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Imperfect Electoral Constraints and Taxation for an Economy with Ideological Parties and Ideological Voters

Ikuho Kochi[1] & Raul Alberto Ponce Rodriguez[2]

Abstract

In this paper we analyze the design of tax structure through a model of electoral competition in which political parties have preferences over fiscal outcomes and the individuals' vote is influenced by policy issues and partisan attitudes. We analyze the tradeoff between the representation of the narrow interests of the core supporters of the party versus the representation of the pluralist preferences of the electorate in tax policy. This tradeoff depends on the electoral constraints faced by parties. To predict tax policies, we introduce a model that can distinguish different sets of electoral constraints. Our model predicts that under soft electoral constraints, taxeson income elastic goods increase under Democrat administrations while they fall under Republican governments. If electoral constraints are binding, parties design tax policy to maximize a politically aggregated welfare function (PAWF). We identify conditions in which the preferences of partisan voters will have a high weight in the PAWF. In this case, we identify conditions in which redistribution is the main guiding principle in determining tax policy in Democrat administrations while efficiency is the main principle in tax design in Republican administrations.

Keywords: Elections and voting behavior, efficiency, redistribution, public goods, tax structure, policy making

JELClassification: D72;H21;H23;H41; H20; D78

I. Introduction

The leading paradigm of electoral competition, the Downs' model, explains the design of spending and tax policies under two fundamental assumptions: first, citizens vote for the party that advances the platform that is closest to the voters' preferences over policies. Second, parties propose policies to win the election. However, evidence suggests that the individuals' choice of the vote is explained, among other things, by the parties' policies and the voters' partisan attitudes. Evidence also suggests that the voter's party identification (or partisan attitude) is the best predictor of the actual vote (Republican and Democrat voters tend to vote, respectively, for the Republican and Democrat party), and the stylized facts indicate that the vast majority of the American electorate has a partisan attitude.[3]

[1]Universidad Autónoma de Ciudad Juárez, Instituto de Ciencias Sociales y Administración, Heroico Colegio Militar y Av. Universidad No. 3775, Zona Chamizal, c.p. 32310, Ciudad Juárez, Chihuahua, México. E-mails: Ikuho Kochi, ikuho.kochi@uacj.mx
[2]Universidad Autónoma de Ciudad Juárez, Instituto de Ciencias Sociales y Administración, Heroico Colegio Militar y Av. Universidad No. 3775, Zona Chamizal, c.p. 32310, Ciudad Juárez, Chihuahua, México. E-mails: rponce@uacj.mx, rponcer@yahoo.com.
[3]For analysis on voting behavior and partisan attitudes see Niemi and Weisberg (2001), Miller, and Shanks (1996), Green, Palmquist, and Schickler (2002), Fiorina (1997), Green, and Palmquist (1990), Campbell, et al (1960).

With respect the Downsian assumption that parties design policies to win elections, many researchers have emphasized that parties seek to win the election to advance the interests of the parties' supporters (see Wittman 1973, 1983, 1990, Alesina 1987, 1988, Roemer 2006). In other words, parties have preferences over policy outcomes, and therefore parties do not seek to propose policies to win the election, as Downs (1957) argued, but seek to win the election to implement their ideal policies.

The formulation of fiscal policy when the individuals' choice of the vote is explained by policy issues and partisan attitudes, and parties are policy motivated has not received adequate attention in the literature of public finance. In this context, questions such as: How are the conflicting preferences of voters over taxes going to be aggregated into a policy platform? And what is the impact of the representation of the voters' interests on the tradeoff between redistributive politics and efficiency? have not been adequately addressed in the literature. Furthermore, the question on how the parties' preferences for policy and the electoral competition influence the tradeoff between efficiency and redistribution has not received adequate attention.

Finally, considering policy motivated parties and an electorate with partisan attitudes allows us to recognize that the parties' electoral constraints are affected by the voters' loyalties.[4] In fact, empirical evidence suggests that imperfections in the process of political competition affect the tax and spending policies of state governments. For instance, Reed (2006), Alt and Lowry (2001), Caplan (2001) find evidence that state taxes increase when Democrats have significant control of the executive and legislative bodies of state governments.[5] Nelson (2000) reports that Democratic administrations enacted 59% of the statutory state tax increases between 1943 and 1993, and 39% of total tax increases were approved under Democratic control of the legislature.

Fletcher and Murray (2006) find that party control is positively associated with higher top income tax rates, higher income threshold for the first bracket of the income tax, and Democratic administrations lead to higher earned income tax credits. Chernick (2005) finds that party control by Republicans is associated with more regressive state tax structures. Rogers and Rogers (2000) also find that imperfect political competition (in this case measured by an index that depends on the share of the vote in the governor's election) leads to greater state tax revenue and spending. Thus, for the purpose of explaining the observed spending and tax policies of governments, it is important that our models incorporate how imperfections in the political arena affect the decision making process of policy. The objective of this paper is to answer the questions raised above and to develop a model that can rationalize tax and spending policies under soft electoral constraints to explain the stylized facts on tax policy in the U.S.

The main contribution of this paper is to extend the literature on tax design by considering that voting behavior is influenced by the voters' preferences over policy issues and partisan loyalties and parties have preferences over fiscal outcomes. In our economy, tax policy is the result of two conflicting incentives: On the one hand, parties seek to design a tax system that redistributes in favor of the party's core base. On the other hand, the parties' need to win the election forces them to design a tax platform that appeals to a majority. The two conflicting incentives describe the tradeoff between the preferences of a minoritarian coalition in control of the party versus the aggregation of the preferences of a majority in the electorate in determining fiscal policy. This tradeoff depends on the electoral constraints faced by parties.

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4 We define the electoral constraints of a party, as the party's need to design policies with the support of a majority to win the election. To see that the partisan preferences modify the parties' electoral constraints, suppose three states of nature in which a party expects to receive respectively, 10%, 20%, and 30%, of the share of the vote in the election from voters who decide their vote based on their party identification (partisan preference). Thus, conditional to the state of nature, a policy motivated party might select policies that seek to secure an additional 41%, 31%, and 21%, respectively, of the share of vote to win the election. Hence, the proportion of the vote a party expects to receive because of the voters' loyalties reduces the party's need to design policies to attract more votes. In this sense, the electoral constraints of the party are softened.

5 Party's control of the legislature can be interpreted as an environment in which a majoritarian coalition faces little or imperfect political competition.

Our model of electoral competition allows us to distinguish different sets of electoral constraints for parties. If a party faces soft electoral constraints (due to a high proportion of loyal voters in the electorate) then the tradeoff between redistributive politics and efficiency depends on the characteristics and tastes of the minoritarian coalition of voters controlling the party on power. In this case, our model identifies conditions in which a party representing the preferences of low (high) income voters with a high (low) valuation for public goods proposes a high (low) tax rate on income elastic commodities. If, in contrast, the electoral constraints are binding then parties select a policy with the appeal of a majority of voters. However, even in this case, the parties' policies do not converge since the voters' loyalties induce parties to aggregate the preferences of the electorate differently.

The rest of the paper is organized as follows: Section two includes the case for policy motivated parties in the analysis of public finance and the review of the literature. Section three characterizes the voters' preferences for tax policy. Section four characterizes te politico-economic equilibrium, taxes, and the tradeoff between redistributive politics and efficiency. Section five concludes.

II. Literature Review and the Case for Policy Motivated Parties in the Analysisof Public Finance

The leading paradigm of the theory of elections, the Downs' model, suggests that parties design fiscal policy to win the election. This assumption has been challenged by Wittman (1990, 1983,1973), Roemer (2006) and others. Their argument is that parties have preferences over policy outcomes since parties represent the interests of their constituencies**.**

If parties seek to advance the interests of their constituencies then the analysis of parties with preferences over policy outcomes (or the Wittman's electoral competition) is relevant for the study of public finance.

