

Voting Behavior, Preference Aggregation and Tax Design

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Abstract

The empirical evidence on voting behavior suggests that the individuals' choice of the vote is explained, among other things, by policy issues and the voters' partisan preferences over the party that rules the government. The evidence also indicates that the voters' partisan preferences are the best predictor of the choice of the vote (Republican and Democratic voters tend to vote, respectively, for the Republican and Democratic party), and that Democratic voters are the dominant coalition of voters in the American electorate. In this paper we show that these stylized facts can explain some features of the US tax policy: first, the divergence of the tax policies adopted by the Democratic and Republican parties. Second, Democratic administrations tend to adopt more pro low income redistributive tax policies than Republican administrations.

Keywords: Efficiency, Redistributive Effects, Taxation, Political Economy, Elections

1. Introduction

In the theory of elections, public policy is the outcome of the strategic interaction between policy makers (parties) and the electorate. The leading paradigm advanced by Downs (1957) assumes that parties select policies to win the election and voters vote for the party advancing the policy that is closest to their ideal policies. Romer (1975) and Roberts (1977) apply the Downs' model to the analysis of tax design. They predict that parties converge in their fiscal policies. However, recent empirical evidence suggests that the parties' fiscal policies do not converge in the US and, in particular, Democratic administrations tend to adopt more pro low income redistributive tax policies than Republican administrations. For instance, Reed (2006), Alt and Lowry (2000), Caplan (2001) and Rogers and Rogers (2000) find evidence that state taxes increase when Democrats have significant control of the legislative body of state governments. Blomberg and Hess (2003) also find that Democratic (Republican) administrations at the federal government increase (reduce) taxes. Fletcher and Murray (2008) find that states with Democrat governors are more likely to choose several progressive provisions. Chernick (2005) finds that party control by Republicans leads to more regressive state tax structures. Caplan (2001) finds that corporate and income taxes rise under the control of Democrats of state legislatures and fall with larger Republican majorities.

Moreover, in contrast to the Downsian assumption that voting is explained only by policy issues, the evidence on voting behavior suggests that the individuals' choice of the vote is explained, among other things, by policy issues and partisan preferences, see Campbell et al (1960), Miller and Shanks (1996), Fiorina (1997) and Niemi and Weisberg (2001) (Note 1). The evidence on voting behavior also indicates that the voters' partisan preferences are the best predictor of the choice of the vote (Republican and Democratic voters tend to vote, respectively, for the Republican and Democratic party), see the papers listed above and Bartels (2000). Finally, the evidence from the American National Election Studies (ANES) shows that the vast majority of the American electorate has a partisan preference. Data from the ANES suggests that, for the period 1952-2004, the average proportion of voters identified as Democrats is 52%, 35% regard themselves as Republicans, 11% as independents, and the rest as apoliticals.

The analysis of the voters' partisan preferences is of considerable interest to explain how parties aggregate the heterogeneous and conflicting demands of voters over tax policy into a policy platform. In general, conflicts of voters over tax policy arise because voters have different preferences and incomes. Parties that design policies to

win elections might have electoral incentives to weigh more (less) heavily the preferences over tax policy of certain coalitions of voters according to the expected votes that these coalitions can deliver in the election. This, in turn, leads to some form of representation of the voters' preferences into the parties' tax platforms. In addition, the issue of preference representation is central to the core issues of public economics since the aggregation of the voters' interests is closely related to the tradeoff between efficiency and redistribution in tax design and the size and composition of public spending. The objective of this paper is to provide a model of electoral competition in which voting behavior is determined by policy and partisan preferences to explain the tax policies adopted by parties in the U.S.

Moreover, in this paper we study several issues of interest for the political economy of taxation. First, the literature on voting behavior has devoted significant effort on studying the extent of influence of partisan and policy preferences in determining the individuals' choice of the vote. There seems to be a consensus that party identification played a less significant role in determining the choice of the vote between the 60's and 70's (see Fiorina 1997). In this period voting is perceived to be more policy oriented. However, Bartels (2000) shows a resurgence of the influence of partisan preferences over the choice of the vote in the 90's. These empirical regularities motivate the following question: A shift in voting behavior, from voting being explained only by policy issues to voting being determined jointly by policy and partisan preferences, leads to more or less electoral redistribution?

Second, we are also interested in studying the relationship between the electoral influence of partisan coalitions in the electorate and the representation of their preferences over the parties' tax platforms. This question is relevant for the literature in special interests politics and motivated by empirical evidence from surveys by the ANES that suggests that the distribution of the voters' party identification has changed over time. In 1964, 61 and 30 per cent of interviewed voters self identified, respectively, with the Democratic and Republican party. In 2004 these figures reached 49 and 41 percent respectively. These facts suggest that: first, the relative political influence in the elections of Democratic, Republican, and independent voters have changed over time. Second, rational parties recognize these facts and the parties' tax policies might respond to the different compositions of the voters' partisan preferences in the electorate.

To study the issues mentioned above, in this paper we analyze a democracy with a majoritarian electoral system and single member districts in which the winner takes all. The main findings of the paper are the following: First, if voting is explained by partisan and policy preferences then each party will weigh differently the demands over tax policy of the same electorate and the parties' tax policies diverge. Therefore, our model can explain the persistent divergence between the tax policies adopted by Republican and Democratic administrations. Second, we also show that if policy and partisan preferences are relevant for the individual's voting calculus then parties have political incentives to redistribute in favor of coalitions with high marginal probabilities to vote for them. We identify conditions in which parties use the tax system to reward (penalize) voters with a positive (negative) partisan bias towards them.

If, in contrast, voting is determined only by policy issues then electoral incentives induce all parties to converge in redistributing in favor of voters with higher than average marginal utilities of labor income. This comparative analysis allows us to identify conditions in which a shift from only policy issue voting to partisan and policy voting induces more electorally driven redistribution, and it also induces Democratic administrations to implement a higher income tax rate and higher public transfers relative those implemented by Republican administrations.

In this paper we also provide empirically verifiable hypothesis to test the relative electoral influence of partisan coalitions over policy makers and tax policy. As argued by Hettich and Winer (2006), the distinction between economic welfare and political influence plays a central role in historical work on the evolution of tax systems, but it has proved difficult to separate the two empirically. In our theory we can distinguish the preferences of voters over tax policy from some elements of voting behavior that explain why some coalitions of voters might be more or less politically influential to some parties. In particular, we provide conditions in which a change in the composition of the partisan preferences in the electorate increases the political leverage of some partisan coalitions in the electorate and induces both parties to design a tax policy with higher transfers pro low income individuals even when the divergence of the parties' tax policies persist at the political equilibrium.

