse model of partisan electoral competition with commitment proposed by Wittman (1977, 1983) and Calvert (1985). However, Wittman-Calvert models of partisan competition focus on unidimensional policy space. For this reason, such theoretical framework has not been considered to investigate how partisan preferences affect the simultaneous political choice of public goods provision and income taxation schedules. Chapter 4 extends previous analysis introducing a stochastic preference probabilistic voting model that allows us to handle equilibria in pure strategies with multidimensional policy space. The proposed model provides a new framework to examine the incentives of partisan politicians to provide public goods and redistribute income among groups of voters. In contrast with significant prior political economy contributions, I show that the identity of political parties matter and that the composition of government spending depends on the ideology of the party that wins elections.

1.4.2 From Normative to Positive Analysis

Overall, the main goal of this dissertation consists in moving the analysis of redistribution and allocation policies from the normative to the positive analysis. The

economic literature usually approaches to policymaking from normative Public Economics based on the Pigouvian paradigm (Besley, 2007a). In particular, economic theory assumes that policies are chosen by a planner (i.e. benevolent government) who implements optimal policies that maximize the weighted welfare of individuals. However, Political Economy has identified two critical weaknesses in this methodological approach.

On the one hand, who is the planner? Besides, are governments benevolent? Therefore, does identity of government not matter for policy? Indeed, governments that make policy choices are formed by politicians elected by citizens, both of them with their own motivations and constraints. Hence, examining policy design making use of a normative perspective can be misleading. This critique was firstly raised by Public Choice literature (Buchanan and Tullock, 1962) and is at the heart of Political Economics (Drazen, 2000; Persson and Tabellini, 2000; Besley, 2007a).

On the other hand, how should the planner weigh the welfare of individuals? Welfare Economics proposes different social welfare functions based on normative criteria of social justice. However, these functions embody exogenous *ad hoc* distributional value judgments on how society should weigh the well-being of different individuals (Sen, 1977; Besley and Coate, 2003; Besley, 2007a). As an alternative, Political Economy focuses on the endogenous determination of the weights that implicitly are maximized in the political process.

These two essential flaws are enough to justify why this thesis takes a positive political economy approach to analyze democratic policymaking. Along this dissertation, the characterization of redistributive schedules and allocation policies does not result from the optimal choice of a benevolent government that maximizes normative criteria of social justice. Instead, economic policies are the equilibrium outcome of a political game between politicians and voters.

Furthermore, the developed positive analysis does not need to rely on value

judgments on the weight of groups in society in order to characterize economic policies. Indeed, redistributive schedules and allocation policies announced by politicians depend on the political influence of groups of voters. By using probabilistic voting models, I can identify how these political weights emerge from both politicians and citizens' optimization choices subject to political and economic constraints. This approach has also empirical support because recent contributions have shown that it is possible to identify the empirical counterparts of political weights in probabilistic voting. As an example, Besley and Preston (2007) and Besley, Persson and Sturm (2010) undertake empirical work that measures the group's influence on policy depending on individuals' attachments to parties.

1.4.3 Normative Analysis of Political Allocations

The normative properties of the political allocations discussed in this dissertation are especially suggestive. The common view in Economics suggests that politics introduces frictions, distorts economic decisions and raises allocative inefficiencies. Indeed, political economy has extensively discussed the potential distortions and welfare losses introduced by democratic policymaking (Besley and Coate, 1998; Lizzeri and Persico, 2001; Acemoglu et al., 2008, 2009, 2011).

However, this dissertation formalizes some of the insights raised informally by Wittman (1989, 1995) on the efficient properties of competitive democracy. Wittman argues that political competition produces the same type of efficient outcomes as market competition does. Therefore, incentives to be elected should force politicians to increase allocative efficiency. Nevertheless, at a formal level scarce work has investigated the welfare enhancing role of political competition. This dissertation contributes to fill this gap.

The use of probabilistic voting plays a crucial role in my findings on the welfare improving effect of political competition. Coughlin (1982, 1992) firstly formalizes the Pareto optimality of policy proposals with probabilistic voting. In fact, I find that

when one party promises policies such that pivotal voters in some group of citizens could be made better off without making critical voters in other groups worse off, the opponent party could announce policies that Pareto dominates its policy platforms. Hence, competition for marginal voters provides politicians with incentives to exhaust potential Pareto improvements in the economy. The main normative contributions of this dissertation consist in showing that electoral competition might lead to internalize the presence of external effects and to choose redistributive schedules that reduce the efficient cost of income taxation.

1.5 Roadmap

This dissertation is organized as follows. In the next chapter, I investigate distributive conflict in competitive market economies. Furthermore, the chapter analyzes the role of in-kind transfers as a tool of political redistribution of income in the presence of external effects. Chapter 3 examines the scope of political redistribution when income taxation generates distortions in labor markets. In particular, research focuses on the composition of political redistributive spending and its effect on allocative efficiency. Chapter 4 explores the interaction between distributive and ideological conflict in competitive democracies. Moreover, this chapter analyzes the effect of partisan preferences on the extent of political competition between ideological politicians. Finally, the last section of each chapter concludes and discusses potential further research.

Chapter 2

The Political Economy of In-Kind Redistribution

2.1 Introduction

In advanced democracies, governments raise taxes and redistribute resources on a large scale. Evidence shows that a significant part of this redistribution is undertaken through in-kind transfers such as health services, education, housing or child and elderly care.¹For instance, public health care spending in 2008 represented on average 7% of GDP and 16% of government expenditures in OECD countries. In the US, public spending in primary and secondary education stands at 5% of GDP. Overall, in-kind transfers in the OECD represent around 15% of GDP.²Why do politicians redistribute resources through in-kind rather than cash transfers? The goal of this chapter is to examine political incentives for in-kind government redistribution.

In particular, I investigate whether politicians who compete for office need to make use of in-kind transfers when there are no constraints in the available taxation

¹By *in-kind transfers* I refer to government expenditures intended to provide the consumption of specific goods, regardless of whether production is public or private.

²Source: OECD Economic Outlook 2009 and OECD Health Data 2010; See Currie and Gahvari (2008) and Alesina and Glaeser (2004) for a detailed discussion on that evidence.

policy tools. The common view in political economy literature is that in-kind transfers emerge as an instrument to redistribute resources across groups of citizens.³ However, my first main result shows that in-kind transfers are not required when politicians can court groups of citizens with differential cash transfers.

In order to analyze the political choice between cash and in-kind transfers, I consider a society in which individuals belong to a finite number of groups. Citizens care about their available income and the consumption of goods that might be subject to public provision such as health and education. Through a political process, citizens have to elect a government who can raise taxes to fund cash and in-kind transfers. There are no constraints in the available taxation policy that government can use and economic policies are non-distortionary.

The government is elected from two office-motivated political parties that compete for power. Politicians credibly commit to a combination of net taxation policy and in-kind transfers targeted to groups in order to maximize their chance of winning elections. Furthermore, each party holds fixed ideological positions non-related with economic policy such as positions on value issues. Citizens have heterogeneous attachments toward those parties' ideological views and share a common valuation of the competing parties. Hence, each citizen votes for the party that maximizes her own well-being given promised economic policies, ideological views and the valuation of political parties. The party that obtains the majority of the votes wins the election and implements the announced policies.

With the purpose of focusing the analysis on the distributional side, I assume the existence of competitive firms that produce goods such as health care or education. In a market economy without government intervention, the access to those goods depends on individuals' income, but the market allocation is not politically sustainable. Once electoral competition is introduced, politicians have incentives to

³See for instance Epple and Romano (1996a,b), Gouveia (1997) and Currie and Gahvari (2008).

redistribute resources in order to win elections. The gainers of the political process are the groups with lower initial amount of resources and homogeneous ideological positions.

However, this does not imply that redistribution must occur through in-kind transfers. Politicians compete for pivotal voters that could swing their vote but can court those swing voters by targeting differential cash transfers across groups of citizens. Hence, why is in-kind redistribution so prevalent? Normative analysis justifies in-kind transfers as optimal responses of a benevolent planner to either market failures or equity concerns.⁴Currie and Gahvari (2008) survey normative theoretical explanations for in-kind transfers and review limited empirical evidence. They consider interdependent preferences such as externalities and paternalism as the leading candidates to explain governments' use of in-kind transfers.⁵I introduce this type of preferences into the distributive politics game. In that situation, I find that in-kind redistribution is politically necessary. Politicians can attract more voters making use of in-kind rather than cash transfers. I focus on two particular cases in order to analyze how political redistribution is affected by interdependent preferences.

I first discuss the role of in-kind transfers in the presence of consumption externalities. Specifically, I explore the case in which the available health care coverage of the elderly generates a positive externality for the rest of the population. In that case, politicians can court simultaneously swing voters in all groups targeting in-kind transfers to the group whose consumption generates a positive external effect. These political incentives lead the economy to increase the overall consumption levels of the good subject to in-kind transfers.

⁴See Stiglitz (1995) and Rosen and Gayer (2010) for a textbook treatment of failures in markets for health and education such as asymmetries of information, liquidity constraints or spillover effects; Musgrave (1959) and Besley (1988) for paternalistic motives on the individuals' lack of skills and myopia to make good choices on merit goods.

⁵Currie and Gahvari (2008) also discuss the extensive literature on the role of in-kind transfers as screening device to redistribution in the presence of asymmetric information (Nichols and Zeckhauser, 1982; Blackorby and Donaldson, 1988; Bruce and Waldman, 1991). However, they highlight the limited practical feasibility of such self-selection mechanism.

I then explore how incentives for political redistribution are affected by the presence of egalitarian preferences on the consumption of specific commodities. For instance, individuals could believe that health and education are fundamental rights. These rights should not be dependent on citizens' ability to pay or any other circumstances. I show that politicians implement in-kind transfers in order to reduce inequalities. However, an egalitarian distribution is not attainable because of the political incentives for differential treatment across groups. Office-motivated politicians exploit individuals' concerns for their own economic well-being, courting voters with differential in-kind transfers. Those incentives also lead to decreasing aggregate consumption levels of goods subject to egalitarian views.

An appealing result of my research is that the electoral competition for marginal voters exhausts potential Pareto improvements in the economy. Politicians redistribute resources using available policy tools in such a manner that the allocation of resources that results from electoral competition and individuals' market decisions is Pareto efficient. The efficiency argument in electoral competition was made informally by Wittman (1989, 1995). Furthermore, Besley and Coate (1998) and Besley (2007) highlighted that efficiency should be reached in static political economy models without constraints in policy tools. The novelty of my contribution relies on showing that this efficiency result holds in the political choice of cash versus in-kind redistribution in the presence of externalities and equity concerns. Politicians competing for marginal voters lead the economy to achieve Pareto-efficient allocations that markets cannot reach.

It is important to notice that this efficiency result is not the choice of a benevolent planner that implements in-kind transfers either to correct market imperfections or to satisfy equity concerns. Instead, the efficient allocation is the equilibrium outcome of the political game between politicians and voters. The political process does not generate allocative inefficiencies and the implemented allocation in the Pareto set depends on the political clout of different groups.

One of the advantages of the present positive analysis over the normative one is that we do not need to rely on value judgments on the weight of groups in society in order to characterize economic policies. The characterization of redistributive schedules announced by politicians depends on the political influence of groups. Such an influence is explained by the expected electoral returns obtained from targeting both cash and in-kind transfers into different groups.

The model builds on previous work on probabilistic voting developed by Lindbeck and Weibull (1987) and Dixit and Londregan (1996) to study political redistribution of cash transfers across groups of voters.⁶I extend that framework, allowing politicians to court groups of citizens with both cash and in-kind transfers when market provision of the targeted goods is also feasible. By exploiting a probabilistic voting model, this chapter can tractably handle political equilibria with multidimensional policy space without imposing severe constraints into policy tools. This modeling strategy allows me to show that previous results on the political use of in-kind transfers are driven by policy constraints imposed in order to ensure the existence of equilibrium. Influential contributions such as Fernandez and Rogerson (1995), Epple and Romano (1996a,b) and Levy (2005) rationalize the use of in-kind transfers as tool of political redistribution across groups of citizens. Those transfers could emerge without the necessity of assuming market failures or equity concerns. However, this chapter shows that a pure redistributive motive does not explain the political use of in-kind transfers once a sufficiently rich set of policy instruments is available.

Essential for my results is the possibility of allowing the targeting of in-kind transfers toward groups of citizens. That form of targeting has been mainly ignored by both the literature on redistributive politics and theoretical research on in-kind transfers. Those contributions have generally assumed that politicians offer universal homogeneous provision of health and education. However, evidence supports the

⁶Those models were extended by Persson and Tabellini (2000) and Lizzeri and Persico (2004) to analyze the size and scope of government spending.

possibility of targeting in-kind transfers. The most obvious cases are the Medicare and the Medicaid programs targeted to the elderly and the poor in the US. Furthermore, even in systems of universal provision the coverage is not uniform. As an example, the co-payments schedules in European public health systems depends on citizens' age, level of income or employment status. Similarly, the exemptions of course fees in public universities are determined by family income or geographic mobility. Hence, this chapter opens the way to new empirical analysis on the political targeting of in-kind transfers towards specific groups or constituencies.

The chapter is organized as follows. In the next section, I present the benchmark of a competitive market allocation. Section III analyzes the role of in-kind transfers as a tool of political redistribution. Section IV introduces external effects into the distributive politics game. Section V explores political redistribution in the presence of equity concerns. Finally, the last section concludes and discusses potential further research.

2.2 The Economy: Market Allocation

Consider an economy with a continuum of citizens whose measure can be normalized to 1. Citizens are divided into a finite number of groups, $j \in \{1, \dots, J\}$, with measure μ^j . No group constitutes a majority of the population. Each individual in group j has an endowment of w^j units of a numeraire good. This endowment can be thought as the level of income or money obtained by citizens of a given occupation or type in a market economy. The total amount of resources in the economy is defined as:

$$w = \sum_{j=1}^J \mu^j w^j \quad (2.1)$$

Competitive firms produce health services at different quality levels, h ,⁷ using a linear technology that requires qh units of the numeraire commodity to produce

⁷For expositional reasons, I focus on health care but the analysis is also valid for education.

one unit of health services at quality h . All individuals in the population have the same preferences over the consumption of the numeraire commodity, c , and health care quality, h , represented by the following utility function:

$$U^j(c^j, h^j) = u(c^j, h^j) \quad \forall j \quad (2.2)$$

This function is continuous, twice differentiable, strictly increasing ($u_c > 0, u_h > 0$) and strictly concave ($u_{cc} < 0, u_{hh} < 0$) in c and h . Marginal utilities are bounded away from 0 and $u_c(0, h) = \infty$ and $u_h(c, 0) = \infty$. There are no complementarities between health quality and the numeraire (i.e. $u_{ch} = 0$) and both commodities are assumed to be normal goods.

I assume perfectly competitive markets.⁸Firms with constant returns to scale produce whatever quality of health care that citizens demand at price, p_h , equal to marginal cost, q . Competitive firms make zero profits. Citizens endowed with available resources, w^j , purchase in competitive markets the quality of health care that they desire at market price p_h . The residual amount of resources is left for consumption of the numeraire commodity. Thus, individual's budget constraint is given by:

$$w^j = c^j + p_h h^j \quad (2.3)$$

The choice problem for individual i located in group j who acquires health services in the market is defined as follows:

$$\forall i \in j \quad \max_{h^j} U^j(c^j, h^j) = u(w^j - p_h h^j, h^j) \quad \text{s.t. } h^j \geq 0 \quad (2.4)$$

where the FOCs for an interior optimum are:

$$[h^j] \quad -p_h u_c + u_h = 0 \rightarrow u_h = p_h u_c \quad \forall j \quad (2.5)$$

⁸I abstract away potential market imperfections such as asymmetries of information and imperfect competition. This assumption is made in order to focus the analysis on the distributional side. i.e. how differences of available income affect access to health care quality.

The optimal market choice, $(c_m^{j*}, h_m^{j*}) \forall j$, for individuals with initial endowment w^j , satisfies (2.5) such that:

$$u_h(c_m^{j*}, h_m^{j*}) = p_h u_c(c_m^{j*}, h_m^{j*}) \quad \forall j \quad (2.6)$$

From this relation, we can implicitly define the marshallian demand functions for health care quality and numeraire commodity:

$$h_m^{j*} = h_m^j(w^j, p_h) \quad \forall j \quad (2.7)$$

$$c_m^{j*} = c_m^j(w^j, p_h) \quad \forall j \quad (2.8)$$

Definition (Market Allocation): A competitive market equilibrium is an allocation of numeraire commodity and health services quality for each group of the polity, $\{c_m^{j*}, h_m^{j*}\}_{j=1}^J$, such that consumers solve problem (2.4); and competitive firms with constant returns to scale produce whatever amount citizens demand at price p_h , equal marginal cost, q . In equilibrium, economy feasibility constraint holds with equality:

$$\sum_{j=1}^J \mu^j c_m^{j*} + \sum_{j=1}^J \mu^j p_h h_m^{j*} = w \quad (2.9)$$

In a competitive equilibrium, the rate at which consumers are willing to trade health services for numeraire commodity, $MRS_{h,c}$, is equal for all individuals and equal to the rate at which the economy is able to transform numeraire into health care quality, $MRT_{h,c}$. Therefore, Market allocation is Pareto Optimal.

$$MRS_{h,c}^j = MRT_{h,c} = q \quad \forall j \in \{1, \dots, J\} \quad (2.10)$$

Market equilibrium yields an allocation of resources such that individuals who belong to groups with larger amount of initial endowment choose higher quality of health services and consume larger amounts of numeraire good than individuals who belong to groups associated to low initial endowments. This follows directly from assumptions about homogeneity of preferences and normality of both goods. Is this market allocation politically sustainable?

2.3 The Polity: Political Allocation

2.3.1 Political Game

The initial distribution of the endowment across groups can be modified by public intervention. Through a political process the polity has to choose a government who can raise taxes and devote these fiscal revenues to redistribute resources through both cash (i.e. numeraire) transfers and the public provision of health services. Public provision is modeled as conditional transfers. Citizens receive non-tradable transfers that can be uniquely spent to purchase health services in markets.⁹I do not impose any constraint on the taxation schedule that government can use and economic policies are non-distortionary.¹⁰

There are two purely office-motivated political parties, $P \in \{A, B\}$, competing for office. Hence, parties announce taxation policy and in-kind transfers to each group j in order to maximize their chances of winning elections. I assume majority voting, therefore winning corresponds to obtaining the support of more than fifty percent of the population. Voting is costless and nobody abstains.

Let y_P^j denote the amount of numeraire commodity promised by party P to group j . This net income is the result of taxation policy targeted to j by P . Furthermore, politicians can announce group-specific in-kind transfers. Let h_{gP}^j be the publicly provided quality of health care promised by P . The marginal cost of the public funding of health services quality is equal to the market price, p_h . Politicians can credibly commit to a policy platform $x_P = \{y_P^j, h_{gP}^j\}_{j=1}^J$ to be implemented if party P wins the elections. The allocation of resources after government intervention

⁹As an alternative, I could assume that governments can directly produce these services with exactly the same technology available to the private sector. In that case, results in terms of allocations of resources would be the same.

¹⁰Formally, those assumptions imply that governments are able to tax away all the initial endowment of resources. Then, politicians redistribute that fixed budget across groups allocating cash and in-kind transfers. See Lizzeri and Persico (2004) for a close approach in economies with cash transfers and pure public goods.

must satisfy economic feasibility:

$$\sum_{j=1}^J \mu^j y_P^j + \sum_{j=1}^J \mu^j p_h h_{gP}^j = w \quad (2.11)$$

This constraint defines a budget set of private and public spending allocations that are feasible. The policy set of available and attainable policies that captures all restrictions, $X \subset \mathbb{R}^{2J}$, is non-empty, convex and compact.

Citizens care about their own economic well-being represented by preferences (3.3) and have access to health care markets. Once one of the parties P wins the elections and implements announced policies, individuals are able to purchase health services, h_{mP}^j , at price p_h . The overall quality of health services in group j under government P would be the sum of the public and private provision, $h_P^j = h_{gP}^j + h_{mP}^j$. The residual amount of available resources are allocated to the consumption of numeraire commodity, $c_{mP}^j = y_P^j - p_h h_{mP}^j$.

In addition to economic policy, citizens care about non-economic issues. Specifically, I adopt a partisanship probabilistic voting model.¹¹ Political parties hold fixed and differentiated positions in some dimension other than economic policy. For instance, parties A and B could represent respectively conservative and liberal positions on *value* issues (e.g. pro-life versus pro-choice views), foreign policy or the role of religion in public life. Individuals have biases toward those parties' ideological views. Define σ^i as the relative attachment that individual i has to party B 's positions (i.e. $\sigma^i = \sigma_B^i - \sigma_A^i$). This ideological bias can be positive or negative.

Parties do not know the party attachment of each individual. However, the group-specific distribution of relative ideological biases for each group is common-knowledge. I assume that the idiosyncratic biases for citizens in group j are drawn from a uniform distribution over the range $[\sigma_a^j, \sigma_b^j]$:

¹¹I use the specification of individuals concerns on non-economic ideological issues and popularity of political parties proposed by Persson and Tabellini (1999). See Persson and Tabellini (2000) for a detailed discussion.

$$\sigma_i \sim U \left[-\frac{1}{2\phi^j} + \bar{\sigma}^j, \frac{1}{2\phi^j} + \bar{\sigma}^j \right] \quad \forall i \in j \quad (2.12)$$

Groups might differ with respect to both their average ideological bias, $\bar{\sigma}^j = (\sigma_a^j + \sigma_b^j)/2$, and the ideological homogeneity within the group. Groups with a broader support of party biases (i.e. greater ideological dispersion) have a lower density $\phi^j = 1/(\sigma_b^j - \sigma_a^j)$. Denote $\phi = \sum_{j=1}^J \mu^j \phi^j$ the weighted average of ideological heterogeneity across groups. In spite of bias diversity within and across groups, I assume that there is no aggregate ideological bias in the overall population. Furthermore, there are ideologically neutral voters, $\sigma^i = 0$, in all groups.

Citizens value the personal attributes of the politicians running in the elections. I assume that between the announcement of cash and in-kind policies and elections each party receives aggregate shocks, ε_A and ε_B , common to all voters in the population. I normalize the common shock, $\varepsilon = \varepsilon_B - \varepsilon_A$, which measures the perception that voters have on party B 's candidate with respect to candidate A at the time of elections (i.e. average relative popularity of candidate B). I assume that the common shock ε is uniformly distributed, independently from σ_i , with density ψ and expected value, $E(\varepsilon)$, equal to 0.

$$\varepsilon \sim U \left[-\frac{1}{2\psi}, \frac{1}{2\psi} \right] \quad (2.13)$$

The timing of the political game is as follows: **1)** Political parties simultaneously and non-cooperatively credibly commit to their economic policy platforms, $x_A = \{y_A^j, h_{gA}^j\}_{j=1}^J$ and $x_B = \{y_B^j, h_{gB}^j\}_{j=1}^J$. **2)** The random idiosyncratic, σ_i , and common popularity shocks, ε , are realized. **3)** Citizens vote for the candidate that they prefer, $\{A, B\}$. **4)** Whichever party P that obtains the majority of the votes, wins the election and implements the economic policy promised at the beginning of the game. Finally, **5)** individuals make consumption choices through competitive markets, $\{c_{mP}^j, h_{mP}^j\}_{j=1}^J$.

2.3.2 Stages of the Game

The political game presented above has three stages:

Stage 1 - Policy Announcements: taking its opponent's policy platform as given, each party chooses the net taxation policy and in-kind transfers for each social group that are economically feasible and maximize its chances of winning elections. Parties take into account expected voting decisions of citizens, knowing that they can supplement health services quality in competitive markets.

Stage 2 - Elections: citizens vote for the party that they prefer given economic policy announcements, their ideological biases and the popularity of politicians.

Stage 3 - Market Decisions: once one of the parties wins the election and implements announced policies, individuals make market choices. Individuals can make private purchases of health care with their available income.

I characterize the Subgame Perfect Nash equilibrium of the political game by backward induction.

Third Stage: Market Decisions

In the last stage of the game, given implemented policies by winner party P , $\{y_P^j, h_{gP}^j\}_{j=1}^J$, individuals decide whether to purchase health services through competitive markets, $\{h_{mP}^j\}_{j=1}^J \geq 0$. The residual available resources are allocated to the consumption of the numeraire commodity, $\{c_{mP}^j\}_{j=1}^J$.

Individual's budget constraint in group j under P 's government is given by:

$$y_P^j = c_{mP}^j + p_h h_{mP}^j \quad \forall j \quad (2.14)$$

Consumer $i \in j$'s choice problem can be written as:

$$\max_{h_{mP}^j} U^j(c^j, h^j) = u(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) \quad \text{s.t.} \quad h_{mP}^j \geq 0 \quad \forall j \quad (2.15)$$

The FOCs for a maximum are given by:

$$[h_{mP}^j] \quad u_h + \gamma_h^j = p_h u_c \quad \forall j \quad (2.16)$$

$$\gamma_h^j h_{mP}^j = 0 ; \quad \gamma_h^j \geq 0 \quad \forall j \quad (2.17)$$

where γ_h^j is the Lagrange multiplier associated to the non-negativity constraint, $h_{mP}^j \geq 0$. The choice problem for group j yields two alternatives. In the first alternative, individuals decide not to make private purchases of health care, $h_{mP}^j = 0$, if and only if this condition holds:

$$u_h(y_P^j, h_{gP}^j) \leq p_h u_c(y_P^j, h_{gP}^j) \quad \forall j \quad (2.18)$$

Given group j 's available income, y_P^j , the quality of publicly provided health services to this group, h_{gP}^j , is such that the marginal benefit of acquiring one unit of health care is lower than the marginal cost in terms of lower consumption of numeraire commodity. Individuals do not purchase private coverage and net income is fully devoted to the consumption of the numeraire commodity, $c_{mP}^j = y_P^j$. Hence, the indirect utility function for groups that do not supplement (*NS*) public health coverage under P 's government is given by:

$$V_P^{jNS}(y_P^j, h_{gP}^j; p_h) = u(y_P^j, h_{gP}^j) \quad \forall j \quad \text{and} \quad \forall P \in \{A, B\} \quad (2.19)$$

Otherwise, when the sign of condition (2.18) is reversed, individuals make private purchases, $h_{mP}^j > 0$. The optimality condition of consumer's choice problem yields:

$$u_h(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) = p_h u_c(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) \quad \forall j \quad (2.20)$$

This condition implicitly defines the ordinary demand function of health services quality for group j under P 's government, $h_{mP}^j = h_m^j(y_P^j, h_{gP}^j, p_h) \quad \forall j$. Using

individual budget constraint (2.14), the consumption of numeraire commodity is defined as:

$$c_{mP}^j = y_P^j - p_h h_m^j(y_P^j, h_{gP}^j, p_h) \quad \forall j \quad (2.21)$$

The indirect utility function for groups that make private purchases (S) under P 's government is given by:

$$V_P^{jS}(y_P^j, h_{gP}^j; p_h) = u(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) \quad \forall j \quad \text{and} \quad \forall P \in \{A, B\} \quad (2.22)$$

Second Stage: Voting

At the voting stage, individuals consider announced policies, x_A and x_B , credible commitments that parties implement if they win elections. Citizens value promised policies according to the impact on their own economic well-being. Individuals take into account that they will be able to make private decisions on health care markets once policies had been implemented. Thus, individuals valuation of policies are summarized by either indirect utility function (2.22) or (2.19) depending whether they supplement or not the quality of health care publicly provided.

Suppose that a member of group j is promised economic policies (y_A^j, h_{gA}^j) by party A and (y_B^j, h_{gB}^j) by B . Given ideological biases and the popularity of politicians, citizen i in group j votes for party A if:

$$V_A^j(y_A^j, h_{gA}^j) > V_B^j(y_B^j, h_{gB}^j) + \sigma_i + \varepsilon \quad (2.23)$$

where $V_P^j = \max\{V_P^{jS}, V_P^{jNS}\}_{j=1}^J \quad \forall j$ and for $P \in \{A, B\}$. While voting for party B if this inequality is reversed.

In each social group will be citizens with an idiosyncratic ideological bias, σ^j , such that they are indifferent between voting for party A or B . The swing voter type in each group j is defined as:

$$\sigma^j = V_A^j(y_A^j, h_{gA}^j) - V_B^j(y_B^j, h_{gB}^j) - \varepsilon \quad (2.24)$$

where $V_P^j = \max\{V_P^{jS}, V_P^{jNS}\}_{j=1}^J \forall j$ for $P \in \{A, B\}$. Voters located in group j with and ideological type σ_i below (above) the cut-off ideological type find optimal to vote for A (B). Previously, I assumed that the idiosyncratic ideological preferences are uniformly distributed in each group. Furthermore, there is no ideological bias to any of the parties in the overall population. Therefore, the overall vote share for party A is defined as:

$$S_A(x_A, x_B; \varepsilon) = \frac{1}{2} + \sum_{j=1}^J \mu^j \phi^j \sigma^j \quad (2.25)$$

The complement share of citizens votes for party B, S_B .

First Stage: Policy Announcements

At the first stage of the game, when politicians announce policy platforms, the common shock has not been observed. The swing voter type in each group depends on both policy platforms and the realized value of the shock, $\sigma^j = \sigma^j(x_A, x_B; \varepsilon)$. Hence, parties are uncertain about the location of the ideological cut-off type in each group and voting is a random variable from politicians' point of view. I assumed majority voting, therefore office-motivated politicians care about the probability of obtaining more than fifty per cent of the total vote. Given the swing voter type in each group (3.27) and distributional assumptions on biases and shock, the probability that party A wins the election can be expressed as:

$$P(x_A, x_B) = \frac{1}{2} + \frac{\psi}{\phi} \left[\sum_{j=1}^J \mu^j \phi^j [V_A^j(y_A^j, h_{gA}^j) - V_B^j(y_B^j, h_{gB}^j)] \right] \quad (2.26)$$

Party B anticipates winning the election with the complementary probability $1 - P(x_A, x_B)$. This function captures the uncertainty regarding electoral outcome and summarizes expected voting behavior of citizens given announced policies and implied market decisions. The probability is a function of the weighted average of differences in indirect utility due to parties' proposals of cash transfers and provision of health services. The weights depend on the heterogeneity of ideological biases

within a group.¹²

Probabilistic voting provides continuity of the probability function. Continuity of both individuals' utility function and distribution of ideological biases insures continuity in both policy platforms of the probability that A wins the election. Furthermore, I assumed concavity of citizens' utility functions and uniform distribution of idiosyncratic ideological positions. Given these assumptions, the probability function is quasi-concave in x_P for each party P .¹³

Taking the opponent's economic policies as given, each political party chooses a combination of available income and public provision of health care for each group, $\{y_P^j, h_{gP}^j\}_{j=1}^J$ for $P \in \{A, B\}$, that maximizes its chances of winning elections subject to economic feasibility and non-negativity constraints. Parties take into account citizens' expected voting decisions (*stage 2*) and individuals' choices in competitive markets (*stage 3*).

The policy choice problem of party A is given by:

$$\max_{\{y_A^j, h_{gA}^j\}_{j=1}^J} P(x_A, x_B) \quad \text{s.t.} \quad (2.11) \quad \text{and} \quad y_A^j \geq 0 \quad \forall j \quad ; \quad h_{gA}^j \geq 0 \quad \forall j \quad (2.27)$$

The policy choice problem is symmetric to political party B . The First Order Conditions for both political parties $P \in \{A, B\}$ are defined as:

$$[y^j] \quad \frac{\psi}{\phi} \mu^j \phi^j \frac{dV_P^j(y_P^j, h_{gP}^j)}{dy^j} + \mu^j \gamma_{yP}^j = \mu^j \lambda_P \quad \forall j \quad (2.28)$$

$$[h_g^j] \quad \frac{\psi}{\phi} \mu^j \phi^j \frac{dV_P^j(y_P^j, h_{gP}^j)}{dh_g^j} + \mu^j \gamma_{hP}^j = p_h \mu^j \lambda_P \quad \forall j \quad (2.29)$$

¹²See Persson and Tabellini (2000) for a detailed discussion on the properties of probability of winning functions in this kind of electoral competition models.

¹³Austen-Smith and Banks (2005) and Banks and Duggan (2006) present excellent surveys on probabilistic voting with office-motivated politicians. Specially relevant are their technical discussion on continuity and quasiconcavity of parties' probability of winning elections.

$$\lambda_P \left[w - \sum_{j=1}^J \mu^j y_P^j - \sum_{j=1}^J \mu^j p_h h_{gP}^j \right] = 0 \quad (2.30)$$

$$\gamma_{yP}^j y_P^j = 0 \quad \forall j \quad ; \quad \gamma_{hP}^j h_{gP}^j = 0 \quad \forall j \quad (2.31)$$

$$\lambda_P \geq 0 \quad \gamma_{yP}^j \geq 0 \quad \forall j \quad ; \quad \gamma_{hP}^j \geq 0 \quad \forall j \quad (2.32)$$

where γ_{yP}^j and γ_{hP}^j are the multipliers associated to the non-negativity constraints $y_P^j \geq 0$ and $h_{gP}^j \geq 0$ for all groups $j \in \{1, \dots, J\}$ for $P \in \{A, B\}$; and λ_P is the Lagrange multiplier associated to the economy feasibility constraint for $P \in \{A, B\}$.

2.3.3 Political Equilibrium

Definition: A Subgame Perfect Nash Equilibrium (SPNE) in the probabilistic electoral competition game is i) a menu of economic policies announced by each political party P , $x_P^N = \{y_P^j, h_{gP}^j\}_{j=1}^J$; ii) a voting decision for each individual of the polity, $\{A, B\}$; and iii) individuals' private choices through competitive markets under P 's government, $\{c_{mP}^j, h_{mP}^j\}_{j=1}^J$, such that:

1) Each political party announces a policy proposal that maximizes its chances of winning elections taking as given its opponents' policy announcements, the economy feasibility constraint and citizens' expected voting and market decisions.

2) Each citizen votes for the party that maximizes her own well-being given announced economic policies, ideological biases, popularity shock and decisions in competitive markets.

3) Each individual, given implemented policies, chooses the bundle of numeraire commodity and health services that maximizes her utility given her available resources.

Proposition 1 (Existence) *A SPNE in pure strategies exists.*

Proof. Given that i) the feasible set of strategies for both political parties is non-empty, compact and convex; and ii) candidates objective functions are continuous in policy strategies (x_A, x_B) and quasiconcave in x_A and x_B for each party respectively. Furthermore, given that i) individuals' budget set is also non-empty, compact and convex; and ii) citizens' utility functions are assumed to be continuous and concave in both goods. Then, according to Glicksberg's Theorem, there does exist a Subgame Perfect Nash Equilibrium in pure strategies. ■

Political Allocation

Solving backwards, I characterize the Political Equilibrium of the game.¹⁴ For both political parties, the equilibrium net taxation and in-kind transfers policies for any group j , (y_P^{jN}, h_{gP}^{jN}) , must satisfy:

$$\frac{\psi}{\phi} \phi^j \mu^j \frac{dV_P^j(y_P^{jN}, h_{gP}^{jN})}{dh_g^j} = p_h \frac{\psi}{\phi} \phi^j \mu^j \frac{dV_P^j(y_P^{jN}, h_{gP}^{jN})}{dy^j} \quad (2.33)$$

$\forall j \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$, such that economic feasibility holds. In the pre-election stage, politicians announce policies such that the marginal benefit of targeting one unit of in-kind transfers in terms of probability of winning elections is equal to the marginal opportunity cost. That cost is measured by the marginal decrease in probability due to a reduction of targeted net income by p_h units.

The presence of competitive markets allows the existence of multiple equilibrium policies for each group j . In the pre-election stage, politicians take into account that in the post-election stage individuals have access to health care markets. In equilibrium, both political parties are indifferent to announce different combinations of net taxation policy and in-kind transfers for each social group j . However, the

¹⁴See Mathematical Appendix A.1. for a detailed discussion and complete characterization of the political equilibrium and the propositions presented in this subsection.

targeted consumption bundle of numeraire and health care to group j is the same regardless of the chosen equilibrium policy. In equilibrium:

$$u_h(c_P^{jN}, h_P^{jN}) = p_h u_c(c_P^{jN}, h_P^{jN}) \quad (2.34)$$

where $c_P^{jN} = y_P^{jN} - p_h h_{mP}^{jN}$ and $h_P^{jN} = h_{gP}^{jN} + h_{mP}^{jN} \quad \forall j \in \{1, \dots, J\}$ and $P \in \{A, B\}$.

The combination of chosen policies, $\{y_P^{jN}, h_{gP}^{jN}\}_{j=1}^J$, imply consumption bundles for all groups that satisfy the economy feasibility constraint. That set of bundles, $\{c_P^{jN}, h_P^{jN}\}_{j=1}^J$, is the one that maximizes politicians' chances of winning elections given expected voting, competitive equilibrium behavior of citizens and economic feasibility.

Proposition 2 (Equilibrium Policies) *Politicians are indifferent between announcing pure private provision, pure public provision or a combination of public and private provision of health services for each group j such that the consumption bundle intended for the groups is reached and economic feasibility holds.*

Corollary 1 (In-kind transfers not necessary) *Office-motivated politicians need not resort to in-kind transfers to win elections.*

The existence of competitive markets allows any consumption bundle to be reached targeting differential cash transfers. That result contrasts with previous significant political economy contributions such as Fernandez and Rogerson (1995), Epple and Romano (1996a,b) and Gouveia (1997). In that literature, in-kind transfers emerge as the political instrument to redistribute resources across groups of voters. However, those results are driven by severe policy constraints imposed in order to ensure the existence of political equilibrium. Specifically, those models do not allow the possibility of income redistribution. Therefore, those insights cannot be generalized when cash transfers are allowed.

One exception in the literature is Levy (2005) who analyzes the possibility of in-kind transfers when income redistribution is also feasible. In the presence of

heterogeneous preferences, public provision of education (i.e. in-kind transfers) could emerge as the result of a coalition between the rich and the young poor. Nevertheless, in that case, in-kind redistribution arises because cash transfers are constrained to be uniform for all the population.