To see this, we use data from the American National Election Studies (ANES) which shows the voters' characteristics and preferences over spending. This data suggests that on average, for the period 1952-2008, (self identified) Democrat (Republican) voters prefer an increase (decrease) in government expenditures compared to the level of spending at the status quo.[6] Data from the ANES also shows that individuals with low levels of income are predominantly identified with the Democrat party, while voters at high levels of income with the Republican party.Thus, if parties represent the preferences over policies of their constituencies, then the analysis of fiscal policies when parties are policy motivated is relevant for the core issues of public finance such as the tradeoff between redistributive politics and efficiency, the indirect-direct tax controversy, and the size and composition of public spending.

Our review of the literature and the surveys conducted by Hettich and Winer (2004, 1999,1997), Mueller (2003), Gould and Baker (2002), Roemer (2006)indicate that the theoretical applications of the Wittman's electoral competition to the analysis of public finance have not received adequate attention. For example, insights might be gained by analyzing the type of tax structure, the selection of tax bases, and the special provisions that would arise in the context of the Wittman's electoral competition. Roemer (2006, 1999, 1997) provides some of the few applications of the Wittman electoral competition and considers the possibility of progressive income taxes. Roemer (2006) shows that under certain assumptions, policy motivated candidates propose the ideal policy of the median voter.[7] According to this prediction, the electoral constraints are binding as to remove any distortion on the representation of the voters' preferences that might have been created by parties seeking to advance the interests of their political base.

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6 See the reports from the American National Election Studies at http://www.electionstudies.org/nesguide/gd-index.htm.

7 These assumptions include: policy motivated parties have perfect information on the voters' preferences, the individuals' voting behavior is driven only by policy issues, policy is one-dimensional.

However, the median voter outcome is not the only equilibrium that might arise under the Wittman's political competition. In the analysis of Roemer (1997, 2006), the ideal policies of parties might also be an equilibrium if the electoral constraints were not binding at all.

Roemer assumes that parties have perfect information on the voters' preferences, and the individuals' choice of the vote is driven by policy issues. However, his analysis of the Wittman's electoral competition can not be extended to study multidimensional policies when there is political-economic heterogeneity of voters and parties have perfect information on the voters' preferences since the model does not produce an equilibrium.[8] Thus, to be able to predict multidimensional policies, in this paper we extend the analysis of the Wittman's electoral competition from the perspective of the probabilistic theory of elections.[9]Roemer also does not analyze the tradeoff between redistributive politics and efficiency while this is the focus of our paper.

Most of the probabilistic models of electoral competition assume that the individuals' vote is driven by policy issues (for a review of the literature see Mueller 2003). In contrast, empirical evidence shows that the voting behavior depends not only on policy issues but also on the voters' partisan loyalties. Furthermore, evidence shows that an overwhelming majority of the American electorate has a partisan attitude and the voter's party identification is considered the best predictor of the choice of the vote.[10] However, the analysis of tax and spending design when policy motivated parties have uncertainty on the voters' preferences and the individuals' vote is explained by policy issues and partisan loyalties has not received adequate attention.

The voters' partisan attitudes might influence the design of tax policy in several ways. First, partisan loyalties affect the individuals' choice of the vote and this, in turn, affect the way parties aggregates the voters' preferences over policy outcomes (see Kochi and Ponce-Rodriguez 2011, 2012). Second, when parties have preferences over policies, the voters' partisan loyalties might lead to softer electoral constraints. This, in turn, modifiesthe tradeoff between the representation of a broad spectrum of preferences from the electorate in tax and spending policies and the incentives for the representation of the preferences of a minoritarian coalition in designing fiscal policy.

This issue might be important to explain why governments design moderate or polarized fiscal policies.

The aggregation of the voters' preferences in the Wittman's electoral model when parties have imperfect information on the voters' preferences (i.e when the voting behavior is probabilistic) remains an unanswered question.In this paper we seek to contribute to fill this gap in the literature by providing a probabilistic model in which the choice of the vote is determined by policy and partisan issues and we analyze the role of imperfect electoral constraints inthe tradeoff between the representation of the interests of a majority from the electorate and the incentives for the representation of the interest of a minoritarian coalition in designing tax policy.

III. The Voters' Preferences for Tax Structure

Consider an economy with a continuum of voters-consumers. In this economy, individuals choose their consumption vector over the opportunity set and participate politically by voting for a party. We consider two candidates-parties denoted by *k* and *-k* competing to form the government. Preferences and the opportunity set for individuals are characterized as follows:

$$U^{hk} = \beta^h \mu^h\left(\mathbf{x}^h, G_s^k\right) + \left(1-\beta^h\right)\varepsilon^{hk} \text{ and } \mathbf{q}^k\mathbf{x}^h = \mathbf{p}\mathbf{x}^h + \mathbf{c}^h\left(\mathbf{t}^k\right) \leq w^h L^h \;\; \forall h \tag{1}$$

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8 See Roemer (2006) for a careful analysis of the existence of an electoral equilibrium under the Wittman's model.

9 The probabilistic theory of elections produces an electoral equilibrium when policy is multidimensional and there is heterogeneity of the voters' preferences over policies see Coughlin (1992).

10 For a comprehensive review of the determinants of voting behavior see Fiorina (1997).

Where U^{hk} is the overall utility of consumer *h* if party *k* forms the government, $\mu^h\left(\mathbf{x}^h, G_s^k\right)$ represents the preferences over private consumption $\mathbf{x}^h \in \Re^n$ and the public good G_s^k. The parameter ε^{hk} measures the partisan preference or attachment of consumer *h* for party *k* and $\beta^h \in [0,1]\ \forall h$ is a parameter measuring intensities of economic versus political preferences. Equation (1) implies that the overall utility of individuals depends not only on the policies that each party might enact (through the influence of $\mathbf{t}^k$ on $\mathbf{x}^h$ and the provision of the public good G_s^k) but also that individuals have a preference relation over the party in power. Here we adopt the Michigan school approach to partisan preference.

Consequently, we assume that the voters' party identification (or preference) is learned during childhood through a process of socialization, and it is largely exogenous (not based on policy views), see Campbell et al (1960), Miller and Shanks (1996), among others.[11]

The opportunity set is defined by the consumers' price $\mathbf{q}^k = \mathbf{p} + \mathbf{t}^k$. The supply of private commodities is perfectly elastic at $p_i\ \forall i = 1,2....n$. The producers' value is $\mathbf{p}\mathbf{x}^h, \mathbf{c}^h\left(\mathbf{t}^k\right) = \mathbf{t}^k\mathbf{x}^h$ is the tax liability of individual *h* under tax policies $\mathbf{t}^k \in \Re^n$ of party *k*. Labor income is given by $y^h = w^h L^h$ where w^h is the labor wage and L^h is the supply of labor services. From (1) we can derive the indirect utility function V^{hk}.[12]

$$\begin{aligned} V^{hk} &= \beta\upsilon^h\left(\mathbf{t}^k, G_s^k, y^h\right) + (1-\beta)\varepsilon^{hk} \\ &= Max\ \left\{\beta^h\mu^h\left(\mathbf{x}^{*h}, G_s^k\right) + \left(1-\beta^h\right)\varepsilon^{hk}\ \text{ s.t}: \mathbf{q}^k\mathbf{x}^{*h} \le w^h L^{*h}\ \ \forall h\right\} \end{aligned} \tag{2}$$