The paper is organized as follows: In section 2 we discuss some stylized facts on political preferences. Section 3 contains the characterization of the politico-economic equilibrium. The relationship between voting behavior and the tradeoff between redistribution and efficiency in the design of the parties' tax platforms is discussed in Section 4. Section 5 provides a comparative analysis that relates the impact on the tax system with changes in the distribution of the partisan preferences of the electorate. Section 6 concludes.

2. Views and Stylized Facts on Partisan Preferences

In this section we discuss some stylized facts and views over the voters' partisan preferences that will be useful for the construction and interpretation of our theoretical model. In particular, some of the empirical regularities emerging from the surveys of the American National Election Studies (ANES) are: First, most American voters are identified with some party, and voters self identified as Democrats represent the largest coalition of partisan voters. Data from the ANES suggests that, for the period 1952-2004, the average proportion of voters identified as Democrats is 52%, 35% regard themselves as Republicans, 11% as independents, and the rest as apoliticals. Second, Democratic and Republican voters seem to have different incomes and preferences over public spending. For instance, over the last three decades, on average, 43% of Democratic voters have consistently expressed support for an increase in public spending services while only 22% of interviewed Republican voters would prefer more public spending (Note 2). Moreover, voters with low income tend to self-identify with the Democratic party and voters with high income with the Republican party. On average, for the period between 1952 and 2000, 58 and 27 percent of individuals in the lowest end of the distribution of income self identify, respectively, as Democrats and Republicans. For the same period, 32 and 59 percent of individuals at the highest end of the distribution of income self identify, respectively, as Democrats and Republicans.

With respect the views on partisan preferences, the Michigan school considers that the voters' partisan preferences resemble a religious affiliation in the following ways: partisan preferences could be viewed as psychological attachments heavily influenced by parents and other agents of socialization, these preferences are acquired in childhood, are stable, and are largely exogenous to policy views, see Campbell et al (1960), and Miller and Shanks (1996). In contrast, Fiorina (1981) argues that party attachments are not exogenous to policy issues but could be viewed as adaptative expectations on the performance of parties in office. Under the later view, if voters and parties share the same policy positions then party identification strengths and on the contrary it weakens. The evidence on the exogeneity of partisan attachments to policy issues is mixed. Fiorina (1981) shows that the voter's party identification is sensitive to economic indicators of unemployment and economic development. However, Green, et al (1998), and Green and Palmquist (1990) find a quite small effect of economic shocks on aggregate measures of partisanship. That is, Green et al (1998) find that only very large economic and political shocks sustained by long periods can alter party attachments. This suggests, that in a regular political and economic environment, the voters' partisan attitudes could be thought as exogenous to policy issues.

3. The Model

Consider an economy with individuals choosing their consumption vector on the opportunity set and participating in the political process by voting for a public official. The individual's utility not only depends on feasible consumption but also on the party that rules the government. Overall utility is given by $U^k = \beta \mu(c, y) + (1 - \beta) \gamma^k$, $\mu(c, y)$ are the preferences over private consumption c and leisure $y = 1 - \ell$ where $\ell \in [0, 1]$ is the supply of labor, $\beta \in (0, 1)$ is a weighing parameter and γ^k is the voter's partisan preference for the state of the economy in which party k rules the government. In this democracy there are two parties denoted by $k = \{D, R\}$. For mathematical simplicity we consider the view of the Michigan school on the nature of partisan preferences. Consequently we assume that the voter's party identification is exogenous to policy views.

The consumer's opportunity set is $c = (1 - t^k)n\ell + T^k$ where $(1 - t^k)n\ell$ is the after tax labor income, $z = n\ell$ is the gross labor income, t^k and T^k are a tax on earnings and a lump sum public transfer chosen by party k when it rules the government, and n is the voter's earning ability. The distribution of abilities is given by $h(n)$, and n is bounded by $n \in [n, n_{\max}]$.

3.1. Electoral competition and tax policy

In our economy, parties are elected to design fiscal policies on behalf of voters. The heterogeneity of preferences and earning abilities of citizens leads to conflicts among voters over the ideal tax policy to be implemented by the elected government. The problem of tax policy design for parties can be considered as a problem of aggregation of the heterogeneous and conflicting preferences of voters over fiscal policy. Consider a democracy with a majoritarian electoral system with a single unit of government in which the winner takes all. Parties propose t^k and $T^k \forall k = \{D, R\}$. Voters observe the parties' platforms and vote for the party with the tax system that is closest to the voters' own preferences over tax policy.

Candidates do not know with certainty the determinants of the individuals' choice of the vote. The probability that a voter type θ (to be defined below) votes for party k is $\Pr^k(\Psi^k(\theta))$ where $\Psi^k(\theta) = v^k(t^k, T^k, n) - v^{-k}(t^{-k}, T^{-k}, n) + \theta$ is the net utility from policy and the partisan preference of voter type θ if party k is elected, and $v^k(t^k, T^k, n)$ is the

indirect utility of the voter when party k selects policies t^k and T^k . A similar interpretation is given to $v^{-k}(t^{-k}, T^{-k}, n)$, and $\theta = \{(1 - \beta)/\beta\} \{\gamma^k - \gamma^{-k}\}$ is the voter's normalized partisan preference. The domain of the voters' type is $\theta \in [\underline{\theta}, \bar{\theta}]$: $\underline{\theta} < 0$ implies that the voter prefers party $-k$ over party k and the opposite holds for $\bar{\theta} > 0$. Define $f^k(\cdot) = \partial Pr^k / \partial \Psi^k(\theta)$, hence the probability that an individual type θ votes for party k evaluated at $\Psi^k(\theta)$ is

$$Pr^k(\Psi^k(\theta)) = \int_{-\infty}^{\Psi^k(\theta)} f^k(\Psi^k(\theta)) d\Psi^k(\theta) = F^k(\Psi^k(\theta)) \tag{1}$$

Where $F^k(\Psi^k(\theta)) : \theta, \mathbf{P}^k, \mathbf{P}^{-k} \rightarrow [0,1]$ is a common, continuous, non decreasing function of $\Psi^k(\theta)$. The proportion of the expected votes for party k , ϕ^k , is given by $\phi^k = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) F^k(\Psi^k(\theta)) d\theta$. The probability that party k wins the election is $\pi^k(\bar{\rho}^k) = \int_{-\infty}^{\bar{\rho}^k} w^k(\phi^k - \phi^{-k}) d\rho^k$ where $w^k(\rho^k)$ is the corresponding distribution over the plurality of party k denoted by $\rho^k = \phi^k - \phi^{-k}$. Hence, the problem of tax policy design for candidates $k = \{D, R\}$ is to select t^k and T^k that maximize $\pi^k(\bar{\rho}^k)$ subject to the public budget constraint in which the per capita transfer T^k is financed by a universal tax on wage income. That is, the problem is

$$Max_{\{t^k\}} \pi^k(\bar{\rho}^k) = \int_{-\infty}^{\bar{\rho}^k} w^k(\phi^k - \phi^{-k}) d\rho^k \quad s.t: T^k = \int_{v_n} t^k n \ell^*(t^k, n) h(n) dn \tag{2}$$