In order to overcome the limitations imposed by modeling constraints, I introduce a probabilistic voting model in the policy choice between cash and in-kind transfers. That allows relaxing the constraints in policy tools allowing for differential targeting cash and in-kind transfers. I show that when there are no severe constraints in redistributive schedules, in-kind transfers are possible but not politically necessary.

In the pre-election stage, political parties could announce different combinations of net taxation and in-kind transfers policies. Then, policy divergence is possible. However, office-motivated politicians propose economic policies that implement the same allocation of resources once individuals make private choices in competitive markets, $\{c^{jN}, h^{jN}\}_{j=1}^J$:

$$c^{jN} = c_A^{jN} = c_B^{jN} \quad \text{and} \quad h^{jN} = h_A^{jN} = h_B^{jN} \quad \forall j \in \{1, \dots, J\} \quad (2.35)$$

Proposition 3 (Political Allocation) *The political game between office-motivated politicians and self-interested citizens yields to a unique consumption bundle of numeraire commodity and health services for each group, $\{c^{jN}, h^{jN}\}_{j=1}^J$.*

Distributive Politics

In equilibrium, parties announce economic policies such that ideologically neutral voters ($\sigma^i = 0$) are expected to be indifferent between political parties. Hence, politicians compete in each group for pivotal indifferent voters that could swing their vote. The electoral competition between office-motivated politicians leads to the consumption patterns of numeraire and health care across groups implicitly defined by the following equations:

$$\phi^k u_c(c^{kN}, h^{kN}) = \phi^{k'} u_c(c^{k'N}, h^{k'N}) \quad \forall k, k' \in \{1, \dots, J\} \quad (2.36)$$

$$\phi^k u_h(c^{kN}, h^{kN}) = \phi^{k'} u_h(c^{k'N}, h^{k'N}) \quad \forall k, k' \in \{1, \dots, J\} \quad (2.37)$$

The relative treatment across groups depends on both the concentration of expected swing voters and the sensitivity of the expected ideological cut-point (3.27) to policy proposals. Those incentives for political redistribution are consistent with the well-known insights on distributive politics highlighted by Lindbeck and Weibull (1997) and Dixit and Londregan (1996) who analyze the political allocation of cash transfers across groups. I extend those results allowing for differential targeting of commodities when market provision is feasible.

Proposition 4 (Swing Voters) *The group-specific consumption bundle of numeraire and health care that results from the political process is monotonically increasing in the density of expected swing voters in each group.*

Proof. Given the assumption of homogeneity of preferences and concavity of utility function, equilibrium conditions hold if and only if groups with larger densities have lower marginal utility of both numeraire and health services. Therefore, these groups must have larger allocations of both commodities.

$$\text{if } \phi^k > \phi^{k'} \rightarrow u_c(c^{kN}, h^{kN}) < u_c(c^{k'N}, h^{k'N}) \rightarrow c^{kN} > c^{k'N} \quad (2.38)$$

$$\text{if } \phi^k > \phi^{k'} \rightarrow u_h(c^{kN}, h^{kN}) < u_h(c^{k'N}, h^{k'N}) \rightarrow h^{kN} > h^{k'N} \quad (2.39)$$

■

The density of the distribution of ideological biases, ϕ^j , measures the ideological heterogeneity within a group. That density captures the expected concentration of marginal voters in the group. Therefore, the political success of a group depends on its degree of ideological homogeneity with respect to the rest of the groups.

Corollary 2 (Homogeneous Biases) *Ideologically homogeneous groups consume more numeraire and health services than groups with larger diversity in ideological biases.*

The political process penalizes groups with more dispersed ideological views. Those groups present a lower concentration of marginal voters who could change their party attachment by parties' economic promises. Instead, groups with more homogeneous views and larger concentration of citizens in the expected cut-point receive larger benefits.¹⁵In the particular case in which all the groups had the same dispersion of ideological biases, the political game yields the utilitarian allocation. That result holds because the expected marginal returns of targeting are identical across groups.

Claim 1 (Utilitarian Allocation) *When social groups have the same extent of ideological heterogeneity, office-motivated politicians announce policies that implement the utilitarian allocation. This allocation implies an egalitarian distribution of numeraire and health care for all individuals of the polity.*

Political incentives to discriminate across groups also depend on the sensitivity of the expected cut-point to policy platforms. Differentiating (3.27) with respect to both policy alternatives, we can notice the relation between expected electoral returns and convexity of preferences. The expected electoral gain is inversely related with the curvature of the utility function over goods.

For instance, I could suppose the case in which the curvature over the consumption of numeraire is lower than over health care (i.e. the marginal utility decreases faster when individuals increase health care quality than when receive cash transfers). In that case, citizens' willingness to compromise their attachments to political parties falls quicker with increased targeting of health care. This implies that one unit of resources devoted to health care is expected to generate lower electoral returns than one unit targeted to the numeraire. Hence, in this case, opportunistic politicians have incentives to announce policies that increase the consumption of numeraire because of its larger electoral impact.

¹⁵See Lizzeri and Persico (2004) for a close discussion on the effect of ideological heterogeneity in the distribution of cash transfers across groups.

Furthermore, the marginal electoral returns of differential targeting health care are lower than the returns from discrimination through cash transfers across groups. On the one hand, with risk aversion over health care, politicians can court swing voters by offering lower amount of resources. On the other hand, pivotal voters remain sensitive to larger offers of cash transfers. Hence, the political process would generate lower inequalities in the consumption of health care than in the numeraire commodity.

Claim 2 *The larger the curvature over the consumption of a good is, the lower the groups' differences in the consumption of that good regardless of their expected concentration of swing voters.*

Allocative Efficiency

The allocation of resources that results from the political process, $\{c^{jN}, h^{jN}\}_{j=1}^J$, is such that the rate at which consumers are willing to trade health care quality for numeraire commodity is equal across groups and equal to the rate at which the economy is able to transform numeraire into health care:

$$MRS_{h,c}^{jN} = MRT_{h,c} = q \quad \forall j \text{ and } P \in \{A, B\} \quad (2.40)$$

Proposition 5 (Efficiency) *The electoral competition game between office-motivated politicians who court self-interested citizens leads the economy to reach a Pareto Efficient allocation.*

Hence, the political process does not generate allocative inefficiencies. As highlighted by Wittman (1989, 1995) that result illustrates an important feature of the competition between politicians who strive to be elected. In the probabilistic electoral competition game, if one party promises policies such that swing voters in one group could be made better off without making critical voters in other group worse

off, the opponent party could announce policies that Pareto dominates its policy platforms. Therefore, when politicians compete for marginal voters they have incentives to exhaust the potential Pareto improvements in order to win the elections.

This efficiency result contrasts with significant political economy contributions which viewed in-kind transfers as the distortionary result of political redistribution. For instance, Epple and Romano (1996a) state that if in-kind transfers are purely a consequence of the redistributive motive, then the equilibrium allocation of goods is Pareto inefficient. However, that inefficiency arises because of the restrictions on the technology of taxation but not by the political process. Once I remove these constraints allowing for differential targeting of cash and in-kind transfers, allocative inefficiencies disappear. This result is consistent with Besley and Coate (1998) and Besley (2007) critique to the common claims about inefficiency of political equilibria in static settings. Inefficiencies would be due to the imposed modeling constraints in order to get existence of equilibrium. In static political economy models without constraints in policy tools efficiency should be reached.¹⁶

Furthermore, Persson and Tabellini (2000) highlight that the system of equations that gives equilibrium policies in partisanship probabilistic voting games corresponds to the solution of the maximization of a weighted utilitarian social welfare function (SWF). Therefore, in those settings, political equilibrium allocations would be Pareto optimal. Nevertheless, it is relevant to be clear on the significant differences between the normative approach that sustains the existence of a SWF and probabilistic voting. On the one hand, the SWF embodies ad hoc distributional value judgments on how society should weight the utility of different social groups (Sen, 1977). On the other hand, probabilistic voting takes a positive approach. The weights of groups depend on their political influence. Those weights determine equilibrium policies which do not generate allocative inefficiencies but modify the distribution of

¹⁶Inefficiencies in representative democracies could be introduced through other sources such as commitment problems and the strategic use of policy in dynamic settings (Besley and Coate, 1998, and Acemoglu, 2003).

real resources across groups with respect to market allocation.¹⁷

Market versus Political Allocation

In the previous section, I assumed competitive markets abstracting potential imperfections in order to focus the analysis on the distributional side. I discussed that, in a market economy without government intervention, the access to health care depends on individuals' available income. Is this market allocation sustainable in a political process?

Proposition 6 (Market Sustainability) *Office-motivated politicians announce policies that implement the market allocation of goods if and only if both i) the initial endowment of resources is the same for all individuals; and ii) ideological polarization is equal across groups.*

Proof. i) if groups are not endowed with the same amount of resources, due to concavity of utility function, candidates can increase their expected number of votes targeting resources toward groups with an initial higher marginal utility (i.e. lower initial endowment); ii) if the dispersion of ideological biases is not homogeneous across social groups, politicians can increase their chances of winning elections targeting more resources toward groups with larger ideological heterogeneity (i.e. higher concentration of *swing* voters). ■

Hence, this paper points out that even in the case that markets work properly, market allocation is not politically sustainable. In the presence of initial economic or ideological heterogeneity across groups, office-motivated politicians have incentives to redistribute resources. The gainers of the political process are the groups with lower initial amount of resources and homogeneous ideological positions.

¹⁷See Besley and Preston (2007) and Besley, Persson and Sturm (2010) for probabilistic voting models with empirical work that measures groups' influence on policy depending on individuals' attachments to parties.

2.4 External Effects

In view of the results outlined above, when citizens only care about their own economic well-being, office-motivated politicians could win elections without promising in-kind transfers. However, evidence shows that elected politicians steadily redistribute resources through in-kind transfers on a large scale.

Normative analysis in public economics has suggested interdependent preferences as one of the leading candidates to explain the use of in-kind transfers. Particularly, literature has highlighted the potential externalities generated by the consumption of health and education.¹⁸ In the normative literature, in-kind transfers emerge as the optimal response of a benevolent government that correct those market imperfections.

However, does this result hold in the presence of office-motivated politicians that compete for voters in elections? Individuals could feel better off when their fellow citizens have access to health and education. Nevertheless, government programs need to be funded and resources are scarce. Then, to what extent are citizens willing to pay more taxes (or receive less cash transfers) in order to fund external effects? And most importantly, who must support the cost of funding those externalities?

I focus on a particular case in order to analyze whether the political game internalizes the presence of externalities. Specifically, I explore the case in which the available health care coverage of the elderly generates a positive externality for the rest of the population. This concern could be motivated by pure altruism between generations. As an alternative, it could be justified by social insurance motives. Individuals care about how society guarantees the access to health services to the elderly.¹⁹

¹⁸See Stiglitz (1995) and Rosen and Gayer (2010) for a textbook treatment on the spillover effects of education or the positive externalities due to the consumption of health care. Currie and Gahvari (2008) highlight justifications based on interdependent preferences and paternalism. They also survey alternative explanations such as the role of in-kind transfers to increase the efficiency of the taxation system; and its potential use as screening device to redistribute towards the needy.

Regardless of the empirical relevance of this particular case, the goal of this section is to analyze how incentives for political redistribution are affected by the presence of consumption externalities.

2.4.1 Distributive Politics with Externalities

Consider an economy composed of three social groups: the workers, L , the entrepreneurs, F , and the elderly, E . Each individual located in group $j \in \{L, F, E\}$ is endowed with w^j units of the numeraire commodity. Office-motivated politicians compete for office targeting both group-specific net taxation policy and in-kind transfers. The selected combination of policies, $\{y_P^j, h_{gP}^j\}_{j=1}^J$, must be feasible (2.11) and citizens have access to competitive health care markets.

Preferences for the elderly are well-represented by the utility function (3.3) whose properties were discussed in section II. However, now elderly's consumption of health services, h^E , is a positive externality for the workers and the entrepreneurs. The preferences for non-elderly citizens, $k \in \{L, F\}$, are represented by an utility separable in own-group consumption of goods and elderly's health care. Let β^k denote the salience that captures group's relative weight between both concerns. The larger the magnitude of the salience is, the greater the external effect.

$$U^k(c^k, h^k, h^E) = u(c^k, h^k) + \beta^k v(h^E) \quad \forall k \in \{L, F\} \quad (2.41)$$

The first component measures utility derived from group k 's own economic well-being. The function $u(\cdot)$ is well-behaved. The second component captures the external effects. Citizens in group k value E 's health care quality according to $v(\cdot)$. I assume that this function is continuous, twice differentiable, strictly increasing and strictly concave in h^E .

$$v_{h^E} > 0 \quad \text{and} \quad v_{h^E h^E} < 0 \quad (2.42)$$

¹⁹The elderly are the big consumers of health care in the OECD countries. Increases in both life expectancy and cost of treatments due to new technologies explain observed significant increases in health care spending. Source: OECD Health Data 2010.

Political Allocation

Solving backwards, I characterize the Political Equilibrium of the game.²⁰ For both political parties, the equilibrium net taxation and in-kind transfers policies for any group k , (y_P^{kN}, h_{gP}^{kN}) , satisfy the same equilibrium conditions than in an economy without external effects. However, now the equilibrium policies for group E must satisfy:

$$\frac{\psi}{\phi} \left[\phi^E \mu^E \frac{dV_P^E(y_P^{EN}, h_{gP}^{EN})}{dh_g^E} + \sum_{k=L}^F \phi^k \mu^k \frac{dV_P^k(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dh_g^E} \right] = p_h \frac{\psi}{\phi} \phi^E \mu^E \frac{dV_P^E(y_P^{EN}, h_{gP}^{EN})}{dy^E} \quad (2.43)$$

$\forall k \in \{L, F\}$ and $\forall P \in \{A, B\}$. In the pre-election stage, politicians announce policies to group E such that the marginal benefit of targeting one unit of in-kind transfers in terms of probability of winning elections is equal to the marginal opportunity cost. The benefit depends on both the direct effect in group E and the electoral impact in groups L and F . The cost is measured by the marginal decrease in probability due to a reduction of targeted net income to group E by p_h units.

Given the existence of competitive markets, both political parties are indifferent to announce different combinations of net taxation policy and in-kind transfers to the non-elderly groups, $\{L, F\}$. Politicians are indifferent between announcing pure private provision, pure public provision or a combination of public and private provision of health services for each group k such that the consumption bundle intended for those groups is reached. However, for both political parties there is a unique equilibrium policy of net taxation and in-kind transfers to group E , (y_P^{EN}, h_{gP}^{EN}) . Politicians constrain health consumption choices of the elderly in order to internalize the external effects in the rest of the groups.

The combination of chosen policies, $\{y_P^{jN}, h_{gP}^{jN}\}_{j=L}^E$, imply consumption bundles for all groups that satisfy the economy feasibility constraint. The set of bundles, $\{c_P^{jN}, h_P^{jN}\}_{j=1}^J$, is the one that maximizes politicians' chances of winning elections given

²⁰See Mathematical Appendix A.2. for a detailed discussion and complete characterization of the political equilibrium and the propositions presented in this subsection.

expected voting, competitive equilibrium behavior of citizens and economic feasibility.

In Equilibrium:

$$u_h(c_P^{kN}, h_P^{kN}) = p_h u_c(c_P^{kN}, h_P^{kN}) \quad (2.44)$$

$$u_h(c_P^{EN}, h_P^{EN}) + \sum_{k=L}^F \frac{\phi^k}{\phi^E} \frac{\mu^k}{\mu^E} \beta^k v_{hE}(h_P^{EN}) = p_h u_c(c_P^{EN}, h_P^{EN}) \quad (2.45)$$

where $c_P^{EN} = y_P^{EN}$; $h_P^{EN} = h_{gP}^{EN}$; $c_P^{kN} = y_P^{kN} - p_h h_{mP}^{kN}$ and $h_P^{kN} = h_{gP}^{kN} + h_{mP}^{kN} \quad \forall k \in \{L, F\}$ and $P \in \{A, B\}$.

Proposition 7 (Externalities and In-kind transfers) *Politicians must target in-kind transfers to the group which consumption choices generates positive externalities in the rest of the population.*

If politicians target group E uniquely with cash transfers, the elderly expected behavior in markets imply that they would allocate available resources between health and numeraire without taking into account the external effects originated into groups L and F . In order to maximize their chances of winning elections, politicians select a combination of feasible policies such that E are constrained to consume more health services than they would buy in competitive markets if targeted resources were given in cash.

In equilibrium, office-motivated politicians propose economic policies that, once individuals make private choice in competitive markets, implement the same allocation of resources $\{c^{jN}, h^{jN}\}_{j=1}^J$.

$$c^{jN} = c_A^{jN} = c_B^{jN} \quad \text{and} \quad h^{jN} = h_A^{jN} = h_B^{jN} \quad \forall j \in \{L, F, E\} \quad (2.46)$$

Proposition 8 (Political Allocation with External Effects) *The political game between office-motivated politicians and self-interested citizens with interdependent preferences yields to a unique consumption bundle of numeraire commodity and health services for each group, $\{c^{jN}, h^{jN}\}_{j=1}^J$.*

Distributive Politics

Political parties announce economic policies such that the ideological cut-point is expected to be equal to zero for all groups. The equilibrium relative treatment between groups in the presence of external effects is implicitly defined by the following system of equations:

$$\phi^k u_c(c^{kN}, h^{kN}) = \phi^E u_c(c^{EN}, h^{EN}) \quad \forall k \in \{L, F\} \quad (2.47)$$

$$\phi^k u_h(c^{kN}, h^{kN}) = \phi^E u_h(c_P^{EN}, h_P^{EN}) + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \phi^k \beta^k v_{h^E}(h_P^{EN}) \quad \forall k \in \{L, F\} \quad (2.48)$$

The patterns of numeraire commodity are characterized by the same conditions previously discussed. Groups with larger concentration of swing voters and lower initial endowments receive more cash transfers (or pay fewer taxes). However, the consumption of health care is affected by the presence of externalities. The novel element is that politicians can court simultaneously swing voters in all groups targeting in-kind transfers to the groups which consumption choices generate positive externalities in the rest of the population. Those incentives leads politicians to announce policies that change both the distribution of health services across groups and its overall consumption in order to court a larger amount of pivotal voters.

In equilibrium, parties equalize across groups the expected electoral returns of targeting one unit of health care. The expected returns of targeting in-kind transfers in each group depends on the density of swing voters and the sensitivity of the expected cut-point in each group to changes in offers of health services. When politicians target in-kind transfers to the elderly they expect to affect the ideological cut-point of the workers and the entrepreneurs. In order to attract swing voters in those groups, politicians increase the amount of health services targeted to the elderly. That increase raises the overall consumption of the good in the economy.

Claim 3 *In the presence of external effects, the consumption of health services is larger with respect to economies where individuals only care about their own economic well-being.*

The overall return of targeting in-kind transfers to the elderly depends on the impact within that group and the external effects generated in the rest of the groups. The return on the elderly mimics previous results: the effect of the amount targeted is directly related with the concentration of pivotal voters and indirectly with the curvature over health services.

The expected electoral returns on groups L and F depends on the salience of external effects and the convexity of preferences weighted by the density of expected swing voters in each group. A larger salience, β^k , means that an extra unit of health care targeted to the elderly is expected to affect group k ideological cut-point by a larger size. Furthermore, the impact on group k 's ideological cut-off is inversely related with the curvature of utility $v(\cdot)$ over h^E . Therefore, the quicker marginal utility declines, the lower the expected electoral return in group k .

Resources are scarce and increases of in-kind transfers to the elderly must be balanced with decreases of targeted resources in other groups. For instance, it could imply a reduction of the amount of health services targeted to group k . That reduction implies a decrease in the expected number of votes in k which size depends on its expected density of swing voters and the convexity of preferences. The expected electoral losses in group k also depend on the relative size of the groups. The smaller the elderly group is, the lower the expected losses in group k . Politicians can increase in-kind transfers to the elderly decreasing group k 's consumption in a lower proportion.

In equilibrium politicians balance expected gains and losses of votes. The size of in-kind transfers targeted to the elderly depends on the density of elderly swing voters and the magnitude of other groups concerns on external effects. The effect of

this magnitude on in-kind transfers is directly related with the success of the workers and the entrepreneurs in distributive politics (i.e. their expected concentration of swing voters). Furthermore, the size of in-kind transfers is inversely related with the size of the group E . The larger the size of the group is, the lower the impact of external effects on the targeted amount. For instance, society ageing will reduce elderly consumption of health care. In that situation, maintaining previous levels of funding would imply additional reductions in the consumption levels of the rest of the groups, L and F . Politicians should reduce in-kind transfers to the elderly in order to court swing voters in the rest of the population.

Furthermore, office-motivated politicians target a combination of cash and in-kind transfers that constraint consumption choices of the elderly regardless of their political clout. Two potential cases are worthy to discuss. For instance, when the elderly group presents a broader support of ideological attachments (i.e. low density, ϕ^E), they could receive low cash transfers but large levels of health coverage. As an alternative, when the elderly are highly influential (i.e. high density, ϕ^E), politicians target larger in-kind transfers than desired by the old in order to court marginal voters in non-elderly groups. The elderly would prefer allocations with lower health care quality and larger available income. However, the expected marginal gains to court swing elderly citizens with cash would be lower than the expected marginal losses of swing voters within the workers and the entrepreneurs. Therefore, politicians must constrain elderly consumption decisions in order to court marginal voters in the rest of the population.

Allocative Efficiency and Markets

In equilibrium, the bundles of numeraire and health services consumed by the workers and the entrepreneurs, $\{c^k, h^k\}_{k=L}^F$, satisfy:

$$MRS_{h,c}^{kN} = MRT_{h,c} = q \quad \forall k \in \{L, F\} \quad (2.49)$$

Furthermore, the consumption bundle of the elderly, (c^E, h^E) , which results from the political process takes into account the existence of external effects:

$$MRS_{h^E, c^E}^{EN} + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \beta^k MRS_{h^E, c^k}^{kN} = MRT_{h,c} = q \quad (2.50)$$

Proposition 9 (Efficiency and External Effects) *The electoral competition game between office-motivated politicians who court self-interested individuals in the presence of external effects yields an allocation in the set of Pareto efficient allocations.*

The efficiency result is explained by the electoral competition for marginal voters. For instance, if one party announced only cash transfers to group E , its opponent, with the same amount of resources, could target in-kind transfers in that group and attract more swing voters from the rest of the population. The competition for courting the maximum amount of swing voters leads politicians to announce net taxation and in-kind transfers policies that lead the economy to reach efficient allocations.

In the case that health care decisions were not subject to the political process, competitive markets do not internalize external effects. The elderly would not take into account the effect of their consumption decisions on the rest of the population. Therefore, the political process leads the economy to achieve Pareto-efficient allocations that markets cannot reach.

It is important to notice that this efficiency result is not obtained by assuming the presence of benevolent governments. Efficiency is the equilibrium outcome of the political process. Looking for their own-interest, office-motivated politicians internalize the external consequences of elderly health consumption in the rest of the population.

Few contributions have discussed the role of political competition to increase efficiency in the presence of market imperfections. One exception in the analysis of in-kind transfers is Blomquist and Christiansen (1999). In the presence of asymmetric information, in-kind transfers could be used as a screening device that alleviates

the self-selection constraint and increases efficiency.²¹In polities where citizens have preferences for redistribution toward low income citizens, well-designed in-kind transfers lead high and low ability individuals to reveal their type. Politicians compete for office announcing redistributive policies that improve efficiency and equity in the presence of asymmetric information.

Other relevant contribution that explores the efficiency-enhancing role of electoral competition is Besley, Persson and Sturm (2010). They analyze the effect of electoral competition on the choice of pro-growth policies in the US states. They make use of probabilistic voting to model the electoral competition for voters with party's loyalties (i.e. swing versus core voters). Their results show that political competition between parties tends to increase efficiency. The larger the competition for marginal swing voters is, the larger the incentives to choose efficient policies.

2.5 Commodity Egalitarianism

Recent contributions on positive political economy have suggested that citizens' support over redistributive policies depends not only on the effect of policies on individuals' own economic well-being but on their beliefs on the fairness of social outcomes.²² Individuals would be averse to inequalities generated by luck and support policies that reduce those inequalities that they consider unfair. That literature has focused on views about the proper distribution of income and citizens' preferences over cash redistribution. However, citizens could also be concerned about the proper consumption of specific commodities.

²¹Blomquist and Christiansen (1999) introduce the main insights of Nichols and Zeckhauser (1982) on the screening role of in-kind transfers into a political economy setting. However, they impose severe constraints into the number of groups and preferences in order to reduce the political game to one dimension. Those assumptions limit the generality of their results.

²²Piketty (1995), Alesina and Angeletos (2005), Bénabou and Tirole (2006) are important contributions on the relation between social beliefs and preferences over redistributive policies. See Alesina and LaFerrara (2004) and Fong (2001) for empirical work on the US case. Alesina and Giuliano (2010) provide a comprehensive theoretical and empirical review of the literature.

In particular, I work the case in which individuals are averse to inequalities in the consumption of goods such as health and education.²³ For instance, individuals could believe that health and education are fundamental rights. These rights not should be related with citizens' ability to pay or any other characteristic.

Furthermore, inequalities in the consumption of these goods could be a proxy for unfair inequalities. For instance, in a market economy, an unlucky child born in a low income family would have access to a low quality education. The market provision of education and its effect on the future children's income would be due to luck.²⁴ The consumption of health services could also be associated to luck. As an example, the fatal diseases and serious medical conditions caused not by individual behavior but by random factors such as genetics and virus. In a market economy, the access to expensive advanced treatments and then the probability of surviving to a fatal disease depends only on citizens' income.

Hence, individuals could be against the inequality in the access to health care and education because the relation between their consumption and random components associated to luck. The existence of those unfair inequalities caused by luck could sustain commodity egalitarian preferences. Other alternatives could be suggested to model social preferences over the consumption of health and education.²⁵ However, the goal of this section is to analyze how incentives for political redistribution change in the presence of equity concerns limited to specific goods.

²³This notion of commodity egalitarianism was suggested by James Tobin (1970).

²⁴Gasparini and Pinto (2006) presents a normative analysis based on equality of opportunities to justify aversion to inequality in the access of education.

²⁵For instance, citizens could support that everyone should have access to at least some minimum level of schooling or medical care. Furthermore, individuals could disagree over the notion of fairness and hold heterogeneous views about how the consumption of goods should be evaluated.

2.5.1 Distributive Politics with Egalitarianism

Consider the same economy with a finite number of groups presented in the preceding sections. Politicians announce taxation schedules and in-kind transfers, $\{y_P^j, h_{gP}^j\}_{j=1}^J \forall P \in \{A, B\}$, in order to win elections. Economic policy platforms must satisfy the economy feasibility constraint (2.11). Furthermore, there are competitive markets where citizens are able to acquire health care services.

I assume that citizens' preferences have two components. The first one measures individual's own economic well-being. The second component captures the utility derived from social outcomes. Let $\Omega(\mathbf{h})$ be citizens' common valuation of health care distribution where $\mathbf{h} = \{h^j\}_{j=1}^J$ is the allocation of health services across groups. Furthermore, let δ^j denote the relative weight that individuals who belong to group j assigns to equity concerns with respect to private utility. The preferences of a citizen i located in group j can be represented by an additively separable utility function:

$$U^j(c^j, \mathbf{h}) = u(c^j, h^j) + \delta^j \Omega(\mathbf{h}) \quad \text{where } \mathbf{h} = \{h^j\}_{j=1}^J \quad (2.51)$$

The individual private utility is well-represented by the non-satiable preferences (2) discussed previously. However, it is common to assume that the social preference component is better represented by satiated preferences. In the commodity egalitarian case, that component could be represented by the following preferences:

$$\Omega(\mathbf{h}) = -\frac{1}{2} \sum_{j=1}^J \mu^j (h^j - \bar{h})^2 \quad \text{where } \bar{h} = \sum_{j=1}^J \mu^j h^j \quad (2.52)$$

Political Allocation

Solving backwards, I characterize the Political Equilibrium of the game.²⁶ For both political parties, the equilibrium net taxation and in-kind transfers policies for

²⁶See Mathematical Appendix A.3. for a detailed discussion and complete characterization of the political equilibrium and the propositions presented in this subsection.

any group k , (y_P^{kN}, h_{gP}^{kN}) , must satisfy:

$$\frac{\psi}{\phi} \left[\sum_{j=1}^J \phi^j \mu^j \frac{dV_P^j(y_P^{jN}, \mathbf{h}_{gP}^N)}{dh_g^k} \right] = p_h \frac{\psi}{\phi} \phi^k \mu^k \frac{dV_P^k(y_P^{kN}, \mathbf{h}_{gP}^N)}{dy^k} \quad (2.53)$$

$\forall k, j \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$. In the pre-election stage, the expected electoral benefit of targeting one unit of in-kind transfers depends on both the direct effect in group k 's economic well-being and the effect on the distribution of health consumption across groups. Politicians announce policies to group k such that the marginal benefit of targeting in terms of probability of winning elections is equal to the marginal opportunity cost. The cost is measured by the marginal decrease in probability due to a reduction of targeted net income to group k by p_h units.

In the presence of egalitarian views, for both political parties there exists a unique equilibrium policy of net taxation and in-kind transfers for each group k , (y_P^{kN}, h_{gP}^{kN}) . Furthermore, politicians choose economic policies such that individuals are expected to no supplement health services in competitive markets, $h_{mP}^{jN} = 0$. The combination of chosen policies, $\{y_P^{jN}, h_{gP}^{jN}\}_{j=1}^J$, imply a set of consumption bundles $\{c_P^{jN}, h_P^{jN}\}_{j=1}^J$, that maximizes politicians' chances of winning elections given expected voting, competitive equilibrium behavior of citizens and economic feasibility. In Equilibrium:

$$u_h(c_P^{kN}, h_P^{kN}) + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \frac{\phi^j}{\phi^k} \delta^j \frac{\partial \Omega(\mathbf{h}^N)}{\partial h^k} = p_h u_c(c_P^{kN}, h_P^{kN}) \quad (2.54)$$

where $c_P^{jN} = y_P^{jN}$ and $h_P^{jN} = h_{gP}^{jN} \forall j \in \{1, \dots, J\}$ and $P \in \{A, B\}$.

Proposition 10 (Egalitarianism and In-kind transfers) *Politicians constrain consumption choices of individuals targeting in-kind transfers to all groups in order to reduce inequalities in the consumption of specific commodities.*

If politicians target group k uniquely with cash transfers, individuals would allocate available resources between health and numeraire without taking into account the effect of their decisions on the health consumption inequality in the overall

population. Individuals value an egalitarian allocation of health, however this valuation has a public good nature which is subject to free-riding behavior in competitive markets. For this reason, vote-maximizer politicians select a combination of feasible policies such that fully constrain consumption decisions of individuals. Hence, commodity egalitarianism prevents that individuals could make their private decisions through competitive markets. The health care coverage of all individuals is decided by office-motivated politicians.

In equilibrium, office-motivated politicians propose the same economic policies (i.e. policy convergence) and therefore implement the same allocation of resources $\{c^{jN}, h^{jN}\}_{j=1}^J$.

$$c^{jN} = c_A^{jN} = c_B^{jN} \quad \text{and} \quad h^{jN} = h_A^{jN} = h_B^{jN} \quad \forall j \in \{1, \dots, J\} \quad (2.55)$$

Proposition 11 (Political Allocation with Commodity Egalitarianism) *The political game between office-motivated politicians and citizens who are averse to inequalities in the consumption of specific goods yields to a unique consumption bundle of numeraire commodity and health services for each group, $\{c^{jN}, h^{jN}\}_{j=1}^J$.*

Distributive Politics

The equilibrium patterns of cash and in-kind redistribution across groups are implicitly defined by the following equations:

$$\phi^k u_c(c^{kN}, h^{kN}) = \phi^{k'} u_c(c^{k'N}, h^{k'N}) \quad (2.56)$$

$$\phi^k u_h(c^{kN}, h^{kN}) + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}^N)}{\partial h^k} = \phi^{k'} u_h(c^{k'N}, h^{k'N}) + \sum_{j=1}^J \frac{\mu^j}{\mu^{k'}} \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}^N)}{\partial h^{k'}} \quad (2.57)$$

these equilibrium conditions hold $\forall k, k' \in \{1, \dots, J\}$ and $\forall P = \{A, B\}$.

Electoral competition focuses on courting ideological neutral voters in each group. Groups with higher concentration of swing voters are targeted with both

larger cash and in-kind transfers. However, the existence of egalitarian views limits the use of differential targeting of in-kind transfers across groups.

In equilibrium, both parties equalize the expected electoral returns of targeting one unit of health care across groups. The overall return of targeting in-kind transfers to citizens who belong to any group k has two components. The first one is the increase of the expected number of votes in the targeted group by self-interested motives. That effect depends on both the concentration of swing voters in the group and the marginal impact in citizens' own-economic well-being.

The second component captures the effect of targeting in-kind transfers in the distribution of health. Citizens take into account how in-kind transfers affect the consumption of health in the overall population. When targeting in-kind transfers to group k increases inequality, it implies a reduction of the expected number of voters in all groups.

For the particular specification of social preferences previously presented (2.52), the marginal effect of targeting group k on the valuation of inequality for any group j is given by:

$$\frac{\partial \Omega(\mathbf{h}^N)}{\partial h^k} = -\mu^k (h^{kN} - \bar{h}^N) \quad (2.58)$$

The impact on the expected ideological cut-point in any group j is increasing in the utility losses which rise with health inequality. Therefore, the larger the inequality is, the greater the expected loss of votes in all groups.

Although all groups are assumed to hold homogeneous valuations of social outcomes, they could differ in their willingness to compromise social preferences in return to economic benefits. Thus, the larger the group-specific salience δ^j is, the larger the impact of health inequalities in the expected ideological cut-point of group j . The electoral impact of egalitarian views in group j also depends on its density of swing voters. The larger the density is, the greater the losses of voters.

Furthermore, resources are scarce and increasing in-kind transfers to one group must be balanced by reducing targeted resources in other groups. For instance, it could imply a reduction of the amount of health care targeted to group k' . That reduction implies a decrease in the expected number of votes in k' . The size of that loss depends on group k' 's expected density of swing voters and the convexity of preferences over health. Furthermore, there is an additional increase in inequality through the reduction of health consumption in k' . Hence, there are additional expected losses of votes in all groups. In equilibrium, politicians balance the expected gains and losses of votes and implement a more egalitarian distribution of health. Therefore, groups with more swing voters receive less health care with respect to a political game in which citizens do not have egalitarian views.

Hence, in the presence of commodity egalitarianism, politicians announce universal in-kind transfers. However, the political process does not yield to uniform levels of health consumption. Office-motivated politicians exploit individuals concerns for their own economic well-being courting voters with differential in-kind transfers. Groups with larger concentration of swing voters have access to higher quality of services. Therefore, even when all citizens agree that a perfect equal distribution of a good is desirable, this allocation is not politically attainable.

Corollary 3 (Universal Public Provision with Targeting) *In the presence of commodity egalitarianism, opportunistic politicians implement universal public systems of health care. Nevertheless, politicians do not target the same quality of services across groups.*

However, commodity egalitarianism reduces the electoral returns of differential in-kind transfers. Those incentives reduce not only health care inequality but lower politicians' incentives to allocate resources to in-kind transfers. Devoting resources to cash transfers is electorally more profitable.

Claim 4 *In an economy with commodity egalitarianism, the inequality levels and the*

overall consumption of health care would be lower with respect to economies in which individuals only care about their own economic well-being.

This crowding out effect is related with the main insights that we learnt from Lizzeri and Persico (2001, 2004). In a distributive politics game, targetability yields a premium for office-motivated politicians. Politicians have electoral incentives to devote more resources to a targetable policy tool such as cash transfers and reduce the resources to fund public goods.

Commodity egalitarianism introduce a public good nature in the consumption of health services. The targetability of in-kind transfers is reduced because now the valuation of the distribution of health consumption is non-rival and non-excludable. Politicians aim to discriminate between voters and in-kind transfers lose part of their effectiveness. That leads the economy to a reduction in the aggregate consumption of health services.

In the presence of egalitarian views, the political incentives for targeting in-kind transfers differ from the ones in the consumption externality case. In the latter, politicians use in-kind to court more swing voters in the rest of the population. Those incentives lead the economy to increase the consumption of health care. In the former, targeting in-kind transfers aims to reduce the loss of votes caused by unequal levels of consumption of specific goods. However, differential targeting is penalized and the overall consumption of health care decreases.

Utilitarian Allocation In the particular case in which all groups had the same extent of ideological heterogeneity, the marginal returns of targeting both cash and in-kind transfers would be the same for all groups. Therefore, office-motivated politicians announce policies that implement the utilitarian allocation. Politicians do not have incentives to make differential targeting of cash transfers. Therefore, the relative electoral advantage of cash over in-kind transfers disappears and the amount of health care consumption in the economy is maximized.

In that specific case, politicians would not need to resort on in-kind transfers. They could announce a uniform level of cash transfers such that individuals acquire the intended uniform amount of health services in competitive markets. Political redistribution would be undertaken from groups with large initial endowments to low income groups. Furthermore, only in this particular case, society reaches the socially desired egalitarian allocation of health care.

Allocative Efficiency and Markets

The political process leads to a bundle of numeraire and health services consumed by individuals who belong to group k , $\forall k \in \{1, \dots, J\}$, that satisfies:

$$MRS_{h,c}^{kN} + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \delta^j MRS_{\Omega^k, c^j}^{jN} = MRT_{h,c} = q \quad (2.59)$$

Proposition 12 (Efficiency and Egalitarianism) *The electoral competition game between office-motivated politicians and self-interested citizens who are averse to commodity inequalities yields an allocation in the Pareto set.*

Politicians take into account that voters penalize policy proposals that lead to unequal distribution of health consumption. Those incentives drive parties to select menus of net taxation and in-kind transfers that internalize the presence egalitarian views. Electoral competition for marginal voters leads to a more egalitarian consumption of specific goods and to achieve allocative efficiency that a market economy cannot reach.

In competitive markets, even when all individuals share the same egalitarian preferences, each individual has an incentive to free-ride on the egalitarian allocation by others. Therefore, in economies with different income levels, normality of goods leads markets to provide unequal distributions of consumption depending on the dispersion of available income.

In order to overcome the free-rider problem, politicians announce combinations of economic policies that fully constrain individuals' health consumption decisions. In spite of the existence of competitive markets, office-motivated politicians must crowd out individual market decisions and choose health consumption of all individuals.