From equation (2) we obtain the ideal policy of voter *h* (denoted as $\mathbf{t}^{*h}, G_s^{*h}$) by maximizing the indirect utility V^{hk} subject to the constraint that the public good is financed by taxation. That is, we consider the voters' preference relation over the policy space constrained by the public budget condition $G_s^{*h} = R(\mathbf{t})$, where $R(\mathbf{t})$ is the tax revenue function $R(\mathbf{t}) = \sum_{h=1}^{n} t_i \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) x_i(\mathbf{t}, y, \theta)\, d\theta$, and where $x_i\left(\mathbf{t}^h, y, \theta\right)$ is the Marshallian demand which depends on labor income y^h and the tax structure. Hence, the ideal fiscal policies $\mathbf{t}^{*h}, G_s^{*h}$ for voter *h* can be found by solving the following problem:[13]

$$\underset{\{\mathbf{t}^h\}}{Max}\ \delta^h\left(\mathbf{t}, G_s, y^h\right) = V^{hk}/\beta^h = \upsilon^h\left(\mathbf{t}, \sum_{h=1}^{n} t_i \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\, x_i(\mathbf{t}, y, \theta)\, d\theta\right) + \left(1-\beta^h\right)/\beta^h\, \varepsilon^{hk} \tag{3}$$

The indirect utility function that recognizes the opportunity budget set of the individual and the public government's constraint (that is $\delta^h\left(\mathbf{t}, G_s, y^h\right)$) is our primitive preference relation over the policy space and it is assumed to be a concave function of taxes.[14]

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[11] This explains why we introduce the partisan preference as an additive parameter in (1).

[12] Equation (2) is obtained by finding $\mathbf{x}^{*h} \in \arg\max U^{hk} = \beta\mu^h\left(\mathbf{x}^h, G_s^k\right) + (1-\beta)\varepsilon^{hk}\ \text{ s.t}: \mathbf{q}^k\mathbf{x}^h \le w^h L^h\ \ \forall h$.

[13] For convenience we normalize (2) as shown in (3).

[14] Note that $\partial\delta^h/\partial t_i = \partial\upsilon^h/\partial t_i + \left\{\partial\upsilon^h/\partial G_s\right\}R_i$, where $R_i = \partial R(\mathbf{t})/\partial t_i$ is the marginal tax revenue and $\partial^2\delta^h/\partial^2 t_i = \partial^2\upsilon^h/\partial^2 t_i + \left\{\partial^2\upsilon^h/\partial^2 G_s\right\}\{R_i\}^2 + \left\{\partial\upsilon^h/\partial G_s\right\}\{R_{ii}\} < 0$ where $\partial^2\upsilon^h/\partial^2 t_i \ge 0$. Decreasing marginal utility on public goods implies $\left\{\partial^2\upsilon^h/\partial^2 G_s\right\}\{R_i\}^2 < 0$ while $\left\{\partial\upsilon^h/\partial G_s\right\}\{R_{ii}\} < 0$ if the marginal tax revenue is decreasing in tax rates, that is if $R_{ii} < 0$. Thus, concavity of $\delta^h\left(\mathbf{t}, G_s, y^h\right)$ implies that the decreasing marginal utility of public goods and decreasing marginal tax revenue dominate $\partial^2\upsilon^h/\partial^2 t_i \ge 0$.

By finding $t_i^{*h} : \partial\delta^h / \partial t_i = 0 \ \forall t_i^{*h}$ we obtain the optimal tax structure for voter *h* denoted as $\mathbf{t}^{*h} = \left[t_1^{*h}, t_2^{*h}, \ldots t_n^{*h}\right]$, while the most preferred level of the public good is obtained by using $\mathbf{t}^{*h} = \left[t_1^{*h}, t_2^{*h}, \ldots t_n^{*h}\right]$ into $G_s^h = \sum_{h=1}^{n} t_i^{*h} \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) x_i\left(\mathbf{t}^{*h}, y, \theta\right) d\theta$. Finally the utility of the individual's ideal policies is given by $\delta^{*hk}\left(\mathbf{t}^{*h}, G_s^{*h}, y^h\right)$.

Let us define $\theta^h = \left\{\varepsilon^{h,-k} - \varepsilon^{hk}\right\}\left(1-\beta^h\right)/\beta^h$, where $\left\{\varepsilon^{h,-k} - \varepsilon^{hk}\right\}$ represents the partisan bias while θ^h is a partisan bias normalized by a factor related with the weight in which the partisan preference explains the individuals' choice of the vote. Let voters identified with the Democrat party have a preference bias $\theta^h < 0$ for party *k* (or Democrat party) and Republican voters have a bias $\theta^h > 0$ for party *–k* (or Republican party). Evidence from the American National Election Studies (ANES) suggests that Democrat (Republican) voters support high (low) spending. Moreover, voters with low (high) levels of income are identified with the Democrat (Republican) party. We use these stylized facts to characterize the voters' preferences and type as follows: Let the domain of the distribution of the voters' partisan type be $\theta^h \in \left[\underline{\theta}, \bar{\theta}\right]$. Also, let the most preferred level of public good for $\forall \theta^0, \theta^1 \in \left[\underline{\theta}, \bar{\theta}\right] : \theta^0 < 0 \wedge \theta^1 > 0$ be denoted as $G_s^*\left(\theta^0\right) \geq G_s^*\left(\theta^1\right) \ \forall \theta^0, \theta^1$ and $\alpha(\theta)$ represents the marginal utility of income of voter type θ. According to the available evidence from the ANES, the voters' preferences for policy and parties can be characterized as follows: $\forall \theta^0, \theta^1 \in \left[\underline{\theta}, \bar{\theta}\right] : \theta^0 < \theta^1 \rightarrow \upsilon_G\left(\theta^0\right) > \upsilon_G\left(\theta^1\right) \wedge \ \alpha\left(\theta^0\right) > \alpha\left(\theta^1\right) : G_s^*\left(\theta^0\right) \geq G_s^*\left(\theta^1\right)$ where $\upsilon_G(\theta)$ is the marginal utility of the public good for voter type θ, and the covariance between θ and full income y is non negative (that is voters with higher than average incomes tend to identify with the Republican party).

IV. Electoral Competition and the Formulation of Fiscal Policy

In this section we characterize tax and spending policies as a result of the electoral competition between policy motivated parties that seek to hold office. In this economy the heterogeneity of preferences and wage income implies that voters have conflicting views about the ideal tax structure and the size of government spending. An election is the collective choice mechanism that solves the problem of fiscal policy design. The timing of our model is as follows: in the first stage of the game, parties announce policy platforms. Voters observe the parties' policies and vote sincerely for the policy that maximizes the voters' well being. After the election takes place, the winning party takes all and implements the policy platform.

We assume parties *k* and-*k* compete by selecting tax and spending policies. The parties' objective is to design fiscal policies that maximize the expected utility of a faction inside the party. The parties' platforms need to recognize the electoral constrains in order to maximize the parties' chance to hold office.

Let $\pi^k\left(\mathbf{P}^k, \mathbf{P}^{-k}\right)$ be the probability of winning the election for party *k* where the vector $\mathbf{P}^k \in \Re^{n+1} : \mathbf{P}^k = \left[\mathbf{t}^k, G_s^k\right]$ denotes the public policies proposed by party *k* and $\mathbf{P}^{-k}$ are the policies of party -*k*. Also, assume that parties are uncertain about the individuals' choice of the vote which can be influenced, among other things, by policy issues, partisan attitudes, the voters' perceptions over candidates (such as the candidates' religion, gender, ethnic background, honesty, etc.), and a retrospective view of the candidates' performance, see Fiorina (1997). Therefore, it is quite compelling to assume that parties do not have perfect information on the determinants of the vote.