Define $\delta^k(\mathbf{P}^k, \lambda^k) = \pi^k(\bar{\rho}^k) = \int_{-\infty}^{\bar{\rho}^k} w^k(\phi^k - \phi^{-k}) d\rho^k + \lambda^k \left\{ T^k - \int_{v_n} t^k n \ell^*(t^k, n) h(n) dn \right\}$ where λ^k is a Lagrange multiplier. Moreover, we assume $\mathbf{H}(\delta^k)$ is a negative definite Hessian of $\delta^k(\mathbf{P}^k, \lambda^k)$. For $\mathbf{P}^{*k}, \lambda^{*k}$ satisfying $\partial \delta^k / \partial t^k = 0 \quad \forall t^{*k} > 0$, $\partial \delta^k / \partial T^k = 0 \quad \forall T^{*k} > 0$, $\partial \delta^k / \partial \lambda^k = 0 \quad \forall \lambda^{*k} > 0$, and $\lambda^{*k} \left\{ T^{*k} - \int_{v_n} t^{*k} n \ell^*(t^{*k}, n) h(n) dn \right\} = 0$ then $\mathbf{P}^{*k} = [t^{*k}, T^{*k}]$ is a global maximizer of π^k on the constrained policy set.

Definition The electoral equilibrium for this economy is characterized by policies t^{*k} and T^{*k} for parties $k = \{D, R\}$, and voting choices for each individual such that

- a) $t^{*k}, T^{*k} \in argmax \pi^k(\bar{\rho}^k) s.t: T^k = \int_{v_n} t^k n \ell^*(t^k, n) h(n) dn \quad \forall k = \{D, R\}$
- b) A voter type θ votes for party $k = \{D, R\}$ if $\Psi^k(\theta) = v^k(t^{*k}, T^{*k}, n) - v^{-k}(t^{*-k}, T^{*-k}, n) + \theta > 0 \quad \forall \theta \in [\underline{\theta}, \bar{\theta}]$
If $\Psi^k(\theta) < 0$, he votes for party $-k$

4. Voting Behavior and Tax Policy

In spite of disagreements on the extent of influence of partisan and policy preferences in determining the individuals' choice of the vote, the conventional wisdom suggests that party identification played a less significant role in determining the vote between the 60's and 70's (see Fiorina 1997 and 2002). However, Bartels (2000) shows a resurgence of the influence of party cleavages over the choice of the vote in the 90's. These empirical regularities motivate the analysis of this section. In particular, we are interested in the effect on the parties' tax policies of changes in the relative influence of policy and partisan preferences on the choice of the vote. We study whether a shift on voting behavior, from voting being explained only by policy issues to policy and partisan voting, leads to more or less electoral redistribution.

On what follows propositions 1 and 2 characterize the general case for the parties' politically optimal tax system when voting is determined, respectively, by policy and partisan preferences and when voting is only policy issued. These propositions allow us to compare the effect of voting behavior on how parties tradeoff redistribution and efficiency in tax design. Then we characterize propositions 3 and 4 in which we identify conditions for the distribution of policy and partisan preferences to provide more insights on whether the individual's voting behavior induces more or less redistribution and how voting behavior induces parties to diverge or converge in their tax policies.

Proposition 1 *If voting is determined by policy and partisan preferences, the tax rate proposed by party k at the political equilibrium, t^{*k} , is characterized by*

$$\left(\frac{t^{*k}}{1-t^{*k}} \right) = \frac{-\tilde{\sigma}^k[f^k, \alpha n \ell^*]}{-\tilde{\varepsilon}_{\ell-t}} + \frac{\bar{z}(n) - z^k(n, \alpha, \theta)}{-\tilde{\varepsilon}_{\ell-t}} \quad (3)$$

The incentives for politically driven redistribution are explained by:

1a) *A normalized covariance, $\tilde{\sigma}^k[f^k, \alpha n \ell^*]$, between the marginal probability of the vote for party k , $f^k(\Psi^k)$, and the marginal utility of wage income, $\alpha n \ell^*$.*

1b) *The term, $\bar{z}(n) - z^k(n, \alpha, \theta)$, which is the difference between the average gross labor income of those voters who work $\bar{z}(n) = \int_{\bar{n}}^{\bar{n}^{\max}} n \ell^*(t^{*k}, n) h(n) dn$, and the politically weighted average gross labor income of all voters*

$z^k(n, \alpha, \theta) = \int_{\forall \theta} \xi^k n \ell^(t^{*k}, n) g(\theta) d\theta$, where $\xi^k = \alpha / \alpha^{\alpha k}$, and $\alpha^{\alpha k} = \int_{\forall \theta} g(\theta) f^k \alpha d\theta / \int_{\forall \theta} g(\theta) f^k d\theta$ is a politically weighted marginal utility of full income.*

The political costs from tax inefficiencies are explained by:

1c) *For those voters who work, their incentives to reduce their supply of labor due to a marginal increase in the income tax rate t^{*k} . This inefficiency is characterized by the average price elasticity of the labor's supply*

$$\tilde{\varepsilon}_{\ell-t} = \int_{\bar{n}}^{\bar{n}^{\max}} \varepsilon_{\ell-t} h(n) dn, \text{ where } \varepsilon_{\ell-t} = \left\{ \frac{\partial \ell^*}{\partial t^{*k}} \right\} \left\{ (1-t^{*k}) z(n) / \ell^* \right\} < 0.$$

1d) *The incentives of some voters to avoid working as a response to the government's fiscal transfers and taxes.*

Proof

See the appendix 1.

Condition (3) characterizes the tradeoff between politically driven redistribution and efficiency in the parties' tax design. Parties have electoral incentives to use the tax system to redistributive income in favor of some coalitions of voters with significant political influence (these incentives are characterized by expressions 1a and 1b). Moreover, rational parties also recognize that the inefficiency costs from t^{*k} reduce both the well being of voters and the parties' electoral support in elections (these costs are given by 1c and 1d).