That result is not obtained because of a benevolent government that takes into account egalitarian tastes in order to maximize a given definition of social welfare. However, it is the result of the electoral competition between office-motivated politicians. In order to win elections, politicians internalize the fact that citizens are willing to sacrifice part of their own economic well-being in order to get a more egalitarian distribution of goods.

It is commonly presumed that politics leads to inefficient provision of public goods. However, as previously discussed, in static models of electoral competition, those claims are due to the modeling restrictions in the available policy set. Besley (2007) proposes a probabilistic voting electoral competition model to overcome those limitations. As an example, Besley introduces the proposed model into the political provision of pure public goods in the presence of distributive politics. Results show that political competition leads politicians to implement a Lindhal Samuelson rule depending on the political clout of core and swing voters. My analysis focuses on swing voters and it is consistent with the efficiency result when I introduce a public good nature in the valuation of private goods.

2.6 Conclusions

This paper provides new insights on the political incentives to redistribution through in-kind transfers. I have shown that even when markets work properly and societies do not have preferences for redistribution, the market allocation is not politically sustainable. Office-motivated politicians have incentives to undertake political redistribution. However, it does not necessarily imply that redistribution must occur

through in-kind transfers.

Indeed, in economies with competitive markets, in-kind transfers are an additional policy tool that politicians might use to reach their desired allocation of resources. Nevertheless, political parties could win elections by promising differential cash transfers across groups of voters. That result contrasts with former positive political economy contributions in which in-kind transfers emerge as a political instrument to redistribute resources across groups. This paper shows that without imposing severe constraints in the available taxation technology, the pure redistributive motive alone could not explain the use of in-kind transfers by politicians.

However, I found that in-kind redistribution is politically necessary in the presence of interdependent preferences such as consumption externalities and equity concerns. My research shows that when citizens care about other individuals' consumption of specific commodities, politicians have incentives to make use of in-kind transfers. Targeting specific groups of voters with in-kind rather than cash transfers allows politicians to simultaneously attract voters in other groups with the same amount of resources.

Furthermore, I found that electoral competition for marginal voters exhausts potential Pareto improvements in the economy. The political process reaches Pareto efficient allocations that markets cannot reach in the presence of equity concerns and externalities. This efficiency result is not obtained by assuming the existence of a benevolent government that implements in-kind transfers either to correct market imperfections or to satisfy equity concerns. Instead, the efficient allocation is the equilibrium outcome of political game between politicians and voters. Politicians choose in-kind rather than cash transfers when the amount of voters that they can attract is larger.

In order to handle political equilibria with multidimensional policy space, I have adopted a well-known probabilistic voting model. That model is based on the

literature of distributional politics and swing voters established by Lindbeck and Weibull (19987) and Dixit and Londregan (1996). Those contributions have focused on the allocation of cash transfers across social groups. My research examines political incentives for redistribution when politicians are able to use both in-kind and cash transfers when market alternatives are also feasible. Furthermore, I extend the literature on redistributive politics exploring how political redistribution is affected by the presence of interdependent preferences between groups of voters.

Some direct extensions of this distributive politics framework with competitive markets are worthy to be considered for further research. I first aim to explore the relation between heterogeneous preferences and political redistribution. For instance, I could assume that individuals' self-interested preferences over commodities are related with some idiosyncratic characteristics such as age. As an example, the young households could prefer higher quality educational services than the old citizens. This extension would allow us to discuss the political incentives for tagging individuals with immutable characteristic either through in-kind or cash transfers.

Furthermore, I intend to endogenize individuals' income by introducing labor supply decisions. That would enable us to analyze the potential trade-off between allocative efficiency and political redistribution. For instance, the existence of information asymmetries would constraint the available government instruments to tax individuals' abilities. In that case, when governments can uniquely use distortionary taxation, redistribution of resources generates deadweight losses. I aim to explore the political incentives to use in-kind instead of cash transfers in order to increase the efficiency of the taxation system. That could enlarge the available amount of resources for political redistribution. Further research is necessary to analyze these extensions which might provide interesting new results.

Chapter 3

The Scope of Political Redistribution with Income Taxation

3.1 Introduction

Governments modify on a large scale the distribution of income that would be generated by private markets without public intervention.¹The most important component of this redistribution is undertaken by raising taxes in order to fund both cash transfers and the public provision of services such as health care, education or child-care.²Furthermore, governments are usually constrained to raise revenues through taxes over earned labor income, capital gains or the consumption of private goods. Therefore, the redistribution of market income distorts economic decisions and cre-

¹See for instance Alesina and Glaeser (2004) for a comprehensive analysis of redistributive policies in OECD countries. The scope of interventions range from regulations in labor markets to social insurance and to budget interventions through taxes and transfers.

²Public Economics usually refers by *in-kind transfers* the public funding of the consumption of specific commodities, regardless of whether their production is public or private. These in-kind transfers are significant and represent on average one third of the budget and around 15% of GDP in advanced economies. See Currie and Gahvari (2008) and the OECD Economic Outlook (2009) for detailed data.

ates welfare losses (Feldstein, 1995, 1999; Salanié, 2003). Do inefficiencies generated by taxation affect the composition of redistributive spending? Has redistribution through in-kind transfers different effects on efficiency than cash transfers?

Normative analysis has explored under what circumstances the provision of in-kind transfers might increase the efficiency of the taxation system (Guesnerie and Roberts, (1984); Gahvari (1994); and Currie and Gahvari (2008) for a comprehensive survey of the literature). In particular, benevolent governments should fund in-kind transfers that increase labor effort in order to reduce distortions generated by income taxation. However, the redistribution of income is a political decision undertaken by elected politicians who require the support of citizens. Why should politicians implement policies that increase efficiency?

Indeed, political economy has longly discussed the potential distortions and welfare losses introduced by democratic policymaking (Besley and Coate, 1998; Lizzeri and Persico, 2001). As an example, recent contributions by Acemoglu et al. (2008, 2010, 2011) point out how political economy constraints might distort the dynamic resource allocation and the structure of taxation. Furthermore, in the particular case in which income redistribution is carried out through in-kind transfers, Epple and Romano (1996a) highlighted the allocative inefficiencies created by the political use of in-kind transfers.

In contrast with previous contributions, this chapter shows that electoral competition might provide incentives to implement redistributive schedules that reduce the efficiency cost of income taxation. In fact, politicians who strive to be elected should consider the effect of income redistribution on individuals' incentives to work. In particular, politicians might fund in-kind transfers in order to reduce distortions in labor markets and enlarge the scope of redistribution. Overall, this chapter points out that political competition implements a size and composition of redistributive spending that minimize the deadweight losses created by income taxation.

In order to investigate the incentives for political redistribution, I build a static electoral competition model in which politicians propose redistributive policies which require the support of citizens to be implemented. I consider a competitive economy in which individuals belong to a finite number of groups. Each group exhibits different productivities and individuals must choose their labor effort which is costly in terms of well-being. Individuals value their available income and the consumption of goods such as health care which can be acquired in private markets. Furthermore, citizens must elect a government which might levy linear taxes over earned labor income to fund cash and in-kind transfers. Government is chosen from two political parties who credibly commit to economic policy proposals uniquely to win elections. Furthermore, each political party holds differentiated fixed positions on ideological issues non-related with economic policy. Citizens exhibit heterogeneous biases toward parties ideological positions. Each voter gives her support to the party which yields higher well-being given policy platforms, ideological biases and a common valuation of competing parties. The party that obtains the support of more than half of the population implements the announced redistributive policies.

Several appealing results emerge from the proposed analysis. I find that politicians who compete for office have incentives to change the market distribution of income to obtain the support of citizens. In particular, politicians have incentives to raise taxes and redistribute income toward groups of voters with lower earning abilities and more pivotal voters who could swing their vote. However, distortions and output losses generated by income taxation limit the scope of political redistribution. In order to overcome these limitations, politicians might constrain individuals to consume more in-kind transfers than the amount of goods that they would buy in private markets if targeted resources were given in cash. The overprovision of in-kind transfers reduces the disincentive effects of redistribution in labor effort and enlarges available resources for political redistribution. As a result, politicians are able to implement redistributive transfers that improve the well-being of pivotal voters.

Furthermore, politics removes the economy from an efficient competitive market allocation because of distortions created by income taxation. However this chapter shows how the electoral competition for marginal voters leads politicians to choose a composition of redistributive transfers that reduce allocative inefficiencies generated by taxation. The idea that incentives to be elected force politicians to increase efficiency was first raised by Wittman (1989,1995) but few work has investigated the welfare enhancing role of political competition. One exception is Besley et al. (2010) which provides theoretical and empirical evidence for the US states on how the extent of political competition might generate efficiency gains. Another example is Lopez-Rodriguez (2010) who points out the role of electoral competition to correct externalities and reach allocative efficiency. This chapter shows that this mechanism could be also present in the political choice of size and composition of redistributive spending.

Few contributions have analyzed the incentives for political redistribution through in-kind transfers funded with proportional income taxation (Fernandez and Rogerson, 1995; Epple and Romano, 1996a,b; Gouveia, 1997; Levy, 2005). Nevertheless, these contributions impose severe policy constraints in order to ensure the existence of equilibria which limit the generality of their analysis. In particular, proposed models constrain in-kind transfers to be uniform for all the population and they do not consider the possibility of redistribution through cash transfers. Furthermore, individuals' income is not the result of labor effort but given as fixed. Therefore, it prevents to examine how workers' behavioral responses to policies affect the characterization of redistributive schedules.³

In order to overcome the limitations imposed by modeling constraints, this chapter presents a model which builds on the literature of distributive politics estab-

³Levy (2005) allows the possibility of both cash and in-kind redistribution. However, transfers are constrained to be uniform across groups and she abstracts labor supply decisions; Meltzer and Richard (1985) allow for uniform cash transfers and consider income as a result of labor effort but they focus on commodity taxation.

lished by Lindbeck and Weibull (1987) and Dixit and Londregan (1996). In particular, by exploiting probabilistic voting I relax the constraints in policy tools allowing for differential targeting of cash and in-kind transfers across groups of voters. Moreover, I extend distributive politics contributions considering that voters' income results from labor decisions, and politicians levy taxes over citizens' earned income. This allows to analyze the distortions in labor markets created by redistribution and therefore the trade-off faced by politicians between efficiency and political redistribution. Furthermore, it permits to examine how the composition of redistributive spending affects individuals' incentives to work and governments' tax revenues. An appealing result of the analysis shows that politicians consider the differential impact on government's tax revenues of targeting cash and in-kind transfers among groups with different productivities. In particular, politicians have incentives to target high productivity groups with in-kind rather than cash to reduce tax losses generated by income taxation.

This chapter rationalizes the political use of in-kind transfers as a tool of income redistribution in the presence of distortionary policy tools. However, this rationalization does not rule out other sensible explanations proposed in the literature. For instance, the presence of market failures such as external effects or imperfect information might justify the public funding of in-kind transfers.⁴ Nevertheless, I abstract away potential market imperfections in order to focus the analysis on the effect of politics on the distribution of income.

The chapter is organized as follows. In the next section, I present the benchmark of a competitive market allocation. Section III introduces an electoral competition game in order to analyze the incentives for political redistribution through income taxation, cash and in-kind transfers. Section IV examines the political choice

⁴In the presence of asymmetric information, in-kind transfers can be used as an screening device to redistribute toward low income individuals (Nichols and Zeckhauser, 1982; Balckorby and Donaldson, 1988; Bruce and Waldman, 1991). Interdependent preferences such as externalities has also been suggested as one of the leading candidates to explain the use of in-kind transfers (Currie and Gahvari, 2008).

of income taxation and the allocation of redistributive spending among groups of voters. Section V discusses how the electoral competition for marginal voters might improve the efficiency of the taxation system. Finally, the last section concludes and discusses potential further research.

3.2 The Economy: Market Allocation

Consider an economy with a continuum of citizens whose measure can be normalized to 1. Individuals are endowed with $\bar{T} = 1$ units of time and idiosyncratic abilities θ . There are J ability types, $\{\theta^j\}_{j=1}^J$, with measure μ^j . No ability group constitutes a majority of the population.⁵ Each individual can sell her time in competitive labor markets. The wage per hour of work, w^j , in units of a numeraire commodity, is equal to the productivity associated to her ability type (i.e. $w^j = \theta^j$). Individuals choose the amount of time devoted to work, n^j . The rest of their time is enjoyed as leisure, $l^j = 1 - n^j$. Therefore, type θ^j individual's market income, y^j , is given by:

$$y^j = w^j n^j = w^j (1 - l^j) \quad (3.1)$$

The aggregate income in the market economy is defined as:

$$y = \sum_{j=1}^J \mu^j w^j n^j \quad (3.2)$$

In this economy, perfectly competitive firms produce health services at different quality levels, h .⁶ Firms have available a linear technology that requires qh units of the numeraire commodity to produce one unit of health services at quality h . Individuals have homogeneous preferences over the consumption of the numeraire commodity, c , health care quality, h , and leisure, l . Preferences are represented by the following

⁵As an alternative, groups could be interpreted as geographic districts (e.g.: states, regions or municipalities) in which an average individual in district j exhibits a productivity (output per unit of time spent working) of w^j .

⁶For expositional reasons, I focus on health care but the analysis is also valid for other goods that could be subject to in-kind transfers such as child and elderly care or education.

utility function:

$$U^j(c^j, h^j, l^j) = u(c^j, h^j, 1 - n^j) \quad \forall j \quad (3.3)$$

This function is continuous, twice differentiable, strictly increasing ($u_c > 0, u_h > 0, u_l > 0$, where subscripts denote partial derivatives with respect to the identified argument) and strictly concave ($u_{cc} < 0, u_{hh} < 0, u_{ll} < 0$) in c, h and l . Marginal utilities are bounded away from 0 and $u_c(0, h, l) = \infty, u_h(c, 0, l) = \infty$ and $u_l(c, h, 0) = \infty$. Leisure, health care and numeraire commodity are assumed to be normal goods.

Competitive firms with constant returns to scale produce whatever quality of health care that citizens demand at price, p_h , equal to marginal cost, q . Individuals choose their supply of labor, n^j , given the competitive wage associated to their ability level, w^j . Furthermore, individuals decide the quality of health care that they acquire at competitive market price, p_h , given the market income obtained by their labor effort, y^j . The residual income is left for consumption of the numeraire commodity, c^j . Thus, ability type θ^j individual's budget constraint is given by:

$$y^j = w^j n^j = c^j + p_h h^j \quad \forall j \quad (3.4)$$

The choice problem for individuals who belong to group j can be written as:

$$\forall i \in j \quad \max_{h^j, n^j} U^j(c^j, h^j, l^j) = u(w^j n^j - p_h h^j, h^j, 1 - n^j) \quad \text{s.t. } h^j \geq 0 \quad \text{and } 0 \leq n^j \leq 1 \quad (3.5)$$

The optimal market choice, $(c_m^{j*}, h_m^{j*}, n_m^{j*})$ for individuals with ability type θ^j , satisfies the FOCs for an interior optimum such that:

$$u_h(c_m^{j*}, h_m^{j*}, 1 - n_m^{j*}) = p_h u_c(c_m^{j*}, h_m^{j*}, 1 - n_m^{j*}) \quad \forall j \quad (3.6)$$

$$w^j u_c(c_m^{j*}, h_m^{j*}, 1 - n_m^{j*}) = u_l(c_m^{j*}, h_m^{j*}, 1 - n_m^{j*}) \quad \forall j \quad (3.7)$$

These relations implicitly define the marshallian demand function for health care quality and numeraire commodity:

$$h_m^{j*} = h_m^j(w^j, p_h) \quad c_m^{j*} = c_m^j(w^j, p_h) \quad \forall j \quad (3.8)$$

Furthermore, individuals participate into the labor market and their effort choice given by the labor supply function is implicitly defined by (3.6) and (3.7):

$$n_m^{j*} = n_m^j(w^j, p_h) \quad \forall j \quad (3.9)$$

Definition (Market Allocation): A competitive market equilibrium is an allocation of numeraire commodity and health services quality, $\{c_m^{j*}, h_m^{j*}\}_{j=1}^J$, and a supply of hours of work, $\{n_m^{j*}\}_{j=1}^J$, for each ability type, such that individuals solve problem (3.5); and competitive firms with constant returns to scale produce whatever quality of health care that individuals demand at price, p_h , equal marginal cost, q . In equilibrium, the market economy feasibility constraint holds with equality:

$$\sum_{j=1}^J \mu^j c_m^{j*} + \sum_{j=1}^J \mu^j p_h h_m^{j*} = \sum_{j=1}^J \mu^j w^j n_m^{j*} \quad (3.10)$$

In a competitive equilibrium, the rate at which consumers are willing to trade health services for numeraire commodity, $MRS_{c,h}$, is equal for all individuals and equal to the rate at which the economy is able to transform numeraire into health care quality, $MRT_{h,c}$. Furthermore, the rate at which individuals are willing to trade leisure for income is equal to the competitive wage for each ability type. Hence, Market allocation is Pareto Optimal.

$$MRS_{h,c}^j = MRT_{h,c} = q \quad \forall j \in \{1, \dots, J\} \quad (3.11)$$

$$MRS_{l,c}^j = w^j \quad \forall j \in \{1, \dots, J\} \quad (3.12)$$

Market equilibrium yields an allocation of resources such that individuals who belong to groups with larger abilities choose higher quality of health services and consume larger amounts of numeraire good than individuals who belong to groups with lower abilities. Furthermore, labor effort is lower for the more productive individuals. This follows directly from assumptions about homogeneity of preferences and normality of goods.

3.3 The Polity: Political Game

The economy presented above constitutes a representative democracy where individuals elect a government to rule economic policy. The government is elected from two office-motivated political parties, $P \in \{A, B\}$, that compete in elections. Parties are able to make credible commitments on taxation and spending policies. I assume that voting is costless, nobody abstains and winning corresponds to obtaining the support of more than half of the population.

The government is able to levy taxes on labor income earned by citizens in competitive markets. I assume that only a linear income taxation schedule is feasible, $0 \leq t \leq 1$. The revenues raised by income taxation can be devoted to fund both cash (i.e. numeraire commodity) and in-kind group-specific transfers. In-kind transfers take the form of non-tradable conditional transfers that citizens can only spend to acquire health care in private markets.

Let s_P^j denote the cash transfer targeted to group j and t_P be the linear income tax committed by party P . Furthermore, politicians can target groups with in-kind transfers, h_{gP}^j , which marginal cost is equal to the market price, p_h . Politicians can credibly commit to a policy platform $x_P = (t_P, \{s_P^j\}_{j=1}^J, \{h_{gP}^j\}_{j=1}^J)$ to be implemented if party P wins the elections. The promised allocation of cash and in-kind transfers across groups by political parties must satisfy the government's budget constraint:

$$\sum_{j=1}^J \mu^j s_P^j + \sum_{j=1}^J \mu^j p_h h_{gP}^j = t_P \sum_{j=1}^J \mu^j w^j n_P^j \equiv t_P y_P \quad (3.13)$$

Citizens care about their economic well-being represented by preferences (3.3) and have access to labor and health care competitive markets. Once one of the parties P wins the elections, individuals who belong to different ability groups make labor decisions, n_P^j , at their wage level, w^j , obtaining net income equal to $z_P^j = w^j(1 - t_P)n_P^j + s_P^j$. Furthermore, the quality of health services under government P by group j could be supplemented at competitive price in private markets, $h_P^j = h_{gP}^j + h_{mP}^j$.

The residual net income is devoted to the consumption of numeraire commodity,

$$c_{mP}^j = z_P^j - p_h h_{mP}^j.$$

Furthermore, parties hold fixed and differentiated positions in some dimension non-related to economic policy such as ideological issues. Citizens care about these non-economic ideological issues and have biases toward parties' positions.⁷ Let σ_i be the relative attachment of citizen i to party B 's positions (i.e. $\sigma_i = \sigma_{iB} - \sigma_{iA}$) which can be positive or negative. Idiosyncratic party attachments are unknown by political parties but group-specific distributions are common knowledge. Relative party attachments in group j are drawn from a uniform distribution over the range $[\sigma_a^j, \sigma_b^j]$ with average ideological attachment $\bar{\sigma}^j = (\sigma_a^j + \sigma_b^j)/2$ and density $\phi^j = 1/(\sigma_b^j - \sigma_a^j)$. The density measures the ideological heterogeneity within the group and therefore $\phi = \sum_{j=1}^J \mu^j \phi^j$ denotes the weighted average of ideological heterogeneity across groups. I assume that in the overall population there is no aggregate ideological bias and suppose that ideologically neutral voters, $\sigma_i = 0$, are present in all groups.

Citizens also care about political parties running in the elections. I assume that between the announcement of taxation and spending policies and the elections each party receives aggregate shocks, ε_A and ε_B , common to all voters in the population. I normalize the common shock, $\varepsilon = \varepsilon_B - \varepsilon_A$, which measures the relative popularity of party B with respect to party A at the time of elections. For simplicity, I assume that the common shock ε is uniformly distributed, and independently from σ_i , with density ψ and expected value, $E(\varepsilon)$, equal to 0.

$$\varepsilon \sim U\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right] \quad (3.14)$$

The timing of the political game is as follows: **1)** Political parties simultaneously and non-cooperatively credibly announce their taxation and spending policy

⁷In order to model individuals' concerns on non-economic issues, I use the partisanship stochastic probabilistic voting model proposed by Persson and Tabellini (1999). See Persson and Tabellini (2000) for a detailed discussion.

platforms, $x_A = (t_A, \{s_A^j\}_{j=1}^J, \{h_{gA}^j\}_{j=1}^J)$ and $x_B = (t_B, \{s_B^j\}_{j=1}^J, \{h_{gB}^j\}_{j=1}^J)$. **2)** The random idiosyncratic, σ_i , and common popularity, ε , shocks are realized. **3)** Citizens vote for the party that they prefer, $\{A, B\}$. **4)** Whichever party P that obtains the majority of the votes, wins the election and implements the economic policy promised at the beginning of the game. Finally, **5)** individuals make labor and consumption choices through competitive markets, $\{c_{mP}^j, h_{mP}^j, n_{mP}^j\}_{j=1}^J$.

3.3.1 Stages of the Game

The political game presented above has three stages: economic policy announcements, elections and market decisions. I characterize the Subgame Perfect Nash equilibrium of the political game by backward induction.

Third Stage: Market Decisions

Once one of the parties, $P \in \{A, B\}$, wins the election, it is committed to implement economic policies, $x_P = (t_P, \{s_P^j\}_{j=1}^J, \{h_{gP}^j\}_{j=1}^J)$. Then, individuals within each ability group decide their labor effort, $\{n_P^j\}_{j=1}^J$, and whether making purchases of private health care, $\{h_{mP}^j\}_{j=1}^J$, with their net income, $\{z_P^j\}_{j=1}^J$. The residual net income is allocated to the consumption of numeraire commodity, $\{c_{mP}^j\}_{j=1}^J$. Therefore, the budget constraint of individuals who belong to ability group j under P 's government is given by:

$$c_{mP}^j + p_h h_{mP}^j = w^j(1 - t_P)n_P^j + s_P^j \equiv z_P^j \quad \forall j \quad (3.15)$$

Hence, given income taxation and transfers policies under the government of party P , x_P , the choice problem for ability type θ^j individuals, who participate in the labor market, can be written as:

$$\max_{h_{mP}^j, n_P^j} U^j(c^j, h^j, l^j) = u(w^j(1 - t_P)n_P^j + s_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j, 1 - n_P^j) \quad \text{s.to.} \quad h_{mP}^j \geq 0 \quad (3.16)$$

The optimal market choices, (h_{mP}^{j*}, n_P^{j*}) , for individuals endowed with ability type θ^j must satisfy the FOCs for a maximum such that:

$$[h_{mP}^j] \quad u_h + \gamma_h^j = p_h u_c \quad \forall j \quad (3.17)$$

$$[n_P^j] \quad w^j(1 - t_P)u_c = u_l \quad \forall j \quad (3.18)$$

$$\gamma_h^j h_{mP}^{j*} = 0 ; \quad \gamma_h^j \geq 0 \quad \forall j \quad (3.19)$$

where γ_h^j is the multiplier associated to the non-negativity constraint, $h_{mP}^j \geq 0$. Depending on implemented economic policies, for each group j the choice problem (3.16) yields two alternatives. In the first alternative, elected government P levies income taxes and fund transfers such that the quality of health services publicly provided to group j , $h_{gP}^j > 0$, given available net income, z_P^j , is overprovided. Individuals would prefer to modify their current resource allocation by a reduction of one unit of the targeted resources through in-kind transfers compensated by a one unit increase in cash transfers. Therefore, when in-kind transfers are overprovided, individuals decide do not make purchases of health care, $h_{mP}^{j*} = 0$, and devote the net income obtained by their labor effort to the consumption of numeraire commodity, $c_{mP}^j = z_P^j$. The labor supply function of group j when there exists overprovision, $n_P^{j*} = n_P^j(p_h, w^j(1 - t_P), s_P^j, h_{gP}^j)$, is implicitly defined by:

$$w^j(1 - t_P)u_c(z_P^j, h_{gP}^j, 1 - n_P^{j*}) = u_l(z_P^j, h_{gP}^j, 1 - n_P^{j*}) \quad \forall j \quad (3.20)$$

where $z_P^j = w^j(1 - t_P)n_P^{j*} + s_P^j$. Furthermore, overprovision in group j implies:

$$u_h(z_P^j, h_{gP}^j, 1 - n_P^{j*}) < p_h u_c(z_P^j, h_{gP}^j, 1 - n_P^{j*}) \quad \forall j \quad (3.21)$$

Hence, given individuals' choices in competitive labor markets and targeted in-kind transfers and net income under the government of party P , the indirect utility function for ability type θ^j individuals when their consumption of health care is overprovided (*OV*) is given by:

$$V_P^{jOV} \equiv V_P^j(p_h, w^j(1 - t_P), s_P^j, h_{gP}^j) = u(w^j(1 - t_P)n_P^{j*} + s_P^j, h_{gP}^j, 1 - n_P^{j*}) \quad (3.22)$$

As an alternative, elected government could raise income taxes and allocate transfers such that the quality of health services publicly provided to group j , h_{gP}^j , given available net income, z_P^j , is either underprovided or enough-provided. Only when health care is underprovided individuals make private purchases in private markets, $h_{mP}^{j*} > 0$.⁸ In this case, individuals market choices are identical to the case where group j would receive the market value of targeted in-kind transfers in terms of numeraire commodity. Then, let $I_P^j = s_P^j + p_h h_{gP}^j$ be the implicit cash transfers targeted to group j . The optimality conditions of individual's choice in group j yields:

$$u_h(z_P^j - p_h h_{mP}^{j*}, h_{gP}^j + h_{mP}^{j*}, 1 - n_P^{j*}) = p_h u_c(z_P^j - p_h h_{mP}^{j*}, h_{gP}^j + h_{mP}^{j*}, 1 - n_P^{j*}) \quad \forall j \quad (3.23)$$

$$w^j(1 - t_P)u_c(z_P^j - p_h h_{mP}^{j*}, h_{gP}^j + h_{mP}^{j*}, 1 - n_P^{j*}) = u_l(z_P^j - p_h h_{mP}^{j*}, h_{gP}^j + h_{mP}^{j*}, 1 - n_P^{j*}) \quad \forall j \quad (3.24)$$

where $z_P^j = w^j(1 - t_P)n_P^{j*} + s_P^j$ and $h_{mP}^{j*} \geq 0$. These conditions implicitly define both the ordinary demand function for private health care, $h_{mP}^{j*} = h_m^j(p_h, w^j(1 - t_P), I_P^j)$, and the labor supply function, $n_P^{j*} = n_P^j(p_h, w^j(1 - t_P), I_P^j)$, for group j conditional to income taxation and transfers implemented by party P .

Given net income, targeted in-kind transfers and market choices in competitive markets under the government of party P , the indirect utility function for individuals with ability type θ^j whose consumption of health care is not overprovided (UN) is given by:

$$V_P^{jUN} \equiv V_P^j(p_h, w^j(1 - t_P), I_P^j) = u(w^j(1 - t_P)n_P^{j*} + s_P^j - p_h h_{mP}^{j*}, h_{mP}^{j*} + h_{gP}^j, 1 - n_P^{j*}) \quad (3.25)$$

⁸In the particular case where government targets in-kind transfers and net income to group j such that health care is enough provided, individuals do not supplement health care in private markets, $h_{mP}^j = h_{gP}^j$. Individuals would be indifferent between a one unit reduction of in-kind transfers compensated by an increase in the targeted amount of cash transfers by the same amount of resources.

Second Stage: Voting

Citizens vote for the political party that they prefer given income taxation and spending policy proposals, their ideological biases and the popularity of parties. At the voting stage, individuals value economic policy platforms taking into account that they can make private decisions in competitive labor and health care markets. Therefore, individuals' valuation of income taxation and transfers policies are summarized by either indirect utility function (3.22) or (3.25) depending on whether quality of health care publicly funded is overprovided or not given the available income in group j implied by proposed policies.

Suppose that a member of group j is promised economic policies $x_A^j = (t_A, s_A^j, h_{gA}^j)$ by party A and $x_B^j = (t_B, s_B^j, h_{gB}^j)$ by B . Given ideological biases and the popularity of politicians, citizen i in group j votes for party A over B conditional on policy platforms (x_A^j, x_B^j) if:

$$V_A^j(x_A^j) > V_B^j(x_B^j) + \sigma_i + \varepsilon \quad (3.26)$$

where $V_P^j = \{V_P^{jOV}, V_P^{jUN}\} \quad \forall j$ and for $P \in \{A, B\}$. While voting for party B if this inequality is reversed.

In each ability group, given proposed policy platforms, there might be citizens whose idiosyncratic ideological bias, σ^j , makes them indifferent between voting for party A and B . The swing voter type in each group j is defined as:

$$\sigma^j(x_A^j, x_B^j; \varepsilon) = V_A^j(x_A^j) - V_B^j(x_B^j) - \varepsilon \quad (3.27)$$

where $V_P^j = \{V_P^{jOV}, V_P^{jUN}\} \quad \forall j$ and for $P \in \{A, B\}$. Voters who belong to group j with an ideological bias σ_i below (above) the cut-off ideological type find optimal to vote for A (B). I assume that a swing voter who is indifferent between both parties randomizes equally over the set of parties. Previously, I assumed that in each group the idiosyncratic ideological preferences are uniformly distributed. Furthermore, there

does not exist an ideological bias to any of the parties in the overall population. Therefore, the overall vote share for party A is defined as:

$$S_A(x_A, x_B; \varepsilon) = \frac{1}{2} + \sum_{j=1}^J \mu^j \phi^j \sigma^j(x_A^j, x_B^j; \varepsilon) \quad (3.28)$$

The complement share of citizens votes for party B , S_B .

First Stage: Policy Announcements

At the first stage of the game, when politicians announce policy platforms, the common popularity shock has not been observed. The swing voter type in each group depends on both economic policy proposals and the realized value of the shock, $\sigma^j = \sigma^j(x_A^j, x_B^j; \varepsilon)$. Hence, parties are uncertain about the identity of pivotal voters in each group and voting is a random variable from politicians' perspective. Under majority voting, office-motivated politicians care about the probability of obtaining the support of more than half of the population. Given the definition of the swing voter type in each group (3.27) and distributional assumptions on ideological biases and popularity shock, the probability that party A wins the election can be expressed as:

$$P(x_A, x_B) = \frac{1}{2} + \frac{\psi}{\phi} \left[\sum_{j=1}^J \mu^j \phi^j [V_A^j(x_A^j) - V_B^j(x_B^j)] \right] \quad (3.29)$$

Party B anticipates winning the election with the complementary probability $1 - P(x_A, x_B)$. This probability function captures parties' uncertainty regarding electoral outcome and summarizes expected voting behavior of citizens given announced policies and implied market decisions. Probabilistic voting introduces heterogeneity at citizens' voting decisions because of the presence of idiosyncratic party attachments. Thus, parties' expected number of votes are a smooth function of policy platforms. Furthermore, given that both group-specific distributions of ideological biases and individuals' utility functions are continuous, the probability of winning is a continuous function in both policy platforms. Moreover, this probability function

is also strictly concave in party A 's platform and strictly convex in party B 's policy proposal. These properties are insured by assumptions on strict concavity of voters' utility functions and uniform distribution of ideological biases.⁹

Taking the opponent's policy choice problem as given, each political party chooses a linear tax over labor income and a combination of cash and in-kind transfers for each ability group, $x_P = (t_P, \{s_P^j\}_{j=1}^J, \{h_{gP}^j\}_{j=1}^J)$ for $P \in \{A, B\}$, that maximizes its chances of winning elections subject to government's budget constraint and non-negativity constraints. Parties take into account citizens' expected voting decisions (*stage 2*) and individuals' choices in competitive labor and health care markets (*stage 3*). Thus, the policy choice problem of party A is given by:

$$\max_{t_P, \{s_P^j\}_{j=1}^J, \{h_{gP}^j\}_{j=1}^J} P(x_A, x_B) \quad (3.30)$$

$$\text{s.to. (3.13) and } 0 \leq t_A \leq 1 ; s_A^j \geq 0 \quad \forall j ; h_{gA}^j \geq 0 \quad \forall j \quad (3.31)$$

Political party B makes policy announcements simultaneously. Its policy choice problem is symmetric to the one of party A .

3.4 Political Equilibrium

Definition: A Subgame Perfect Nash Equilibrium (SPNE) in the electoral competition game is i) a menu of income taxation and group-specific transfers announced by each political party P , $x_P^N = (t_P^N, \{s_P^{jN}\}_{j=1}^J, \{h_{gP}^{jN}\}_{j=1}^J)$; ii) a voting decision for each individual of the polity, $\{A, B\}$; and iii) individuals' private choices in competitive labor and health care markets under P 's government, $\{c_{mP}^{jN}, h_{mP}^{jN}, n_P^{jN}\}_{j=1}^J$, such that:

⁹See Persson and Tabellini (2000) for a discussion on the properties of objective functions in probabilistic voting games. Austen-Smith and Banks (2005) and Banks and Duggan (2006) provide a detailed technical argument on continuity and concavity properties.

1) Each political party commits to a policy proposal that maximizes its chances of winning elections subject to the government's budget constraint, taking into account both citizens' expected voting and market decisions and its opponent's policy choice problem.

2) Each citizen votes for the party that provides her with the maximum well-being given proposed economic policies, ideological biases, popularity shock and decisions in competitive labor and health care markets.

3) Each individual, given implemented economic policies by the winner party, chooses the labor effort and private health care services that maximize her well-being.

In the electoral competition game with competitive markets, a SPNE in pure strategies exists and it is unique.¹⁰ Furthermore, in this unique equilibrium, both parties propose the same income tax and distribution of cash and in-kind transfers across groups, $x_A^N = x_B^N = x^N$. This policy convergence follows because both parties make simultaneous policy announcements facing exactly the same policy choice problem. Both political parties aim to maximize their chances of winning elections constrained by the same taxation policy tools. Hence, regardless of which party wins the election, the electoral competition game implements the same allocation of resources once individuals make private choices in competitive markets, $\{c^{jN}, h^{jN}, n^{jN}\}_{j=1}^J$.

Furthermore, when parties commit to the same policy proposals, citizens' economic well-being would be the same under the government of either party A or B , $V^j(x_A^j) = V^j(x_B^j) \forall j$. Therefore, in equilibrium non-biased voters (i.e. $\sigma_i = 0$) in each group are expected to be indifferent between parties. Hence, politicians choose income taxation and transfers in order to court ideologically neutral voters who could swing their vote. I characterize equilibrium policies, $x^N = (t^N, \{s^{jN}\}_{j=1}^J, \{h_g^{jN}\}_{j=1}^J)$, when politicians undertake political redistribution.

¹⁰See Mathematical Appendix B.1. for a formal discussion on the existence and uniqueness of the political equilibrium.

3.4.1 Linear Income Taxation

Politicians need to raise income taxes in order to undertake political redistribution. Higher tax rates levied over labor income yield more revenue for redistribution. However, income taxation reduces voters' private utility and therefore raising taxes has a negative impact on parties' expected number of votes. Furthermore, taxes over earned income lead workers to reduce their labor effort. Therefore, these behavioral responses of workers decrease the endogenous pool of resources available for political redistribution. Hence, the size of the income tax chosen by politicians is limited by both its negative effect on chances of winning elections and individuals' adjustment of their labor effort.¹¹

For both political parties, the equilibrium choice of income taxation satisfies the following relation:

$$\frac{t^N}{1 - t^N} = - \frac{COV(\beta^j, y^j)}{\sum_{j=1}^J \mu^j y^j \varepsilon_{n,w}^{jc}} \quad (3.32)$$

where β^j is the net electoral marginal valuation of income in group j ; y^j is the market income of individuals of group j ; and $\varepsilon_{n,w}^{jc}$ is the group j 's compensated labor supply elasticity.

This equation shows how various factors affect the equilibrium linear income tax chosen by political parties and it is close to the expression that results from the classical optimal income taxation problem with linear tax and uniform cash transfers.¹² I extend that framework allowing for group-specific transfers. Furthermore, now the implemented tax rate is not the optimal choice of a benevolent planner who aims to maximize social welfare. However, income tax rate is the equilibrium outcome of

¹¹See Mathematical Appendix B.2. for a detailed characterization of the equilibrium linear income tax chosen by office-motivated political parties.

¹²See seminal work on optimal income taxation by Mirrlees (1971); Stiglitz (1987) and Kaplow (2008) for a discussion of the linear income tax case.

the electoral competition between office-motivated politicians. I discuss with some detail the different elements that affect the political choice of the income tax.¹³

Consider that politicians had available one unit of numeraire that could be targeted to whichever group j . Then, the net electoral marginal valuation of the income promised to individuals who belong to group j , β^j , is given by:

$$\beta^j = \frac{\psi \frac{\phi^j}{\phi} u_c}{\lambda} + tw^j \frac{\partial n^j}{\partial s^j} \quad (3.33)$$

The first term measures the marginal effect on parties' chances of winning by targeting an additional unit of numeraire commodity to a swing voter in group j . This contribution is normalized by the value of a unit of numeraire to politicians (*i.e.* it is converted in numeraire units dividing by the equilibrium shadow price of government revenue, λ). This marginal contribution depends on three elements: the marginal utility of consumption, u_c ; the relative concentration of pivotal voters in group j with respect to the average concentration of swing voters in the overall population, ϕ^j/ϕ ; and the uncertainty regarding the electoral outcome measured by the parameter ψ .