Thus, the parties' system of beliefs on voting behavior is characterized as follows: Let there exists a voter *h* with a partisan attitude θ^h and a pair of set of policies $\mathbf{P}^k, \mathbf{P}^{-k}$ such that the probability voter *h* votes for candidate *k* is Pr^{hk}.

Let f^k be the probability distribution function (pdf) over $\Psi^h(-\theta^h) = \upsilon^{hk}(\mathbf{t}^k, G_s^k, y^h) - \upsilon^{h-k}(\mathbf{t}^{-k}, G_s^{-k}, y^h) - \theta^h$ with $\theta^h = \frac{(1-\beta^h)}{\beta^h}\{\varepsilon^{h,-k} - \varepsilon^{hk}\}$ and $\Psi^h(-\theta^h)$ is defined as the net utility from policy and partisan issues for voter type θ^h if party *k* is elected.

Note that $\upsilon^k(\mathbf{t}^k, G_s^k, y^h)$ is the utility for voter *h* when party *k* selects policies $\mathbf{t}^k, G_s^k$, and a similar interpretation is given to $\upsilon^{-k}(\mathbf{t}^{-k}, G_s^{-k}, y^h)$. Thus, the probability voter *h* votes for candidate *k* is given by $\Pr(\, h \text{ voting } k\,) = \Pr^{hk}(\upsilon^{hk}(\mathbf{t}^k, G_s^k, y^h) - \upsilon^{h-k}(\mathbf{t}^{-k}, G_s^{-k}, y^h) - \theta^h) = \int_{-\infty}^{\Psi^h} f^k(\psi^h)d\psi^h = F^k(\Psi^h)$. The expression $F^k(\Psi^h): \mathbf{P}^k \times \mathbf{P}^{-k} \times \theta^h \to [0,1]$ is a cumulative distribution function evaluated at $\Psi^h(-\theta^h)$ for some θ^h and $\mathbf{P}^k, \mathbf{P}^{-k}$. Assume $F^k(\Psi^h)$ is a continuous, non decreasing function of $\Psi^h(-\theta^h)$.

For convenience of the analysis, let the distribution of types of the partisan preference be given by $\theta^h \in [\underline{\theta}, \bar{\theta}]$ where $\underline{\theta} = Min\{\theta^h\}_{\forall h}$, $\bar{\theta} = Max\{\theta^h\}_{\forall h}$ and $\underline{\theta} < 0 \wedge \bar{\theta} > 0$. Let $\forall \theta^h \in [\underline{\theta}, \bar{\theta}]$ there is a fraction of voters $g(\theta)$ such that $\forall h \neq h' \in g(\theta)$, $\theta^h = \theta^{h'} = \theta$ and $y^h = y^{h'} = y : \Pr^{hk} = \Pr^{h'k} = \Pr^{\theta k}$ where $\Pr^{\theta k}(\Psi(-\theta)) = \int_{-\infty}^{\Psi(-\theta)} f^k(\psi)d\psi$ and $\Psi(-\theta) = \upsilon^k(\mathbf{t}^k, G_s^k, y) - \upsilon^{-k}(\mathbf{t}^{-k}, G_s^{-k}, y) - \theta$. The proportion of the expected votes, $\phi^k(\mathbf{P}^k, \mathbf{P}^{-k})$, is a function that aggregates the probabilities of voting for a candidate across the voters' partisan type $\forall \theta \in [\underline{\theta}, \bar{\theta}]$ for party *k*:[15]

$$\phi^k(\mathbf{P}^k, \mathbf{P}^{-k}) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) F^k(\Psi(-\theta)) d\theta \tag{4}$$

The probability to win the election is denoted by the cumulative distribution over the plurality of parties. Let $M^k : \phi^k \times \phi^{-k} \to [0,1]$ where we assume M^k is a continuous non decreasing and a strictly concave cumulative distribution function of $\mathbf{P}^k\ \forall k$. Let $M'^k = m^k(\rho^k) \geq 0$ be the corresponding pdf. Therefore the probability of winning the election for party *k* under policies $\mathbf{P}^k, \mathbf{P}^{-k}$ is:

$$\pi^k(\rho^k) = \pi^k(\phi^k - \phi^{-k}) \tag{5}$$

Where $\rho^k = \phi^k(\mathbf{P}^k, \mathbf{P}^{-k}) - \phi^{-k}(\mathbf{P}^k, \mathbf{P}^{-k})$ is the proportion of the expected plurality for party *k*.We assume $\pi^k(\rho^k)$ is a continuous, non decreasing function of ρ^k. Hence we can characterize the probability of winning the election as:

$$\pi^k(\mathbf{P}^k, \mathbf{P}^{-k}) = \int_{-\infty}^{\rho^k} m^k(\rho^k) d\rho^k \tag{6}$$

As mentioned earlier, the problem for candidate *k* is to select the tax vector and the public good that leads to the highest expected utility of the minoritarian coalition controlling party*k* subject to the constraints imposed by electoral competition.

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[15] Similarly, the proportion of the expected vote for candidate –*k* is $\phi^{-k}(\mathbf{P}^k, \mathbf{P}^{-k}) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) F^{-k}(-\Psi(-\theta)) d\theta$.

Formally, the problem of tax and spending policy design for parties *k*and$-k$ are:

$$k:\ \underset{\{\mathbf{t}^k, G_s^k\}}{Max}\ \Im^k = \pi^k \delta^k\left(\mathbf{P}^k, y^k\right) + \left\{1-\pi^k\right\}\delta^k\left(\mathbf{P}^{-k}, y^k\right) \quad \text{s.t:}\ \pi^k\left(\mathbf{P}^k, \mathbf{P}^{-k}\right) = \int_{-\infty}^{\rho^k} m^k\left(\rho^k\right) d\rho^k$$

$$-k:\ \underset{\{\mathbf{t}^{-k}, G_s^{-k}\}}{Max}\ \Im^{-k} = \pi^{-k} \delta^{-k}\left(\mathbf{P}^{-k}, y^{-k}\right) + \left\{1-\pi^{-k}\right\}\delta^{-k}\left(\mathbf{P}^{k}, y^{-k}\right) \quad \text{s.t:}\ \pi^{-k}\left(\mathbf{P}^k, \mathbf{P}^{-k}\right) = \int_{-\infty}^{\rho^{-k}} m^{-k}\left(\rho^{-k}\right) d\rho^{-k} \tag{7}$$

For party *k*, $\Im^k$ is the expected utility of the coalition of voters who control party*k* , $\pi^k\delta^k\left(\mathbf{P}^k, y^k\right)$ is the expected utility in the state in which party *k* wins and implements policies $\mathbf{t}^k, G_s^k$ where $\delta^k\left(\mathbf{P}^k, y^k\right)$ is given by condition (3) and $\left\{1-\pi^k\right\}\delta^k\left(\mathbf{P}^{-k}, y^k\right)$ is the expected utility under the state in which the opposition wins and implements policies $\mathbf{t}^{-k}, G_s^{-k}$. A similar interpretation is given for $\Im^{-k}$.