An intuitive interpretation of (1a) is that party k will weigh more heavily the preferences of those voters who are identified with the party (while the preferences of voters identified with the competing party $-k$ will be somewhat discounted), if the cumulative distribution $F^k(\Psi^k(\theta))$ is non decreasing and strictly convex over Ψ^k (Note 3). This is the case because voters identified with party k (party $-k$) might display higher (lower) than average marginal probabilities to vote for party k (Note 4). Therefore, party k maximizes its probability of winning the election by designing a policy that pleases voters with a positive preference bias towards the party. If, in addition, voters with a partisan bias for candidate k have lower (higher) than average wage earning abilities then the normalized covariance, $\tilde{\sigma}^k[f^k, \alpha n \ell^*]$, between the voter's marginal probability of voting for candidate k and the product between the marginal utility of income and the gross labor income could be negative (positive). In this case, the lower $\tilde{\sigma}^k[f^k, \alpha n \ell^*] < 0$, the higher the electoral gains for party k from adopting a tax policy with a high t^{*k} and high public transfers that seek to redistribute income in favor of voters with a positive partisan bias for party k .

Condition (1b) characterizes another political incentive for pro-low income redistribution. If voters with high marginal utilities of income have also low earning abilities then $z^k(n, \alpha, \theta)$ tends to be lower than $\bar{z}(n)$ and the higher $\bar{z}(n) - z^k(n, \alpha, \theta)$, the higher t^{*k} and the pro low income transfers proposed by party k .

The parties' political support in elections also depends on the efficiency of the tax structure. Inefficiencies from tax policy take two forms: first, for those voters who work, tax policy creates incentives to reduce their supply of labor. The higher the inefficiency costs from taxation (the more elastic $\tilde{\varepsilon}_{\ell-t}$), the lower the proportion of the expected votes for party k in the election and the lower t^{*k} . Second, redistributing income through the tax system might induce low earning ability voters to avoid working. This inefficiency costs is characterized by a lower taxable base $\bar{z}(n)$ in which voters with earnings abilities $n \leq \tilde{n}$ choose not to work. Therefore, the higher the proportion of voters who do not work as a response to the parties' tax and transfer policy the lower t^{*k} .

Proposition 2 *If voting is only policy oriented then the parties' tax policies converge towards $t^{*D} = t^{*R} = \hat{t}^{*k}$ with*

$$\left(\frac{\hat{t}^{*k}}{1 - \hat{t}^{*k}} \right) = \left\{ \frac{1}{-\tilde{\varepsilon}_{\ell-t}} \right\} \{ \bar{z}(n) - z(n, \alpha) \} \tag{4}$$

Where

$$z(n, \alpha) = \int_{\tilde{n}}^{n_{\max}} \alpha n \ell^*(t^{*k}, n) h(n) dn / \int_{\forall n} \alpha h(n) dn \tag{5}$$

The incentives for electorally driven redistribution are explained by:

2a) The term, $\bar{z}(n) - z(n, \alpha)$, which is the difference between the average gross labor income of working voters

$\bar{z}(n) = \int_{\tilde{n}}^{n_{\max}} n \ell^*(t^{*k}, n) h(n) dn$, and the weighted average gross labor income of working voters, $z(n, \alpha)$. Moreover,

$\int_{\forall n} \alpha h(n) dn$ is the average marginal utility of all voters.

The political costs from tax inefficiencies are explained by:

2b) For those voters who work, their incentives to reduce their supply of labor due to a marginal increase in the income tax rate t^{*k} . This inefficiency is characterized by the average price elasticity of the labor's supply

$\tilde{\varepsilon}_{\ell-t} = \int_{\tilde{n}}^{n_{\max}} \varepsilon_{\ell-t} h(n) dn$, where $\varepsilon_{\ell-t} = \left\{ \frac{\partial \ell^*}{\partial t^{*k}} \right\} \left\{ \frac{(1 - t^{*k}) z(n)}{\ell^*} \right\} < 0$.

2c) The incentives of some voters to avoid working.

Proof

See the appendix 2.

Conditions (1a) to (1d) from proposition 1 and (2a) to (2c) from proposition 2 allow us to compare the effect of voting behavior on the aggregation of preferences of voters for fiscal policy into the parties' tax policies. If policy is explained only by policy issues, parties converge in advancing the ideal tax and transfer policy of the voter with the weighted average labor income in (5). If voting is explained by policy and partisan preferences then, in general, parties diverge in their tax platforms. To see this, it is sufficient to recognize that, in general, the voters' partisan preferences imply that for any voter type $\theta \neq 0$, $f^D(\theta) \neq f^R(-\theta)$. Thus $\tilde{\sigma}^D[\bullet] \neq \tilde{\sigma}^R[\bullet]$ and $z^D(n, \alpha, \theta) \neq z^R(n, \alpha, \theta)$ which means, by condition 3, that $t^{*D} \neq t^{*R}$.

Propositions 1 and 2 also reveal how the voting behavior affects the parties' electoral calculus that determines the extent of political redistribution vis-à-vis efficiency in the parties' design of tax structures. If voting is determined only by policy issues then electoral incentives induce all parties to converge in redistributing in favor of voters with higher than average products between the marginal utility of income and the gross labor income. For the class of equilibria in which $t^{*k} > 0$ and $T^{*k} > 0$, if voters with high marginal utilities of income have also low earning abilities then $z(n, \alpha)$ tends to be lower than $\bar{z}(n)$ and the higher $\bar{z}(n) - z(n, \alpha)$ the higher the electoral incentives for both parties to select high taxes and public transfers.

In contrast, if partisan preferences are relevant for the individual's voting calculus then parties have political incentives to redistribute in favor of coalitions of voters with high marginal probabilities to vote for the party. From our discussion of proposition 1, we have argued that parties can have incentives to use the tax system to reward (penalize) voters with a positive (negative) preference bias towards them. For the class of equilibria in which $t^{*k} > 0$ and $T^{*k} > 0$, the higher (lower) the earning abilities of voters with a partisan bias towards party k , the lower (higher) will be the tax rate and public transfers proposed by the party that shares the partisan bias with these

coalitions. In other words, if Democratic (Republican) voters have low (high) earning abilities then the Democratic (Republican) party is likely to propose high (low) taxes and public transfers.

In propositions 3 and 4 we provide more insights on whether the individual’s voting behavior induces more or less redistribution and how voting behavior induces parties to diverge or converge in their tax policies. For the analysis that follows, it is useful to adopt the next parametric assumption:

A1 The voters’ preferences for consumption and leisure are $\mu = \gamma c - \ell^2/2$ **where**
 $\forall n, \gamma : n \in [\underline{n}, n_{\max}] \exists \gamma > 0 : \gamma \in [\underline{\gamma}, \gamma_{\max}]$.