The second component captures the effect of behavioral responses of workers to cash transfers into government's revenues. In particular, assuming that leisure is a normal good implies that an additional unit of numeraire targeted to a voter in group j reduces her labor effort. Therefore, per each unit of labor supply reduction there is a tw^j marginal cost of revenues.

Equation (3.32) shows that the larger the covariance between the net electoral marginal valuation and the market income in each group is, the greater the income tax rate announced by politicians. The magnitude of this covariance depends on the dispersion of y^j and β^j . Market income exhibits a higher dispersion when the distribution of abilities across groups is more unequal. The dispersion of β^j depends

¹³The exposition of the results is close to Stiglitz (1987) and Kaplow (2008) in order to highlight both similarities and differences with optimal taxation literature in which governments are benevolent.

on both the relative concentration of swing voters among groups and the concavity of utility over consumption of numeraire.

Furthermore, income tax rate proposed by parties is larger when the compensated labor supply elasticities to changes in net wages of the groups are low. Compensated elasticities capture the inefficiencies introduced by income taxation and measure the income and tax revenues that are lost per unit of reduction in labor effort. Politicians consider the impact of these elasticities more relevant for groups with larger productivities and size because of the larger lost in tax revenues.

Hence, larger differences in the relative concentration of swing voters among groups; greater individuals' aversion to risk; higher inequality in the distribution of abilities across groups; and lower compensated labor supply elasticities contribute to a higher equilibrium tax rate which allows politicians to fund larger transfers.

Politicians do not have incentives to undertake political redistribution in the particular cases in which either the deadweight losses associated with income taxation are huge or there does not exist dispersion of y^j and β^j .¹⁴ Nevertheless, I focus on the general case in which there exists dispersion in both productivity and concentration of pivotal voters among groups. Furthermore, efficiency costs of taxation are not excessive.¹⁵

3.4.2 Overprovision of Health Services

In equilibrium, political parties commit to a linear income tax and a combination of transfers such that the quality of health services publicly funded for each group, given their available net income, is overprovided. Overprovision implies:

$$u_h(z^{jN}, h_g^{jN}, 1 - n^{jN}) < p_h u_c(z^{jN}, h_g^{jN}, 1 - n^{jN}) \quad \forall j \quad (3.34)$$

¹⁴For instance, politicians would not have incentives to redistribute when groups exhibit both the same productivity and concentration of non-biased voters. See Appendix B for additional details.

¹⁵See Salanié (2003) for a discussion on the efficiency cost of taxation and estimates of the compensated elasticities of labor supply.

where the equilibrium net income is given by $z^{jN} = w^j n^{jN}(1 - t^N) + s^{jN}$, with $s^{jN} \geq 0$. Thus, politicians constrain individuals to consume more health services than they would buy in private markets if targeted resources were given in cash. Why do politicians who require the support of citizens to be elected might have incentives to overprovide the consumption of goods? The political reason relies on the fact that overprovision might increase the scope of political redistribution which is limited by distortions generated by income taxation.

In order to examine under which conditions there exists political incentives for in-kind redistribution, consider an economy in which both political parties do not overprovide health care. In that case, politicians announce the same set of policies which implies that health care publicly funded in all groups is either under or enough provided. Suppose that one party, for instance A , decides to modify its policy platform. In particular, for a given income tax, party A increases in-kind transfers targeted to group k reducing the funding of cash transfers. Suppose that the magnitude of the policy change involves that now in-kind transfers in group k are overprovided. What's the effect of this change in policy platforms on the economic well-being of non-biased voters in group k ? I find that pivotal voters' well-being raises, $dV_A^k/dh_g^k > 0$, when the change in the composition of targeted transfers increases individuals' incentives to work.¹⁶

Workers raise their labor effort as long as leisure is a normal good and there exists complementarities between labor and the good subject to in-kind transfers, (i.e. $\partial l^{ck}/\partial h_g^k < 0$, where l^c is the compensated demand of leisure). The latter condition holds when either: i) preferences between leisure and goods subject to in-kind transfers are weakly separable, $\partial l^{ck}/\partial h_g^k = 0$; or ii) leisure and health are Hicks substitutes, $\partial l^{ck}/\partial p_h > 0$. The raise in labor effort enlarges aggregate labor income

¹⁶See Mathematical Appendix B.3. for a technical proof that shows the conditions under which overprovision is a political equilibrium. The exposed procedure follows closely Gahvari (1994) who analyzes the effect of cash and in-kind transfers in labor supply and tax revenues when government is benevolent.

and therefore government's revenues for any level of income taxation. That increment of resources allows politicians targeting group k with larger in-kind transfers reducing targeted cash in a lower magnitude. Party A 's change of policy platforms modifies the identity of expected swing voters in group k . Non-biased individuals and a share of voters with attachments to party B would be expected to vote for party A . Thus, this net gain in the expected number of votes provides incentives to modify the composition of redistributive transfers. Furthermore, these incentives are also present in the rest of the groups and therefore parties would deviate from the initial set of policy platforms. Thus, it is showed that either under or enough provision cannot be an equilibrium.

Hence, when there exists complementarities between labor and goods subject to in-kind transfers ($\partial l^{ck} / \partial h_g^k < 0$), politicians overprovide the consumption of these goods for all the population. The greater the complementarities are, the larger the rise in workers' labor effort and government's tax revenues to fund redistributive transfers. Therefore, politicians would have more incentives for overproviding these goods because it expands the scope of political redistribution which is limited by the disincentive effects created by income taxation.

3.4.3 In-Kind Transfers

In equilibrium, when political parties need to resort to in-kind transfers to compete for office, the publicly funded health care targeted to group j satisfies:

$$\frac{\frac{\psi}{\phi} \phi^j u_h(z^{jN}, h_g^{jN}, 1 - n^{jN})}{\lambda^N} + t^N w^j \frac{dn^{jN}}{dh_g^{jN}} = p_h \quad \forall j \quad (3.35)$$

where the equilibrium net income is given by $z^{jN} = w^j n^{jN} (1 - t^N) + s^{jN}$, with $s^{jN} \geq 0$. Hence, for each group of voters, politicians equalize the marginal cost of funding in-kind transfers to their marginal political valuation. This valuation consists of both the marginal contribution of targeted in-kind transfers to parties' chances of winning and their marginal effect on tax revenues. Overprovision of goods increases incentives

to work, $dn^j/dh_g^j > 0$, and therefore raises government's resources by tw^j per each additional unit of time devoted to work.

The electoral competition between politicians leads to a distribution of in-kind transfers across groups of voters that satisfies:

$$\frac{\phi^k u_h(z^{kN}, h_g^{kN}, 1 - n^{kN})}{1 - t^N w^k \frac{dn^{kN}}{dh_g^k}} = \frac{\phi^{k'} u_h(z^{k'N}, h_g^{k'N}, 1 - n^{k'N})}{1 - t^N w^{k'} \frac{dn^{k'N}}{dh_g^{k'}}} \quad \forall k, k' \in \{1, \dots, J\} \quad (3.36)$$

The interplay of three elements determine the equilibrium allocation of in-kind transfers among groups: i) the individuals' risk aversion over the consumption of the good subject to in-kind transfers; ii) the concentration of swing voters in the group; and iii) its level of productivity.

By concavity of utility function, politicians have incentives to transfer resources toward low ability groups because they exhibit higher marginal utility (i.e. lower market income). The larger the risk aversion is, the lower the groups' differences in the consumption of the good. Furthermore, politicians compete for pivotal non-biased voters who could swing their vote. Therefore, groups with larger concentration of non-biased individuals are favored in the allocation of in-kind transfers.

The effect of concavity and swing voters in the political allocation of transfers is well-known. Distributive politics points out how these factors affect the expected electoral returns of targeting transfers among groups (Lindbeck and Weibull, 1987; Dixit and Londregan, 1996). The novelty of this contribution relies on considering the effect of transfers on workers' incentives to work and government's revenues.

Income redistribution reduces workers' labor effort and therefore the tax basis to fund redistributive transfers. Previous section discusses under which conditions overproviding in-kind transfers might mitigate the disincentive effects of taxation. Furthermore, an extra unit of labor effort for high productivity groups generates more aggregate labor income and enlarges government's revenues for any level of taxation.

Therefore, high productivity is a factor that contributes positively to receive larger in-kind transfers. Politicians have incentives to target high productivity groups with in-kind rather than cash to reduce tax losses generated by income redistribution. Nevertheless, the impact of this component on the targeted transfer depends on the groups' elasticities of labor supply to in-kind transfers.

3.4.4 Cash Transfers

Politicians can also undertake income redistribution through differential targeting of cash transfers among groups of voters. However, parties do not have incentives to target cash transfers to groups in which the net electoral marginal valuation of promising one unit of numeraire, β^j , is lower or equal than the cost of the transfer.¹⁷ Therefore, group j does not receive cash when:

$$\frac{\frac{\psi}{\phi}\phi^j u_c(w^j n^{jN}(1-t^N), h_g^{jN}, 1-n^{jN})}{\lambda^N} + t^N w^j \frac{dn^{jN}}{ds^j} \leq 1 \quad \forall j \quad (3.37)$$

Otherwise, politicians promise cash transfers. In equilibrium, when group k is targeted with transfers, politicians equalize the marginal contribution of the transfer to their chances of winning, expressed in terms of numeraire, to its marginal cost. This cost consists of the direct effect of funding the transfer and the lost of tax revenues because of behavioral responses of workers. In particular, cash transfers reduce labor effort through the income effect (*i.e.* $dn^j/ds^j < 0$). Hence, in equilibrium the cash transfer allocated to group k satisfies:

$$\frac{\frac{\psi}{\phi}\phi^k u_c(z^{kN}, h_g^{kN}, 1-n^{kN})}{\lambda^N} = 1 - t^N w^k \frac{dn^{kN}}{ds^k} \quad (3.38)$$

where the equilibrium net income is given by $z^{kN} = w^k n^{kN}(1-t^N) + s^{kN}$.

Furthermore, for any pair of groups targeted with cash transfers, k and k' , the equilibrium relative allocation of transfers among groups is given by:

¹⁷See Mathematical Appendix B.5. for technical details on necessary conditions for targeting cash transfers and equilibrium characterization of the distribution of transfers across groups of voters.

$$\frac{\phi^k u_c(z^{kN}, h_g^{kN}, 1 - n^{kN})}{1 - t^N w^k \frac{dn^{kN}}{ds^k}} = \frac{\phi^{k'} u_c(z^{k'N}, h_g^{k'N}, 1 - n^{k'N})}{1 - t^N w^{k'} \frac{dn^{k'N}}{ds^{k'}}} \quad (3.39)$$

The factors that affect the electoral incentives to redistribute among groups through cash are the same that the elements previously discussed for in-kind transfers. Groups with higher concentration of swing voters and lower productivities (i.e. higher marginal utility of consumption) exhibit larger electoral benefits of being targeted. On the other side, politicians must consider the differential impact on tax revenues of targeting cash transfers among groups with different productivities. Indeed, the cost of targeting cash transfers is greater for groups with larger productivities because of the decrease of their labor effort represents a larger loss of tax revenues per unit of labor supply reduction. Hence, politicians have incentives to target low rather than high productivity groups with cash in order to reduce income and tax revenues losses generated by political redistribution.

3.5 Normative Analysis

When politicians are constrained to raise revenues through income taxation, political redistribution generates allocative inefficiencies. Taxation over earned income introduces distortions in labor markets through the substitution effect reducing individuals' incentives to work. Indeed, the rate at which individuals are willing to trade leisure for consumption is lower than their competitive wage rate:

$$MRS_{l,c}^{jN} = w^j(1 - t^N) < w^j \quad \text{for all } j \in \{1, \dots, J\} \quad (3.40)$$

Furthermore, politicians implement redistributive policies that create distortions in goods markets. In fact, under the conditions previously discussed, the allocation of resources that results from the political process, $\{c^{jN}, h^{jN}, n^{jN}\}_{j=1}^J$, is such that the consumption of health care is overprovided for all individuals in the economy. Hence, in each income group, the rate at which consumers are willing to trade health

care quality for numeraire commodity is lower than the rate at which the economy is able to transform numeraire into health care:

$$MRS_{h,c}^{jN} < MRT_{h,c} = q \quad \text{for all } j \in \{1, \dots, J\} \quad (3.41)$$

Nevertheless, the feasibility of in-kind transfers reduces inefficiencies with respect to a situation in which governments were able to redistribute only through cash transfers. By overproviding in-kind transfers, politicians introduce a friction in the consumption of goods. However, this distortion provides workers incentives to increase their labor effort with respect to a situation in which targeted transfers were given in cash. Therefore, it reduces the distortions in labor markets generated by income taxation. Overall, politicians choose redistributive schedules that increase the well-being of all individuals.

The increase in allocative efficiency can be showed as follows. The economic well-being of citizens when publicly funded health care is either under or enough provided is equivalent to the case in which the same amount of resources was targeted in cash.¹⁸ Furthermore, I showed the conditions under which, for any level of income taxation, all individuals increase their well-being when health care is overprovided. In that case, politicians are able to raise in-kind reducing cash transfers in a lower magnitude. Hence, it is shown that voters can be made better off when politicians are able to redistribute income through in-kind transfers.

Thus, the allocation that results from the political game when in-kind transfers are available is Pareto superior to the case in which redistributive spending is restricted to cash transfers. Furthermore, the larger the complementarities between publicly funded goods and labor are, the greater the efficiency gains. Hence, the composition of redistributive spending chosen by politicians is not neutral in terms of efficiency.

¹⁸In the case that politicians do not overprovide consumption and target group j with in-kind transfers, h_g^j , these are equivalent to a cash transfer of value $I^j = p_h h_g^j$. Therefore, in this situation cash and in-kind transfers are equivalent in terms of individuals' well-being.

Individuals work more and their consumption of health care is overprovided. However, citizens are better off with respect to a situation where only cash transfers were available because redistributive schedules enlarge their net income. Indeed, the equilibrium income tax is lower than the implemented tax rate when in-kind transfers are not feasible. On the one hand, the increase in labor effort raises the marginal utility of leisure, u_l . On the other hand, larger net income decreases the marginal utility of consumption, u_c . Therefore, the marginal rate of substitution between income and leisure for each group, $MRS_{l,c}$, is higher when in-kind transfers are feasible. In equilibrium, this marginal rate of substitution is equal to the net wage, $w^j(1 - t^N)$. Hence, the net wage is larger with respect to a situation in which only cash transfers are available and therefore a lower equilibrium income tax rate is implemented. Thus, an economy where in-kind transfers are feasible exhibits lower distortions in labor markets with respect to a situation in which politicians were constrained to redistribute income only through cash transfers.

Normative analysis justifies the use of in-kind transfers to increase the efficiency of the taxation system. Literature relies on an important contribution due to Guesnerie and Roberts (1984) who show how forced consumption of goods which are complements to labor can make all individuals better off when the economy is in a second best because of the presence of distortions.¹⁹ For the particular case in which the government is only able to levy linear taxes over labor income, Gahvari (1994, 1995) points out the welfare-enhancing role of in-kind transfers in an economy with uniquely two groups, the rich and the poor. Gahvari finds that government could decrease cash transfers and choose a uniform level of in-kind transfers that reduces distortions generated by income taxation. The funding of in-kind transfers results in overprovision (underprovision) of goods for the poor (rich) that leads to an increase (decrease) of their labor effort. Overall, the government is able to enlarge its tax revenues and fund larger transfers that increase the welfare of all individuals.

¹⁹See Currie and Gahvari (2008) for an exhaustive review of the normative literature and a discussion on the role of in-kind transfers in second best economies.

However, why should elected politicians implement Pareto improving policies? This chapter points out that when governments are elected by citizens they would have incentives to choose redistributive policies that minimize efficiency losses created by taxation. Nevertheless, it is important to notice that the reason is not a welfare improving goal of a benevolent government. Instead, politicians who strive to be elected propose redistributive schedules that enlarge the scope of redistribution which is limited by distortions. Politicians aim to enlarge resources to court pivotal voters who could swing their vote. Therefore, it is the competition for non-biased voters that leads politicians to choose policies that yield to constrained efficient allocations.

This efficiency result contrasts with a significant contribution by Epple and Romano (1996) in which in-kind transfers emerge as an inefficient tool of income redistribution. Instead, this chapter shows that when income is the result of labor effort and policies modify individuals' incentives to work, redistribution through in-kind rather than cash might increase efficiency. Furthermore, the reduction of welfare losses attainable by the political mechanism analyzed in this paper are larger than efficiency gains explored in the normative literature. By exploiting probabilistic voting I can remove the constraint that transfers must be uniform. Once differential targeting of transfers is feasible, politicians can design redistributive schedules that increase labor effort of all individuals regardless of their productivity. Therefore, it provides larger reductions in the distortions introduced by income taxation.

These results show the potential role of electoral competition to increase allocative efficiency in economies which allocations of resources are the result of a political process. This idea was first raised by Wittman (1989,1995) who suggested it as an important feature of the competition between politicians who strive to be elected. Furthermore, few contributions have analyzed how the competition for pivotal citizens who could swing their vote improves efficiency. One exception is Besley (2007) who proposes a framework to analyze groups' influence on policy depending on individuals' attachments to parties. That set up is adopted by Besley, Persson and

Sturm (2010) who showed how the competition for non-biased voters in the US states leads to pro-economic growth policies and efficiency gains. Another example in the literature is Lopez-Rodriguez (2010) who discusses the role of electoral competition for pivotal voters to achieve allocative efficiency in the presence of market imperfections such as external effects.²⁰ In the current chapter, I show how the competition for non-biased voters leads politicians to redistribute resources through tax-transfers schedules that minimize the efficiency cost of income taxation.

3.6 Conclusions

This chapter investigates the scope of income redistribution when it is a political decision undertaken by elected politicians. The political incentives for redistribution are examined through an electoral competition model which provides interesting new insights. I first show that politicians have incentives to raise taxes and modify the market distribution of income to be elected. Nevertheless, when politicians are constrained to levy taxes on labor income the extent of political redistribution is limited by distortions and output losses created by income taxation. In order to mitigate these limitations, I show that politicians who compete for office might fund in-kind transfers and overprovide the consumption of goods which are complements to labor. This policy increases individuals' labor effort with respect to a situation in which only cash transfers are available. As a result, politicians extend resources for political redistribution which allows them to fund larger transfers to court pivotal voters.

An appealing contribution of this chapter is its focus on the positive analysis of policymaking. I point out that the reason for redistribution and the characterization of redistributive schedules does not result from the optimal choice of a benevolent

²⁰Blomquist and Christiansen (1999) also point out the potential efficiency gains generated by political competition. In particular, they show how in the presence of both asymmetric information and tastes for redistribution toward low ability individuals, politicians that compete for office might implement policies that improve efficiency and reach distributive goals.

government who maximizes a normative criteria of social justice. However, it is the equilibrium outcome of a political process between politicians and voters. Furthermore, the normative properties of the political allocation are also suggestive. In spite of that redistribution through distortionary policy tools introduces inefficiencies, I find that political competition can be welfare improving. In particular, I show how the electoral competition for marginal voters who could swing their vote might improve the efficiency of the taxation system.

This chapter extends the literature of distributive politics examining how the political allocation of transfers depends on the effect of redistribution on individuals' incentives to work. In particular, this chapter provides a framework in which income is the result of labor effort, and politicians are constrained to raise revenues through distortionary taxation tools. This allows to analyze the trade-off faced by politicians between efficiency and political redistribution. Furthermore, I contribute to the literature examining the case in which not only cash but also in-kind transfers can be targeted across groups of voters. This gives interesting insights about how behavioral responses of workers to redistribution affect the composition of redistributive spending.

Some extensions of the proposed distributive politics framework with distortionary taxation are worthy to be considered for further research. As an example, I might allow for the possibility of commodity taxation over the consumption of goods. For instance, politicians could also subsidize goods that are complements to labor in order to stimulate labor effort. This extension would permit us to analyze the effect of both price and quantity interventions on political redistribution.

Other venue for research would consist of analyzing how political redistribution affects the extensive margin responses of individuals in labor markets. I developed the case in which everyone participates into the labor market. However, empirical evidence shows that individuals responses to taxation policy are specially significant in the extensive margin (Eissa and Liebman, 1996). Indeed, literature has focused on

designing optimal tax-transfers schedules that increase the incentives to participate in labor markets (Saez, 2002). Hence, it would be worthy to examine whether in-kind rather than cash transfers could provide incentives to participate in labor market. Furthermore, the implementation of these schedules should be rationalized not by the presence of benevolent governments but as the result of a political mechanism. Further research is necessary to analyze these extensions which might provide interesting new results.

Chapter 4

Distributive Politics and Economic Ideology

4.1 Introduction

Individuals broadly disagree on the extent of government provision of goods and services such as public health care coverage, the magnitude of national defense expenditure and public education extension and quality. The heterogeneity of individuals' positions on the economic role of government might arise because of either different views on how society should work or perceptions on the relative merits of governments and markets (Bénabou, 2008).¹For instance, some citizens believe that society should rely on individual responsibility and advocate for a reduced involvement of government in the economy. As an example, this ideological view considers that individuals should be free to choose their doctors, health insurance plan and the school of their children in private markets. Furthermore, perceptions and beliefs over the benefits of competitive markets may also justify positions against govern-

¹International surveys such as the World Values Survey report both the persistence over time and the significant large disparity in citizens' economic beliefs across and within countries. For the particular case of beliefs on the relative merits of governments and markets, the International Pew Research Survey (2007) documents different views about the extent of free-market beliefs and the economic role of government around the World.

ment intervention. Individuals who perceive that markets work properly, or at least better than the public sector, would limit the scope of government to the provision of pure public goods such as national defense or property rights protection. On the other side, equality of opportunities claims are often argued by individuals who believe that all citizens have right to affordable health care and education which access should be guaranteed by governments. Moreover, some individuals believe that market failures are specially common in markets for health and education and therefore public provision could be justified to correct the presence of inefficiencies.²

Whichever set of subjective beliefs and perceptions individuals hold, it constitutes economic ideology about the proper role of government. These ideologies translate into heterogeneous policy preferences over the resources that governments should devote to the provision of goods. Nevertheless, resources are scarce and governments are usually constrained to fund the provision of goods through income taxation. Therefore, it is not possible to disregard the public provision of goods from the effect of taxation schedules on the private well-being of citizens. In fact, individuals prefer to pay lower taxes and receive more transfers to increase their own economic well-being. Thus, examining how societies solve the ideological conflict on the role of government requires to consider the distributive conflict generated by the possibility of income redistribution (Dixit and Londregan, 1996). Hence, how do societies solve the simultaneous presence of both conflicts?

In representative democracies, these conflicts are resolved through elections where citizens choose among political parties to rule economic policy. Nevertheless, political parties are composed of politicians who are also citizens with their own partisan preferences over policy outcomes (Wittman, 1977, 1983; Alesina, 1988; Besley and Coate, 1997). Thus, do parties' ideologies over the role of government matter?

²For instance, the existence of asymmetric information in health care insurance markets which creates moral hazard and adverse selection; the spillover effects and externalities generated by education; or capital market imperfections such as liquidity constraints that constrain the access to some goods for low income individuals. See Currie and Gahvari (2008) for a comprehensive survey of the literature.

This chapter examines under what circumstances the presence of partisan politicians affect the public provision of goods and the design of income taxation schedules. Furthermore, ideological parties need to obtain the support of a majority of citizens to be elected. Therefore, electoral incentives should also be considered in the analysis of partisan competition among politicians (Calvert, 1985). In particular, this chapter investigates whether the political redistribution of income to court voters affects both the extent of electoral competition and public goods proposals by partisan politicians.

In order to investigate the effect of ideological positions on public goods provision and income taxation schedules, I build an electoral competition model with partisan politicians. I consider an economy in which citizens belong to groups differentiated by identifiable features which are associated to levels of gross income obtained by individuals in a market economy. Through an electoral process citizens choose a government to rule economic policy. In particular, governments can redistribute income among groups through tax-transfers schedules, and fund public goods with revenues raised by these income taxation schedules. There are no constraints in the available income taxation schedules that government might use (i.e. non-linear schedules are feasible). Furthermore, I assume that income taxes and government expenditures do not distort economic decisions and create income losses. This assumption is made in order to isolate the effect of partisan preferences on public good provision and income redistribution. The government is elected from two partisan political parties, right and left, that compete for office. Right-wing (left-wing) party holds pro-market (pro-government) ideological views and advocate by a reduced (significant) public provision of goods. Besides, politicians might have private benefits associated to win elections. In spite of their partisan views, politicians can credibly commit to policy platforms that depart from their ideological positions. Individuals care about the net income that results from taxation, and the public provision of goods over which they exhibit heterogeneous views. I assume that partisan positions on public goods are represented by satiated Euclidean quadratic preferences. Therefore, departures

from desired levels of public provision decrease individuals' well-being. Furthermore, citizens also consider the relative valence or popularity of politicians running for office. Hence, every citizen votes for the party that provides her larger well-being given policy platforms and parties' valence. The party that attracts the larger number of votes wins elections and implements the announced economic policies.

The proposed analysis provides interesting new insights. I first show that the presence of both politicians' partisan preferences and uncertainty about the electoral outcome supports parties' economic policy divergence. In fact, the pro-government party offers larger public good provision than the right-wing party which holds pro-market ideological positions. The extent of the divergence between parties' public goods platforms depends on the magnitude of the electoral uncertainty; the ideological polarization between parties; and the presence of politicians' private benefits associated to win elections. Furthermore, income taxation schedules proposed by parties aim to maximize their electoral returns. As we learnt from distributive politics literature, electoral incentives lead politicians to redistribute income toward groups with lower gross income and more pivotal voters who are most likely to change their vote. Nevertheless, despite both parties have incentives to favor the same groups of voters, I show that the right-wing party targets larger net income to all groups because its lower provision of goods. I find that the public provision of goods is funded by reducing in larger proportion the net income of groups targeted with more resources. Therefore, given that the left-wing party commits to higher provision of goods, it announces income taxation schedules that implement lower income inequality than that proposed by the right-wing party. Hence, in spite of politicians who do not exhibit partisan preferences over the distribution of income, net income inequality depends on parties' partisan positions over public goods provision.

An appealing result of my research shows that the presence of partisan preferences over economic policies might affect the extent of political competition between parties. In particular, I point out that ideological citizens are willing to trade their

partisan views for increases of net income. Thus, rightist politicians strategically target larger income to groups with higher concentration of moderate pro-leftist citizens who could swing their vote. The funding of public goods through income taxation confers an electoral advantage to pro-market ideological positions. As a result, the political redistribution of income allows the right-wing party to exhibit larger chances of winning elections. I show that this advantage leads the left-wing party to support larger ideological sacrifices because risk aversion leads it to reduce its public good proposals aiming to prevent the victory of distasteful ideological positions of its opponent.

Several political economy contributions have analyzed the effect of electoral incentives on the size and scope of government (Persson and Tabellini, 1999, 2000; Lizzeri and Persico, 2001, 2004); Milesi-Ferreti et al., 2002). These contributions assume that voters have homogeneous preferences over policy and politicians uniquely care about winning elections. Under these assumptions, electoral competition leads politicians to announce the same combination of public goods and redistributive transfers that maximizes their chances of being elected. Nevertheless, the economic policy convergence predicted by the literature is refused by empirical evidence (Besley and Case, 2003). In particular, empirical research for the US shows that politicians' partisan preferences affect policy outcomes at federal and state levels of government (Lee, Moretti and Butler, 2004; Bartels, 2008).³Recent contributions have highlighted the existence of citizens' economic beliefs which create heterogeneous preferences over economic policy.⁴Hence, in order to overcome these limitations, this chapter introduces

³Besley and Case (2003) reports that the larger the fraction of Democrat party seats in the state legislature is, the larger the state spending per person: Lee et al. (2004) show the highly partisan voting behavior of legislators in the US Congress; Bartels (2008) find out a significant partisanship effect in the American redistributive policy between Republicans and Democrats. Nevertheless, Ferreira and Gyourko (2009) find lack of partisan effect in policy outcomes at local level in the US; Glaeser, Ponzetto and Shapiro (2005) point out that policy divergence could not be caused by politicians' preferences over policy outcomes. Instead, politicians might choose strategically policy divergence in order to mobilize core voters, increase turnout and raise their chances of winning elections.

⁴The literature mainly focuses on examining how beliefs over the fairness of social competition

partisan politicians and voters who exhibit heterogeneous preferences on the extent of government provision of goods (Bénabou, 2008; Alesina and Fuchs-Schundeln, 2007).⁵

The proposed model builds on contributions by Wittman (1977, 1983) and Calvert (1985) who introduce partisan electoral competition with commitment. In particular, I extend these models to a multidimensional policy space to examine the political choice of both public goods provision and income taxation schedules. By exploiting probabilistic voting model, I can handle political equilibrium and analyze the effect of both electoral incentives and ideological preferences on policy outcomes.⁶ The theoretical predictions raised by this chapter are consistent with the main insights provided by Wittman-Calvert models of partisan electoral competition. The presence of uncertainty regarding the electoral outcome breaks politicians' incentives to full policy convergence. Thus, in contrast with previous results in the literature, political parties matter and the composition of government spending depends on the ideology of the party which wins elections. Furthermore, it is important to notice how this chapter extends the distributive politics literature (Lindbeck and Weibull, 1987; Dixit and Londregan, 1996). It examines the political redistribution of income when both voters and politicians exhibit ideological preferences over economic policy. On the other hand, it permits to investigate how distributive politics affects the race between partisan politicians. In particular, this analysis shows how pro-government ideology is more difficult to pursue in terms of electoral feasibility.

affect individuals' preferences for income redistribution policy. For instance, theoretical contributions by Piketty (1995), Alesina and Angeletos (2005) and Bénabou and Tirole (2006); and empirical work by Fong (2001), Alesina and Glaeser (2004) Alesina and LaFerrara (2005). See Alesina and Giuliano (2009) for a comprehensive survey of the theoretical and empirical literature.

⁵Bénabou (2008) develops a model in which ideology emerges as the result of collectively sustained distortions in beliefs concerning the proper scope of the public sector providing good and services; Alesina and Fuchs-Schundeln (2007) points out that indoctrination could be a relevant source to explain the formation of economic beliefs over the role of government in the economy. In particular, they show how communist dictatorship in East Germany might cause stronger preferences for government intervention and redistribution.

⁶As an alternative, the citizen-candidate literature (Besley and Coate, 1997; and Osborne and Slivinsky, 1996) considers that politicians with policy preferences cannot make credible commitments. However, this chapter departs from citizen-candidate approach and abstracts away potential commitment problems.

The rest of the chapter is organized as follows. The next section presents the electoral competition model on which the analysis relies. Section III characterizes the political equilibrium and discusses the main results on the effect of partisan politics on the scope of government, income taxation schedules and competition between parties. Section IV analyzes some comparative statics regarding electoral uncertainty and private benefits associated to winning elections. Section V presents the normative analysis and characterizes the set of policies that would be chosen by an utilitarian benevolent government. The final section concludes and briefly discusses further research.

4.2 Political Game

4.2.1 The Polity

Consider a polity with a continuum of citizens with measure 1. Citizens are divided into J groups with measure μ^j for $j \in \{1, \dots, J\}$ and none of them constitutes a majority of the population. These groups are distinguished by identifiable features such as occupation, age, race or geographic location. Each individual i in group j is endowed with y^j units of a private good. This endowment can be thought as the gross income obtained by individuals in a market economy. Therefore, the aggregate income in the economy is given by:

$$y = \sum_{j=1}^J \mu^j y^j \quad (4.1)$$

Through a voting process the polity has to choose a government in order to rule economic policy. There are two parties, left, L , and right, R , competing for office in elections. I assume that winning elections corresponds to obtaining the support of the majority of the population. Voting is costless and nobody abstains. Politicians can raise income taxes to fund both public goods and group-specific cash transfers. There are no constraints on the taxation schedule that government can use and economic policies are non-distortionary.

The elected government has available a linear technology which produces one unit of public good, g , with one unit of income. Political parties can make promises over the amount of resources that they would devote to the production of those goods, g_P for $P \in \{L, R\}$. Furthermore, let $c_P = \{c_P^j\}_{j=1}^J$ denote the vector of net income promised by party P to the J groups. That distribution of net income is the result of the net taxation policy targeted to each group j by P . Politicians can credibly commit to a policy platform $x_P = (g_P, c_P)$ to be implemented if party P wins the election. The allocation of resources after government intervention must satisfy economic feasibility:

$$g_P + \sum_{j=1}^J \mu^j c_P^j = y \quad (4.2)$$

This constraint defines a budget set of private and public spending allocations which are feasible. The policy set of available and attainable fiscal policies that captures all restrictions, $X \subset \mathbb{R}^{J+1}$, is non-empty, convex and compact.

Citizens' Preferences

Citizens care about the effect of income tax-transfers schedules on their own economic well-being. All individuals have the same preferences over available income, c , represented by the utility function $u(c)$. This function is continuous, twice differentiable, strictly increasing ($u_c > 0$) and strictly concave ($u_{cc} < 0$) in c . Marginal utility is bounded away from 0 and $u_c(0) = \infty$.

Citizens hold heterogeneous views over the role of government providing goods and services. In particular, each individual has a desired level of public goods provision, g^* . The larger the ideological bliss point is, the stronger the belief in government intervention. It is common to assume that ideological preferences over social outcomes are well represented by satiated preferences. I adopt Euclidean quadratic preferences to capture individuals' partisan valuation over public provision of goods:

$$W(g; g_i^*) = -(g - g_i^*)^2 \quad (4.3)$$

where the function $W(\cdot)$ is twice differentiable, continuous and strictly concave in the distance, z_i , between implemented and ideologically desired public goods policy for individual i , i.e. $z_i = |g - g_i^*|$.

Preferences over announced policies $x_P = (g_P, c_P)$ of citizen i located in group j with ideological type g_i^* are represented by the following additively separable indirect utility function that captures both self-interested and ideological motivations of citizens:

$$V_i(c_P^j, g_P; g_i^*) = u(c_P^j) + W(g_P; g_i^*) \quad (4.4)$$

this function is continuous, twice differentiable and concave in c^j and g .

I adopt a preference stochastic probabilistic voting model. Parties do not know the ideological position of each citizen, g_i^* . However, ideological beliefs are persistent over time and the distribution of partisan preferences in each group is common knowledge. I assume that the idiosyncratic ideological parameter of individuals who belong to group j are drawn from a uniform distribution, F^j , over the range $[g_a^{*j}, g_b^{*j}]$. Groups might differ with respect to both their average ideological positions, \bar{g}^{*j} , and the ideological homogeneity within the group. The density of the distribution, $\phi^j = 1/(g_b^{*j} - g_a^{*j})$, measures the ideological dispersion within a group. Denote $\phi = \sum_{j=1}^J \mu^j \phi^j$ the weighted average of the densities across groups.

Given the assumption on uniform distribution of ideologies across groups, let g_m^* be the weighted average of the mean ideology in each group weighted by the size and ideological dispersion of the group:

$$g_m^* = \frac{\sum_{j=1}^J \mu^j \phi^j \bar{g}^{*j}}{\phi} \quad (4.5)$$

This weighted average measures the median ideological type in the overall population. That type differs from the mean ideological type as long as the level of ideological heterogeneity varies across social groups.

In addition to economic policies, citizens care about the personal qualities of politicians ruling the polity. I suppose that once parties announce policy platforms, along the electoral campaign, political parties receive popularity shocks, ε_L and ε_R , common to all citizens. The relative popularity shock, $\varepsilon = \varepsilon_L - \varepsilon_R$, measures the perception that voters have on party L with respect to R at the time of elections. I assume that the common shock ε is uniformly distributed, and independently from g_i^* , with density ψ and expected value, $E(\varepsilon)$, equal to 0.

$$\varepsilon \sim U\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right] \quad (4.6)$$

Partisan Politicians

Political parties have heterogeneous positions on the role of government in the economy. Specifically, each party has a desired level of public provision of goods and services denoted by g_P^* . The residual resources of the economy should be in hands of citizens. However, parties do not have partisan preferences about how these resources should be distributed across groups. Politicians' preferences over public goods are represented by the same Euclidean quadratic preferences previously discussed:

$$W_P(g; g_P^*) = -(g - g_P^*)^2 \quad \forall P \in \{L, R\} \quad (4.7)$$

Suppose that party L , *pro-government* party, is the one with the highest preference for public intervention and party R , *pro-market party*, believes in a lower involvement of government in the economy, $g_L^* > g_R^*$. Parties' ideological leanings are symmetrically located around the median ideological type in the overall population (i.e. $g_m^* = g_R^* + g_L^*/2$). Hence, there is not overall population bias toward any party ideological position. However, there may be group biases toward either rightist or leftist ideological views. Furthermore, I assume that in each group there are citizens whose ideological views correspond to political parties' ideological positions.

In spite of partisan views, politicians can credibly commit to a policy platform

$x_p = (g_p, c_p)$ that departs from their ideological positions.⁷ Besides partisan preferences, politicians could assign non-material private benefits associated to power. Denote Q as the ego-rents or value that both parties attach to winning elections. This parameter measures politicians' office-holding motivation and is assumed to be weakly positive if P comes to power and 0 otherwise.

Given the presence of electoral uncertainty, the expected utility of party R is defined as:⁸

$$EU_R(x_R, x_L) = P(x_R, x_L)[Q + W_R(g_R; g_R^*)] + [1 - P(x_R, x_L)]W_R(g_L; g_R^*) \quad (4.8)$$

where the probability that party R comes to office, $P(x_R, x_L)$, captures the uncertainty regarding electoral outcome and summarizes expected voting behavior of citizens. The expected utility for party L is symmetric with probability of winning equal to $1 - P(x_R, x_L)$.

4.2.2 Stages of the Game

The timing of the political game is as follows: **1)** Political parties simultaneously and non-cooperatively credibly announce their economic policy platforms, $x_R = (g_R, c_R)$ and $x_L = (g_L, c_L)$. **2)** The random common popularity shock, ε , is realized. **3)** Citizens vote for the party that they prefer, $\{R, L\}$. Finally, **4)** Whichever party P that obtains the majority of the votes, wins the election and implements the economic policy promised at the beginning of the game. Hence, the political game presented above has two stages: policy announcements and elections. I characterize the Subgame Perfect Nash equilibrium of the political game by backward induction.