Definition 1. The electoral-economic equilibrium for this economy is constituted as follows:

1. i) *In the first stage parties k and –k announce policies* $\mathbf{P}^{*k}$ *and* $\mathbf{P}^{*-k}$ *where*

$$\mathbf{P}^{*k} \in ArgMax\ \Im^k \ and \ \ \mathbf{P}^{*-k} \in ArgMax\ \Im^{-k}$$

1. ii) *In the second stage, voters with preferences* $\theta \in \left[\underline{\theta}, \bar{\theta}\right]$ *vote for party k if* $\Psi(-\theta) > 0$, *for party –k if* $\Psi(-\theta) < 0$ *and if* $\Psi(-\theta) = 0$ *the voter flips a fair coin.*

Proposition 1. *The politically optimal tax structure* $t_i^{*k} > 0,\ \forall i$ *satisfies the following*:

$$-\frac{\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) S_{ij}\, d\theta}{X_i} = \frac{\sigma^k\left[f^k(\Psi(-\theta)), \lambda\right] + \left\{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta\right\}\left\{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta\right\}}{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \upsilon_G d\theta + \left(\pi^k / \Upsilon^k \Delta\delta^k\right)\upsilon_G^k}$$
$$+ \frac{\left(\pi^k / \Upsilon^k \Delta\delta^k\right)\lambda^k}{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \upsilon_G d\theta + \left(\pi^k / \Upsilon^k \Delta\delta^k\right)\upsilon_G^k} - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) T(i) \frac{\partial c}{\partial y} d\theta \tag{8}$$

Where $\Delta\delta^k = \delta^k\left(\mathbf{P}^k, y^k\right) - \delta^k\left(\mathbf{P}^{-k}, y^k\right)$

Proof.

From the first order conditions

$$\frac{\partial \pi^k}{\partial t_i^k}\Delta\delta^k + \pi^k \frac{\partial \delta^k}{\partial t_i^k} = 0 \ \ \forall\, t_i^{*k} > 0 \tag{9}$$

With $\frac{\partial \pi^k}{\partial t_i^k} = \Upsilon^k \frac{\partial \phi^k}{\partial t_i^k} = \Upsilon^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \frac{\partial \Psi^k}{\partial t_i^k} d\theta$, $\Upsilon^k = 2w^k$, $\frac{\partial \delta^k}{\partial t_i^k} = \frac{\partial \upsilon^k}{\partial t_i^k} + \frac{\partial \upsilon^k}{\partial G_s^k}\frac{\partial R(\mathbf{t})}{\partial t_i^k}$ and $R(\mathbf{t}) = \sum_{h=1}^{n} t_i^h \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) x_i(\mathbf{t}, y, \theta) d\theta$ then

$\frac{R(\mathbf{t})}{\partial t_i^k} = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) x_i(\mathbf{t}, y, \theta) d\theta + \sum_{j=1}^{n} t_j^h \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) \frac{\partial x_j(\mathbf{t}, y, \theta)}{\partial t_i^k} d\theta$. Use $\frac{\partial \pi^k}{\partial t_i^k}, \frac{\partial \delta^k}{\partial t_i^k}$ and $\frac{\partial R(\mathbf{t})}{\partial t_i^k}$ into the first order conditions to show that

$$-\frac{\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) S_{ij}\, d\theta}{X_i} = \frac{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \lambda d\theta + \left(\pi^k / \Upsilon^k \Delta\delta^k\right)\lambda^k}{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \upsilon_G d\theta + \left(\pi^k / \Upsilon^k \Delta\delta^k\right)\upsilon_G^k} - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) \frac{\partial c}{\partial y} T(i)\, d\theta \qquad (10)$$

Where $MRS_{G-\alpha} = \upsilon_G / \alpha$, α is the marginal utility of income of a voter type θ , and $T(i) = \frac{t_i^k x_i(\mathbf{t}, y, \theta)}{t_i^k X_i}$ where $X_i = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) x_i(\mathbf{t}, y, \theta)\, d\theta$. Hence, define λ by

$$\lambda = \alpha \left\{ MRS_{G-\alpha} - T(i) \right\} \qquad (11)$$

Similarly, define $MRS_{G-\alpha}^k = \upsilon_G^k / \alpha^k$, α^k , and $T^k(i) = \frac{t_i^k x_i^k(\mathbf{t}, y, \theta)}{t_i^k X_i}$ to obtain

$$\lambda^k = \alpha^k \left\{ MRS_{G-\alpha}^k - T^k(i) \right\} \qquad (12)$$

The term $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) \frac{\partial c}{\partial y} T(i)\, d\theta = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) \left\{ \sum_{\forall j} t_j^k \left(\frac{\partial x_j(\mathbf{t}, y, \theta)}{\partial y} \right) \right\} T(i)\, d\theta$ with $\frac{\partial c}{\partial y} = \left\{ \sum_{\forall j} t_j^k \left(\frac{\partial x_j(\mathbf{t}, y, \theta)}{\partial y} \right) \right\}$.

Define $\sigma^k \left[f^k(\Psi(-\theta), \lambda) \right]$ as the covariance between $f^k(\Psi(-\theta))$ and λ , then it is satisfied

$$\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \lambda d\theta = \sigma^k \left[f^k(\Psi(-\theta)), \lambda \right] + \left\{ \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta \right\} \left\{ \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) \lambda d\theta \right\} \qquad (13)$$

Use (13) into (10) to show

$$\begin{aligned} -\frac{\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) S_{ij}\, d\theta}{X_i} &= \frac{\sigma^k \left[f^k(\Psi(-\theta)), \lambda \right] + \left\{ \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta \right\} \left\{ \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) \lambda d\theta \right\}}{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \upsilon_G d\theta + \left(\pi^k / \Upsilon^k \Delta\delta^k\right)\upsilon_G^k} \\ &+ \frac{\left(\pi^k / \Upsilon^k \Delta\delta^k\right)\lambda^k}{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \upsilon_G d\theta + \left(\pi^k / \Upsilon^k \Delta\delta^k\right)\upsilon_G^k} - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) T(i) \frac{\partial c}{\partial y} d\theta \quad \blacksquare \end{aligned} \qquad (14)$$

Expression (8) says that the tradeoff between efficiency and politically driven redistribution is explained by a combination of the party's own preferences over taxation and public spending and the electoral incentives to reduce tax burdens and to increase the benefits from public spending to voters who deliver the highest expected proportion of the votes for party *k* in the election.

On the right hand side of (8), $\lambda = \alpha\left\{MRS_{G-\alpha} - T(i)\right\}$ is the marginal utility of the net fiscal exchange for voter type θ characterized by the product of the marginal utility of income, α, and the difference between the voter's valuation of the public good (that is $MRS_{G-\alpha}$) and the voter's tax share in tax on commodity *i*, $T(i) = t_i^k x_i / t_i^k X_i$, where $X_i = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) x_i d\theta$.[16]

The term $\sigma^k\left[f^k(\Psi(-\theta)), \lambda\right]$ is the covariance between the probability that a voter type θ votes for party *k*, $f^k(\Psi(-\theta))$, and λ. Similarly, λ^k and υ_G^k correspond, respectively, to the marginal utility of the marginal net fiscal exchange and the marginal utility of the public good of the minoritarian coalition of voters controlling party *k*. The expressions $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta$, $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta$, and $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \upsilon_G d\theta$ are, respectively, a weighted average probability of the vote in the electorate, the average marginal utility of the net fiscal exchange, and the marginal proportion of the expected votes for party *k* from the marginal utility of the public good.

The term $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) T(i) \frac{\partial c}{\partial y} d\theta$ is the tax revenue loss when the government takes away one dollar from voters through the tax system. The government can induce a change in income across the electorate by changing the relative prices of commodities through the tax structure. In the equation, the individuals' share of tax contributions, $T(i)$, is a weighing factor of the marginal tax revenue ($\partial c / \partial y$) from taking away one dollar from each taxpayer through the tax system. The higher $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) T(i) \frac{\partial c}{\partial y} d\theta$ the lower is t_i^{*k} because of the political costs associated with a high marginal tax revenue loss associated with a negative income effect due to taxation.