Proposition 3 Assume A1. If voting is determined only by policy issues then the parties’ tax policies converge towards $t^{*D} = t^{*R} = \hat{t}^{*k}$ with

$$\left(\frac{\hat{t}^{*k}}{1 - \hat{t}^{*k}} \right) = \frac{E_n(n^2) - E_\alpha(\alpha n^2)}{E_n(n^2)} \tag{6}$$

Where

$$E_n(n^2) = \int_{\underline{n}}^{n_{\max}} n^2 h(n) dn \text{ and } E_\alpha(\alpha n^2) = \int_{\underline{n}}^{n_{\max}} \alpha n^2 h(n) dn / \int_{\underline{n}}^{n_{\max}} \alpha h(n) dn \tag{7}$$

The proof of proposition 3 follows the steps shown in the appendix 2 and it is omitted to save space. The results in proposition 3 say that the parties’ tax policies converge to $\hat{t}^{*k}/(1 - \hat{t}^{*k})$ which depends positively on the average measure of gross labor income $E_n(n^2)$ of those voters who work and negatively on the weighted gross labor income $E_\alpha(\alpha n^2)$ of working voters.

Proposition 4 Assume A1. If voting is explained by policy and partisan preferences then the parties’ tax policies diverge. Party D will weigh more heavily redistribution pro low income voters in tax design relative party R and it will propose $t^{*D} > t^{*R}$ and $T^{*D} > T^{*R}$ if

- 4a) $\tilde{\sigma}^D[f^D, \alpha n^2] < 0$
- 4b) $\tilde{\sigma}^R[f^R, \alpha n^2] > 0$
- 4c) $E_f^D[\alpha] > E_f^R[\alpha]$

Where $\tilde{\sigma}^k[\bullet]$ is a weighted covariance between the marginal probability of the vote for party $k = \{D, R\}$ and the marginal utility of labor income. Moreover,

$$E_f^k[\alpha] = \int_{\forall \theta} f^k \alpha g(\theta) d\theta / \int_{\forall \theta} f^k g(\theta) d\theta \tag{8}$$

is a politically weighted marginal utility of transferring one dollar to voters by party k .

Proof

Use the parametric form of the utility to solve the parties’ problem (as it is shown in the appendix 1) and find that $\hat{t}^{*k}/(1 - \hat{t}^{*k})$ is given by:

$$\left(\frac{\hat{t}^{*k}}{1 - \hat{t}^{*k}} \right) = 1 - \frac{\tilde{\sigma}^k[f^k, \alpha n^2]}{E_n(n^2)} - \frac{E_\theta(\alpha n^2)/E_f^k(\alpha)}{E_n(n^2)} \tag{9}$$

Where $\tilde{\sigma}^k[f^k, \alpha n^2] = \sigma^k[f^k, \alpha n^2] / \int_{\forall \theta} f^k \alpha g(\theta) d\theta$ is a weighted covariance between the marginal probability of voting for party k , f^k , and the marginal utility of gross labor income, αn^2 , where $\alpha = \partial \mu / \partial c = \gamma > 0 : \gamma \in [\underline{\gamma}, \gamma_{\max}]$, and $z = n \ell^*(t^{*k}, n) = n^2$ is the gross labor income. The expected gross income of working voters, $E_n(n^2) \geq 0$, is characterized by condition (7). The expression

$$E_\theta[\alpha n^2] = \int_{\forall \theta} \alpha n^2 g(\theta) d\theta \geq 0 \tag{10}$$

is a weighted gross labor income. Using condition (9) for $k = \{D, R\}$ we obtain

$$\left(\frac{t^{*D}}{1 - t^{*D}} \right) - \left(\frac{t^{*R}}{1 - t^{*R}} \right) = \frac{\tilde{\sigma}^R[f^R, \alpha n^2] - \tilde{\sigma}^D[f^D, \alpha n^2]}{E_n(n^2)} + \left\{ \frac{E_\theta(\alpha n^2)}{E_n(n^2)} \right\} \left\{ \frac{1}{E_f^R[\alpha]} - \frac{1}{E_f^D[\alpha]} \right\} \tag{11}$$

The expression $\left(\frac{t^{*k}}{1-t^{*k}} \right) \forall k = \{D, R\}$ is a non decreasing function of t^{*k} , therefore $\left(\frac{t^{*D}}{1-t^{*D}} \right) > \left(\frac{t^{*R}}{1-t^{*R}} \right) \Leftrightarrow t^{*D} > t^{*R}$. Conditions (4a), (4b), and (4c) mean $t^{*D} > t^{*R}$.

Propositions 3 and 4 imply the following: First, if voting is driven by policy and partisan preferences, voters with a low product between the marginal utility of income and the labor income show higher than average propensities to vote for party D (see condition 4a), voters with a high product between the marginal utility of income and the labor income display higher than average propensities to vote for party R (see condition 4b), and the distribution of the voters' partisan and policy preferences are such that the politically weighted marginal utility of transferring one dollar to voters is higher for the Democratic party relative to the Republican party (see condition 4c), then the Democratic party will weigh more heavily pro low income redistribution in tax design relative the Republican party. Consequently, at the electoral equilibrium tax policies diverge with $t^{*D} > t^{*R}$ which implies that the per capita transfers proposed by parties D and R are, respectively, $T^{*D} > T^{*R}$ (Note 5).

The conditions identified in proposition 4 have an intuitive interpretation since these assumptions seem to be a reasonable approximation of stylized facts that suggests that: first, a significant proportion of Democratic (Republican) voters vote for the Democratic (Republican) party. Second, voters with low income tend to self-identify with the Democratic party and voters with high income with the Republican party. Hence it is likely that the marginal utility of transferring \$1 through the tax system to the average Democratic voter is higher than that of the average Republican voter. Therefore, these empirical regularities might provide support for the assumptions in conditions (4a), (4b), and (4c).

Moreover, it is simple to see from propositions 3 and 4 that there are parametric values of the distribution of policy and partisan preferences such that $\hat{t}^* < t^{*R} < t^{*D}$. This means that a shift in voting behavior, from only policy issue voting to partisan and policy voting, induces more political redistribution since public transfers of both parties are higher in the latter political environment in which voting behavior is influenced by policy and partisan preferences. For the case, $t^{*R} < \hat{t}^* < t^{*D}$, a shift from policy to partisan and policy issue voting leads to more (less) political redistribution only under Democratic (Republican) administrations.

5. Partisan Dominance and Tax Structure

Empirical evidence from the American National Election Studies for the period 1952-2004 indicates a downward trend in the proportion of individuals identified as Democrats and an upward trend in the proportion of Republicans in the electorate. In 1964, 61 and 30 per cent of interviewed voters self identified, respectively, with the Democratic and Republican party. In 2004 these figures reached 49 and 41 percent respectively. This fact suggests that: first, the relative political influence in the elections of Democratic, Republican, and independent voters have changed over time. Second, the tax policies of parties might respond to the different compositions of the voters' partisan preferences in the electorate. To see this, it is sufficient to recognize that a change in the distribution of partisan preferences affect the way parties aggregate the voters' interests for fiscal policy since different distributions of the voters' partisan preferences affect the distribution of the marginal propensity of the vote across the electorate and the relative proportion of votes that different coalitions of voters may deliver in the election.