⁷Alesina (1988) points out the credibility problem of partisan politicians in one-shot static games. To avoid candidates' commitment problem, I assume that this model represents the reduced form of a dynamic game in which political parties run in repeated elections. Parties will be punished by losing credibility if politicians do not deliver the announced policy.

⁸This politicians' objective function with mixed motivations was introduced by Wittmman (1983) in his classical work on partisan electoral competition.

Second Stage: Voting

Citizens vote for the party that they prefer given economic policy announcements and the relative popularity of political parties. At the voting stage, policy platforms (x_R, x_L) and common bias ε are observed by voters. Suppose that a member of group j with ideological preference g_i^* is promised public goods provision and income tax-transfers schedules (g_R, c_R^j) by pro-market party and (g_L, c_L^j) by pro-government party. Given individuals' preferences over economic policies (4.4) and the realization of the random shock, citizen i in group j votes for party R over L conditional on policy platforms if:

$$V_i(c_R^j, g_R; g_i^*) > V_i(c_L^j, g_L; g_i^*) + \varepsilon \quad (4.9)$$

while voting for party L if this inequality is reversed.

Given the proposed policies, in each group there might be citizens with an idiosyncratic ideological parameter, g_s^{*j} , such that they are indifferent between voting for the pro-market, R , as for the pro-government, L , party. The swing voter type in group j is implicitly defined by:

$$u(c_R^j) + W(g_R; g_s^{*j}) = u(c_L^j) + W(g_L; g_s^{*j}) + \varepsilon \quad (4.10)$$

Voters located in group j with an ideological type g_i^* below (above) the cut-off ideological type, g_s^{*j} , vote for pro-market party (pro-government party). I assume that pivotal voters who are indifferent between political parties randomize equally over the set of parties. The swing voter type in group j when citizens have Euclidean quadratic preferences over public goods is given by:

$$g_s^{*j} = \bar{g}_{LR} + \frac{1}{2\Delta_g} [u(c_R^j) - u(c_L^j) - \varepsilon] \quad (4.11)$$

where \bar{g}_{LR} is the average of parties' promises regarding public provision of goods and Δ_g is the difference between leftist and rightist proposals.⁹ Given that partisan

⁹See Mathematical Appendix C.1. for full development and discussion of swing voter types, vote shares and probability of winning.

preferences over public goods are uniformly distributed in each group, the overall vote share for party R is given by:

$$S_R(x_R, x_L; \varepsilon) = \frac{1}{2} + \sum_{j=1}^J \mu^j \phi^j [g_s^{*j} - \bar{g}^{*j}] \quad (4.12)$$

The complement share of citizens, $1 - \sum_{j=1}^J \mu^j F^j(g_s^{*j})$, votes for pro-government party L , S_L .

First Stage: Policy Announcements

Rolling back to the first stage of the game, when politicians commit to economic policies, the common valuation shock has not been realized. Thus, parties are uncertain about who are the swing voters in each group and voting is a random variable for politicians. Given that the expected value of the shock is equal to zero, the expected swing voters in group j are citizens indifferent between parties' economic policy proposals. Therefore, political parties choose their platforms being in mind that the expected voting decisions in each group are given by the expected cut-point ideological type, $E[g_s^{*j}] = \widehat{g}_s^{*j}$. Denote \widehat{g}_s^* the weighted average ideological type of the expected swing voters in each social group.¹⁰ The weights depend on the concentration of voters located at the cut-points. This type captures the expected swing voters' ideology in the overall population:

$$\widehat{g}_s^* = \frac{\sum_{j=1}^J \mu^j \phi^j \widehat{g}_s^{*j}}{\phi} \quad (4.13)$$

I assumed majority voting and then winning the election corresponds to obtaining more than fifty per cent of the total vote. Given the expected swing voter type in each group and distributional assumptions on ideological types and popularity shock, the probability that pro-market party R wins the election can be expressed as:

¹⁰This definition follows from Dixit and Londregan (1998) discussion about swing voters ideology.

$$P(x_R, x_L) = \frac{1}{2} + \psi 2\Delta_g[\widehat{g}_s^* - g_m^*] \quad (4.14)$$

Pro-government party L anticipates winning the election with the complementary probability $1 - P(x_R, x_L)$. The stochastic preference probabilistic voting provides continuity of the probability function in a multidimensional policy space. The individual heterogeneity in voting decisions introduced by the ideological types smooths the expected vote share for both parties. That smoothness is due to the continuity of individuals' indirect utility function (4.4) and distributions of ideological types in each group. Therefore, parties' probabilities of winning elections are continuous in both policy platforms. Furthermore, the concavity of citizens' utility functions and the uniform distribution of ideological types in groups ensure that probabilities are concave in a party's own platform, x_P , and convex in its opponent's proposal, x_{-P} .¹¹

Taking the opponent's policy choice problem as given, each party chooses a combination of public good provision and net income for each group, $x_P = (g_P, c_P)$ for $P \in \{R, L\}$, that maximizes its expected utility subject to economic feasibility and non-negativity constraints. Parties take into account the uncertainty regarding electoral outcome by the probability function (4.14) which summarizes expected voting behavior of citizens given announced policies. Thus, the policy choice problem of the right-wing party R is given by:

$$\max_{g_R, \{c_R^j\}_{j=1}^J} EU_R(x_R, x_L) \quad \text{s.t.} \quad g_R + \sum_{j=1}^J \mu^j c_R^j = y \quad \text{and} \quad g_R \geq 0 \quad ; \quad c_R^j \geq 0 \quad \forall j \quad (4.15)$$

Pro-government party L makes policy announcements simultaneously and its policy choice problem is symmetric to party R .

¹¹See Austen-Smith and Banks (2005) and Banks and Duggan (2006) for a discussion on continuity and concavity properties in preference stochastic probabilistic voting models.

4.3 Political Equilibrium

Definition: A Subgame Perfect Nash Equilibrium (SPNE) in the partisan electoral competition game is i) a menu of income taxation schedules and public goods provision announced by each political party P , $x_P^N = (g_P^N, c_P^N)$; and ii) a voting decision for each individual of the polity, $\{R, L\}$, such that:

1) Each political party commits to a policy proposal that maximizes its expected utility subject to the economy feasibility constraint, taking into account citizens' expected voting decisions and its opponent's policy choice problem.

2) Each citizen votes for the party that provides her greater well-being given policy platforms, ideological preferences and valuation of political parties.

Proposition 13 (Existence) *In the partisan electoral competition game, a SPNE in pure strategies exists and it is unique.*

Proof. [1] For each citizen, parties' policy proposals, idiosyncratic ideological preferences and popularity shocks yield different utility levels under the government of either party R or L . Then, every citizen votes for the party which provides her the maximum level of utility. When the utility level implied by each party is the same, indifferent individuals randomize equally over the set of candidates and vote for one of the parties.

[2] Given that for each political party i) the feasible set of strategies defined by the government's budget constraint is non-empty, compact and convex; and ii) parties' expected utility functions are 1) continuous in both policy platforms, (x_R, x_L) ; and 2) strictly concave in x_P and strictly convex in x_{-P} for $P \in \{R, L\}$, because of the continuity and concavity properties of both probability functions and parties' partisan preferences. Then, according to Glicksberg's Fixed Point Theorem, there does exist a unique Nash Equilibrium in pure strategies in the first stage of the game.

Therefore, given [1] and [2], in the political game there exists a Subgame Perfect Nash Equilibrium in pure strategies and it is unique. ■

4.3.1 Equilibrium Policies

The system of equations formed by the best responses for each political party and their budget constraints simultaneously determine the Nash Equilibrium in the first stage of the game. Therefore, equilibrium parties' proposals of public goods and net income taxation, (g_P^N, c_P^N) for $P \in \{R, L\}$, satisfy the following system of equations:

$$\frac{\frac{\partial P(x_R^N, x_L^N)}{\partial g_R} \Omega_R^N}{\lambda_R} + \frac{P(x_R^N, x_L^N) \frac{\partial W_R(g_R^N; g_R^*)}{\partial g_R}}{\lambda_R} = 1 \quad (4.16)$$

$$\frac{\frac{\partial P(x_R^N, x_L^N)}{\partial c_R^j} \Omega_R^N}{\lambda_R} = \mu^j \quad \forall j \quad (4.17)$$

$$-\frac{\frac{\partial P(x_R^N, x_L^N)}{\partial g_L} \Omega_L^N}{\lambda_L} + \frac{[1 - P(x_R^N, x_L^N)] \frac{\partial W_L(g_L^N; g_L^*)}{\partial g_L}}{\lambda_L} = 1 \quad (4.18)$$

$$-\frac{\frac{\partial P(x_R^N, x_L^N)}{\partial c_L^j} \Omega_L^N}{\lambda_L} = \mu^j \quad \forall j \quad (4.19)$$

where Ω_P^N for $P \in \{R, L\}$ denotes party P 's benefit of winning elections. This benefit is defined as the difference between party's payoffs under victory and under defeat;¹² and where $\lambda_P > 0$ is the Langrange multiplier associated to party P 's budget constraint which measures the value of one extra unit of income for partisan politicians.¹³

¹²The benefits of winning are divided into two components. The first component captures politicians' weakly positive private payoffs associated to win elections. The second component measures the ideological benefits associated to victory. Hence, party P 's benefits of winning elections are given by:

$$\Omega_P^N = \Omega_P(x_R^N, x_L^N) = Q_P + W_P(g_P^N; g_P^*) - W_P(g_{-P}^N; g_P^*)$$

In equilibrium, this magnitude is weakly positive to prevent the situation where party P prefers to lose.

¹³See Mathematical Appendix C.2. for a detailed discussion and complete characterization of the political equilibrium and the propositions presented in this subsection.

This system of equations shows that, in equilibrium, parties equalize the marginal cost of providing public goods to the marginal benefit in their expected utility expressed in terms of income (i.e. normalized by the Lagrange multiplier, λ_P). Furthermore, for each group, parties equalize the marginal cost of increasing one unit of net income in a group of size μ^j to the marginal contribution to their expected utility, expressed also in terms of income.

The system of best responses reveals that both parties offering the same economic policy cannot be an equilibrium. Politicians are trading off the desirability of the policy from their partisan views against the probability that their policy proposal wins the election. Thus, in the presence of electoral uncertainty, the electoral competition between partisan politicians, who can commit to policy platforms, yields to divergent equilibrium policy platforms.

Proposition 14 (Policy Divergence) *In equilibrium partisan parties announce divergent economic policy platforms, $x_R^N \neq x_L^N$.*

In the case that both parties uniquely consider the electoral returns of policy platforms and converge completely, there would not be incentives to modify platforms to increase their chances of winning elections. Nevertheless, both parties still would have incentives to adjust policies toward their ideological positions because departing from them is costly. Therefore, full convergence cannot be an equilibrium.

If parties choose their most preferred policies, there would not be incentives to adapt platforms to parties' ideological bliss points. However, politicians would have incentives to adjust policies to increase their electoral returns because they care about the electoral outcome. Indeed, politicians compete for office aiming to avoid the victory of their opponents who would implement distasteful ideological views. The potential presence of private benefits associated to victory would increase the relevance of electoral incentives. Thus, full policy divergence cannot be an equilibrium.

In equilibrium, there is partial economic policy divergence in which each party balances its policy preferences with its chances of ruling the polity. These insights on partisan electoral competition with commitment are well-known and rely on classical contributions due to Wittman (1977, 1983) and Calvert (1985). This theoretical framework has not been considered to investigate how partisan preferences affect the simultaneous political choice of public goods provision and income redistribution.

Wittman-Calvert models of partisan competition focus on unidimensional policy space.¹⁴ This chapter extends previous analysis introducing a stochastic preference probabilistic voting model which allows to handle equilibria in pure strategies with multidimensional policy space. The uncertainty about the heterogeneous idiosyncratic ideological preferences of voters ensures continuity in politicians' objective functions. The valence shock provides uncertainty about the identity of expected swing voters in each group. This creates aggregate uncertainty about the electoral outcome and yields policy divergence in the presence of ideological politicians. The proposed model provides a new framework to examine the incentives of partisan politicians to provide public goods and redistribute net income across groups of voters.

Public Goods Provision

In equilibrium, the provision of public goods and income taxation schedules proposed by partisan politicians satisfies economic feasibility and the following system of best responses:

$$-\psi 2(g_R^N - g_m^*)\Omega_R^N - 2(g_R^N - g_R^*)P(x_R^N, x_L^N) = \frac{1}{\mu^k} \frac{\phi^k}{\phi} \mu^k \psi u_c(c_R^{kN})\Omega_R^N \quad \forall k \in \{1, \dots, J\} \quad (4.20)$$

$$-\psi 2(g_L^N - g_m^*)\Omega_L^N - 2(g_L^N - g_L^*)[1 - P(x_R^N, x_L^N)] = \frac{1}{\mu^k} \frac{\phi^k}{\phi} \mu^k \psi u_c(c_L^{kN})\Omega_L^N \quad \forall k \in \{1, \dots, J\} \quad (4.21)$$

¹⁴Calvert (1985) presents an extension with multidimensional space but he relies on strong symmetry conditions (Ploot, 1967).

This system of equations can be written as follows:¹⁵

$$\sum_{j=1}^J \mu^j MRS_{g_R, c_R}^{jg_m^*} + \gamma_R^N \sum_{j=1}^J \mu^j MRS_{g_R, c_R}^{jg_R^*} = MRT_{g,c} \quad (4.22)$$

$$\sum_{j=1}^J \mu^j MRS_{g_L, c_L}^{jg_m^*} + \gamma_L^N \sum_{j=1}^J \mu^j MRS_{g_L, c_L}^{jg_L^*} = MRT_{g,c} \quad (4.23)$$

where $MRS_{g_P, c_P}^{jg_m^*}$ is the marginal rate of substitution between public goods and net income for individuals in group j with median ideological type given policy platform by party $P \in \{R, L\}$; $MRS_{g_P, c_P}^{jg_P^*}$ is the rate at which individuals in group j who hold ideological positions of party $P \in \{R, L\}$ are willing to trade public goods for net income; and $MRT_{g,c}$ is the rate at which the government is able to transform income into public goods. In equilibrium, γ_R^N and γ_L^N are given by:

$$\gamma_R^N = \frac{P(x_R^N, x_L^N)}{\psi \Omega_R^N} \quad \text{and} \quad \gamma_L^N = \frac{[1 - P(x_R^N, x_L^N)]}{\psi \Omega_L^N} \quad (4.24)$$

These equations capture how electoral incentives and ideological positions simultaneously determine the equilibrium choice of public goods proposals by political parties. When one party announces public goods provision closer to its ideological leanings, it reduces its expected number of votes. That raises its chances of losing in front of politicians who would provide public goods more distant from its partisan preferences. It is important to notice that even pure ideological politicians (i.e. $Q = 0$) do not announce public goods platforms that perfectly reflect their partisan preferences. Politicians have concave utility over public goods and therefore they exhibit ideological risk aversion. The marginal increase in utility from a distasteful level of provision is larger than the marginal gain in utility because public goods provision is closer to their partisan positions. Ideological risk aversion limits parties' incentives to diverge. In particular, risk aversion leads pro-market (pro-government) party to propose public goods provision larger (lower) than its ideological bliss point. Thus,

¹⁵See Mathematical Appendix C.2.4. for a complete description of how this system of equations is obtained.

electoral competition generates an ideological sacrifice in platforms proposed by party P , z_P . This ideological sacrifice is defined as the difference between proposed and ideologically desired public goods policy by party P , $z_P = |g_P^N - g_P^*| \quad \forall P \in \{R, L\}$.

Each party might increase its electoral returns by adjusting public goods to the preferred policy by individuals with median ideological type. This adjustment would raise its chances of winning elections and implementing its policy platforms. However, parties hold ideological positions regarding public goods provision and it would be costly to depart from these positions. In case of victory politicians should implement a less preferred policy. Furthermore, electoral incentives to adjust policies are decreasing because of concavity of probability function. Therefore, parties do not have incentives to promise the same level of public goods.

Political parties share the same electoral incentives but hold different ideological positions on the extent of public good provision. In the presence of electoral uncertainty, politicians choose public goods proposals that balance their ideological leanings and the expected electoral returns of policy platforms.

Proposition 15 (Partisan Public Goods Provision) *In equilibrium, the pro government party's proposal of public good provision is larger than the pro-market party's policy platform, $g_L^N > g_R^N$.*

In equilibrium parties propose different provision of public goods and income taxation schedules across groups. The extent of policy divergence between parties' policy proposals depends on i) the degree of aggregate uncertainty regarding of the electoral outcome; ii) the polarization between parties' ideological leanings; and iii) the presence of politicians' private benefits associated to win elections.¹⁶

¹⁶The effect of these factors on policy divergence is discussed with detail in the comparative statics section.

Distributive Politics

Politicians commit to income taxation schedules that maximize their expected electoral returns. In equilibrium, the electoral competition between partisan politicians leads to taxation schedules that satisfy:

$$\phi^k u_c(c_P^{kN}) = \phi^{k'} u_c(c_P^{k'N}) \quad \forall k, k' \in \{1, \dots, J\} \quad \text{and} \quad \forall P \in \{R, L\} \quad (4.25)$$

The electoral incentives for political income redistribution are consistent with the well-known insights on distributive politics highlighted by Lindbeck and Weibull (1987) and Dixit and Londregan (1996). In equilibrium, both parties redistribute resources towards groups with lower gross income because of the concavity of utility over consumption. Furthermore, political parties favor groups with larger concentration of pivotal voters who could swing their vote. In the proposed model, the concentration of expected swing voters is measured by the density of the uniform distribution of ideological preferences within each group, ϕ^j .

The factors that characterize income taxation schedules are identical for both parties and therefore both parties favor the same groups of voters targeting either larger transfers or lower taxes. However, politicians commit to different levels of public goods provision and therefore they promise different net income in absolute terms. The larger the provision of public goods is, the lower the magnitude of net income targeted to individuals.

Proposition 16 (Income Tax-Transfers Schedules) *The pro-market party offers larger net income than the pro-government party to all groups of the polity, $c_R^{jN} > c_L^{jN}$ $\forall j \in \{1, \dots, J\}$.*

The public provision of goods is funded through non-linear income taxation schedules. Hence, given the assumption on concavity of utility over income, politicians fund public goods reducing in larger proportion the net income of groups targeted with

more resources (i.e. public goods are funded through progressive income taxation). Therefore, given that the left-wing party commits to higher provision of goods, the pro-government party announces income taxation schedules that implement lower income inequality than the proposed by pro-market party.

It is important to notice that although politicians do not exhibit partisan preferences over the distribution of income, ideological preferences over public goods provision lead parties to offer different levels of income inequality. Redistributive politics is affected by the presence of partisan politicians even when parties do not hold ideological positions over the distribution of income.¹⁷

Each party commits to its largest public good platform in the particular case in which all groups exhibit the same concentration of expected swing voters, $\phi^j = \phi \forall j$. In this case, according to (4.25), the marginal utility of private consumption is equalized across groups of voters. The expected marginal electoral returns of targeting net income are identical across groups and politicians do not have incentives to discriminate among them in terms of net income. In equilibrium, both political parties commit to income taxation schedules that implement an egalitarian distribution of income. The equilibrium policy platforms satisfy the following system of equations:

$$MRS_{g_R, c_R}^{g_m^*} + \gamma_R^N MRS_{g_R, c_R}^{g_R^*} = MRT_{g, c} \quad (4.26)$$

$$MRS_{g_L, c_L}^{g_m^*} + \gamma_L^N MRS_{g_L, c_L}^{g_L^*} = MRT_{g, c} \quad (4.27)$$

Political parties do not have constraints on the income taxation schedule that they can commit to during the electoral campaign. Furthermore, income redistribution does not create distortions and income losses. Formally, these assumptions imply that, once in government, politicians are able to tax away all the initial individuals' gross income. We can think of it as the presented model captures how political parties

¹⁷Dixit and Londregan (1998) consider a distributive politics game in which citizens and parties exhibit ideological concerns about the distribution of income and the extent of inequality. However, this important contribution abstracts away the possibility of partisan preferences over the public provision of goods.

choose the allocation of a fixed budget among the public provision of goods and cash transfers across groups of voters.

Corollary 4 (Composition of Government Spending) *In the presence of uncertainty about the electoral outcome, the composition of government spending among public goods and transfers depends on the economic ideology of the party ruling the government (i.e. partisanship effect).*

The leading political economy models of size and scope of government rely on office-motivated politicians who adjust policies uniquely to win elections. These contributions predict that, regardless of which party comes to power, electoral incentives lead politicians to announce the same composition of government spending. Instead, I extend this significant literature considering partisan politicians and citizens who exhibit heterogeneous preferences over the extent of public good provision. The introduction of these assumptions allow to examine the conditions under which the composition of government spending depends on the ideology of the party that wins the election. In particular, I find that policy convergence is not feasible in the presence of both electoral uncertainty and heterogeneous partisan preferences.

4.3.2 Advantage of Pro-Market ideological positions

In equilibrium, the expected swing voter type in group j , \widehat{g}_s^{*jN} , is implicitly defined by:

$$u(c_R^{jN}) - u(c_L^{jN}) = W(g_L^N; \widehat{g}_s^{*jN}) - W(g_R^N; \widehat{g}_s^{*jN}) \quad \forall j \in \{1, \dots, J\} \quad (4.28)$$

I showed that the net income promised to any group j by right-wing party is larger than the income that results from taxation schedules committed by left-wing party, $c_R^{jN} > c_L^{jN} \forall j$. It leads that, in equilibrium, expected swing voters' private well-being is larger under right-wing party's income taxation platform, i.e. $u(c_R^{jN}) > u(c_L^{jN})$. I found that pro-government party promises larger provision of public goods than pro-market party, $g_L^N > g_R^N$. According to (4.28), in equilibrium, the

ideological utility loss of expected swing voters under left-wing proposal is lower than the ideological loss implied by right-wing platform, i.e. $W(g_L^N; \widehat{g}_s^{*jN}) > W(g_R^N; \widehat{g}_s^{*jN})$.

Hence, given policy platforms, equilibrium pivotal swing voters are indifferent between the ideological benefits associated to left-wing party's victory (i.e. lower ideological sacrifice) and the larger private economic well-being obtained if right-wing party wins elections. Therefore, in equilibrium, the ideological positions of expected swing voters in each group are closer to pro-government than to pro-market ideological positions.

Proposition 17 (Ideology Swing Voters) *In equilibrium, the expected pivotal voters who could swing their vote are moderate pro-leftist citizens.*

Thus, the ideological type of the equilibrium indifferent voter in each group is larger than the median ideological position in the overall population, $\widehat{g}_s^{*jN} > g_m^*$. This result shows that in equilibrium parties commit to policies such that in each group there exists a subset of citizens biased towards pro-government ideological positions who prefer economic policy platforms by the right-wing party. Therefore, a subset of centrist and moderate pro-leftist citizens are expected to vote for pro-market party. Hence, in equilibrium the probability that left-wing party wins elections is lower than the chances for right-wing party, $P(x_R^N, x_L^N) > 1/2$.

Corollary 5 (Electoral Advantage of the Right) *In equilibrium the probability that pro-market politicians win the elections is higher than the chances for pro-government politicians.*

Citizens hold ideological positions but also care about their own economic well-being. In fact, voters are willing to trade ideological positions by promises of larger net income. This provides an advantage to pro-market party which can court centrist and moderate pro-leftist voters in every group targeting them with larger net income and reducing the public provision of goods. This strategic targeting of net income allows

right-wing politicians to increase their expected electoral returns and, at the same time, propose public good provision closer to its partisan positions. The expected strategy of the right-wing party forces ideological risk-averse pro-government party to decrease its promises of public goods. Thus, left-wing party is able to increase the targeted amount of net income to groups with larger concentration of pivotal voters in order to increase their expected number of votes. As a result, in equilibrium, public good platform by left-wing party supports a larger ideological sacrifice than the proposal by the right-wing party, $z_L^N > z_R^N$.

Proposition 18 (Ideological Sacrifice left-wing party) *In equilibrium, the pro-government public goods proposal supports a larger ideological sacrifice than the proposal of the pro-market party.*

In previous subsection, I showed that each political party promises its largest public goods platform when all groups exhibit the same concentration of pivotal voters. In this particular case, both the electoral advantage of the right-wing party and the ideological sacrifice of the left-wing party are minimized. However, when the concentration of expected swing voters differs across groups, politicians have incentives to discriminate them through differential net income. The differentiation across groups is possible because of the availability of non-linear income taxation schedules. Furthermore, there exists more competition to attract pivotal moderate pro-leftist voters who could swing their vote. This competition leads both parties to reduce resources to fund public goods provision and to increase the net income targeted to groups.

Persson and Tabellini (1999, 2000) and Lizzeri and Persico (2001, 2004) first pointed out that in a distributive politics game with public goods, targetability of cash transfers yields a premium over public goods. Electoral incentives lead office-motivated politicians to reduce the provision of public goods, because of their lack of targetability, and to increase the amount of resources devoted to cash transfers. This chapter shows that these incentives also exist in partisan electoral competition.

Furthermore, the main novelty relies on pointing out that now targetability yields a premium for particular partisan politicians. Indeed, the possibility of differential targeting of net income, given the availability of non-linear taxation schedules, allows the right-party to attract larger expected number of voters. Therefore, non-linear taxation increases the electoral advantage of right-wing party and raises the ideological sacrifice of the left-wing party.

Several contributions have examined the effect of various factors non-related to economic policy on the electoral competition between parties. For instance, Groseclose (2001) analyzes partisan competition when one party exhibits a valence advantage over the other competing party (e.g. incumbency advantage). In particular, Groseclose shows that in this situation the advantaged party adopts a more moderate policy than the disadvantaged party which moves toward its ideological preferred position; Roemer (1998) examines how the presence of value issues such as religion might confer an advantage to right-wing parties and limits the extent of income redistribution; Besley and Preston (2007) and Besley et al. (2010) investigate the advantage generated by the larger presence of core voters attached to one party in districts with majoritarian elections.

These contributions introduce exogenous elements non-related to policy in order to create advantages in the electoral race between politicians. In contrast to the previous literature, this paper examines an electoral advantage that depends on chosen economic policies and therefore it is an endogenous variable in the electoral competition game. In particular, the analysis starts from a situation in which society does not exhibit an aggregate bias towards any ideological position. Indeed, political parties' ideological leanings are symmetrically located around the median ideological type in the overall population. However, the funding of public goods through income taxation confers an electoral advantage to pro-market ideological positions. This chapter finds that pro-government ideological positions could be more costly to pursue in terms of electoral feasibility. Hence, the presence of partisan preferences over

economic policies affect the extent of political competition between political parties.

4.4 Comparative Statics

Equilibrium policy platforms proposed by political parties diverge because of both uncertainty about electoral outcome and politicians' partisan preferences on the economic role of government. Hence, it is worthwhile to examine how the presence of private benefits associated to come to office-holding and the extent of uncertainty affect equilibrium policies and the competition between parties.

4.4.1 Electoral uncertainty

In the proposed model, citizens' voting decisions do not uniquely depend on economic policy platforms. In fact, citizens also consider the valence of politicians running for office.¹⁸ Furthermore, this valuation is unknown by politicians when they choose policy platforms and therefore it generates uncertainty about the electoral outcome. This uncertainty has been introduced through a common shock received by political parties along the electoral campaign. In particular, the relative valuation of politicians is drawn from a uniform distribution with density ψ . Thus, the parameter ψ can be interpreted as a measure of the relative weight between policy platforms and politicians' valence on individuals' voting decisions.

Hence, when the valence of politicians might have a large impact on voting decisions (i.e. low parameter ψ), the electoral uncertainty faced by parties when choose policy platforms would be high. For instance, consider the limit case in which $\psi \rightarrow 0$ (i.e. huge electoral uncertainty). In this situation, party R 's equilibrium condition (4.20) can be written as:

$$-2(g_R^N - g_R^*)P(x_R^N, x_L^N) = 0 \quad (4.29)$$

¹⁸This valence could be interpreted as the charisma or popularity of politicians who compete for office. In some particular elections and systems of government (e.g. presidential systems), citizens' voting decisions might be highly determined by personal characteristics of politicians.

Similarly, given (4.21), party L 's equilibrium condition is given by:

$$-2(g_L^N - g_L^*)[1 - P(x_R^N, x_L^N)] = 0 \quad (4.30)$$

Furthermore, given that the expected valence is equal to zero, when $\psi \rightarrow 0$ the equilibrium probability that party R wins elections tends to one-half. Therefore, by (4.29) and (4.30), when politicians face huge electoral uncertainty equilibrium public goods proposals tend to converge to parties' ideological bliss points:

$$g_R^N \rightarrow g_R^* \quad \text{and} \quad g_L^N \rightarrow g_L^* \quad (4.31)$$

Hence, these results show that when uncertainty raises, public good policy divergence also rises. The larger the electoral uncertainty is, the closer public goods proposals to parties' ideological positions. The extent of policy divergence depends on parties' ideological polarization (i.e. $g_L^* - g_R^* > 0$). Furthermore, as uncertainty raises, the advantage of ideological market positions decreases. Indeed, both parties tend to exhibit the same chances of winning elections, i.e. $P(x_R^N, x_L^N) \rightarrow 1/2$, and their platforms do not support ideological sacrifice, $z_R^N = z_L^N \rightarrow 0$.

As an alternative, citizens could vote mainly on economic policy proposals rather than politicians' valence (i.e. high parameter ψ). In that case, the electoral uncertainty faced by politicians when choose policy platforms would be low. For instance, consider the limit case in which uncertainty tends to be residual (i.e. $\psi \rightarrow \infty$). In this situation, equilibrium conditions (4.22) and (4.23) can be written as:

$$\sum_{j=1}^J \mu^j \frac{-2(g_P^N - g_m^*)}{u_c(c_P^{jN})} \rightarrow 1 \quad \text{then} \quad \sum_{j=1}^J \mu^j MRS_{g,c}^{jg_m^*} \rightarrow MRT_{g,c} \quad \forall P \in \{R, L\} \quad (4.32)$$

Therefore, in equilibrium, both political parties tend to converge to identical economic policy platforms (i.e. $g^N = g_R^N = g_L^N$ and $c^{jN} = c_R^{jN} = c_L^{jN} \quad \forall j$). In particular, the equilibrium public goods provision and income taxation schedules tend to converge towards the weighted average of the preferred policy of individuals located in group j with median ideological type. Thus, both parties tend to implement the same income inequality through taxation schedules characterized by (4.25).

Furthermore, when policy platforms tend to converge, individuals are expected to be indifferent between political parties. Thus, the equilibrium parties' probability of winning elections tend to one-half. Nevertheless, despite the electoral advantage of right-wing party declines as uncertainty decreases, pro-government party supports larger ideological sacrifice, $z_R^N < z_L^N$.

As showed above, in the particular case in which all groups exhibit the same concentration of pivotal voters ($\phi^j = \phi \ \forall j$), both political parties announce income taxation schedules that implement an egalitarian distribution of income ($c^j = c^N \ \forall j$). In this situation, when electoral uncertainty is residual, parties' equilibrium policy platform satisfies:

$$\frac{-2(g_P^N - g_m^*)}{u_c(c^N)} \rightarrow 1 \quad \text{then} \quad MRS_{g,c}^{g_m^*} \rightarrow MRT_{g,c} \quad \forall P \in \{R, L\} \quad (4.33)$$

Hence, both parties tend to converge towards the preferred public good policy by the median ideological type in the overall population.

These insights point out that when uncertainty decreases, policy platforms tend to converge and left-wing policy platform supports larger ideological sacrifice. These strong forces toward policy convergence in models of partisan electoral competition were first raised by Calvert (1985). Indeed, ideological risk aversion leads parties towards policy convergence. Therefore, the presence of uncertainty about the identity of swing voters is a necessary condition to prevent that risk-averse politicians implement identical policy platforms.

4.4.2 Private Benefits of winning elections

As I discussed previously, even pure ideological parties (i.e. $Q = 0$) consider the effect of policy platforms on their chances of winning elections. Policy motivated politicians sacrifice ideological positions in order to prevent the victory of their opponents' partisan preferences. Hence, the potential presence of private benefits associated to win elections would increase the relevance of electoral incentives even

more. Indeed, office-motivated politicians are willing to sacrifice ideology in order to raise their expected number of votes. In the limit case in which uniquely office-motivations matter ($Q \rightarrow \infty$), politicians concerns on public good policy only rely on the extent that platforms lead to electoral victory. In equilibrium, public goods provision and income taxation schedules tend to converge and satisfy (4.32).

4.5 Normative Analysis: Utilitarian Allocation

In this section, I investigate the allocation of resources that would be implemented by a benevolent government. In particular, I examine the case in which government aims to maximize the overall well-being of citizens. Consider the utilitarian social welfare function (UW) which aggregates all individuals' utilities giving them the same weight. Let UW be given as:

$$\sum_{j=1}^J \mu^j u(c^j) + \sum_{j=1}^J \mu^j \int_{g_a^{*j}}^{g_b^{*j}} W(g; g_i^*) \phi^j dg_i^* \quad (4.34)$$

A benevolent utilitarian government maximizes this social welfare function subject to the available resources given by the economy feasibility constraint.¹⁹The allocation of net income across groups satisfies:

$$u_c(c_U^k) = u_c(c_U^{k'}) \quad \forall k, k' \in \{1, \dots, J\} \quad (4.35)$$

Thus, a benevolent government implements income taxation schedules that lead to an egalitarian distribution of income, $c_U^j = c_U \forall j$. This result follows from the assumptions on homogeneous preferences over net income represented by concave utility functions, and the absence of distortions and income losses generated by income redistribution. Furthermore, the utilitarian allocation of resources satisfies:

$$\frac{W_g(g_U; \bar{g}^*)}{u_c(c_U)} = 1 \rightarrow MRS_{g,c}^{\bar{g}^*} = MRT_{g,c} \quad (4.36)$$

¹⁹See Mathematical Appendix C.4. for details regarding the characterization of the utilitarian allocation.

Hence, a benevolent utilitarian government provides the level of public goods preferred by individuals with average ideological type subject to economic feasibility. Does electoral competition implement the utilitarian allocation?

On the one hand, only in the particular case in which groups exhibit the same concentration of expected swing voters, politicians do not have electoral incentives to discriminate across groups and political parties implement an egalitarian distribution of income. On the other hand, politicians' provision of public goods tends to converge when either i) the uncertainty about the electoral outcome is low; or ii) the private benefits associated to win elections are large (i.e. reduced weight of partisan preferences).

Hence, political parties choose income redistribution schedules and public goods provision that implement the utilitarian allocation if and only if: i) groups exhibit the same concentration of expected swing voters; and ii) politicians only consider electoral incentives because of either large private benefits associated to win elections or absence of electoral uncertainty.

It is important to notice that when only the first condition holds (i.e. egalitarian distribution of income), politicians' partisan preferences prevent to implement the utilitarian allocation. Indeed, pro-market (pro-government) party underprovides (overprovides) public goods with respect to the utilitarian level of provision (i.e. $g_R^N < g_U < g_L^N$). In that situation, when the right-wing party (left-wing party) wins elections, there would be a majority of the population which would prefer an increase (reduction) in public good provision.

4.6 Conclusions

This chapter has investigated the effect of heterogeneous partisan preferences over public goods provision on the scope of government and the political redistribution of income. I first showed that the presence of both ideological politicians

and uncertainty about the electoral outcome generates a partisanship effect. The economic ideology of the party ruling the polity affects the extent of public good provision and the distribution of income among individuals. In particular, I pointed out that pro-government politicians promise larger provision of public goods and lower net income than pro-market politicians. As a result, the composition of government spending between public goods and cash transfers depends on the ideology of the party ruling the polity. Furthermore, I have shown that pro-government party commits to income taxation schedules that implement lower income inequality than the schedules proposed by the right-wing party.

This chapter shows how ideological preferences over economic policy might affect the electoral competition between partisan politicians. Partisan citizens are willing to trade their economic ideology for promises of higher income. In that case, pro-market politicians make use of redistributive schedules to court moderate pro-leftist citizens and increase their expected number of votes. The presence of redistributive politics provides an electoral advantage to pro-market politicians who exhibit a higher probability of winning elections. This advantage implies that pro-government parties support larger ideological sacrifices aiming to avoid the victory of more distasteful policies from its opponent.

Leading political economy contributions have focused on how electoral incentives affect the size and scope of government. Literature points out that politicians who compete for office commit to the same redistributive schedules and composition of government spending in order to win elections. The contribution of this chapter relies on introducing the main insights on partisan electoral competition due to Wittman (1977, 1983) and Calvert (1985) into models of distributive politics and scope of government. I showed that when there exists uncertainty about the electoral outcome, the economic ideology of parties matter for income redistribution and public goods provision.

Political economy has put emphasis on how political institutions, in particu-

lar electoral rules, affect size and composition of government spending across countries.²⁰Persson and Tabellini (2003) and Shelton (2007) point out that there exists significant variation in both the level of public good provision and the scope of government across countries with similar levels of economic development, social and demographic features and even political institutions such as electoral rules. The theoretical predictions raised in this chapter suggest that economic ideological positions held by citizens and politicians may be a complementary source to explain these disparities across countries. That source of variation has not been explored in the literature and constitutes a venue of future research. It would be worthwhile to test the existence of a partisanship effect on the extent of public good provision and the composition of public spending across countries. It is important to notice that the feasibility of this empirical research is seriously limited by the current availability of microdata on individuals' preferences over public good provision. Furthermore, it would be also necessary to overcome the absence of data on parties' ideological positions on the extent of government provision of goods and services.²¹

This chapter also makes a suggestive contribution regarding the existence of an electoral advantage between partisan parties. I found that that pro-government ideological positions could be more costly to pursue in terms of electoral feasibility. In contrast to the previous contributions that examined the effect of exogenous non-economic factors, this chapter provides a new source of electoral advantage which is directly related to economic policy and endogenous to the political process. The model presented in this chapter can be viewed as the reduced form of a two-party competition in a majoritarian electoral system. As a further research, it would be interesting to test

²⁰Persson and Tabellini (1999, 2000), Lizzeri and Persico (2001), Milesi-Ferreti et al. (2002) discuss the direct effect of electoral rules on politicians' incentives to allocate public budgets. Furthermore, Persson, Roland and Tabellini (2008) examine the indirect effect of electoral rules on government spending through party structure and the existence of coalition governments.