The expression in the numerator of (8) given by $-d\delta^k / d\phi^k \big|_{\Delta\Im^k = 0} = \pi^k / \Upsilon^k \Delta\delta^k$ is a marginal rate of substitution between the welfare of the coalition of voters controlling party *k*, δ^k, and the proportion of the expected votes ϕ^k that the party can obtain in the election. Finally, the left hand side of (8) is the percentage change along the compensated demand of commodity i as a result of the tax system where $S_{ij} = \partial x_i^c / \partial t_j^k$ is the change in the compensated demand (x_i^c) due to a change in prices. Higher values of t_i^k imply higher values of $-\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) S_{ij} d\theta \Big/ X_i$ and the fact that the party is willing to accept higher political costs associated with the inefficiency costs of taxation at the political equilibrium.

As mentioned before, condition (8) characterizes the tradeoff between efficiency-redistribution in tax design. The factors that affect the politically driven redistribution are characterized in the right hand side of (8) while the political costs of inefficiency due to taxation in the left hand side of (8). The term $-d\delta^k / d\phi^k \big|_{\Delta\Im^k = 0} = \pi^k / \Upsilon^k \Delta\delta^k$ also reflects the tradeoff between the representation of broad pluralist interests from the electorate in tax and spending policies and the incentives for the representation of the interest of a minoritarian coalition in designing fiscal policy.

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[16] The marginal net fiscal exchange incorporates that an increase in t_i^k, first, reduces the purchasing power of the household to buy private goods, second, it implies a tax collection and a change in the provision of the public good G_s^k. The consumer willingness to pay for the public good is given by $MRS_{G-\alpha}$. Hence $\lambda = \alpha\left\{MRS_{G-\alpha} - T(i)\right\}$ is the marginal utility of the net fiscal exchange for voter type θ.

That is, a policy motivated party balances the incentives for designing a policy with the support of a majority of the electorate which leads to a pluralist representation of preferences in tax policy (this effect is captured by $\sigma^k\left[f^k(\Psi(-\theta)),\lambda\right]$, $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)f^k d\theta \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta$ and $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)f^k \upsilon_G d\theta$) versus a policy that maximizes the preferences of the party's followers (the narrow interest of a faction inside the party determined by λ^k and υ_G^k).

On what follows we will show, see proposition 2, that if $\pi^k \to 1$ then the party's electoral constraints are eliminated since party *k* believes it will win the election with certainty. In this case, tax and spending policies are determined by the narrow interest of groups or factions inside the party.

If in contrast $\pi^k \to 0$, see proposition 3, fiscal policies are determined by the joint interaction of preferences over policy of all voters. In this case, a policy motivated party behaves as a Downsian party (which designs policy to maximize the probability of winning the election) and the electoral competition leads parties to design a policy that maximizes a politically aggregated welfare function and the tax system lies in the Pareto set.

For the analysis that follows we take into account the distribution of the voters' partisan preferences. This distribution is given by the cumulative distribution of party identification $G(\theta) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)d\theta \;\; \forall\, \theta \in \left[\underline{\theta},\bar{\theta}\right]$. In general, different distributions of partisan preferences will create different incentives in policy design for parties. For a party purely motivated by electoral goals (a Downsian party), a change in the distribution of partisan preferences imply that the propensities of the vote will change across the electorate. This, in turn, affects how parties aggregate the conflicting views of voters over tax and spending policies and the electoral desirability of certain policy platforms.

For a policy motivated party, a change in the distribution of partisan preferences implies the following: first, the party faces a different set of electoral constraints. In particular, the marginal rate of substitution between the welfare of the minoritarian coalition of voters controlling party *k* and the proportion of the expected votes that the party can obtain in the election will be modified. Second, the party also recognizes that the propensity of the vote of the electorate has changed and this modifies the electoral calculus of policy design.

Proposition 2. *Consider a cumulative distribution of party identification* $G(\theta) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta : \pi^k(G(\theta)) \to 1$ *then the tradeoff between redistribution and efficiency in tax design is determined by*

$$-\frac{\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) S_{i\,j}\, d\theta}{X_i} = \frac{\lambda^k}{\upsilon_G^k} - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)T(i)\frac{\partial c}{\partial y}\, d\theta \quad \forall\, t_i^{*k} > 0,\, i = 1,2\ldots n \qquad (15$$

Proof

By definition $\pi^k\left(\mathbf{P}^k,\mathbf{P}^{-k}\right) = \int_{-\infty}^{\rho^k} m^k\left(\rho^k\right)d\rho$, $\rho^k = \phi^k - \phi^{-k}$ and

$\phi^k = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)F^k(\Psi(\theta))d\theta$. Since $\partial\pi^k/\partial\phi^k = m^k \geq 0$ then

$\exists\ \phi^{0k}, \phi^{1k} : \phi^{1k} \geq \phi^{0k} \Leftrightarrow \pi^k(\phi^{1k}) \geq \pi^k(\phi^{0k})$. Consider two different partisan distributions $G(\theta), \tilde{G}(\theta)$ such that $G(\theta) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)d\theta$ and $\tilde{G}(\theta) = \int_{\underline{\theta}}^{\bar{\theta}} \tilde{g}(\theta)d\theta$. Integrate by parts ϕ^k under the two partisan distributions $G(\theta), \tilde{G}(\theta)$ to show that $\forall\ G(\theta) \leq \tilde{G}(\theta)\ \forall\ \theta \in [\underline{\theta}, \bar{\theta}]$ it is satisfied

$$\int_{\underline{\theta}}^{\bar{\theta}} \tilde{g}(\theta)F^k d\theta - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)F^k d\theta = \int_{\underline{\theta}}^{\bar{\theta}} f^k \left[\tilde{G}(\theta) - G(\theta)\right] \geq 0 \ \Rightarrow \pi^k(\tilde{G}(\theta)) \geq \pi^k(G(\theta)) \quad (16)$$

Hence $\exists\ \mathbf{P}^{*k}, \mathbf{P}^{*-k} \wedge G(\theta) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)d\theta : \pi^k(G(\theta)) \to 1$. Consider the limiting case $\pi^k(G(\theta)) = 1$, it follows that the party's problem of policy design is:

$$Max_{\{\mathbf{t}^k, G_s^k\}} \quad \delta^k(\mathbf{t}^k, G_s^k, y^k) \ \text{ s.t :} \quad G_s^k = \sum_{h=1}^{n} t_i^h \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\, x_i(\mathbf{t}, y, \theta)\, d\theta \quad (17)$$

Solve problem (17) and re-arrange terms to show that

$$-\frac{\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) S_{ij}\, d\theta}{X_i} = \frac{\lambda^k}{\upsilon_G^k} - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) T(i) \frac{\partial c}{\partial y} d\theta \quad \forall\ t_i^{*k} > 0, i = 1,2 \ldots n \quad (18)$$

■

Proposition 2 considers the case in which there is a partisan distribution $G(\theta)$ such that $\pi^k(G(\theta)) = 1$. In this case, party *k* designs the tax system and the spending policy under the special case in which there are no electoral constraints.[17]

The tradeoff between efficiency and politically driven redistribution for an economy without electoral constraints is determined positively by λ^k/υ_G^k, which is a normalized net marginal utility of the fiscal incidence of tax and spending policies and negatively related to $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)T(i)\frac{\partial c}{\partial y} d\theta$ which is the tax revenue loss when the government takes away one dollar from voters through the tax system.[18]

It is simple to see that a high λ^k/υ_G^k and a low $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)T(i)\frac{\partial c}{\partial y} d\theta$ imply that the governing party can deliver a high excess surplus from the provision of the public good and the tax structure to the core supporters of the party. This also implies that party *k* will be more willing to accept the inefficiency costs associated with taxation in order to transfer excess surplus from the fiscal exchange to the coalition of voters controlling party *k*.[19]

Condition (15) can characterize differences in tax policies between parties *k* and *–k* that are attributed to the parties' preferences over tax and spending policies.