In this section, we provide testable predictions that relate the composition of the voters' partisan preferences and the parties' tax policies. In particular, we identify conditions in which a change in the composition of the partisan preferences in the electorate increases the electoral influence of some partisan coalitions and induces both parties to design a tax policy with higher pro low income transfers even when the divergence of the parties' tax policies persist at the political equilibrium. To analyze the impact of the composition of the voters' partisan preferences on the parties' tax platforms, we define the concept of first order partisan dominance as a distribution of the voters' partisan preferences in which a higher proportion of a partisan coalition unambiguously leads to a higher political influence of the coalition on both parties. Formally:

Proposition 5 Consider two cumulative distributions of the voters' partisan preferences $\tilde{G}(\theta) = \int_{\underline{\theta}}^{\theta} \tilde{g}(\theta) d\theta$ and $G(\theta) = \int_{\underline{\theta}}^{\theta} g(\theta) d\theta : G(\theta) \leq \tilde{G}(\theta) \forall \theta \in [\underline{\theta}, \bar{\theta}]$ implies $\tilde{G}(\theta)$ partisan-dominates $G(\theta)$. Therefore

$$G(\theta) \leq \tilde{G}(\theta) \forall \theta \in [\underline{\theta}, \bar{\theta}] \Rightarrow \pi^k(\mathbf{P}^k, \mathbf{P}^{-k}, \tilde{G}(\theta)) \geq \pi^k(\mathbf{P}^k, \mathbf{P}^{-k}, G(\theta)) \forall \mathbf{P}^k, \mathbf{P}^{-k}$$

Where $\pi^k(\mathbf{P}^k, \mathbf{P}^{-k}, \tilde{G}(\theta))$ and $\pi^k(\mathbf{P}^k, \mathbf{P}^{-k}, G(\theta))$ correspond to the probabilities of party k of winning the election under $\tilde{G}(\theta)$ and $G(\theta)$.

Proof

The proportion of the expected vote for party k is $\phi^k(\mathbf{P}^k, \mathbf{P}^{-k}) = \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) F^k(\Psi^k(\theta)) d\theta \quad \forall k = \{D, R\}$. Integrate by parts ϕ^k under the partisan distributions $G(\theta)$ and $\tilde{G}(\theta)$ to obtain

$$\int_{\underline{\theta}}^{\bar{\theta}} \tilde{g}(\theta) F^k(\Psi^k(\theta)) d\theta - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) F^k(\Psi^k(\theta)) d\theta = \int_{\underline{\theta}}^{\bar{\theta}} f^k(\Psi^k(\theta)) \{ \tilde{G}(\theta) - G(\theta) \} d\theta \geq 0 \tag{13}$$

Since $t^k|_{\tilde{G}(\theta)} = t^k|_{G(\theta)} = t$ then $f^k(\Psi^k(\theta))|_{t, \tilde{G}(\theta)} = f^k(\Psi^k(\theta))|_{t, G(\theta)} \quad \forall \mathbf{P}^k, \mathbf{P}^{-k} \in \mathbf{P}$ and $G(\theta) \leq \tilde{G}(\theta) \quad \forall \theta \in [\underline{\theta}, \bar{\theta}]$. The probability that party k wins the election is a non decreasing function of $\phi^k(\mathbf{P}^k, \mathbf{P}^{-k})$, therefore $\int_{\underline{\theta}}^{\bar{\theta}} \tilde{g}(\theta) F^k(\Psi^k(\theta)) d\theta \geq \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) F^k(\Psi^k(\theta)) d\theta \Rightarrow \pi^k(\mathbf{P}^k, \mathbf{P}^{-k}, \tilde{G}(\theta)) \geq \pi^k(\mathbf{P}^k, \mathbf{P}^{-k}, G(\theta))$.

The response of the marginal income tax rate to a change in the composition of the voters' political preferences can be easily characterized from the optimality conditions if we assume that each party takes as given the tax policies of the competing party and we characterize the distribution of preferences over taxes of partisan voters. For the analysis that follows, and without loss of generality, consider that party k is the Democratic party and that the electorate is composed by three types of voters: Democratic voters with $\theta \in [\underline{\theta}, \bar{\theta}]$; $\bar{\theta} > 0$, independent voters with $\underline{\theta} = 0$, and Republican voters with $\theta \in [\underline{\theta}, \bar{\theta}]$; $\underline{\theta} < 0$. Moreover, consider the following distribution of preferences of voters over tax policy (Note 6):

A2) $\partial \Psi^k / \partial t^k|_{\underline{\theta}} \leq 0$ **Strongly identified Republican voters, or voters type, $\underline{\theta}$, prefer a lower tax and a lower public transfer relative the status quo.**

A3) $\partial \Psi^k / \partial t^k|_{\bar{\theta}} \geq 0$ **Strongly identified Democratic voters, or voters type, $\bar{\theta}$, prefer a higher tax and a higher public transfer relative the status quo.**

A4) $\{g(\bar{\theta}) - g(\underline{\theta})\} \geq 0$

A2 and **A3** correspond to the distribution of preferences over income tax rates of strongly partisan voters, while **A4** is a measure of the extent of the partisan dominance of $\tilde{G}(\theta)$ over $G(\theta)$. Now consider the response of party k to a change in the composition of partisan coalitions of voters in the electorate. To find $dt^k/dG(\theta) \quad \forall k$ differentiate the first order condition of the parties' problem when voting behavior is explained by partisan and policy issues (see condition A.1.1 in the appendix 1) with respect $G(\theta) \quad \forall \theta \in [\underline{\theta}, \bar{\theta}]$. In this case $dt^{*D}/dG(\theta) = -(\partial^2 \pi^D / \partial t^{*D} \partial G(\theta)) / (\partial^2 \pi^D / \partial t^{*D})$. It follows that $sign(\partial^2 \pi^D / \partial t^{*D} \partial G(\theta)) \Rightarrow sign(dt^{*D}/dG(\theta))$ since the second order sufficient conditions of $\pi^k(\mathbf{P}^k, \mathbf{P}^{-k})$ on taxes implies $-(\partial^2 \pi^D / \partial t^{*D}) > 0$. Moreover, $G(\theta) = \int_{\forall \theta} g(\theta) d\theta$ is a non decreasing monotone function of θ , then there exists an inverse function $\theta = \chi(G(\theta))$: $\partial \theta / \partial G(\theta) = 1 / \{g(\bar{\theta}) - g(\underline{\theta})\}$: $\partial^2 \pi^D / \partial t^{*D} \partial G(\theta) = \{ \partial t^{*D} / \partial \theta \} \{ \partial \theta / \partial G(\theta) \}$. Hence

$$\frac{\partial^2 \pi^D}{\partial t^{*D} \partial G(\theta)} = \frac{\int_{\underline{\theta}}^{\bar{\theta}} g'(\theta) f^D(\Psi^D) \{ d\Psi / \partial t^{*D} \} d\theta - \int_{\underline{\theta}}^{\bar{\theta}} g(\theta) \left(f^D(\Psi^D) \{ d\Psi / \partial t^{*D} \} \right)' d\theta}{g(\bar{\theta}) - g(\underline{\theta})} \tag{14}$$