²¹Few empirical work has been done to identify and estimate economic partisan preferences of political parties. One exception is Kim and Fording (2002) who present measures of both parties' and government's ideologies based on Party Manifesto Data provided by Budge et al.(2001). One of the main components included in politicians' ideology are their views on the economic role of government.

whether in this electoral system right-wing parties exhibit higher chances of winning elections than parties which favor a larger involvement of government in the public provision of goods. I might test whether in the majoritarian system the electoral advantage of pro-market ideological leanings yields lower public goods provision and larger income inequality.

Interesting further research would consist on examining how different dimensions of ideology interact and affect the chosen economic policy. In this chapter, I investigated the case in which individuals have ideology only over the role of government providing goods and services. The analysis could be extended to include citizens' different views regarding the fair distribution of income and the level of inequality. Furthermore, the model might be enlarged to incorporate the fact that some citizens vote taking into account mainly values (e.g. moral and religious issues) represented by parties and they abstract away from economic policy proposals. It would be worthy to analyze the simultaneous impact of both value issues and economic ideologies on implemented economic policies and political competition between parties. Further research is necessary to analyze these extensions.

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Appendix A

Mathematical Appendix to Chapter 2

A.1 Distributional Game

A.1.1 Political Equilibrium

Taking the opponent's economic policies as given, each political party $P \in \{A, B\}$ chooses a combination of net taxation policy and public provision of health care for each group, $\{y_P^j, h_{gP}^j\}_{j=1}^J$, that maximizes its chances of winning elections subject to economic feasibility and non-negativity constraints. Parties take into account citizens' expected voting decisions (*stage 2*) and individuals' choices in competitive markets (*stage 3*). The policy choice problem of party A is given by:

$$\begin{aligned} \mathcal{L}^A = & \frac{1}{2} + \frac{\psi}{\phi} \sum_{j=1}^J \mu^j \phi^j [V_A^j(y_A^j, h_{gA}^j) - V_B^j(x_B)] + \\ & + \lambda_A \left[w - \sum_{j=1}^J \mu^j y_A^j - \sum_{j=1}^J \mu^j p_h h_{gA}^j \right] + \sum_{j=1}^J \mu^j \gamma_{yA}^j y_A^j + \sum_{j=1}^J \mu^j \gamma_{hA}^j h_{gA}^j \end{aligned} \quad (\text{A.1})$$

The policy choice problem of political party B is symmetric. The First Order Conditions for both political parties $P \in \{A, B\}$ are defined as:

$$[y^j] \quad \frac{\psi}{\phi} \mu^j \phi^j \frac{dV_P^j(y_P^j, h_{gP}^j)}{dy^j} + \mu^j \gamma_{yP}^j = \mu^j \lambda_P \quad \forall j \quad (\text{A.2})$$

$$[h_g^j] \quad \frac{\psi}{\phi} \mu^j \phi^j \frac{dV_P^j(y_P^j, h_{gP}^j)}{dh_g^j} + \mu^j \gamma_{hP}^j = p_h \mu^j \lambda_P \quad \forall j \quad (\text{A.3})$$

$$\lambda_P \left[w - \sum_{j=1}^J \mu^j y_P^j - \sum_{j=1}^J \mu^j p_h h_{gP}^j \right] = 0 \quad (\text{A.4})$$

$$\gamma_{yP}^j y_P^j = 0 \quad \forall j ; \quad \gamma_{hP}^j h_{gP}^j = 0 \quad \forall j \quad (\text{A.5})$$

$$\lambda_P \geq 0 \quad \gamma_{yP}^j \geq 0 \quad \forall j ; \quad \gamma_{hP}^j \geq 0 \quad \forall j \quad (\text{A.6})$$

Solving backwards, I characterize the Political Equilibrium of the game. The system of equations formed by the best responses for each political party and their feasibility constraints, simultaneously determine the Nash Equilibrium in the first stage of the game. Therefore, for both political parties, the equilibrium net taxation and in-kind transfers policies announced to group j , (y_P^{jN}, h_{gP}^{jN}) , must satisfy:

$$\frac{\psi}{\phi} \mu^j \phi^j \frac{dV_P^j(y_P^{jN}, h_{gP}^{jN})}{dh_g^j} + \mu^j \gamma_{hP}^{jN} = p_h \left[\frac{\psi}{\phi} \mu^j \phi^j \frac{dV_P^j(y_P^{jN}, h_{gP}^{jN})}{dy^j} + \mu^j \gamma_{yP}^{jN} \right] \quad (\text{A.7})$$

$\forall j \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$. Those equilibrium conditions hold if and only if taxation policies announced by parties imply a positive level of net income for all groups, $\{y_P^{jN}\}_{j=1}^J > 0$.

Proof. Suppose that group j is targeted no numeraire commodity, $y_P^j = 0$. By Envelope Theorem:

$$\frac{dV_P^j(y_P^j, h_{gP}^j)}{dy^j} = u_c(0, h) = \infty \quad (\text{A.8})$$

Thus equation (A.7) would not hold. Therefore, equilibrium net taxation policy must imply a positive available income for each group, $y_P^{jN} > 0$, and then, in equilibrium,

the multipliers associated to the non-negative constraints of net income are equal to zero, $\gamma_{yP}^{jN} = 0 \quad \forall j \in \{1, \dots, J\}$ and $P \in \{A, B\}$. ■

Furthermore, for each group j , politicians must decide whether targeting in-kind transfers. In the case that party $P \in \{A, B\}$ chooses not targeting in-kind transfers to group j , $h_{gP}^{jN} = 0$, politicians take into account that voters are expected to purchase health care in competitive markets with their available income $y_P^{jN} > 0$. For any positive net income targeted by party P , the optimal behavior in competitive markets of an individual who belongs to group j is characterized by:

$$u_h(y_P^j - p_h h_{mP}^j, h_{mP}^j) = p_h u_c(y_P^j - p_h h_{mP}^j, h_{mP}^j) \quad (\text{A.9})$$

When individuals purchase health care through competitive markets and there is no public provision, by Envelope Theorem:

$$\frac{dV_P^{jS}(y_P^j, h_{gP}^j)}{dy^j} = u_c(y_P^j - p_h h_{mP}^j, h_{mP}^j) \quad (\text{A.10})$$

$$\frac{dV_P^{jS}(y_P^j, h_{gP}^j)}{dh_g^j} = u_h(y_P^j - p_h h_{mP}^j, h_{mP}^j) \quad (\text{A.11})$$

Given the expected behavior of voters in competitive markets, equilibrium condition (A.7) for a group j not targeted with in-kind transfers holds if and only if the targeted net taxation policy, y_P^{jN} , implies that the multiplier associated to the non-negative constraint of in-kind transfers must be zero, $\gamma_{hP}^{jN} = 0$. Hence, the equilibrium condition for a group j not targeted with in-kind transfers that acquires health services in competitive markets, h_{mP}^{jN} , is given by:

$$u_h(y_P^{jN} - p_h h_{mP}^{jN}, h_{mP}^{jN}) = p_h u_c(y_P^{jN} - p_h h_{mP}^{jN}, h_{mP}^{jN}) \quad (\text{A.12})$$

As an alternative, political party $P \in \{A, B\}$ could choose targeting in-kind transfers to group j , $h_{gP}^{jN} > 0$ and then $\gamma_{hP}^{jN} = 0$. In that case, politicians take into account that voters in group j are expected not to make private purchases of health

care in markets, $h_{mP}^{jN} = 0$, if and only if this condition holds:

$$u_h(y_P^j, h_{gP}^j) \leq p_h u_c(y_P^j, h_{gP}^j) \quad (\text{A.13})$$

Otherwise, when the sign of this condition is reversed, politicians expect that individuals make private purchases, $h_{mP}^{jN} > 0$. The expected optimal behavior of individuals that supplement health services in competitive markets is given by:

$$u_h(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) = p_h u_c(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) \quad (\text{A.14})$$

In the first alternative, when individuals do not purchase health care through competitive markets and there is public provision, by Envelope Theorem:

$$\frac{dV_P^{jNS}(y_P^j, h_{gP}^j)}{dy^j} = u_c(y_P^j, h_{gP}^j) \quad (\text{A.15})$$

$$\frac{dV_P^{jNS}(y_P^j, h_{gP}^j)}{dh_g^j} = u_h(y_P^j, h_{gP}^j) \quad (\text{A.16})$$

Thus, party P 's equilibrium condition (A.7) when group j is targeted with in-kind transfers, $h_{gP}^{jN} > 0$, and net income, $y_P^{jN} > 0$, such that individuals do not supplement health services, $h_{mP}^{jN} = 0$, is given by:

$$u_h(y_P^{jN}, h_{gP}^{jN}) = p_h u_c(y_P^{jN}, h_{gP}^{jN}) \quad (\text{A.17})$$

Therefore, in equilibrium, condition (A.13) for group j holds with equality.

Otherwise, when individuals purchase health care through competitive markets and there is public provision, by Envelope Theorem:

$$\frac{dV_P^{jS}(y_P^j, h_{gP}^j)}{dy^j} = u_c(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) \quad (\text{A.18})$$

$$\frac{dV_P^{jS}(y_P^j, h_{gP}^j)}{dh_g^j} = u_h(y_P^j - p_h h_{mP}^j, h_{gP}^j + h_{mP}^j) \quad (\text{A.19})$$

Hence, party P 's equilibrium condition (A.7) when group j is targeted with in-kind transfers, $h_{gP}^{jN} > 0$, and net income, $y_P^{jN} > 0$, such that individuals do supplement

health services with purchases in markets, $h_{mP}^{jN} > 0$, is given by:

$$u_h(y_P^{jN} - p_h h_{mP}^{jN}, h_{gP}^{jN} + h_{mP}^{jN}) = p_h u_c(y_P^{jN} - p_h h_{mP}^{jN}, h_{gP}^{jN} + h_{mP}^{jN}) \quad (\text{A.20})$$

Thus, the equilibrium net taxation and in-kind transfers policies for any group j , (y_P^{jN}, h_{gP}^{jN}) , must satisfy:

$$\frac{\psi}{\phi} \phi^j \mu^j \frac{dV_P^j(y_P^{jN}, h_{gP}^{jN})}{dh_g^j} = p_h \frac{\psi}{\phi} \phi^j \mu^j \frac{dV_P^j(y_P^{jN}, h_{gP}^{jN})}{dy^j} \quad (\text{A.21})$$

$\forall j \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$. In the pre-election stage, politicians announce policies such that the marginal benefit of targeting one unit of in-kind transfers in terms of probability of winning elections is equal to the marginal opportunity cost. That cost is measured by the marginal decrease in probability due to a reduction of targeted net income by p_h units. The presence of competitive markets allows the existence of multiple equilibrium policies for each group j . In equilibrium, both political parties are indifferent to announce different combinations of net taxation policy and in-kind transfers for each social group j such that (A.21) holds. Therefore, the targeted consumption bundle of numeraire and health care to group j implicitly defined by (A.12), (A.17) and (A.20) is the same regardless of the chosen equilibrium policy. In Equilibrium:

$$u_h(c_P^{jN}, h_P^{jN}) = p_h u_c(c_P^{jN}, h_P^{jN}) \quad (\text{A.22})$$

where $c_P^{jN} = y_P^{jN} - p_h h_{mP}^{jN}$ and $h_P^{jN} = h_{gP}^{jN} + h_{mP}^{jN}$ $\forall j \in \{1, \dots, J\}$ and $P \in \{A, B\}$; with $y_P^{jN} > 0$, $h_{gP}^{jN} \geq 0$ and $h_{mP}^{jN} \geq 0$.

A.1.2 Distributive Politics

From the the First Order Conditions for both political parties $P \in \{A, B\}$, taking (A.2) for a pair of groups k and k' and arranging I get:

$$\frac{\psi}{\phi} \phi^k \frac{dV_P^k(y_P^k, h_{gP}^k)}{dy^k} + \gamma_{yP}^k = \frac{\psi}{\phi} \phi^{k'} \frac{dV_P^{k'}(y_P^{k'}, h_{gP}^{k'})}{dy^{k'}} + \gamma_{yP}^{k'} \quad (\text{A.23})$$

Given the equilibrium policies for each group j discussed above, the relative treatment between groups in terms of numeraire are implicitly defined by:

$$\phi^k u_c(c^{kN}, h^{kN}) = \phi^{k'} u_c(c^{k'N}, h^{k'N}) \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{A.24})$$

where $c^{kN} = c_P^{kN} = y_P^{kN} - p_h h_{mP}^{kN}$ and $h_P^{kN} = h_{gP}^{kN} + h_{mP}^{kN} \quad \forall k, k' \in \{1, \dots, J\}$ and $P \in \{A, B\}$; with $y_P^{kN} > 0$, $h_{gP}^{kN} \geq 0$ and $h_{mP}^{kN} \geq 0$.

Similarly taking the FOCs (A.3) for a pair of groups k and k' , the equilibrium patterns of health services across groups of voters are given by:

$$\phi^k u_h(c^{kN}, h^{kN}) = \phi^{k'} u_h(c^{k'N}, h^{k'N}) \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{A.25})$$

where $c^{kN} = c_P^{kN} = y_P^{kN} - p_h h_{mP}^{kN}$ and $h_P^{kN} = h_{gP}^{kN} + h_{mP}^{kN} \quad \forall k, k' \in \{1, \dots, J\}$ and $P \in \{A, B\}$; with $y_P^{kN} > 0$, $h_{gP}^{kN} \geq 0$ and $h_{mP}^{kN} \geq 0$.

A.1.3 First Best Allocations: Allocative Efficiency

The first-best problem consists of the maximization of the weighted average of individual utilities with group-specific Pareto weights, α^j , subject to the economy feasibility constraint. The solution to this optimization problem yields the set of Pareto efficient allocations:

$$\max_{\{c^j, h^j\}_{j=1}^J} \sum_{j=1}^J \mu^j \alpha^j u(c^j, h^j) \quad \text{s.t.} \quad \sum_{j=1}^J \mu^j c^j + \sum_{j=1}^J \mu^j q h^j \leq \sum_{j=1}^J \mu^j w^j \quad (\text{A.26})$$

The FOCs for an interior optimum are given by:

$$[c^j] \quad \mu^j \alpha^j u_c = \lambda \mu^j \quad \forall j \in \{1, \dots, J\} \quad (\text{A.27})$$

$$[h^j] \quad \mu^j \alpha^j u_h = \lambda \mu^j q \quad \forall j \in \{1, \dots, J\} \quad (\text{A.28})$$

The set of Pareto efficient allocation of resources, $\{c_{PO}^j, h_{PO}^j\}_{j=1}^J$, satisfies (A.27), (A.28) and the economy feasibility constraint such that:

$$\frac{u_h(c_{PO}^j, h_{PO}^j)}{u_c(c_{PO}^j, h_{PO}^j)} = q \rightarrow MRS_{h,c}^j = MRT_{h,c} \quad \forall j \quad (\text{A.29})$$

In a Pareto efficient allocation the rate at which individuals are willing to trade health services for numeraire commodity is equal across groups and equal to the rate at which the economy is able to transform numeraire into health care.

In the political equilibrium, the combination of chosen policies, $\{y_P^{jN}, h_{gP}^{jN}\}_{j=1}^J$ is such that (A.22) holds for all $P \in \{A, B\}$. Those equilibrium policies imply consumption bundles for all groups, $\{c_P^{jN}, h_P^{jN}\}_{j=1}^J$, that satisfy the economy feasibility constraint given expected voting and competitive equilibrium behavior of citizens. In equilibrium:

$$u_h(c_P^{jN}, h_P^{jN}) = p_h u_c(c_P^{jN}, h_P^{jN}) \rightarrow MRS_{h,c}^{jN} = MRT_{h,c} \quad \forall j \quad (\text{A.30})$$

where $c_P^{jN} = y_P^{jN} - p_h h_{mP}^{jN}$ and $h_P^{jN} = h_{gP}^{jN} + h_{mP}^{jN} \quad \forall j \in \{1, \dots, J\}$ and $P \in \{A, B\}$; with $y_P^{jN} > 0$, $h_{gP}^{jN} \geq 0$ and $h_{mP}^{jN} \geq 0$.

Therefore, the political process leads the economy to reach a Pareto Efficient allocation

A.2 External Effects

A.2.1 Political Equilibrium

The stages of the political game with externalities follow symmetric to the pure distributional game. However, in the presence of external effects, the indirect utility functions of individuals who belong to groups $\{L, F, E\}$ are given by:

$$V_P^k(y_P^k, h_{gP}^k, h_{mP}^E) = u(y_P^k - p h_{mP}^k, h_{gP}^k + h_{mP}^k) + \beta^k v(h_{gP}^E + h_{mP}^E) \quad \forall k \in \{L, F\} \quad (\text{A.31})$$

$$V_P^E(y_P^E, h_{gP}^E) = u(y_P^E - p h_{mP}^E, h_{gP}^E + h_{mP}^E) \quad (\text{A.32})$$

where $y_P^j \geq 0$; $h_{mP}^j \geq 0$; and $h_{gP}^j \geq 0 \quad \forall j \in \{L, F, E\}$ and $\forall P \in \{A, B\}$.

Therefore, the swing voter type in group $k \in \{L, F\}$ is defined as:

$$\sigma^k = V_A^k(y_A^k, h_{gA}^k, h_{gA}^E) - V_B^k(y_B^k, h_{gB}^k, h_{gB}^E) - \varepsilon \quad (\text{A.33})$$

The swing voter type in the elderly group, E , follows:

$$\sigma^E = V_A^E(y_A^E, h_{gA}^E) - V_B^E(y_B^E, h_{gB}^E) - \varepsilon \quad (\text{A.34})$$

Taking into account the presence of external effects, the policy choice problem of party A is given by:

$$\begin{aligned} \mathcal{L}^A = & \frac{1}{2} + \frac{\psi}{\phi} \left[\sum_{k=L}^F \mu^k \phi^k [V_A^k(y_A^k, h_{gA}^k, h_{gA}^E) - V_B^k(x_B)] + \right. \\ & \left. + \mu^E \phi^E [V_A^E(y_A^E, h_{gA}^E) - V_B^E(x_B)] \right] \\ & + \lambda^A \left[w - \sum_{j=1}^J \mu^j y_A^j - \sum_{j=1}^J \mu^j p_h h_{gA}^j \right] + \sum_{j=1}^J \mu^j \gamma_{yA}^j y_A^j + \sum_{j=1}^J \mu^j \gamma_{hA}^j h_{gA}^j \end{aligned} \quad (\text{A.35})$$

The policy choice problem is symmetric to political party B . The First Order Conditions for both political parties $P \in \{A, B\}$ are defined as:

$$[y^k] \quad \frac{\psi}{\phi} \mu^k \phi^k \frac{dV_P^k(y_P^k, h_{gP}^k, h_{gP}^E)}{dy^k} + \mu^k \gamma_{yP}^k = \mu^k \lambda_P \quad \forall k \in \{L, F\} \quad (\text{A.36})$$

$$[y^E] \quad \frac{\psi}{\phi} \mu^E \phi^E \frac{dV_P^E(y_P^E, h_{gP}^E)}{dy^E} + \mu^E \gamma_{yP}^E = \mu^E \lambda_P \quad (\text{A.37})$$

$$[h_g^k] \quad \frac{\psi}{\phi} \mu^k \phi^k \frac{dV_P^k(y_P^k, h_{gP}^k, h_{gP}^E)}{dh_g^k} + \mu^k \gamma_{hP}^k = \mu^k p_h \lambda_P \quad \forall k \in \{L, F\} \quad (\text{A.38})$$

$$[h_g^E] \quad \frac{\psi}{\phi} \left[\mu^E \phi^E \frac{dV_P^E(y_P^E, h_{gP}^E)}{dh_g^E} + \sum_{k=L}^F \mu^k \phi^k \frac{dV_P^k(y_P^k, h_{gP}^k, h_{gP}^E)}{dh_g^E} \right] + \mu^E \gamma_{hP}^E = \mu^E p_h \lambda_P \quad (\text{A.39})$$

$$\lambda_P \left[w - \sum_{j=L}^E \mu^j y_P^j - \sum_{j=L}^E \mu^j p_h h_{gP}^j \right] = 0 \quad (\text{A.40})$$

$$\gamma_{yP}^j y_P^j = 0 \quad ; \quad \gamma_{hP}^j h_{gP}^j = 0 \quad \forall j \in \{L, F, E\} \quad (\text{A.41})$$

$$\lambda_P \geq 0 \quad \gamma_{yP}^j \geq 0 \quad ; \quad \gamma_{hP}^j \geq 0 \quad \forall j \in \{L, F, E\} \quad (\text{A.42})$$

The system of equations formed by the best responses for each political party and their feasibility constraints, simultaneously determine de Nash Equilibrium in the first stage of the game. For both political parties, the equilibrium net taxation and in-kind transfers policies for any group $k \in \{L, F\}$, (y_P^{kN}, h_{gP}^{kN}) , satisfy the same equilibrium conditions discussed for an economy without external effects. Furthermore, the equilibrium net taxation policy must also imply a positive available income for group E , $y_P^{EN} > 0$. Therefore, in equilibrium the multiplier associated to the non-negative constraint of net income of the elderly is equal to zero, $\gamma_{yP}^{EN} = 0 \quad \forall P \in \{A, B\}$. Hence, equilibrium policies targeted to group E must satisfy:

$$\begin{aligned} & \frac{\psi}{\phi} \left[\phi^E \mu^E \frac{dV_P^E(y_P^{EN}, h_{gP}^{EN})}{dh_g^E} + \sum_{k=L}^F \phi^k \mu^k \frac{dV_P^k(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dh_g^E} \right] + \mu^E \gamma_{hP}^E (\text{A.43}) \\ & = p_h \frac{\psi}{\phi} \phi^E \mu^E \frac{dV_P^E(y_P^{EN}, h_{gP}^{EN})}{dy^E} \end{aligned}$$

Politicians must decide whether targeting in-kind transfers to the elderly. In the case that party $P \in \{A, B\}$ chooses not targeting in-kind transfers to group E , $h_{gP}^{EN} = 0$, politicians take into account that voters are expected to purchase health care in competitive markets with their available income $y_P^{EN} > 0$. For any positive net income targeted by party P , the optimal behavior in competitive markets of an individual who belongs to group E is characterized by:

$$u_h(y_P^E - p_h h_{mP}^E, h_{mP}^E) = p_h u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E) \quad (\text{A.44})$$

When the elderly purchase health care through competitive markets and there is no public provision, by Envelope Theorem:

$$\frac{dV_P^E(y_P^E, h_{gP}^E)}{dy^E} = u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E) \quad (\text{A.45})$$

$$\frac{dV_P^E(y_P^E, h_{gP}^E)}{dh_g^E} = u_h(y_P^E - p_h h_{mP}^E, h_{mP}^E) \quad (\text{A.46})$$

Furthermore, elderly's health care consumption affects the utility of individuals who belong to group $k \in \{L, F\}$, by Envelope Theorem:

$$\frac{dV_P^k(y_P^k, h_{gP}^k, h_{mP}^E)}{dh_g^E} = \beta^k v_{h^E}(h_{mP}^E) \quad (\text{A.47})$$

Given (A.45), (A.46) and (A.47) and introducing into the equilibrium condition (A.43), it yields:

$$\begin{aligned} & \frac{\psi}{\phi} \left[\phi^E \mu^E u_h(y_P^E - p_h h_{mP}^E, h_{mP}^E) + \sum_{k=L}^F \phi^k \mu^k \beta^k v_{h^E}(h_{mP}^E) \right] + \mu^E \gamma_{hP}^E \quad (\text{A.48}) \\ & = p_h \frac{\psi}{\phi} \phi^E \mu^E u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E) \end{aligned}$$

$$\left[\frac{u_h(y_P^E - p_h h_{mP}^E, h_{mP}^E)}{u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E)} + \sum_{k=L}^F \frac{\phi^k \mu^k}{\phi^E \mu^E} \beta^k \frac{v_{h^E}(h_{mP}^E)}{u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E)} \right] = p_h \quad (\text{A.49})$$

$$+ \frac{\mu^E \gamma_{hP}^E}{\phi^E \mu^E u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E)} \frac{\phi}{\psi}$$

Given elderly's expected behavior in competitive markets (A.44), equilibrium condition would be:

$$\left[p_h + \sum_{k=L}^F \frac{\phi^k \mu^k}{\phi^E \mu^E} \beta^k \frac{v_{h^E}(h_{mP}^E)}{u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E)} \right] + \frac{\mu^E \gamma_{hP}^E}{\phi^E \mu^E u_c(y_P^E - p_h h_{mP}^E, h_{mP}^E)} \frac{\phi}{\psi} = p_h \quad (\text{A.50})$$

By concavity, $v_h > 0$ and $u_c > 0$. Therefore, equilibrium condition holds if and only if $\gamma_{hP}^E < 0$ which is not possible. Thus, in equilibrium parties must target in-kind transfers to the elderly, $h_{gP}^{EN} > 0 \forall P \in \{A, B\}$, and then $\gamma_{hP}^E = 0 \forall P \in \{A, B\}$. Hence, for both political parties, the equilibrium net taxation and in-kind transfers

policies announced to group E , (y_P^{EN}, h_{gP}^{EN}) , must satisfy:

$$\begin{aligned} & \frac{\psi}{\phi} \left[\phi^E \mu^E \frac{dV_P^E(y_P^{EN}, h_{gP}^{EN})}{dh_g^E} + \sum_{k=L}^F \phi^k \mu^k \frac{dV_P^k(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dh_g^E} \right] \\ &= p_h \frac{\psi}{\phi} \phi^E \mu^E \frac{dV_P^E(y_P^{EN}, h_{gP}^{EN})}{dy^E} \end{aligned} \quad (\text{A.51})$$

$\forall k \in \{L, F\}$ and $\forall P \in \{A, B\}$.

Politicians choose in-kind transfers to the elderly taking into account that voters in group E are expected not to make private purchases of health care in markets, $h_{mP}^{EN} = 0$, if and only if this condition holds:

$$u_h(y^E, h_{gP}^E) \leq p_h u_c(y_P^E, h_{gP}^E) \quad (\text{A.52})$$

otherwise, when the sign of this condition is reversed, politicians expect that individuals make private purchases, $h_{mP}^{EN} > 0$. The expected optimal behavior of individuals that supplement health services in competitive markets is given by:

$$u_h(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E) = p_h u_c(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E) \quad (\text{A.53})$$

In the first place, when the elderly purchase health care through competitive markets and there is public provision, by Envelope Theorem:

$$\frac{dV_P^E(y_P^E, h_{gP}^E)}{dy^E} = u_c(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E) \quad (\text{A.54})$$

$$\frac{dV_P^E(y_P^E, h_{gP}^E)}{dh_g^E} = u_h(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E) \quad (\text{A.55})$$

Furthermore, elderly's health care consumption affects the utility of individuals who belong to group $k \in \{L, F\}$, by Envelope Theorem:

$$\frac{dV_P^k(y_P^k, h_{gP}^k, h_{gP}^E)}{dh_g^E} = \beta^k v_{h^E}(h_{gP}^E + h_{mP}^E) \quad (\text{A.56})$$

Given (A.54), (A.55) and (A.56) and introducing into the equilibrium condition (A.51), it yields:

$$\begin{aligned} & \frac{\psi}{\phi} \left[\phi^E \mu^E u_h(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E) + \sum_{k=L}^F \phi^k \mu^k \beta^k v_{h^E}(h_{gP}^E + h_{mP}^E) \right] \quad (\text{A.57}) \\ &= p_h \frac{\psi}{\phi} \phi^E \mu^E u_c(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E) \end{aligned}$$

$$\left[\frac{u_h(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E)}{u_c(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E)} + \sum_{k=L}^F \frac{\phi^k \mu^k}{\phi^E \mu^E} \beta^k \frac{v_{h^E}(h_{gP}^E + h_{mP}^E)}{u_c(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E)} \right] = p_h \quad (\text{A.58})$$

Given elderly's expected behavior in competitive markets (A.53), equilibrium condition would be:

$$\left[p_h + \sum_{k=L}^F \frac{\phi^k \mu^k}{\phi^E \mu^E} \beta^k \frac{v_{h^E}(h_{gP}^E + h_{mP}^E)}{u_c(y_P^E - p_h h_{mP}^E, h_{gP}^E + h_{mP}^E)} \right] = p_h \quad (\text{A.59})$$

By concavity, $v_h > 0$ and $u_c > 0$. Therefore, equilibrium condition does not hold. Thus, in equilibrium both parties $\{A, B\}$ must target a combination of net taxation policy and in-kind transfers to the elderly (y_P^{EN}, h_{gP}^{EN}) such that the elderly do not supplement health services in competitive markets, $h_{mP}^E = 0$. When the elderly do not purchase health care through competitive markets and there is public provision, by Envelope Theorem:

$$\frac{dV_P^E(y_P^E, h_{gP}^E)}{dy^E} = u_c(y_P^E, h_{gP}^E) \quad (\text{A.60})$$

$$\frac{dV_P^E(y_P^E, h_{gP}^E)}{dh_g^E} = u_h(y_P^E, h_{gP}^E) \quad (\text{A.61})$$

Furthermore, elderly's health care consumption affects the utility of individuals who belong to group $k \in \{L, F\}$, by Envelope Theorem:

$$\frac{dV_P^k(y_P^k, h_{gP}^k, h_{gP}^E)}{dh_g^E} = \beta^k v_{h^E}(h_{gP}^E) \quad (\text{A.62})$$

Given (A.60), (A.61) and (A.62) and introducing into the equilibrium condition (A.51), it yields:

$$\frac{\psi}{\phi} \left[\phi^E \mu^E u_h(y_P^{EN}, h_{gP}^{EN}) + \sum_{k=L}^F \phi^k \mu^k \beta^k v_{h^E}(h_{gP}^{EN}) \right] = p_h \frac{\psi}{\phi} \phi^E \mu^E u_c(y_P^{EN}, h_{gP}^{EN}) \quad (\text{A.63})$$

Arranging terms, party P 's equilibrium condition when group E is targeted with in-kind transfers, $h_{gP}^{EN} > 0$, and net income, $y_P^{EN} > 0$, such that individuals do not supplement health services, $h_{mP}^{EN} = 0$, is given by:

$$u_h(c_P^{EN}, h_P^{EN}) + \sum_{k=L}^F \frac{\phi^k}{\phi^E} \frac{\mu^k}{\mu^E} \beta^k v_{h^E}(h_P^{EN}) = p_h u_c(c_P^{EN}, h_P^{EN}) \quad (\text{A.64})$$

$\forall k \in \{L, F\}$ and $\forall P \in \{A, B\}$; where $c_P^{EN} = y_P^{EN}$ and $h_P^{EN} = h_{gP}^{EN}$.

A.2.2 Distributive Politics

The relative treatment of health services across groups is affected by the presence of external effects. From the the First Order Conditions for both political parties $P \in \{A, B\}$, taking (A.38) for group k and (A.39) for the elderly, in equilibrium:

$$\frac{\psi}{\phi} \phi^k \frac{dV_P^{kN}(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dh_g^k} = \frac{\psi}{\phi} \left[\frac{\phi^E dV_P^{EN}(y_P^{EN}, h_{gP}^{EN})}{dh_g^E} + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \phi^k \frac{dV_P^{kN}(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dh_g^E} \right] \quad \forall k \in \{L, F\} \quad (\text{A.65})$$

Hence, the political relative treatment in terms of health services between elderly and non-elderly citizens is given by:

$$\phi^k u_h(c^{kN}, h^{kN}) = \phi^E u_h(c^{EN}, h^{EN}) + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \phi^k \beta^k v_{h^E}(h^{EN}) \quad \forall k \in \{L, F\} \quad (\text{A.66})$$

where $c^{kN} = c_P^{kN} = y_P^{kN} - p_h h_{mP}^{kN}$ and $h^{kN} = h_P^{kN} = h_{gP}^{kN} + h_{mP}^{kN} \quad \forall k \in \{L, F\}$; $c^{EN} = c_P^{EN} = y_P^{EN}$ and $h^{EN} = h_P^{EN} = h_{gP}^{EN}$; with $y_P^{kN} > 0$, $h_{gP}^{kN} \geq 0$, $h_{mP}^{kN} \geq 0$, $y_P^{EN} > 0$ and $h_{gP}^{EN} > 0$ for all $P \in \{A, B\}$.

Similarly, I can characterize the relative treatment of numeraire commodity across groups. From the the First Order Conditions for both political parties $P \in \{A, B\}$, taking (A.36) for group k and (A.37) for the elderly, in equilibrium:

$$\frac{\psi}{\phi} \phi^k \frac{dV_P^{kN}(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dy^k} = \frac{\psi}{\phi} \phi^E \frac{dV_P^{EN}(y_P^{EN}, h_{gP}^{EN})}{dy^E} \quad \forall k \in \{L, F\} \quad (\text{A.67})$$

Thus, the political relative treatment in terms of numeraire between elderly and non-elderly citizens is given by:

$$\phi^k u_c(c^{kN}, h^{kN}) = \phi^E u_c(c^{EN}, h^{EN}) \quad \forall k \in \{L, F\} \quad (\text{A.68})$$

where $c^{kN} = c_P^{kN} = y_P^{kN} - p_h h_{mP}^{kN}$ and $h^{kN} = h_P^{kN} = h_{gP}^{kN} + h_{mP}^{kN} \forall k \in \{L, F\}$; $c^{EN} = c_P^{EN} = y_P^{EN}$ and $h^{EN} = h_P^{EN} = h_{gP}^{EN}$; with $y_P^{kN} > 0$, $h_{gP}^{kN} \geq 0$, $h_{mP}^{kN} \geq 0$, $y_P^{EN} > 0$ and $h_{gP}^{EN} > 0$ for all $P \in \{A, B\}$.

A.2.3 Allocative Efficiency

The first-best problem consists of the maximization of the weighted average of individual utilites with group-specific Pareto weights, α^j , subject to the economy feasibility constraint. The solution to this optimization problem yields the set of Pareto efficient allocations:

$$\max_{\{c^j, h^j\}_{j=L}^F} \sum_{k=L}^F \mu^k \alpha^k [u(c^k, h^k) + \alpha^k \beta^k v(h^E)] + \mu^E \alpha^E u(c^E, h^E) \quad (\text{A.69})$$

$$\text{s.t.} \quad \sum_{j=1}^J \mu^j c^j + \sum_{j=1}^J \mu^j q h^j \leq \sum_{j=1}^J \mu^j w^j \quad (\text{A.70})$$

The FOCs for an interior optimum are given by:

$$[c^j] \quad \mu^j \alpha^j u_c = \mu^j \lambda \quad \forall j \in \{L, F, E\} \quad (\text{A.71})$$

$$[h^k] \quad \mu^k \alpha^k u_h = \mu^k q \lambda \quad \forall k \in \{L, F\} \quad (\text{A.72})$$

$$[h^E] \quad \mu^E \alpha^E u_h + \sum_{k=L}^F \mu^k \alpha^k \beta^k v_{h^E} = \mu^E q \lambda \quad (\text{A.73})$$

The set of Pareto efficient allocation of resources, $\{c_{PO}^j, h_{PO}^j\}_{j=L}^E$, satisfies (A.71,A.72,A.73) and the economy feasibility constraint. Therefore, Pareto efficient allocations for the non-elderly groups satisfy:

$$\frac{u_h(c_{PO}^k, h_{PO}^k)}{u_c(c_{PO}^k, h_{PO}^k)} = q \rightarrow MRS_{h,c}^k = MRT_{h,c} \quad \forall k \in \{L, F\} \quad (\text{A.74})$$

Furthermore, from the FOCs for consumption of the numeraire (A.71) I obtain:

$$\frac{\alpha^k}{\alpha^E} = \frac{u_c(c_{PO}^E, h_{PO}^E)}{u_c(c_{PO}^k, h_{PO}^k)} \quad (\text{A.75})$$

Therefore, a Pareto efficient allocation of numeraire and health for group E must satisfy:

$$\begin{aligned} \frac{u_h(c_{PO}^E, h_{PO}^E)}{u_c(c_{PO}^E, h_{PO}^E)} + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \beta^k \frac{v_{h^E}(h_{PO}^E)}{u_c(c_{PO}^k, h_{PO}^k)} &= q \\ MRS_{h,c}^E + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \beta^k MRS_{h^E,c^k}^k &= MRT_{h,c} \end{aligned} \quad (\text{A.76})$$

In the political equilibrium, both parties, $P \in \{A, B\}$, announce a menu of net taxation and in-kind transfers policies targeted to the elderly, (y_P^{EN}, h_{gP}^{EN}) , such that:

$$u_h(c_P^{EN}, h_P^{EN}) + \sum_{k=L}^F \frac{\phi^k}{\phi^E} \frac{\mu^k}{\mu^E} \beta^k v_{h^E}(h_P^{EN}) = p_h u_c(c_P^{EN}, h_P^{EN}) \quad (\text{A.77})$$

$\forall k \in \{L, F\}$ and $\forall P \in \{A, B\}$; where $c_P^{EN} = y_P^{EN}$ and $h_P^{EN} = h_{gP}^{EN}$.

From the equilibrium relative treatment between groups in terms of numeraire (A.68) I obtain:

$$\frac{\phi^k}{\phi^E} = \frac{u_c(c^{EN}, h^{EN})}{u_c(c^{kN}, h^{kN})} \quad \forall k \in \{L, F\} \quad (\text{A.78})$$

Introducing (A.78) into the equilibrium political allocation of the elderly (A.77):

$$\begin{aligned} u_h(c_P^{EN}, h_P^{EN}) + \sum_{k=L}^F \frac{u_c(c^{EN}, h^{EN})}{u_c(c^{kN}, h^{kN})} \frac{\mu^k}{\mu^E} \beta^k v_{h^E}(h_P^{EN}) &= p_h u_c(c_P^{EN}, h_P^{EN}) \\ \frac{u_h(c_P^{EN}, h_P^{EN})}{u_c(c_P^{EN}, h_P^{EN})} + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \beta^k \frac{v_{h^E}(h_P^{EN})}{u_c(c^{kN}, h^{kN})} &= p_h \\ MRS_{h,c}^{EN} + \sum_{k=L}^F \frac{\mu^k}{\mu^E} \beta^k MRS_{h^E, c^k}^{kN} &= MRT_{h,c} \end{aligned} \quad (\text{A.79})$$

Hence, the consumption bundle of the elderly, (c^{EN}, h^{EN}) , that results from the political process is Pareto efficient.