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[17] We define the electoral constraints of a party, as the party's need to design policies with the support of a majority to win the election. If $\pi^k(G(\theta)) = 1$, party *k*, thinks it will win the election with certainty.

[18] Recall that $\lambda^k = \alpha^k \left\{ MRS_{G-\alpha}^k - T^k(i) \right\}$ with $MRS_{G-\alpha}^k = \upsilon_G^k / \alpha^k$ is the marginal rate of substitution between G_s^k and income and α^k is the marginal utility of income of the coalition of voters who control party *k*. The coalition's tax share in relation to total tax collections from tax rate t_i^k is $T^k(i) = t_i^k x_i^k(\mathbf{t}, y^k, \theta) / t_i^k X_i$ where $X_i = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) x_i(\mathbf{t}, y, \theta) d\theta$.

[19] The higher λ^k/υ_G^k, the higher the excess surplus for the coalition of voters type y^k who controls party *k*.

For instance, the expression λ^k / υ_G^k is high if commodity i is income elastic, the public good is normal, party *k* represents the preferences of a faction of voters with high marginal utility of income, a high valuation of the public good, and the party *k* has ability to export tax burdens to other voters in the electorate (that is, the tax share $T^k(i)$ of the relevant coalition of voters controlling party *k* is low).[20] In this case, the tax rate on the income elastic commodity will be high at the political equilibrium.

Proposition 3. *Consider a cumulative distribution of party identification* $G(\theta) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta : \pi^k(G(\theta)) \to 0 \wedge \frac{\pi^k}{\Upsilon^k \Delta\delta^k} = 0$ *then the tradeoff between redistribution and efficiency in tax design is determined by*

$$-\frac{\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) s_{ij}\, d\theta}{X_i} = \frac{\sigma^k\left[f^k(\Psi(-\theta)), \lambda\right] + \left\{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta\right\}\left\{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta\right\}}{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \upsilon_G d\theta} - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) T(i) \frac{\partial c}{\partial y}\, d\theta \tag{19}$$

Proof

In proposition 2 we have shown that $\exists\ \mathbf{P}^{*k}, \mathbf{P}^{*-k}$ and $G(\theta) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) d\theta : \pi^k(G(\theta)) \to 0$. Condition (19) follows trivially from condition (8) by imposing $\pi^k(G(\theta)) = 0$.

From (19), the pattern of redistributive taxation is explained by the covariance, $\sigma^k\left[f^k(\Psi(-\theta)), \lambda \right]$, between the voters' marginal probability of voting for candidate *k*, $f^k(\Psi(-\theta))$, and the net fiscal exchange λ. Hence, party *k* proposes a tax system with a high tax rate t_i^{*k} when the distribution of preferences for the public good and tax liabilities are such that,higher than average marginal probabilities of voting for *k* are positively related with higher than average surplus from the fiscal exchange.

The relationship between the partisan preference bias, the aggregation of the voters' preferences for tax policy, and the candidates' platforms can be explained as follows: for the limiting case $\pi^k(G(\theta)) = 0$, the optimality conditions for the tax system proposed by party *k* are $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \frac{\partial \Psi^k}{\partial t_i^k} d\theta = 0\ \forall\, t_i^{*k} > 0$. The expression $g(\theta) f^k \left\{\partial\Psi^k / \partial t_i^k\right\}$ is the marginal proportion of the expected vote for party *k*due to a change in the well being of voter type θ because of a marginal change in tax rate i.

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[20] A party *k* with sufficient options(in our case commodities) to tax can export tax burden away from the voters who constitute the core base of the party. To see this, consider tax structures $\mathbf{t}^{0k}, \mathbf{t}^{1k} \in \Re^2 : \mathbf{t}^{0k} = \left[t_i^{0k}, t_j^{01k}\right], \mathbf{t}^{1k} = \left[t_i^{1k}, t_j^{1k}\right]$ collecting the same tax revenue and satisfying $x_i^k(\mathbf{t}^{ok}, y^k, \theta) < x_i^k(\mathbf{t}^{1k}, y^k, \theta)$ then $T^k(i)\big|_{\mathbf{t}^{0k}} < T^k(i)\big|_{\mathbf{t}^{1k}}$. In this case, party *k* unambiguously choose $\mathbf{t}^{0k}$ over $\mathbf{t}^{1k}$ since, in this case, the tax burden of the coalition controlling party *k* is lower (and consequently the tax burden is exported to someone else in the electorate).

The term $g(\theta)f^{k}(\Psi(-\theta))$ represents a weighing factor that determines how responsive candidate *k* is to the preferences over policy of voters type θ, while $\partial\Psi^{k}/\partial t_i^k$ provides the marginal welfare change of the voter due to a change in t_i^k and, consequently, it shows the direction of the spatial mobility of the candidate.[21]

Now, consider two different types of citizens with a partisan bias $\forall\theta^0,\theta^1 \in [\underline{\theta},\bar{\theta}]: \theta^0 < 0 \wedge \theta^1 > 0$ and ideal policy positions for taxation on commodity *i* given by $t_i^*(\theta^0) \geq t_i^*(\theta^1)$, leading to $\Psi(-\theta^0) \geq \Psi(-\theta^1)\ \ \forall t_i^{*k}, \forall k$. Assume the probability of the vote (F^k) is convex and, to simplify let $g(\theta^0) = g(\theta^1)$, then the condition $f^k(\Psi(-\theta^0)) \geq f^k(\Psi(-\theta^1))\ \ \forall t_i^{*k}, \forall k$ is satisfied.[22] That is, a Downsian candidate *k* will weigh more heavily the preferences over fiscal policies from individuals type θ^0, who also have a partisan bias in favor of candidate *k*. In other words, the Democrat party will weigh more (less) heavily the preferences of Democrat (Republican) voters.

If differences in the partisan preferences are also associated with differences in the ideal policy positions of voters, that is, if $\forall\,\theta^0 < \theta^1 \Rightarrow G_s^*(\theta^0) \geq G_s^*(\theta^1)$, then the provision of the public good will be closer to the ideal level of the public good of citizens with a partisan bias towards party *k* (voters type θ^0) and therefore, the provision of the public good by party *k* will be high at the Nash equilibrium.

Now, consider the average of the marginal probability of the vote, $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)f^k d\theta$, and the average net fiscal exchange across the electorate $E[\lambda] = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta$.

The larger the product between the average of the marginal probability of the vote and the average net fiscal exchange across the electorate, the higher the incentives for party *k* to engage in electorally driven redistribution and the higherwill be the tax rate used in the tax system since the electoral gains from the provision of the public good are exhausted at high levels of public spending.

The model suggests that an increase in the willingness to pay for the public good from the electorate (an increase in $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)f^k\upsilon_G d\theta$), leads to a higher t_i^{*k} and to a higher level of the public good at the political equilibrium G_s^{*k}.[23] The last term $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)T(i)\frac{\partial c}{\partial y}d\theta$ is the tax revenue loss when the government takes away one dollar from voters through the tax system. This effect is negatively related with t_i^{*k}.

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[21] The term $\partial\Psi^k/\partial t_i^k$ can be positive, negative or zero. Suppose $\partial\Psi^k/\partial t_i^k > 0$ then, at the margin, if candidate *k* increases tax rate *i*, the candidate changes his expected proportion of the votes by $g(\theta)f^k(\Psi(-\theta))$.

[22] A convex cumulative density can be justified through an exogenous system of beliefs of parties in which loyal voters have the highest marginal propensity to vote for the party.