We integrate by parts the numerator of (14) to obtain

$$\frac{\partial^2 \pi^D}{\partial t^{*D} \partial G(\theta)} = \left\{ g(\bar{\theta}) - g(\underline{\theta}) \right\}^{-1} \left\{ g(\bar{\theta}) f^D(\bar{\theta}) \frac{d\Psi}{\partial t^{*D}} \Big|_{\bar{\theta}} - g(\underline{\theta}) f^D(\underline{\theta}) \frac{d\Psi}{\partial t^{*D}} \Big|_{\underline{\theta}} \right\} \geq 0 \tag{15}$$

To interpret (15), use **A2** to **A4**. It follows that $dt^{*D}/\partial t^{*D} \partial G(\theta) \geq 0$ therefore $dt^{*D}/dG(\theta) \geq 0$, and it is easy to verify that $dt^{*R}/dG(\theta) \geq 0$ (to save space we don't prove this result). Therefore, an increase in the partisan dominance induces parties D and R to increase the marginal tax rate of equilibrium and the degree of progressivity of the tax system although the divergence of the tax policies persists.

In words, as a result of a more dominant partisan distribution in favor of party D , there is an increase in the proportion of the expected votes that parties D and R could obtain from Democratic voters in the election. By assumption, strong Democratic voters prefer a higher marginal tax rate and higher public transfers relative to the status quo. Hence, if parties increases the tax rate, the expected proportion of the votes for both parties increases by

a proportion given by $g(\bar{\theta})f^k(\Psi^k(\bar{\theta})) \forall k$. Simultaneously, a more dominant partisan distribution reduces the proportion of the expected votes for the parties from the rest of voters (this effect is approximated by a fall in the proportion of strong Republican voters of $g(\theta)f^k(\Psi^k(\theta)) \forall k$). By assumption, strong Republican voters support a decrease in the marginal tax rate. Consequently, parties $k = \{D, R\}$ have electoral incentives to take a policy position closer to Democratic voters, although differences in the policy positions between parties D and R persist.

6. Conclusions

The evidence on voting behavior suggests that: *i*) The individuals' choice of the vote is heavily influenced by policy and partisan preferences, *ii*) The voters' partisan preferences are the best predictor of the choice of the vote, *iii*) The voters' partisan identification is a persistent feature of the American electorate, but the influence of party preferences in explaining the individuals' choice of the vote has changed over time. The main contribution of this paper is to show that these stylized facts can explain some features of the US tax policy: first, the divergence of the tax policies adopted by the Democratic and Republican parties. Second, Democratic administrations tend to adopt more pro low income redistributive tax policies than Republican administrations.

In this paper we show that if voting is explained by policy and partisan preferences then parties diverge in their tax policies. Our theory provides a different rationale for the persistent divergence between the tax policies of Democratic and Republican administrations. We show that policy and partisan preferences induce each party to aggregate differently the demands over tax policy of the electorate and therefore the parties' tax policies diverge. While tax divergence has been explained by arguing that parties have preferences over tax policy, our model suggests that the effect of party cleavages on voting behavior and the electoral incentives for parties to use tax policy to maximize votes are sufficient to explain the divergence of the U.S. tax policies.

Some political scientists argue that the voters' partisan preferences played a less significant role in determining the vote between the 60's and 70's, but the influence of party cleavages over the choice of the vote became more relevant in the 90's. This evidence motivates a comparative analysis to identify some parametric values on the distribution of political and policy preferences that suggests that a shift in voting behavior (from only policy issue voting to policy and partisan voting) leads to more redistribution, and in particular, to higher taxes and per capita transfers under Democratic administrations relative the taxes and transfers implemented by Republican administrations.

The probabilistic theory of elections predicts that fiscal policy reflects more closely the preferences of those coalitions of voters that are more effective to influence policy makers. As argued by Hettich and Winer (2006), the distinction between economic welfare and political influence plays a central role in explaining the evolution of tax systems, but this distinction is difficult to separate empirically. As a result, few empirically verifiable tests over the role of the coalitions' electoral influence have been provided by the probabilistic voting models. In this paper we contribute to fill this gap since we provide testable predictions that allow us to identify the electoral influence of partisan coalitions and its effects on tax policy. In particular, we identify conditions in which a change in the composition of the partisan preferences increases the political influence of some partisan coalitions in the electorate and induces both parties to design a tax policy with higher pro low income redistribution even when the divergence of the parties' tax policies persist.

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Notes

Note 1. The voters' partisan attitudes (or preferences) are empirically measured as the voters' self identification (or lack of it) with some party.

Note 2. The ANES also shows that only 16% of Democrat voters would like a reduction in public spending services while 42% of Republican voters have expressed support for a cut in public spending.

Note 3. To see this, note from condition A.1.1 in the appendix 1 that the relative weight that party k assigns to the preferences of a voter type $\theta \in [\underline{\theta}, \bar{\theta}]$ is $\omega(\theta) = g(\theta)f^k(\Psi^k)$. Hence the higher $f^k(\Psi^k)$ the higher $\omega(\theta)$ and the stronger is the representation of the preferences over tax policy of voters type θ in the tax platform of party k .

Note 4. This means that voters self identified as Democrats (Republicans) will have higher than average marginal probabilities to vote for the Democratic (Republican) party. It also means that Democratic (Republican) voters will have lower than average marginal probabilities to vote for the Republican (Democratic) party.

Note 5. To see that a higher t^{*k} means higher per capita transfers T^{*k} , it is sufficient to recognize that a tax rate that produces a negative marginal tax revenue cannot belong to a Nash equilibrium in our game since there are feasible lower taxes that reduce the parties' electoral costs from taxation and increases their electoral gains from a higher tax revenue and transfers. Hence it must be that $dT^{*k}/dt^{*k} > 0 \forall k$.

Note 6. In assumptions A2 and A3 the policy at the status quo is the tax policy adopted by parties when the distribution of partisan preferences is characterized by the cumulative distribution $G(\theta)$.