Furthermore, from the the First Order Conditions for both political parties $P \in \{A, B\}$, taking (A.36) and (A.38) for group k in equilibrium:

$$\frac{\psi}{\phi} \frac{dV_P^{kN}(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dh_g^k} = p_h \frac{\psi}{\phi} \frac{dV_P^{kN}(y_P^{kN}, h_{gP}^{kN}, h_{gP}^{EN})}{dy^k} \quad \forall k \in \{L, F\} \quad (\text{A.80})$$

In the political equilibrium, both parties, $P \in \{A, B\}$, announce a menu of net taxation and in-kind transfers policies targeted to each group k , (y_P^{kN}, h_{gP}^{kN}) , such that (A.22) holds. Those equilibrium policies imply consumption bundles for each group k , (c_P^{kN}, h_P^{kN}) , that satisfy the economy feasibility constraint given expected voting and competitive equilibrium behavior of citizens. In equilibrium:

$$\begin{aligned} u_h(c_P^{kN}, h_P^{kN}) &= p_h u_c(c_P^{kN}, h_P^{kN}) \\ MRS_{h,c}^{kN} &= MRT_{h,c} \quad \forall k \in \{L, F\} \end{aligned} \quad (\text{A.81})$$

where $c^{kN} = c_P^{kN} = y_P^{kN} - p_h h_{mP}^{kN}$ and $h^{kN} = h_P^{kN} = h_{gP}^{kN} + h_{mP}^{kN} \quad \forall k \in \{L, F\}$; with $y_P^{kN} > 0$, $h_{gP}^{kN} \geq 0$, $h_{mP}^{kN} \geq 0$ for all $P \in \{A, B\}$.

Therefore, the political process leads the economy to reach a Pareto Efficient allocation.

A.3 Commodity Egalitarianism

A.3.1 Political Equilibrium

The stages of the political game with commodity egalitarianism follows symmetric to the pure distributional game. Nevertheless, in the presence of egalitarianism, the indirect utility functions of individuals who belong to groups group $j \in \{1, \dots, J\}$ are given by:

$$V_P^j(y_P^j, \mathbf{h}_{gP}) = u(y_P^j - ph_{mP}^j, h_{gP}^j + h_{mP}^j) + \delta^j \Omega(\mathbf{h}_P) \quad (\text{A.82})$$

where $y_P^j \geq 0$; $h_{mP}^j \geq 0$; $h_{gP}^j \geq 0$; and $\mathbf{h}_P = \{h_{gP}^j + h_{mP}^j\}_{j=1}^J \quad \forall j \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$. Furthermore, I work with the case:

$$\Omega(\mathbf{h}_P) = -\frac{1}{2} \sum_{j=1}^J \mu^j (h_{gP}^j + h_{mP}^j - \bar{h})^2 \quad \text{where } \bar{h} = \sum_{j=1}^J \mu^j (h_{gP}^j + h_{mP}^j) \quad (\text{A.83})$$

Therefore, the swing voter type in group $j \in \{1, \dots, J\}$ is defined as:

$$\sigma^j = V_A^j(y_A^j, \mathbf{h}_{gA}) - V_B^j(y_B^j, \mathbf{h}_{gB}) - \varepsilon \quad (\text{A.84})$$

Taking into account the presence of egalitarianism, the policy choice problem of party A is given by:

$$\begin{aligned} \mathcal{L}^A = & \frac{1}{2} + \frac{\psi}{\phi} \left[\sum_{j=1}^J \mu^j \phi^j [V_A^j(y_A^j, \mathbf{h}_{gA}) - V_B^j(x_B)] \right] + \\ & + \lambda^A \left[w - \sum_{j=1}^J \mu^j y_A^j - \sum_{j=1}^J \mu^j p_h h_{gA}^j \right] + \sum_{j=1}^J \mu^j \gamma_{yA}^j y_A^j + \sum_{j=1}^J \mu^j \gamma_{hA}^j h_{gA}^j \end{aligned} \quad (\text{A.85})$$

The policy choice problem is symmetric to political party B . The First Order Conditions for both political parties $P \in \{A, B\}$ are defined as:

$$[y^k] \quad \frac{\psi}{\phi} \mu^k \phi^k \frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dy^k} + \mu^k \gamma_{yP}^k = \mu^k \lambda_P \quad \forall k \in \{1, \dots, J\} \quad (\text{A.86})$$

$$[h_g^k] \quad \frac{\psi}{\phi} \left[\begin{array}{c} \mu^k \phi^k \frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dh_g^k} + \\ + \sum_{j=1}^J \mu^j \phi^j \frac{dV_P^j(y_P^j, \mathbf{h}_{gP})}{dh_g^k} \end{array} \right] + \mu^k \gamma_{hP}^k = \mu^k p_h \lambda_P \quad \forall k \text{ and } j \neq k \in \{1, \dots, J\} \quad (\text{A.87})$$

$$\lambda_P \left[w - \sum_{j=L}^E \mu^j y_P^j - \sum_{j=L}^E \mu^j p_h h_{gP}^j \right] = 0 \quad (\text{A.88})$$

$$\gamma_{yP}^j y_P^j = 0 \quad ; \quad \gamma_{hP}^j h_{gP}^j = 0 \quad \forall j \in \{1, \dots, J\} \quad (\text{A.89})$$

$$\lambda_P \geq 0 \quad \gamma_{yP}^j \geq 0 \quad ; \quad \gamma_{hP}^j \geq 0 \quad \forall j \in \{1, \dots, J\} \quad (\text{A.90})$$

The system of equations formed by the best responses for each political party and their feasibility constraints, simultaneously determine the Nash Equilibrium in the first stage of the game. For both political parties, the equilibrium net taxation policy must imply a positive net income for all groups, $y_P^{jN} > 0 \forall j$ and $\forall P \in \{A, B\}$. Thus, in equilibrium the multiplier associated to the non-negativity constraint of net income is equal to zero for all groups, $\gamma_{yP}^{jN} = 0 \forall j$ and $\forall P \in \{A, B\}$. Hence, equilibrium policies targeted to group k must satisfy:

$$\frac{\psi}{\phi} \left[\begin{array}{c} \mu^k \phi^k \frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dh_g^k} + \\ + \sum_{j=1}^J \mu^j \phi^j \frac{dV_P^j(y_P^j, \mathbf{h}_{gP})}{dh_g^k} \end{array} \right] + \mu^k \gamma_{hP}^k = p_h \frac{\psi}{\phi} \mu^k \phi^k \frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dy^k} \quad \forall k \in \{1, \dots, J\} \quad (\text{A.91})$$

Politicians must decide whether targeting in-kind transfers to group k . In the case that party $P \in \{A, B\}$ chooses not targeting in-kind transfers to group k , $h_{gP}^{kN} = 0$, politicians take into account that voters are expected to purchase health care in competitive markets with their available income $y_P^{kN} > 0$. For any positive net income targeted by party P , the optimal behavior in competitive markets of an individual who belongs to group k is characterized by:

$$u_h(y_P^k - p_h h_{mP}^k, h_{mP}^k) = p_h u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k) \quad (\text{A.92})$$

When individuals who belong to group k purchase health care through competitive markets and there is no public provision, by Envelope Theorem:

$$\frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dy^k} = u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k) \quad (\text{A.93})$$

$$\frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dh_g^k} = u_h(y_P^k - p_h h_{mP}^k, h_{mP}^k) + \delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \quad (\text{A.94})$$

Furthermore, group k 's health care consumption affects the utility of individuals in the rest of the population, by Envelope Theorem:

$$\frac{dV_P^j(y_P^j, \mathbf{h}_{gP})}{dh_g^k} = \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \quad \forall j \neq k \quad (\text{A.95})$$

Given (A.93), (A.94) and (A.95) and introducing into the equilibrium condition (A.91), it yields:

$$\frac{\psi}{\phi} \left[\begin{aligned} & \mu^k \phi^k u_h(y_P^k - p_h h_{mP}^k, h_{mP}^k) + \\ & + \mu^k \phi^k \delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} + \sum_{j=1}^J \mu^j \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \end{aligned} \right] + \mu^k \gamma_{hP}^k = p_h \frac{\psi}{\phi} \mu^k \phi^k u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k) \quad (\text{A.96})$$

$$\left[\begin{aligned} & \frac{u_h(y_P^k - p_h h_{mP}^k, h_{mP}^k)}{u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k)} + \\ & \frac{\delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} + \sum_{j=1}^J \mu^j \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k}}{u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k)} \end{aligned} \right] + \frac{\mu^k \gamma_{hP}^k}{\mu^k \phi^k u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k)} \frac{\phi}{\psi} = p_h \quad (\text{A.97})$$

Given the expected behavior in competitive markets of individuals who belong to group k (A.92), equilibrium condition would be:

$$\left[p_h + \frac{\delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} + \sum_{j=1}^J \mu^j \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k}}{u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k)} \right] + \frac{\mu^k \gamma_{hP}^k}{\mu^k \phi^k u_c(y_P^k - p_h h_{mP}^k, h_{mP}^k)} \frac{\phi}{\psi} = p_h \quad (\text{A.98})$$

$$\forall k \in \{1, \dots, J\} \text{ and } \forall P \in \{A, B\}.$$

This equilibrium condition holds if and only if all groups have the same ideological heterogeneity and therefore are targeted with the same amount of cash transfers. Otherwise, in equilibrium parties must target in-kind transfers to all groups, $h_g^{kN} > 0 \forall P \in \{A, B\}$, and then $\gamma_{hP}^k = 0 \forall P \in \{A, B\}$. Hence, for both political parties, the equilibrium net taxation and in-kind transfers policies announced to group k , (y_P^{kN}, h_{gP}^{kN}) , must satisfy:

$$\frac{\psi}{\phi} \left[\mu^k \phi^k \frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dh_g^k} + \sum_{j=1}^J \mu^j \phi^j \frac{dV_P^j(y_P^j, \mathbf{h}_{gP})}{dh_g^k} \right] = p_h \frac{\psi}{\phi} \mu^k \phi^k \frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dy^k} \quad (\text{A.99})$$

$\forall k \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$.

Politicians choose in-kind transfers to individuals who belong to group k taking into account that voters in group k are expected not to make private purchases of health care in markets, $h_{mP}^{kN} = 0$, if and only if this condition holds:

$$u_h(y^k, h_{gP}^k) \leq p_h u_c(y_P^k, h_{gP}^k) \quad (\text{A.100})$$

Otherwise, when the sign of this condition is reversed, politicians expect that individuals make private purchases, $h_{mP}^{kN} > 0$. The expected optimal behavior of individuals that supplement health services in competitive markets is given by:

$$u_h(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k) = p_h u_c(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k) \quad (\text{A.101})$$

In the first alternative, when individuals who belong to group k purchase health care through competitive markets and there is public provision, by Envelope Theorem:

$$\frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dy^k} = u_c(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k) \quad (\text{A.102})$$

$$\frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dh_g^k} = u_h(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k) + \delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \quad (\text{A.103})$$

Furthermore, group k 's health care consumption affects the utility of individuals in the rest of the population, by Envelope Theorem:

$$\frac{dV_P^j(y_P^j, \mathbf{h}_{gP})}{dh_g^k} = \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \quad \forall j \neq k \quad (\text{A.104})$$

Given (A.102), (A.103) and (A.104) and introducing into the equilibrium condition (A.99), it yields:

$$\frac{\psi}{\phi} \left[\begin{array}{l} \phi^k \mu^k u_h(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k) + \\ \phi^k \mu^k \delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} + \sum_{j=1}^J \mu^j \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \end{array} \right] = p_h \frac{\psi}{\phi} \phi^k \mu^k u_c(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k) \quad (\text{A.105})$$

$$\left[\frac{u_h(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k)}{u_c(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k)} + \frac{\delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} + \sum_{j=1}^J \mu^j \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k}}{u_c(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k)} \right] = p_h \quad (\text{A.106})$$

Given the expected behavior in competitive markets of individuals who belong to group k (A.101), equilibrium condition would be:

$$\left[p_h + \frac{\delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} + \sum_{j=1}^J \mu^j \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k}}{u_c(y_P^k - p_h h_{mP}^k, h_{gP}^k + h_{mP}^k)} \right] = p_h \quad (\text{A.107})$$

This equilibrium condition holds if and only if all groups have the same ideological heterogeneity and therefore are targeted with the same amount of cash transfers. Otherwise, in equilibrium both parties $\{A, B\}$ must target a combination of net taxation and in-kind transfers to each group k , (y_P^{kN}, h_{gP}^{kN}) for $k \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$, such that individuals who belong to any group $k \in \{1, \dots, J\}$ do not supplement health services in competitive markets, $h_{mP}^{kN} = 0 \forall k \in \{1, \dots, J\}$. When individuals who belong to group k do not purchase health care through competitive markets and there is public provision, by Envelope Theorem:

$$\frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dy^k} = u_c(y_P^k, h_{gP}^k) \quad (\text{A.108})$$

$$\frac{dV_P^k(y_P^k, \mathbf{h}_{gP})}{dh_g^k} = u_h(y_P^k, h_{gP}^k) + \delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \quad (\text{A.109})$$

Furthermore, group k 's health care consumption affects the utility of individuals in the rest of the population, by Envelope Theorem:

$$\frac{dV_P^j(y_P^j, \mathbf{h}_{gP})}{dh_g^k} = \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \quad \forall j \neq k \quad (\text{A.110})$$

Given (A.108), (A.109) and (A.110) and introducing into the equilibrium condition (A.99), it yields:

$$\frac{\psi}{\phi} \left[\phi^k \mu^k u_h(y_P^k, h_{gP}^k) + \phi^k \mu^k \delta^k \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} + \sum_{j=1}^j \phi^j \mu^j \delta^j \frac{\partial \Omega(\mathbf{h}_P)}{\partial h_g^k} \right] = p_h \frac{\psi}{\phi} \phi^k \mu^k u_c(y_P^k, h_{gP}^k) \quad (\text{A.111})$$

Arranging terms, party P 's equilibrium condition when group k is targeted with in-kind transfers, $h_{gP}^{kN} > 0$, and net income, $y_P^{kN} > 0$, such that individuals do not supplement health services, $h_{mP}^{kN} = 0$, is given by:

$$u_h(c_P^{kN}, h_P^{kN}) + \sum_{j=1}^J \frac{\phi^j}{\phi^k} \frac{\mu^j}{\mu^k} \delta^j \frac{\partial \Omega(\mathbf{h}_P^N)}{\partial h_g^k} = p_h u_c(c_P^{kN}, h_P^{kN}) \quad (\text{A.112})$$

$\forall k, j \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$; where $c_P^{kN} = y_P^{kN}$ and $h_P^{kN} = h_{gP}^{kN}$.

A.3.2 Distributive Politics

The relative treatment of health services across groups is affected by the presence of egalitarianism. From the the First Order Conditions for both political parties $P \in \{A, B\}$, taking (A.87) for a pair of groups k and k' , in equilibrium:

$$\frac{\psi}{\phi} \left[\frac{\phi^k dV_P^{kN}(y_P^{kN}, \mathbf{h}_{gP}^N)}{dh_g^k} + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \phi^j \frac{dV_P^{jN}(y_P^{jN}, \mathbf{h}_{gP}^N)}{dh_g^k} \right] = \frac{\psi}{\phi} \left[\frac{\phi^{k'} dV_P^{k'N}(y_P^{k'N}, \mathbf{h}_{gP}^N)}{dh_g^{k'}} + \sum_{j=1}^J \frac{\mu^j}{\mu^{k'}} \phi^j \frac{dV_P^{jN}(y_P^{jN}, \mathbf{h}_{gP}^N)}{dh_g^{k'}} \right] \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{A.113})$$

Hence, the political relative treatment in terms of health services across groups of voters is given by:

$$\left[\begin{array}{l} \phi^k u_h(c^{kN}, h^{kN}) + \\ + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_g^N)}{\partial h_g^k} \end{array} \right] = \left[\begin{array}{l} \phi^{k'} u_h(c^{k'N}, h^{k'N}) + \\ + \sum_{j=1}^J \frac{\mu^j}{\mu^{k'}} \phi^j \delta^j \frac{\partial \Omega(\mathbf{h}_g^N)}{\partial h_g^{k'}} \end{array} \right] \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{A.114})$$

where $c^{kN} = c_P^{kN} = y_P^{kN}$ and $h^{kN} = h_P^{kN} = h_{gP}^{kN}$; and $c^{k'N} = c_P^{k'N} = y_P^{k'N}$ and $h^{k'N} = h_P^{k'N} = h_{gP}^{k'N} \quad \forall k, k' \in \{1, \dots, J\}$; with $y_P^{kN}, y_P^{k'N} > 0$ and $h_{gP}^{kN}, h_{gP}^{k'N} > 0$ for all $P \in \{A, B\}$.

Similarly, I can characterize the relative treatment of numeraire commodity across groups. From the the First Order Conditions for both political parties $P \in \{A, B\}$, taking (A.86) for a pair of groups k and k' , in equilibrium:

$$\frac{\psi}{\phi} \phi^k \frac{dV_P^{kN}(y_P^{kN}, \mathbf{h}_{gP}^N)}{dy^k} = \frac{\psi}{\phi} \phi^{k'} \frac{dV_P^{k'N}(y_P^{k'N}, \mathbf{h}_{gP}^N)}{dy^{k'}} \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{A.115})$$

Thus, the political relative treatment in terms of numeraire between elderly and non-elderly citizens is given by:

$$\phi^k u_c(c^{kN}, h^{kN}) = \phi^{k'} u_c(c^{k'N}, h^{k'N}) \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{A.116})$$

where $c^{kN} = c_P^{kN} = y_P^{kN}$ and $h^{kN} = h_P^{kN} = h_{gP}^{kN}$; and $c^{k'N} = c_P^{k'N} = y_P^{k'N}$ and $h^{k'N} = h_P^{k'N} = h_{gP}^{k'N} \quad \forall k, k' \in \{1, \dots, J\}$; with $y_P^{kN}, y_P^{k'N} > 0$ and $h_{gP}^{kN}, h_{gP}^{k'N} > 0$ for all $P \in \{A, B\}$.

A.3.3 Allocative Efficiency

The first-best problem consists of the maximization of the weighted average of individual utilites with group-specific Pareto weights, α^j , subject to the economy

feasibility constraint. The solution to this optimization problem yields the set of Pareto efficient allocations:

$$\max_{\{c^j, h^j\}_{j=1}^J} \sum_{j=1}^J \mu^j \alpha^j [u(c^j, h^j) + \delta^j \Omega(\mathbf{h})] \quad (\text{A.117})$$

$$\text{s.t.} \quad \sum_{j=1}^J \mu^j c^j + \sum_{j=1}^J \mu^j q h^j \leq \sum_{j=1}^J \mu^j w^j \quad (\text{A.118})$$

The FOCs for an interior optimum are given by:

$$[c^k] \quad \mu^k \alpha^k u_c = \mu^k \lambda \quad \forall k \in \{1, \dots, J\} \quad (\text{A.119})$$

$$[h^k] \quad \mu^k \alpha^k u_h + \sum_{j=1}^J \mu^j \alpha^j \delta^j \frac{d\Omega(\mathbf{h})}{dh^k} = \mu^k q \lambda \quad \forall k, j \in \{1, \dots, J\} \quad (\text{A.120})$$

The set of Pareto efficient allocation of resources, $\{c_{PO}^j, h_{PO}^j\}_{j=1}^J$, satisfies (A.119), (A.120) and the economy feasibility constraint. Furthermore, from the FOCs for consumption of the numeraire (A.119) I obtain:

$$\frac{\alpha^j}{\alpha^k} = \frac{u_c(c_{PO}^k, h_{PO}^k)}{u_c(c_{PO}^j, h_{PO}^j)} \quad (\text{A.121})$$

Therefore, a Pareto efficient allocation of numeraire and health for group k must satisfy:

$$\begin{aligned} \frac{u_h(c_{PO}^k, h_{PO}^k)}{u_c(c_{PO}^k, h_{PO}^k)} + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \delta^j \frac{\frac{\partial \Omega(\mathbf{h})}{\partial h^k}}{u_c(c_{PO}^j, h_{PO}^j)} &= q \\ MRS_{h,c}^k + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \delta^j MRS_{\Omega^k, c^j}^j &= MRT_{h,c} \quad \forall k, j \in \{1, \dots, J\} \end{aligned} \quad (\text{A.122})$$

In the political equilibrium, both parties, $P \in \{A, B\}$, announce a menu of net taxation and in-kind transfers policies targeted to group k , (y_P^{kN}, h_{gP}^{kN}) , such that:

$$u_h(c_P^{kN}, h_P^{kN}) + \sum_{j=1}^J \frac{\phi^j}{\phi^k} \frac{\mu^j}{\mu^k} \delta^j \frac{\partial \Omega(\mathbf{h}_P^N)}{\partial h_g^k} = p_h u_c(c_P^{kN}, h_P^{kN}) \quad (\text{A.123})$$

$\forall k, j \in \{1, \dots, J\}$ and $\forall P \in \{A, B\}$; where $c_P^{kN} = y_P^{kN}$ and $h_P^{kN} = h_{gP}^{kN}$.

From the equilibrium relative treatment between groups in terms of numeraire (A.116) I obtain:

$$\frac{\phi^j}{\phi^k} = \frac{u_c(c^{kN}, h^{kN})}{u_c(c^{jN}, h^{jN})} \quad k, j \in \{1, \dots, J\} \quad (\text{A.124})$$

Introducing (A.117) into the equilibrium political allocation of group k (A.123):

$$\begin{aligned} u_h(c_P^{kN}, h_P^{kN}) + \sum_{j=1}^J \frac{u_c(c^{kN}, h^{kN})}{u_c(c^{jN}, h^{jN})} \frac{\mu^j}{\mu^k} \delta^j \frac{\partial \Omega(\mathbf{h}_P^N)}{\partial h_g^k} &= p_h u_c(c_P^{kN}, h_P^{kN}) \quad (\text{A.125}) \\ \frac{u_h(c_P^{kN}, h_P^{kN})}{u_c(c_P^{kN}, h_P^{kN})} + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \delta^j \frac{\frac{\partial \Omega(\mathbf{h}_P^N)}{\partial h_g^k}}{u_c(c^{jN}, h^{jN})} &= p_h \\ MRS_{h,c}^{kN} + \sum_{j=1}^J \frac{\mu^j}{\mu^k} \delta^j MRS_{\Omega^k, c^j}^{jN} &= MRT_{h,c} \end{aligned}$$

Hence, the consumption bundle of group k , $(c^{kN}, h^{kN}) \quad \forall k \in \{1, \dots, J\}$, that results from the political process is Pareto efficient.

Appendix B

Mathematical Appendix to Chapter 3

B.1 Existence of Equilibrium

Proposition 19 *In the electoral competition game with competitive markets, a Subgame Perfect Nash Equilibrium exists and it is unique.*

Proof. [1] Given that i) the budget constraint of individuals who belong to ability group j under the government of any party $P \in \{A, B\}$ is defined by $c_m^{jP} + p_h h_{mP}^j = w^j(1 - t_P)n_P^j + s_P^j \equiv z_P^j$. Then, individuals' budget sets are non-empty, compact and convex for all ability groups in the economy; and ii) citizens' utility functions are assumed to be continuous and strictly concave in the consumption of numeraire, health care and leisure. Therefore, for any policy implemented by $P \in \{A, B\}$, individuals choose a unique bundle of private health care and labor supply.

[2] For each individual, parties' policy proposals, idiosyncratic ideological biases and popularity shocks imply different utility levels under the government of either party A or B . Then, every citizen votes for the party which yields him the maximum level of utility. When the utility level provided by each party is the same, indifferent

individuals randomize equally over the set of candidates and vote for one of the parties.

[3] Given that for each political party i) the feasible set of strategies defined by the government's budget constraint is non-empty, compact and convex; and ii) the probability of winning elections is 1) continuous in both policy platforms, (x_A, x_B) ; and 2) strictly concave in x_P and strictly convex in x_{-P} for $P \in \{A, B\}$. Then, according to Glicksberg's Fixed Point Theorem, there exists a unique Nash Equilibrium in pure strategies in the first stage of the game.

Therefore, given [1], [2] and [3], in the political game there exists a Subgame Perfect Nash Equilibrium in pure strategies and it is unique. ■

B.2 Equilibrium Income Taxation

Equilibrium policies are determined as the Nash Equilibrium of the first stage of the game in which both parties make simultaneous policy announcements. Taking the opponent's policy choice problem as given, each political party chooses a linear tax over labor income and a combination of cash and in-kind transfers for each group, $x_P = (t_P, \{s_P^j\}_{j=1}^J, \{h_{gP}^j\}_{j=1}^J)$ for $P \in \{A, B\}$, that maximizes its chances of winning elections subject to government budget constraint and non-negativity constraints. Parties take into account citizens' expected voting decisions (*stage 2*) and individuals' choices in competitive labor and health care markets (*stage 3*). Thus, the policy choice problem of party *A* results from the maximization of the following Lagrangean:

$$\begin{aligned} \mathcal{L}^A = & \frac{1}{2} + \frac{\psi}{\phi} \sum_{j=1}^J \mu^j \phi^j [V_A^j(x_A^j) - V_B^j(x_B^j)] + \\ & + \lambda_A \left[\sum_{j=1}^J \mu^j t_A w^j n_A^j - \sum_{j=1}^J \mu^j s_A^j - \sum_{j=1}^J \mu^j p_h h_{gA}^j \right] + \sum_{j=1}^J \mu^j \gamma_{sA}^j s_A^j + \sum_{j=1}^J \mu^j \gamma_{hA}^j h_{gA}^j \end{aligned} \quad (\text{B.1})$$

where λ_A is the Lagrange multiplier associated to the budget constraint. The policy choice problem of political party B is symmetric. There exists a unique equilibrium in which both parties propose the same income tax and distribution of cash and in-kind transfers across groups, $x_A^N = x_B^N = x^N$. Therefore, the First Order Conditions for both political parties evaluated at $x_A^N = x_B^N = x^N$ characterize equilibrium taxation and transfers policies:

$$[t] \quad \frac{\psi}{\phi} \sum_{j=1}^J \mu^j \phi^j \frac{dV^j(x^{jN})}{dt} + \lambda^N \left[\sum_{j=1}^J \mu^j w^j n^{jN} + t^N \sum_{j=1}^J \mu^j w^j \frac{dn^{jN}}{dt} \right] = 0 \quad (\text{B.2})$$

$$[s^j] \quad \frac{\psi}{\phi} \mu^j \phi^j \frac{dV^j(x^{jN})}{ds^j} + \lambda^N \left[t^N \mu^j w^j \frac{dn^{jN}}{ds^j} - \mu^j \right] + \mu^j \gamma_s^{jN} = 0 \quad \forall j \quad (\text{B.3})$$

$$[h_g^j] \quad \frac{\psi}{\phi} \mu^j \phi^j \frac{dV^j(x^{jN})}{dh_g^j} + \lambda^N \left[t^N \mu^j w^j \frac{dn^{jN}}{dh_g^j} - \mu^j p_h \right] + \mu^j \gamma_h^{jN} = 0 \quad \forall j \quad (\text{B.4})$$

$$\lambda^N \left[\sum_{j=1}^J \mu^j t^N w^j n^{jN} - \sum_{j=1}^J \mu^j s^{jN} - \sum_{j=1}^J \mu^j p_h h_g^{jN} \right] = 0 \quad (\text{B.5})$$

$$\gamma_s^{jN} s^{jN} = 0 \quad \forall j \quad ; \quad \gamma_s^{jN} \geq 0 \quad \forall j \quad (\text{B.6})$$

$$\gamma_h^{jN} h_g^{jN} = 0 \quad \forall j \quad ; \quad \gamma_h^{jN} \geq 0 \quad \forall j \quad (\text{B.7})$$

Individuals are at optimum before the introduction of policies, therefore by Envelope Theorem:

$$\frac{dV^j(x^{jN})}{dt} = -w^j n^{jN} u_c \quad ; \quad \frac{dV^j(x^{jN})}{ds^j} = u_c \quad ; \quad \frac{dV^j(x^{jN})}{dh_g^j} = u_h \quad (\text{B.8})$$

Furthermore, using the Slutsky relation, the effect of income taxes on labor supply can be expressed as follows:

$$\frac{\partial n^j}{\partial t} = -w^j \frac{\partial n^{cj}}{\partial w^j} - w^j n^j \frac{\partial n^j}{\partial s^j} \quad (\text{B.9})$$

Consider that politicians had available one unit of numeraire which could be targeted to group j . Then, the net electoral marginal valuation of income promised in group j , β^j , is given by:

$$\beta^j = \frac{\frac{\psi}{\phi} \phi^j u_c}{\lambda} + t w^j \frac{\partial n^j}{\partial s^j} \quad (\text{B.10})$$

Adding over j the equilibrium FOC for group-specific cash transfers (B.3) and arranging terms gives:

$$\frac{\sum_{j=1}^J \frac{\psi}{\phi} \mu^j \phi^j u_c}{\lambda^N} + \sum_{j=1}^J \mu^j t^N w^j \frac{\partial n^{jN}}{\partial s^j} = 1 \quad (\text{B.11})$$

Given the definition of β^j , equation (B.11) captures the equilibrium weighted average of the marginal electoral valuation of income across groups which can be expressed as:

$$\sum_{j=1}^J \mu^j \beta^j = 1 \quad (\text{B.12})$$

Making use of (B.8) and (B.9), the equilibrium FOC for income tax (B.2) can be written as:

$$\sum_{j=1}^J \mu^j w^j n^j \left[\frac{\psi}{\phi} \phi^j u_c - \lambda \left[1 - t w^j \frac{\partial n^{cj}}{\partial w^j} \frac{1}{n^j} - t w^j \frac{\partial n^j}{\partial s^j} \right] \right] = 0 \quad (\text{B.13})$$

Dividing by the shadow price of government revenue, λ , gives:

$$\sum_{j=1}^J \mu^j w^j n^j \left[\frac{\frac{\psi}{\phi} \phi^j u_c}{\lambda} + t w^j \frac{\partial n^j}{\partial s^j} - 1 + t w^j \frac{\partial n^{cj}}{\partial w^j} \frac{1}{n^j} \right] = 0 \quad (\text{B.14})$$

Given the definition of the electoral marginal valuation of income in group j (B.10) and using (B.12), the equilibrium condition satisfies:

$$\sum_{j=1}^J \mu^j w^j n^j \left[\beta^j - \sum_{j=1}^J \mu^j \beta^j + \frac{t}{1-t} \varepsilon_{n,w}^{jc} \right] = 0 \quad (\text{B.15})$$

where $\varepsilon_{n,w}^{jc}$ is the compensated elasticity of labor supply defined as:

$$\varepsilon_{n,w}^{jc} = \frac{\partial n^{cj} w^j (1-t)}{\partial w^j n^j} \quad (\text{B.16})$$

Arranging terms, the equilibrium choice of income taxation satisfies the following expression:¹

$$\frac{t}{1-t} = - \frac{COV(\beta^j, y^j)}{\sum_{j=1}^J \mu^j y^j \varepsilon_{n,w}^{jc}} \quad (\text{B.17})$$

Furthermore, the equilibrium shadow price of revenue can be obtained solving for λ using (B.11):

$$\lambda^N = \frac{\sum_{j=1}^J \frac{\psi}{\phi} \mu^j \phi^j u_c}{1 - \sum_{j=1}^J \mu^j t^N w^j \frac{\partial n^{jN}}{\partial s^j}} \quad (\text{B.18})$$

Therefore, the equilibrium net marginal electoral valuation of income promised to group j is given by:

$$\beta^j = \frac{\frac{\psi}{\phi} \phi^j u_c}{\sum_{j=1}^J \frac{\psi}{\phi} \mu^j \phi^j u_c} \left[1 - \sum_{j=1}^J \mu^j t^N w^j \frac{\partial n^{jN}}{\partial s^j} \right] + t^N w^j \frac{\partial n^{jN}}{\partial s^j} \quad (\text{B.19})$$

Notice that the equilibrium market allocation would be a political equilibrium (i.e. parties propose do not undertake redistribution) if and only if this condition holds for all groups of the economy:

$$\frac{\frac{\psi}{\phi} \phi^j u_c (w^j n^{j*} - p_h h_m^{j*}, h_m^{j*}, 1 - n^{j*})}{\lambda} = 1 \quad \forall j \quad (\text{B.20})$$

¹The procedure to obtain the equilibrium relation follows closely Stiglitz (1987) and Kaplow (2008). However, I show how this expression arises as the equilibrium outcome of the electoral competition between politicians rather than from the optimal choice of a benevolent planner.

Therefore, the following relation must hold for any pair of groups, k and k' , of the economy:

$$\phi^k u_c(w^k n^{k*} - p_h h_m^{k*}, h_m^{k*}, 1 - n^{k*}) = \phi^{k'} u_c(w^{k'} n^{k'*} - p_h h_m^{k'*}, h_m^{k'*}, 1 - n^{k'*}) \quad (\text{B.21})$$

This would be the case when all groups exhibit both the same productivity and concentration of pivotal voters.

B.3 Overprovision of Health Services

In equilibrium, political parties choose a combination of policies that overprovide the consumption of health services for all the population. In order to show this result, consider an economy in which both parties do not overprovide health services.² Suppose that one party, for instance A , deviates from the common policy announcement. In particular, for a given income tax, party A increases in-kind transfers targeted to group k reducing the funding of cash transfers. This change in policies involves that now in-kind transfers in group k are overprovided. What's the effect of this change on the economic well-being of non-biased voters in group k ?

The indirect utility function of non-biased individuals in group k when party A overprovides health services is given by:

$$V_A^{kOV} \equiv V_A^k(p_h, w^k(1 - t_A), h_{gA}^k, s_A^k) = u(w^k(1 - t_A)n_A^{j*} + s_A^k, h_{gA}^k, 1 - n_A^{k*}) \quad (\text{B.22})$$

Totally differentiating (B.22) with respect to in-kind-transfers targeted to group k , yields:

$$\frac{dV_A^k}{dh_g^k} = \frac{\partial V_A^k}{\partial h_g^k} + \frac{\partial V_A^k}{\partial s^k} \frac{ds_A^k}{dh_{gA}^k} \quad (\text{B.23})$$

²The logic and steps to proof the results follow closely Gahvari (1994, 1995) who analyzes the differentiated effect of uniform cash and in-kind transfers in labor supply and tax revenues of an exogenous government. Nevertheless, I work the case in which group-specific transfers are feasible and the government must be elected by citizens.

The combination of policies proposed by political party A is constrained to satisfy its budget constraint given by:

$$\sum_{j=1}^J \mu^j s_A^j + \sum_{j=1}^J \mu^j p_h h_{gA}^j = \sum_{j=1}^J \mu^j t_A w^j n_A^j \quad (\text{B.24})$$

For a given income tax rate, $t_A > 0$, totally differentiating party A 's budget constraint with respect to in-kind-transfers targeted to group k and solving for ds_A^k/dh_{gA}^k yields:

$$\frac{ds_A^k}{dh_{gA}^k} = t_A w^k \frac{dn_A^k}{dh_g^k} - p_h \quad (\text{B.25})$$

Thus, introducing the value of ds_A^k/dh_{gA}^k from (B.25) into (B.23) and arranging terms gives:

$$\frac{dV_A^k}{dh_g^k} = \left(\frac{\partial V_A^k}{\partial h_g^k} - p_h \frac{\partial V_A^k}{\partial s^k} \right) + \frac{\partial V_A^k}{\partial s^k} t_A w^k \frac{dn_A^k}{dh_g^k} \quad (\text{B.26})$$

Party A departs from a situation in which the consumption of health care is not overprovided, therefore by Envelope Theorem:

$$\left(\frac{\partial V_A^k}{\partial h_g^k} - p_h \frac{\partial V_A^k}{\partial s^k} \right) = u_h - p_h u_c = 0 \quad (\text{B.27})$$

Hence, the effect of the marginal change of transfers policy on economic well-being of non-biased voters, dV_A^k/dh_g^k , depends on the sign of dn_A^k/dh_{gA}^k .