[23] To see this, note that condition (19) can be expressed as follows:

$$-\frac{\sum_{j=1}^{n} t_j^k \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)S_{ij}\,d\theta}{X_i} = 1 - \frac{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)f^k\alpha\,T(i)d\theta}{\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)f^k\upsilon_G\,d\theta} - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\frac{\partial c}{\partial y}T(i)d\theta \quad (19')$$

Condition (19') shows that an increase in $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)f^k\upsilon_G d\theta$ unambiguously increases t_i^{*k} and G_s^{*k} at the political equilibrium.

Proposition 4. *Consider a cumulative distribution of party identification* $G(\theta)=\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\lambda d\theta : \pi^k(G(\theta)) \to 0 \wedge \frac{\pi^k}{\Upsilon^k \Delta\delta^k}=0$. *Therefore* $t_i^{*k} > t_i^{*-k}$, *if*

4.1) $\partial^2\Psi(-\theta)/\partial^2 t_i^k < 0$

4.2) $\tilde{\sigma}^k\left[f^k(\Psi(-\theta)),\ \partial\Psi(-\theta)/\partial t_i^k\right] > \tilde{\sigma}^{-k}\left[f^{-k}(-\Psi(-\theta)),\ -\partial\Psi(-\theta)/\partial t_i^{-k}\right]$

Where $\tilde{\sigma}^k\left[f^k(\Psi^k), \partial\Psi/\partial t_i^k\right] = \sigma^k\left[f^k(\Psi^k), \partial\Psi/\partial t_i^k\right] \Big/ \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta$ *is a normalized covariance between* $f^k(\Psi^k)$ *and* $\partial\Psi^k/\partial t_i^k$ *for party **k**.*

Proof

The optimality conditions for party *k* are given by $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \frac{\partial\Psi}{\partial t_i^k} d\theta = 0 \ \forall t_i^{*k} > 0$.

Use the definition of covariance to show

$$\int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k \frac{\partial\Psi}{\partial t_i^k} d\theta = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\frac{\partial\Psi(-\theta)}{\partial t_i^k} d\theta \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta + \sigma^k\left[f^k(\Psi),\ \partial\Psi(-\theta)/\partial t_i^k\right] = 0 \quad \forall t_i^{*k} > 0 \tag{20}$$

Re-arrange terms and sow that equation (20) is

$$\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\frac{\partial\Psi(-\theta)}{\partial t_i^k} d\theta = -\tilde{\sigma}^k\left[f^k(\Psi),\ \partial\Psi(-\theta)/\partial t_i^k\right] \quad \forall t_i^{*k} > 0 \tag{21}$$

Where

$$\tilde{\sigma}^k\left[f^k(\Psi(-\theta)),\ \partial\Psi(-\theta)/\partial t_i^k\right] = \sigma^k\left[f^k(\Psi(-\theta)),\ \partial\Psi(-\theta)/\partial t_i^k\right] \Big/ \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta \quad \forall k \tag{22}$$

Similarly the tax policy of party –*k* is given by

$$\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\frac{\partial\Psi(-\theta)}{\partial t_i^{-k}} d\theta = -\tilde{\sigma}^{-k}\left[f^{-k}(-\Psi),\ -\partial\Psi(-\theta)/\partial t_i^{-k}\right] \quad \forall t_i^{*-k} > 0 \tag{23}$$

Note that $\Psi(-\theta)$ determines the choice of the vote for a voter type θ for party *k* while $-\Psi(-\theta)$ determines the choice of the vote for party $-k$. Hence $\forall t_i^{*k} \cong t_i^{*-k}$

$\Psi(-\theta) > -\Psi(-\theta) \Rightarrow f^k(\Psi(-\theta)) > f^{-k}(-\Psi(-\theta)) \Rightarrow \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^k d\theta > \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) f^{-k} d\theta$ and $\tilde{\sigma}^k[\bullet] \neq \tilde{\sigma}^{-k}[\bullet]$. In particular, if $\partial^2\Psi(-\theta)/\partial^2 t_i^k < 0$ and $\tilde{\sigma}^k[\bullet] > \tilde{\sigma}^{-k}[\bullet]$ then $\int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\frac{\partial\Psi(-\theta)}{\partial t_i^k} d\theta < \int_{\underline{\theta}}^{\bar{\theta}} g(\theta)\frac{\partial\Psi(-\theta)}{\partial t_i^{-k}} d\theta \Rightarrow$ ■

$t_i^{*k} > t_i^{*-k}$ at the political equilibrium.

Proposition 4 showsthat even in the case that electoral constraints are binding, the parties' policies do not converge since the voters' loyalties induce parties to aggregate the preferences of the electorate differently.

Proposition 4 says that if the normalized covariance between the probability of the vote and the marginal net incidence of tax on commodity i in the welfare of a voters is higher for party k (relative party $-k$) then a commodity tax system will be used to redistribute tax burdens in favor of individuals with a partisan bias towards the party. That is, policies of the Democrat (Republican) party follow closely the preferences of Democrat (Republican) voters.[24]This suggests that income transfers and a progressive tax structure would be supported (opposed) by Democrat (Republican) voters.

That is, proposition 4 predicts that under Democrat administrations taxes on income elastic goods increase while taxes on income inelastic commodities fall implying that the Democrat party has an electoral incentive to propose a commodity tax system in which redistribution plays a more prominent role than efficiency on tax design. In contrast, the Republican party has an electoral incentive to weigh less heavily redistribution (vis-à-vis efficiency).

V. Conclusion

In a democracy, representatives are elected to design policies in favor of the electorate. However, the actual representation of preferences in fiscal policy is the outcome of different institutions performing the aggregation of the voters' and the parties' interests. In this paper, we analyze the interaction between the voting behavior of a partisan electorate and the electoral competition of policy motivated parties to determine the tax structure of an economy. In our economy tax policy reflects two conflicting incentives: On the one hand a party seeks to win the election to implement the ideal policy of the party's core base. On the other hand, the competition for votes forces parties to design policies that appeal to a majority and, hence, the design of policy recognizes a wider set of preferences from the electorate.

The conflict between the narrow interest of the party and the pluralist preferences of the electorate on determining tax policy depends on the electoral constraints that parties face.

Our model allows us to distinguish different sets of electoral constraints: if a party faces soft electoral constraints (as a result of a high proportion in the electorate of loyal voters to the party) then the party selects the ideal tax policy of the party's constituency. Redistribution will guide the tax policy of a party that represents the interests of low income voters who support high government spending. Similarly, efficiency will dominate the design of tax structure if the party represents voters with high income who prefer low government spending.

Evidence from the ANES suggests that the American electorate is divided along these dimensions, with Democrat (Republican) followers supporting high (low) spending and having low (high) levels of income. Therefore, the tradeoff between the narrow interests of parties versus the preferences of a majority in the electorate suggests that soft electoral constraints lead to increases on taxes under Democrat administrations and reductions on taxes under Republican governments. A growing body of empirical evidence suggests the existence of tax and spending cycles in the federal and state fiscal policies in the U.S. Our theory can explain this stylized fact.

If, conversely, the electoral constraints are binding, then parties select a tax policy with the support of the electorate to maximize the party's chance to win the election. In this case, the tradeoff between redistributive politics and efficiency depends on how the party aggregates the preferences of voters over tax policy. Our analysis predicts that candidates' policies do not converge since the voters' loyalties induce parties to aggregate the preferences of the electorate differently. We identify conditions in which a differential commodity tax system will be used to redistribute tax burdens in favor of individuals with a partisan bias towards the party.

[24]Evidence from the American National Election Studies (ANES) suggests that Democrat (Republican) voters support high (low) spending. Moreover, voters with low (high) levels of income are identified with the Democrat (Republican) party. This suggests that income transfers and a progressive tax structure would be supported (opposed) by Democrat (Republican) voters.

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