The ordinary labor supply function of a worker who belongs to group k when there exists overprovision is given by:

$$n_A^{kOV} = n_A^k(p_h, w^k(1 - t_A), h_{gA}^k, s_A^k) \quad (\text{B.28})$$

Totally differentiating this labor supply function with respect to in-kind transfers targeted to group k , maintaining economic feasibility, yields:

$$\frac{dn_A^k}{dh_{gA}^k} = \frac{\partial n_A^k}{\partial h_g^k} + \frac{\partial n_A^k}{\partial s^k} \frac{ds_A^k}{dh_{gA}^k} \quad (\text{B.29})$$

Given the value of ds_A^k/dh_{gA}^k from (B.25), equation (B.29) can be expressed as:

$$\frac{dn_A^k}{dh_{gA}^k} = \frac{\partial n_A^k}{\partial h_g^k} + \frac{\partial n_A^k}{\partial s^k} \left[t_A w^k \frac{dn_A^k}{dh_{gA}^k} - p_h \right] \quad (\text{B.30})$$

Therefore, arranging terms yields:

$$\frac{dn_A^k}{dh_{gA}^k} = \frac{p_h \left[\frac{1}{p_h} \frac{\partial n_A^k}{\partial h_g^k} - \frac{\partial n_A^k}{\partial s^k} \right]}{1 - t_A w^k \frac{\partial n_A^k}{\partial s^k}} \quad (\text{B.31})$$

Leisure was assumed to be a normal good, then $\partial n_A^k / \partial s^k < 0$. Therefore, the sign of the denominator of (B.31) is positive. In order to analyze the sign of the numerator, consider the ordinary demand function of leisure which is defined as the amount of time that individuals do not devote to work, i.e. $l^k = 1 - n^k$. The compensated demand of leisure conditional to policies promised by party A , l_A^{ck} , is obtained from the dual of the utility maximization problem that gives the ordinary demand of leisure under party A 's government, l_A^k . Ordinary and compensated demand functions for leisure are related by the identity:

$$l_A^k(p_h, w^k(1 - t_A), h_{gA}^k, s_A^k) \equiv l_A^{ck} [p_h, w^k(1 - t_A), h_{gA}^k, V_A^k(p_h, w^k(1 - t_A), h_{gA}^k, s_A^k)] \quad (\text{B.32})$$

Differentiating (B.32) partially with respect to both cash and in-kind transfers to obtain:

$$\frac{\partial l_A^k}{\partial h_g^k} = \frac{\partial l_A^{ck}}{\partial h_g^k} + \frac{\partial l_A^{ck}}{\partial V_A^k} \frac{\partial V_A^k}{\partial h_g^k} \quad (\text{B.33})$$

$$\frac{\partial l_A^k}{\partial s^k} = \frac{\partial l_A^{ck}}{\partial V_A^k} \frac{\partial V_A^k}{\partial s^k} \rightarrow \frac{\partial l_A^k}{\partial s^k} = \frac{\partial l_A^k / \partial s^k}{\partial V_A^k / \partial s^k} \quad (\text{B.34})$$

Introducing the value of $\partial l_A^{ck} / \partial V_A^k$ from (B.34) into (B.33) yields:

$$\frac{\partial l_A^k}{\partial h_g^k} = \frac{\partial l_A^{ck}}{\partial h_g^k} + \frac{\partial V_A^k / \partial h_g^k}{\partial V_A^k / \partial s^k} \frac{\partial l_A^k}{\partial s^k} \quad (\text{B.35})$$

Substituting $(1 - n_A^k)$ for l_A^k and multiplying both sides of (B.35) by the inverse of the in-kind transfers unit cost yields:

$$-\frac{\partial n_A^k}{\partial h_g^k} \frac{1}{p_h} = \frac{1}{p_h} \frac{\partial l_A^{ck}}{\partial h_g^k} - \frac{\partial n_A^k}{\partial s^k} \frac{\partial V_A^k / \partial h_g^k}{\partial V_A^k / \partial s^k} \frac{1}{p_h} \quad (\text{B.36})$$

Subtracting $\partial n_A^k / \partial s^k$ from both sides and arranging terms gives:

$$\left[\frac{1}{p_h} \frac{\partial n_A^k}{\partial h_g^k} - \frac{\partial n_A^k}{\partial s^k} \right] = -\frac{1}{p_h} \frac{\partial l_A^{ck}}{\partial h_g^k} - \frac{\partial n_A^k}{\partial s^k} \left[1 - \frac{1}{p_h} \frac{\partial V_A^k / \partial h_g^k}{\partial V_A^k / \partial s^k} \right] \quad (\text{B.37})$$

The first component of the RHS of (B.37) is positive when either preferences between leisure and the rest of the goods are weakly separable or leisure and health care are Hicks substitutes. On the one side, Gahvari (1994) shows that weakly separability of preferences and normality of leisure are enough to guarantee net substitutability, *i.e.* $\partial l^c / \partial h_g < 0$. This result holds in the current setting because given (B.35), when $\partial l_A^k / \partial h_g^k = 0$ and $\partial l_A^k / \partial s^k > 0$, we also obtain net substitutability:

$$\frac{\partial l_A^{ck}}{\partial h_g^k} = -\frac{\partial V_A^k / \partial h_g^k}{\partial V_A^k / \partial s^k} \partial l_A^k / \partial s^k < 0 \quad (\text{B.38})$$

As an alternative, Neary and Roberts (1980) show that when leisure and the good subject to in-kind transfers are Hicks substitutes, *i.e.* $\partial l^{ck} / \partial p_h > 0$, then there also exists net substitutability, $\partial l^{ck} / \partial h_g^k < 0$.³

Furthermore, the second component of the RHS of (B.37) is negative. Indeed, party *A* overprovision of health care gives:

$$\partial V_A^k / \partial h_g^k < p_h \partial V_A^k / \partial s^k \rightarrow \frac{1}{p_h} \frac{\partial V_A^k / \partial h_g^k}{\partial V_A^k / \partial s^k} < 1 \rightarrow 1 - \frac{1}{p_h} \frac{\partial V_A^k / \partial h_g^k}{\partial V_A^k / \partial s^k} < 0 \quad (\text{B.39})$$

Thus, given that leisure is a normal good, $\partial n^k / \partial s^k < 0$, we can obtain the sign of the effect of overprovision of in-kind transfers on labor supply (B.31):

$$\left[\frac{1}{p_h} \frac{\partial n_A^k}{\partial h_g^k} - \frac{\partial n_A^k}{\partial s^k} \right] > 0 \rightarrow dn_A^k / dh_g^k > 0 \quad (\text{B.40})$$

Therefore, for a given income tax, when party increases in-kind transfers and reduces cash transfers in group *k* such that health services are overprovided, individuals have incentives to work more, $dn_A^k / dh_g^k > 0$, as long as there exists complementarities

³See Gahvari (1994, 1995) for a detailed discussion of the results obtained by Neary and Roberts (1980).

between labor and the good subject to transfers. It implies a change in the utility of pivotal voters:

$$\frac{dV_A^k}{dh_g^k} = u_c t_A w^k \frac{dn_A^k}{dh_g^k} > 0 \quad (\text{B.41})$$

Hence, the change in policy platforms increases the economic well-being of non-biased voters in group k .

B.4 Equilibrium In-Kind Transfers

Consider the equilibrium FOC for in-kind transfers promised to group j , (B.4). I showed that the unique equilibrium involves overprovision of in-kind transfers for all groups (i.e. $h_g^{jN} > 0$ and then $\gamma_h^j = 0$ for all j). Therefore, the equilibrium condition for group j yields:

$$\frac{\frac{\psi}{\phi} \phi^j u_h(z^{jN}, h_g^{jN}, 1 - n^{jN})}{\lambda^N} + t^N w^j \frac{dn^{jN}}{dh_g^{jN}} = p_h \quad \forall j \quad (\text{B.42})$$

where the equilibrium net income is given by $z^{jN} = w^j n^{jN} (1 - t^N) + s^{jN}$, with $s^{jN} \geq 0$.

Furthermore, given the equilibrium condition (B.4), the equilibrium distribution of in-kind transfers across groups satisfies:

$$\frac{\phi^k u_h(z^{kN}, h_g^{kN}, 1 - n^{kN})}{1 - t^N w^k \frac{dn^{kN}}{dh_g^k}} = \frac{\phi^{k'} u_h(z^{k'N}, h_g^{k'N}, 1 - n^{k'N})}{1 - t^N w^{k'} \frac{dn^{k'N}}{dh_g^{k'}}} \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{B.43})$$

B.5 Equilibrium Cash Transfers

Consider the equilibrium FOC for cash transfers targeted to group j , (B.3). This equilibrium condition shows that group j does not receive cash transfers when:

$$\frac{\frac{\psi}{\phi}\phi^j u_c(w^j n^{jN}(1-t^N), h_g^{jN}, 1-n^{jN})}{\lambda^N} + t^N w^j \frac{dn^{jN}}{ds^j} \leq 1 \quad \forall j \quad (\text{B.44})$$

Otherwise, parties promise cash transfers. In equilibrium, politicians target cash transfers to group k such that the net electoral marginal valuation of income, β^{kN} , is equal to the direct cost of lump sum cash transfers:

$$\beta^{kN} \equiv \frac{\frac{\psi}{\phi}\phi^k u_c(z^{kN}, h_g^{kN}, 1-n^{kN})}{\lambda^N} + t^N w^k \frac{dn^{kN}}{ds^k} = 1 \quad (\text{B.45})$$

where the equilibrium net income is given by $z^{kN} = w^k n^{kN}(1-t^N) + s^{kN}$.

Furthermore, given the equilibrium condition (B.3), for any pair of groups targeted with cash, k and k' , the equilibrium relative allocation of transfers is given by:

$$\frac{\phi^k u_c(z^{kN}, h_g^{kN}, 1-n^{kN})}{1-t^N w^k \frac{dn^{kN}}{ds^k}} = \frac{\phi^{k'} u_c(z^{k'N}, h_g^{k'N}, 1-n^{k'N})}{1-t^N w^{k'} \frac{dn^{k'N}}{ds^{k'}}} \quad (\text{B.46})$$

Appendix C

Mathematical Appendix to Chapter 4

C.1 Political Game

C.1.1 Swing Voters

Given policy platforms, there might be citizens in group j with an idiosyncratic ideological parameter, g_s^{*j} , such that they are indifferent between voting for the pro-market, R , as for the pro-government, L , party. The swing voter type in group j is implicitly defined by:

$$\begin{aligned} V_i(c_R^j, g_R; g_s^{*j}) &= V_i(c_L^j, g_L; g_s^{*j}) + \varepsilon \\ u(c_R^j) + W(g_R; g_s^{*j}) &= u(c_L^j) + W(g_L; g_s^{*j}) + \varepsilon \end{aligned} \tag{C.1}$$

For the case in which individuals' preferences over public goods are represented by Euclidean quadratic preferences, the swing voter type in group j can be obtained

as follows:

$$\begin{aligned}
u(c_R^j) - (g_R - g_i^*)^2 &= u(c_L^j) - (g_L - g_i^*)^2 + \varepsilon \\
[u(c_R^j) - u(c_L^j)] - g_R^2 - g_i^{*2} + 2g_Rg_i^* &= -g_L^2 - g_i^{*2} + 2g_Lg_i^* + \varepsilon \\
g_L^2 - g_R^2 + [u(c_R^j) - u(c_L^j)] + 2g_Rg_i^* - 2g_Lg_i^* - \varepsilon &= 0 \\
(g_L - g_R)(g_L + g_R) + [u(c_R^j) - u(c_L^j)] + g_i^*2(g_R - g_L) - \varepsilon &= 0 \\
(g_L - g_R)(g_L + g_R) + [u(c_R^j) - u(c_L^j)] - \varepsilon &= g_i^*2(g_L - g_R)
\end{aligned}$$

Arranging terms, the ideological cut-off type in group j is given by:

$$g_s^{*j} = \frac{(g_L + g_R)}{2} + \frac{1}{2(g_L - g_R)}[u(c_R^j) - u(c_L^j)] - \frac{\varepsilon}{2(g_L - g_R)} \quad (\text{C.2})$$

$$g_s^{*j} = \bar{g}_{LR} + \frac{1}{2\Delta_g}[u(c_R^j) - u(c_L^j) - \varepsilon] \quad (\text{C.3})$$

where \bar{g}_{LR} is the average of parties' promises regarding public provision of goods and Δ_g is the difference between leftist and rightist proposals.

C.1.2 Vote Share

I assume that the idiosyncratic ideological parameter of individuals who belong to group j is drawn from a uniform distribution, F^j , over the range $[g_a^{*j}, g_b^{*j}]$. Therefore, the fraction of citizens who vote for party R in group j is given by:

$$\begin{aligned}
S_R^j(x_R, x_L) &= F^j(g^{*j}) = \phi^j[g_s^{*j} - g_a^{*j}] = \phi^j[g_s^{*j} - g_a^{*j} + \bar{g}^{*j} - \bar{g}^{*j}] = \\
&= \phi^j[g_s^{*j} - g_a^{*j} + \frac{g_a^{*j} + g_b^{*j}}{2} - \bar{g}^{*j}] = \phi^j[g_s^{*j} + \frac{g_b^{*j} - g_a^{*j}}{2} - \bar{g}^{*j}] = \\
&= \phi^j[g_s^{*j} - \bar{g}^{*j} + \frac{1}{2\phi^j}] \\
&= \frac{1}{2} + \phi^j[g_s^{*j} - \bar{g}^{*j}] \quad (\text{C.4})
\end{aligned}$$

Hence, the overall vote share for party R can be written as:

$$S_R(x_R, x_L; \varepsilon) = \sum_{j=1}^J \mu^j F^j(g^{*j}) = \frac{1}{2} + \sum_{j=1}^J \mu^j \phi^j [g_s^{*j} - \bar{g}^{*j}] \quad (\text{C.5})$$

The complement share of citizens, $1 - \sum_{j=1}^J \mu^j F^j(g_s^{*j})$, votes for pro-government party L , S_L .

C.1.3 Parties' Probability of winning

Given that the expected value of the popularity shock is equal to zero, the expected swing voters in group j are citizens with an ideological type, \widehat{g}_s^{*j} , such that they are indifferent between parties' economic policy proposals. Therefore, the expected cut-off ideological type is given by:

$$E(g_s^{*j}) = \widehat{g}_s^{*j} = \bar{g}_{LR} + \frac{1}{2\Delta_g} [u(c_R^j) - u(c_L^j)] \quad (\text{C.6})$$

I assume majority voting and then winning the election corresponds to obtaining more than fifty per cent of the total vote. Given the expected swing voter type in each group and the assumed uniform distribution of ideological types and popularity shock, the probability that pro-market party R wins the election is obtained as follows:

$$\begin{aligned} P(x_R, x_L) &= P(S_R \geq \frac{1}{2}) = P\left(\frac{1}{2} + \sum_{j=1}^J \mu^j \phi^j [\widehat{g}_s^{*j} - \bar{g}^{*j} - \frac{\varepsilon}{2\Delta_g}] \geq \frac{1}{2}\right) \quad (\text{C.7}) \\ &= P\left(\sum_{j=1}^J \mu^j \phi^j [\widehat{g}_s^{*j} - \bar{g}^{*j} - \frac{\varepsilon}{2\Delta_g}] \geq 0\right) \\ &= P\left(\sum_{j=1}^J \mu^j \phi^j [\widehat{g}_s^{*j} - \bar{g}^{*j}] \geq \sum_{j=1}^J \mu^j \phi^j \frac{\varepsilon}{2\Delta_g}\right) \\ &= P\left(\sum_{j=1}^J \mu^j \phi^j [\widehat{g}_s^{*j} - \bar{g}^{*j}] \geq \phi \frac{\varepsilon}{2\Delta_g}\right) = P\left(\varepsilon \leq 2\Delta_g \frac{\sum_{j=1}^J \mu^j \phi^j [\widehat{g}_s^{*j} - \bar{g}^{*j}]}{\phi}\right) \\ &= G\left(\frac{2\Delta_g}{\phi} \sum_{j=1}^J \mu^j \phi^j [\widehat{g}_s^{*j} - \bar{g}^{*j}]\right) \quad (\text{C.8}) \end{aligned}$$

Thus, pro-market party's probability of winning is given by:

$$P(x_R, x_L) = \frac{1}{2} + \frac{\psi}{\phi} 2\Delta_g \sum_{j=1}^J \mu^j \phi^j [\widehat{g}_s^{*j} - \bar{g}^{*j}] \quad (\text{C.9})$$

Pro-government party anticipates winning the election with the complementary probability $1 - P(x_R, x_L)$. Furthermore, the median ideological type, g_m^* , and the expected swing voters' ideology in the overall population, \widehat{g}_s^* , are defined as:

$$g_m^* = \frac{\sum_{j=1}^J \mu^j \phi^j \bar{g}^{*j}}{\phi} \quad \text{and} \quad \widehat{g}_s^* = \frac{\sum_{j=1}^J \mu^j \phi^j \widehat{g}^{*j}}{\phi} \quad (\text{C.10})$$

Hence, party R 's probability of winning can also be expressed as:

$$P(x_R, x_L) = \frac{1}{2} + \psi 2\Delta_g [\widehat{g}_s^* - g_m^*] \quad (\text{C.11})$$

As an alternative, making use of (C.6) this probability can be written in terms of policy platforms as:

$$P(x_R, x_L) = \frac{1}{2} + \psi \left(\frac{\sum_{j=1}^J \mu^j \phi^j [u(c_R^j) - u(c_L^j)]}{\phi} + 2\Delta_g [\bar{g}_{LR} - g_m^*] \right) \quad (\text{C.12})$$

C.2 Political Equilibrium

C.2.1 Policy Choice Problem

Taking the opponent's policy choice problem as given, each political party chooses a combination of public good provision and net income for each group, $x_P = (g_P, c_P)$ for $P \in \{R, L\}$, that maximizes its expected utility subject to economic feasibility and non-negativity constraints. Thus, the policy choice problem of party R is given by:

$$\max_{g_R, \{c_R^j\}_{j=1}^J} EU_R(x_R, x_L) \quad \text{s.t.} \quad g_R + \sum_{j=1}^J \mu^j c_R^j = y \quad \text{and} \quad g_R \geq 0 \quad ; \quad c_R^j \geq 0 \quad \forall j \quad (\text{C.13})$$

Party L makes simultaneous policy announcements and its policy choice problem is given by:

$$\max_{g_L, \{c_L^j\}_{j=1}^J} EU_L(x_R, x_L) \quad \text{s.t.} \quad g_L + \sum_{j=1}^J \mu^j c_L^j = y \quad \text{and} \quad g_L \geq 0 \quad ; \quad c_L^j \geq 0 \quad \forall j \quad (\text{C.14})$$

The constrained optimization problems for parties R and L exhibit the following Lagrangeans:

$$\begin{aligned} \mathcal{L}_R(g_R, c_R^1, \dots, c_R^J; \lambda_R) &= P(x_R, \bar{x}_L)[Q_R + W_R(g_R; g_R^*)] + [1 - P(x_R, \bar{x}_L)]W_R(\bar{g}_L; g_R^*) \\ &\quad + \lambda_R[y - g_R - \sum_{j=1}^J \mu^j c_R^j] + \gamma_{g_R} g_R + \sum_{j=1}^J \mu^j \gamma_{c_R}^j c_R^j \quad (\text{C.15}) \end{aligned}$$

$$\begin{aligned} \mathcal{L}_L(g_L, c_L^1, \dots, c_L^J; \lambda_L) &= [1 - P(\bar{x}_R, x_L)][Q_L + W_L(g_L; g_L^*)] + P(\bar{x}_R, x_L)W_L(\bar{g}_R; g_L^*) \\ &\quad + \lambda_L[y - g_L - \sum_{j=1}^J \mu^j c_L^j] + \gamma_{g_L} g_L + \sum_{j=1}^J \mu^j \gamma_{c_L}^j c_L^j \quad (\text{C.16}) \end{aligned}$$

where λ_P is the Lagrange multiplier associated to the economy feasibility constraint for $P \in \{R, L\}$; and $\gamma_{g_P} \geq 0$ and $\gamma_{c_P}^j$ are the multipliers associated to the non-negativity constraints $g_P \geq 0$ and $c_P^j \geq 0$ for all groups $j \in \{1, \dots, J\}$ for $P \in \{R, L\}$.

The First Order Conditions for pro-market party for an interior optimum are given by:

$$[g_R] \quad \frac{\partial P(x_R, x_L)}{\partial g_R} [Q_R + W_R(g_R; g_R^*) - W_R(g_L; g_R^*)] + P(x_R, x_L) \frac{\partial W_R(g_R; g_R^*)}{\partial g_R} = \lambda_R \quad (\text{C.17})$$

$$[c_R^j] \quad \frac{\partial P(x_R, x_L)}{\partial c_R^j} [Q_R + W_R(g_R; g_R^*) - W_R(g_L; g_R^*)] = \mu^j \lambda_R \quad \forall j \quad (\text{C.18})$$

The First Order Conditions for pro-government party for an interior optimum are given by:

$$[g_L] \quad -\frac{\partial P(x_R, x_L)}{\partial g_L} [Q_L + W_L(g_L; g_L^*) - W_L(g_R; g_L^*)] + [1 - P(x_R, x_L)] \frac{\partial W_L(g_L; g_L^*)}{\partial g_L} = \lambda_L \quad (\text{C.19})$$

$$[c_L^j] \quad -\frac{\partial P(x_R, x_L)}{\partial c_L^j} [Q_L + W_L(g_L; g_L^*) - W_L(g_R; g_L^*)] = \mu^j \lambda_L \quad \forall j \quad (\text{C.20})$$

Let Ω_P denote party P 's benefit of winning elections which is defined as the difference between the payoff under victory and defeat. Hence:

$$\Omega_P = \Omega_P(x_R, x_L) = Q_P + W_P(g_P; g_P^*) - W_P(g_{-P}; g_P^*) \quad (\text{C.21})$$

C.2.2 Equilibrium Policy Divergence

The set of FOCs implicitly define the best responses of each party as function of its opponent's strategy profile. When both candidates are playing their best responses there exists a Nash Equilibrium in which neither candidate has an incentive to offer an alternative policy. Therefore, a Nash Equilibrium of the policy announcement stage, (x_R^N, x_L^N) , is a solution to the system of equations consisting of parties' FOCs and their budget constraints. In the examined political game, we have $k = J + 1$ FOCs and a budget constraint for each candidate. Hence, the Nash equilibrium in the first stage of the game is the solution to the following system of equations and parties' budget constraints:

$$\frac{\frac{\partial P(x_R^N, x_L^N)}{\partial g_R} \Omega_R^N}{\lambda_R} + \frac{P(x_R^N, x_L^N) \frac{\partial W_R(g_R^N; g_R^*)}{\partial g_R}}{\lambda_R} = 1 \quad (\text{C.22})$$

$$\frac{\frac{\partial P(x_R^N, x_L^N)}{\partial c_R^j} \Omega_R^N}{\lambda_R} = \mu^j \quad \forall j \quad (\text{C.23})$$

$$-\frac{\frac{\partial P(x_R^N, x_L^N)}{\partial g_L} \Omega_L^N}{\lambda_L} + \frac{[1 - P(x_R^N, x_L^N)] \frac{\partial W_L(g_L^N; g_L^*)}{\partial g_L}}{\lambda_L} = 1 \quad (\text{C.24})$$

$$\frac{-\frac{\partial P(x_R^N, x_L^N)}{\partial c_L^j} \Omega_L^N}{\lambda_L} = \mu^j \quad \forall j \quad (\text{C.25})$$

C.2.3 Equilibrium Income Taxation Schedules

Consider the equilibrium FOCs for net income promised to group j by party R (C.18) and party L (C.20). Given these conditions, the equilibrium allocation of net income across groups promised by party P satisfies:

$$\frac{1}{\mu^k} \frac{\partial P(x_R^N, x_L^N)}{\partial c_P^k} \Omega_P^N = \frac{1}{\mu^{k'}} \frac{\partial P(x_R^N, x_L^N)}{\partial c_P^{k'}} \Omega_P^N \quad \forall k, k' \in \{1, \dots, J\} \quad \text{and} \quad \forall P \in \{R, L\} \quad (\text{C.26})$$

By (C.9) the change in parties' probability of winning because of marginal increase in group j 's net income is given by:

$$\frac{\partial P(x_R^N, x_L^N)}{\partial c_R^j} = \psi \frac{\mu^j \phi^j}{\phi} u_c(c_R^{jN}) \quad \text{and} \quad \frac{\partial P(x_R^N, x_L^N)}{\partial c_L^j} = -\psi \frac{\mu^j \phi^j}{\phi} u_c(c_L^{jN}) \quad \forall j \quad (\text{C.27})$$

Hence, equilibrium distribution of net income satisfies:

$$\phi^k u_c(c_P^{kN}) = \phi^{k'} u_c(c_P^{k'N}) \quad \forall k, k' \in \{1, \dots, J\} \quad \text{and} \quad \forall P \in \{R, L\} \quad (\text{C.28})$$

C.2.4 Equilibrium Public Goods Provision

By (C.9) the changes in parties' probability of winning because of marginal increase in public goods provision are given by:

$$\frac{\partial P(x_R^N, x_L^N)}{\partial g_R} = -\psi 2(g_R^N - g_m^*) \quad \text{and} \quad \frac{\partial P(x_R^N, x_L^N)}{\partial g_L} = \psi 2(g_L^N - g_m^*) \quad (\text{C.29})$$

Furthermore, in the particular case that preferences over public goods are quadratic, the effect in ideological well-being because of marginal changes in policy platforms are given by:

$$\frac{\partial W_R(g_R^N; g_R^*)}{\partial g_R} = -2(g_R^N - g_R^*) \quad \text{and} \quad \frac{\partial W_L(g_L^N; g_L^*)}{\partial g_L} = -2(g_L^N - g_L^*) \quad (\text{C.30})$$

Consider party R 's equilibrium FOCs for public goods (C.17) and net income promised to group j (C.18). When voters and politicians exhibit quadratic preferences, equilibrium conditions satisfy:

$$-\psi 2(g_R^N - g_m^*)\Omega_R^N - 2(g_R^N - g_R^*)P(x_R^N, x_L^N) = \lambda_R \quad (\text{C.31})$$

$$\psi \mu^j \frac{\phi^j}{\phi} u_c(c_R^{jN}) \Omega_R^N = \mu^j \lambda_R \quad \forall j \quad (\text{C.32})$$

The equilibrium conditions for party L satisfy:

$$-\psi 2(g_L^N - g_m^*)\Omega_L^N - 2(g_L^N - g_L^*)[1 - P(x_R^N, x_L^N)] = \lambda_L \quad (\text{C.33})$$

$$\psi \mu^j \frac{\phi^j}{\phi} u_c(c_L^{jN}) \Omega_L^N = \mu^j \lambda_L \quad \forall j \quad (\text{C.34})$$

Taking (C.31) and (C.32), party R 's equilibrium choice between allocating one unit of income to public goods provision and to net income to group k satisfies:

$$-\psi 2(g_R^N - g_m^*)\Omega_R^N - 2(g_R^N - g_R^*)P(x_R^N, x_L^N) = \frac{1}{\mu^k} \frac{\phi^k}{\phi} \mu^k \psi u_c(c_R^{kN}) \Omega_R^N \quad \forall k \in \{1, \dots, J\} \quad (\text{C.35})$$

Similarly, the equilibrium policy choice for party L satisfies:

$$-\psi 2(g_L^N - g_m^*)\Omega_L^N - 2(g_L^N - g_L^*)[1 - P(x_R^N, x_L^N)] = \frac{1}{\mu^k} \frac{\phi^k}{\phi} \mu^k \psi u_c(c_L^{kN}) \Omega_L^N \quad \forall k \in \{1, \dots, J\} \quad (\text{C.36})$$

Simplifying and arranging terms, (C.35) can be written as:

$$-\phi 2(g_R^N - g_m^*) - \phi 2(g_R^N - g_R^*) \frac{P(x_R^N, x_L^N)}{\psi \Omega_R^N} = \phi^k u_c(c_R^{kN}) \quad \forall k \quad (\text{C.37})$$

The weighted average of the density of group-specific distributions of ideological preferences was defined as:

$$\phi = \sum_{j=1}^J \mu^j \phi^j \quad (\text{C.38})$$

Furthermore, from the equilibrium relative treatment in terms of net income (C.28) we obtain:

$$\frac{\phi^j}{\phi^k} = \frac{u_c(c_R^{kN})}{u_c(c_R^{jN})} \quad \forall j, k \in \{1, \dots, J\} \quad (\text{C.39})$$

Making use of both the definition (C.38) and the relation (C.39), equilibrium condition (C.37) can be written as:

$$\sum_{j=1}^J \mu^j \frac{\phi^j}{\phi^k} \frac{-2(g_R^N - g_m^*)}{u_c(c_R^{kN})} + \frac{P(x_R^N, x_L^N)}{\psi \Omega_R^N} \sum_{j=1}^J \mu^j \frac{\phi^j}{\phi^k} \frac{-2(g_R^N - g_R^*)}{u_c(c_R^{kN})} = 1 \quad (\text{C.40})$$

$$\sum_{j=1}^J \mu^j \frac{u_c(c_R^{kN})}{u_c(c_R^{jN})} \frac{-2(g_R^N - g_m^*)}{u_c(c_R^{kN})} + \frac{P(x_R^N, x_L^N)}{\psi \Omega_R^N} \sum_{j=1}^J \mu^j \frac{u_c(c_R^{kN})}{u_c(c_R^{jN})} \frac{-2(g_R^N - g_R^*)}{u_c(c_R^{kN})} = 1 \quad (\text{C.41})$$

$$\sum_{j=1}^J \mu^j \frac{-2(g_R^N - g_m^*)}{u_c(c_R^{jN})} + \frac{P(x_R^N, x_L^N)}{\psi \Omega_R^N} \sum_{j=1}^J \mu^j \frac{-2(g_R^N - g_R^*)}{u_c(c_R^{jN})} = 1 \quad (\text{C.42})$$

Given the assumption on available technology to provide public goods, the marginal rate of transformation between income and public goods, $MRT_{g,c}$, is equal to one. Furthermore, given party R 's platform, the marginal rate of substitution between public goods and net income for individuals in group j with median ideological type, $MRS_{g_R, c_R}^{jg_m^*}$, and ideological position of party R , $MRS_{g_R, c_R}^{jg_R^*}$, are given by:

$$MRS_{g_R, c_R}^{jg_m^*} = \frac{-2(g_R^N - g_m^*)}{u_c(c_R^{jN})} \quad \text{and} \quad MRS_{g_R, c_R}^{jg_R^*} = \frac{-2(g_R^N - g_R^*)}{u_c(c_R^{jN})} \quad \forall j \quad (\text{C.43})$$

Hence, party R 's equilibrium condition can be written as:

$$\sum_{j=1}^J \mu^j MRS_{g_R, c_R}^{jg_m^*} + \gamma_R^N \sum_{j=1}^J \mu^j MRS_{g_R, c_R}^{jg_R^*} = MRT_{g,c} \quad (\text{C.44})$$

where $\gamma_R^N = \frac{P(x_R^N, x_L^N)}{\psi \Omega_R^N}$; and equilibrium Ω_R^N is given by:

$$\Omega_R^N = Q + 2\Delta_g^N (\bar{g}_{LR}^N - g_R^*) \quad (\text{C.45})$$

The equilibrium condition for party L can be obtained following the same steps, and therefore it can be written as:

$$\sum_{j=1}^J \mu^j MRS_{g_L, c_L}^{jg_m^*} + \gamma_L^N \sum_{j=1}^J \mu^j MRS_{g_L, c_L}^{jg_L^*} = MRT_{g,c} \quad (\text{C.46})$$

where $\gamma_L^N = \frac{[1-P(x_R^N, x_L^N)]}{\psi \Omega_L^N}$; and equilibrium Ω_L^N is given by:

$$\Omega_L^N = Q + 2\Delta_g^N (g_L^* - \bar{g}_{LR}^N) \quad (\text{C.47})$$

The system of equations formed by (C.44), (C.46) and the feasibility constraints for both parties simultaneously determine equilibrium policy platforms (c_R^N, g_R^N) and (c_L^N, g_L^N) .

In the particular case in which all groups exhibit the same concentration of expected swing voters ($\phi^j = \phi \ \forall j$), both political parties implement income taxation schedules that implement an egalitarian distribution of income ($c_R^{jN} = c^N$ and $c_L^{jN} = c^N \ \forall j$). Thus, the system of equations that simultaneously determine equilibrium policy platforms can be written as:

$$MRS_{g_R, c_R}^{g_m^*} + \gamma_R^N MRS_{g_R, c_R}^{g_R^*} = MRT_{g, c} \quad (\text{C.48})$$

$$MRS_{g_L, c_L}^{g_m^*} + \gamma_L^N MRS_{g_L, c_L}^{g_L^*} = MRT_{g, c} \quad (\text{C.49})$$

C.2.5 Electoral Advantage Right-wing Party

In equilibrium, the expected indifferent swing voter in group j , \widehat{g}_s^{*jN} , is implicitly defined by:

$$u(c_R^{jN}) - u(c_L^{jN}) = W(g_L^N; \widehat{g}_s^{*jN}) - W(g_R^N; \widehat{g}_s^{*jN}) \quad \forall j \in \{1, \dots, J\} \quad (\text{C.50})$$

In equilibrium, net income in group j promised by party R is larger than the income that results from party L 's platform, therefore expected swing voters' private well-being is larger under party R 's income taxation policy platform:

$$c_R^{jN} > c_L^{jN} \rightarrow u(c_R^{jN}) - u(c_L^{jN}) > 0 \quad \forall j \quad (\text{C.51})$$

Furthermore, party L commits to larger public goods proposals than party R , $g_L^N > g_R^N$. Therefore, according to (C.50), in equilibrium, swing voters' ideological

utility loss under party L 's proposal is lower than the ideological loss implied by party R 's proposal:

$$W(g_L^N; \widehat{g}_s^{*jN}) - W(g_R^N; \widehat{g}_s^{*jN}) > 0 \quad \forall j \quad (\text{C.52})$$

Hence, expected swing voters are indifferent between the ideological benefits associated to party L 's victory and the larger private economic well-being if party R wins elections. Therefore, in equilibrium the ideological positions of expected swing voters in group j are closer to pro-government party L 's ideological leanings than to pro-market R 's positions. Hence, the ideology of the equilibrium indifferent type in any group is larger than the median ideological position in the overall population:

$$\widehat{g}_s^{*jN} > g_m^* \quad \forall j \quad \rightarrow \quad \widehat{g}_s^{*N} > g_m^* \quad (\text{C.53})$$

This shows that in each group there exists a subset of citizens biased toward pro-government ideology who are expected to vote for pro-market party. Thus, in equilibrium the probability that party R wins elections is larger than one-half:

$$P(x_R^N, x_L^N) > 1/2 \quad (\text{C.54})$$

C.3 Comparative Statics

C.3.1 Electoral Uncertainty

In the limit case in which $\psi \rightarrow 0$ (i.e. huge electoral uncertainty), party R 's equilibrium condition (C.35) can be written as:

$$-2(g_R^N - g_R^*)P(x_R^N, x_L^N) = 0 \quad (\text{C.55})$$

Similarly, given (C.36), party L 's equilibrium condition is given by:

$$-2(g_L^N - g_L^*)[1 - P(x_R^N, x_L^N)] = 0 \quad (\text{C.56})$$

Furthermore, when $\psi \rightarrow 0$, the equilibrium probability that party R wins elections tends to one-half. Therefore, given (C.55) and (C.56), parties' equilibrium public goods proposals tends to their respective ideological bliss points:

$$g_R^N \rightarrow g_R^* \quad \text{and} \quad g_L^N \rightarrow g_L^* \quad (\text{C.57})$$

Both parties exhibit the same chances of winning elections, i.e. $P(x_R^N, x_L^N) = 1/2$, and parties' platforms do not support ideological sacrifice, $z_R^N = z_L^N = 0$.

C.3.2 Private Benefits of winning

When parties' private benefits associated to win elections are huge (i.e. $Q \rightarrow \infty$), equilibrium conditions (C.44) and (C.46) can be written as:

$$\sum_{j=1}^J \mu^j \frac{-2(g_P^N - g_m^*)}{u_c(c_P^{jN})} \rightarrow 1 \quad \text{then} \quad \sum_{j=1}^J \mu^j MRS_{g,c}^{jg_m^*} \rightarrow MRT_{g,c} \quad \forall P \in \{R, L\} \quad (\text{C.58})$$

Therefore, in equilibrium, when $Q \rightarrow \infty$ both political parties tend to converge to the same economic policy platform (i.e. $g^N = g_R^N = g_L^N$ and $c^{jN} = c_R^{jN} = c_L^{jN} \forall j$). The equilibrium distribution of net income across groups is characterized by (C.28). Furthermore, the equilibrium public goods provision and income taxation schedules tend to converge towards the weighted average of the preferred policy of individuals located in group j with median ideological type.

In the particular case in which all groups exhibit the same concentration of expected swing voters ($\phi^j = \phi \forall j$), both political parties implement income taxation schedules that implement an egalitarian distribution of income ($c^{jN} = c^N \forall j$). Furthermore, parties' equilibrium policy platform satisfies:

$$\frac{-2(g_P^N - g_m^*)}{u_c(c^N)} \rightarrow 1 \quad \text{then} \quad MRS_{g,c}^{g_m^*} \rightarrow MRT_{g,c} \quad \forall P \in \{R, L\} \quad (\text{C.59})$$

Hence, both parties tend to converge towards the preferred public good policy of the median ideological type. Furthermore, when political parties converge to the

same policy platforms, individuals are expected to be indifferent between parties. Thus, the equilibrium probability that party R wins elections tends to one-half.

C.4 Utilitarian Allocation

The Utilitarian social welfare function (UW) integrates over all individuals' utility functions:

$$UW \equiv \sum_{j=1}^J \mu^j \left[\int_{g_a^{*j}}^{g_b^{*j}} V(c^j, g; g_i^*) \phi^j dg_i^* \right] \quad (\text{C.60})$$

$$\begin{aligned} &= \sum_{j=1}^J \mu^j \left[\int_{g_a^{*j}}^{g_b^{*j}} [u(c^j) + W(g; g_i^*)] \phi^j dg_i^* \right] \\ &= \sum_{j=1}^J \mu^j u(c^j) + \sum_{j=1}^J \mu^j \int_{g_a^{*j}}^{g_b^{*j}} W(g; g_i^*) \phi^j dg_i^* \end{aligned} \quad (\text{C.61})$$

A benevolent utilitarian government maximizes (C.61) subject to the economy feasibility constraint. The Lagrangean for the constrained optimization problem is given by:

$$\mathcal{L}_U = \sum_{j=1}^J \mu^j u(c^j) + \sum_{j=1}^J \mu^j \int_{g_a^{*j}}^{g_b^{*j}} W(g; g_i^*) \phi^j dg_i^* + \lambda \left[y - g - \sum_{j=1}^J \mu^j c^j \right] \quad (\text{C.62})$$

The First Order Conditions for an interior optimum are given by:

$$[c^j] \quad \mu^j u_c(c^j) = \lambda \mu^j \rightarrow u_c(c^j) = \lambda \quad \forall j \quad (\text{C.63})$$

$$[g] \quad -2(g - \bar{g}^*) = \lambda \rightarrow W_g(g; \bar{g}^*) = \lambda \quad (\text{C.64})$$

Considering (C.63), the distribution of net income across groups satisfies:

$$u_c(c_U^k) = u_c(c_U^{k'}) \quad \forall k, k' \in \{1, \dots, J\} \quad (\text{C.65})$$

Furthermore, the utilitarian allocation of resources satisfies:

$$\frac{W_g(g_U; \bar{g}^*)}{u_c(c_U)} = 1 \rightarrow MRS_{g,c}^{\bar{g}^*} = MRT_{g,c} \quad (\text{C.66})$$

Therefore, a benevolent utilitarian government implements an egalitarian distribution of income and the level of public goods provision preferred by individuals with average ideology.