Note 7. The optimality condition is $\partial\pi^k/\partial\tau^k = 0 \Rightarrow w^k(\rho^k)\{\partial\phi^k/\partial\tau^k - \partial\phi^{-k}/\partial\tau^k\} = 0 \forall t^{*k} > 0$. Since $\phi^k + \phi^{-k} = 1$ then

$\partial\phi^k/\partial\tau^k = -\partial\phi^{-k}/\partial\tau^k$ therefore $\partial\pi^k/\partial\tau^k = 2w^k(\rho^k)\{\partial\phi^k/\partial\tau^k\} = 0 \forall t^{*k} > 0$. From (2) we obtain

$$\partial\phi^k/\partial\tau^k = \int_{\forall\theta} g(\theta)f^k(\Psi^k)d\Psi^k/dt^{*k}d\theta = 0.$$

Appendix 1

Proposition 1 *If voting is determined by policy and partisan preferences, the tax rate proposed by party k at the political equilibrium, t^{*k} is characterized by*

$$\left(\frac{t^{*k}}{1-t^{*k}}\right) = \frac{-\tilde{\sigma}^k [f^k, \alpha n \ell^*]}{-\tilde{\varepsilon}_{\ell-t}} + \frac{\bar{z}(n) - z^k(n, \alpha, \theta)}{-\tilde{\varepsilon}_{\ell-t}} \tag{3}$$

Proof

The first order condition of the electoral equilibrium for $k = \{D, R\}$ is (Note 7).

$$\int_{\forall \theta} g(\theta) f^k(\Psi^k) d\Psi^k / dt^{*k} d\theta = 0 \tag{A.1.1}$$

Let $\ell^*(t^{*k}, n) \in \text{argmax } U^k / \beta = \mu(c, 1 - \ell) + \{(1 - \beta) / \beta\} \gamma^k$ s.t. $c = (1 - t^k)n\ell + T^k$ satisfying $\ell^*(t^{*k}, n) > 0$ for $n > \tilde{n} : n \in [\tilde{n}, n_{\max}] : \{\partial \mu / \partial c\}(1 - t^{*k})n - \partial \mu / \partial y = 0$ and $\ell^*(t^{*k}, \tilde{n}) = 0 \forall n \leq \tilde{n}, t^{*k} : \{\partial \mu / \partial c\}(1 - t^{*k})\tilde{n} - \partial \mu / \partial y < 0$.

Moreover, use the fact that $d\Psi^k / dt^{*k} = d\nu(t^k, T^k, n) / dt^{*k}$ to show that the first order condition is equivalent to

$$\begin{aligned} & - \int_{\forall \theta} g(\theta) f^k \alpha n \ell^*(t^{*k}, n) d\theta / \int_{\forall \theta} g(\theta) f^k \alpha d\theta + \left\{ \int_{\tilde{n}}^{n_{\max}} h(n) n \ell^*(t^{*k}, n) dn \right\} \\ & - h(\tilde{n}) \tilde{n} \ell^*(t^{*k}, \tilde{n}) d\tilde{n} / dt^{*k} + t^{*k} \int_{\tilde{n}}^{n_{\max}} h(n) \partial \ell^*(t^{*k}, n) / \partial t^{*k} dn = 0 \end{aligned} \tag{A.1.2}$$

Since $\ell^*(t^{*k}, \tilde{n}) = 0$ then $h(\tilde{n}) \tilde{n} \ell^*(t^{*k}, \tilde{n}) d\tilde{n} / dt^{*k} = 0$. By the definition of the covariance between X and Y the next is satisfied $\sigma(X, Y) = E[XY] - E[X]E[Y]$ where $E[X], E[Y]$ and $E[XY]$ are the expectations over X, Y, and XY.

Re-define, $X = f^k(\Psi^k)$ and $Y = \alpha n \ell^*$ and use this expression to state the following

$$\sigma^k [f^k(\Psi^k), \alpha n \ell^*] = \int_{\forall \theta} g(\theta) f^k \alpha n \ell^* d\theta - \left\{ \int_{\forall \theta} g(\theta) f^k d\theta \right\} \left\{ \int_{\forall \theta} g(\theta) \alpha n \ell^* d\theta \right\} \tag{A.1.2}$$

Define

$$\tilde{\sigma}^k [f^k(\Psi^k), \alpha n \ell^*] = \sigma^k [f^k(\Psi^k), \alpha n \ell^*] / \int_{\forall \theta} g(\theta) f^k \alpha d\theta$$

and simplify terms to express (A.1.2) as follows:

$$-\tilde{\sigma}^k [f^k(\Psi^k), \alpha n \ell^*] - \int_{\forall \theta} g(\theta) f^k d\theta \int_{\forall \theta} g(\theta) \alpha n \ell^* d\theta / \int_{\forall \theta} g(\theta) f^k \alpha d\theta + \bar{z}(n) + \frac{t^{*k}}{(1-t^{*k})} \tilde{\varepsilon}_{\ell-t} = 0 \tag{A.1.3}$$

Where $\bar{z}(n) = \int_{\tilde{n}}^{n_{\max}} h(n) n \ell^*(t^{*k}, n) dn$, the labor supply price elasticity is $\varepsilon_{\ell-t} = \frac{\partial \ell^*(1-t^{*k})z(n)}{\partial t^{*k} \ell^*}$, and

$\tilde{\varepsilon}_{\ell-t} = \int_{\tilde{n}}^{n_{\max}} h(n) \varepsilon_{\ell-t} dn$ is the average supply price elasticity of those who work. Define

$z^k(n, \alpha, \theta) = \int_{\forall \theta} g(\theta) \xi n \ell^*(t^{*k}, n) d\theta$ where $\xi^k = \alpha / \alpha^{ok}$, and $\alpha^{ok} = \int_{\forall \theta} g(\theta) f^k \alpha d\theta / \int_{\forall \theta} g(\theta) f^k d\theta$ is a weighted

marginal utility of income. Re-arrange terms to obtain

$$\left(\frac{t^{*k}}{1-t^{*k}}\right) = \frac{-\tilde{\sigma}^k [f^k(\Psi^k), \alpha n \ell^*]}{-\tilde{\varepsilon}_{\ell-t}} + \frac{\bar{z}(n) - z^k(n, \alpha, \theta)}{-\tilde{\varepsilon}_{\ell-t}} \tag{A.1.4}$$

Appendix 2

Proposition 2 *If voting is only policy oriented then the parties' tax policies converge towards $t^{*D} = t^{*R} = \hat{t}^*$ with*

$$\left(\frac{\hat{t}^*}{1-\hat{t}^*}\right) = \left\{ \frac{1}{-\tilde{\varepsilon}_{\ell-t}} \right\} \{ \bar{z}(n) - z(n, \alpha) \} \tag{4}$$

$$z(n, \alpha) = \int_{\tilde{n}}^{n_{\max}} h(n) \alpha n \ell^*(t^{*k}, n) dn / \int_{\forall n} h(n) \alpha dn \tag{5}$$

And the term, $\bar{z}(n) - z(n, \alpha)$, which is the difference between the average gross wage income of working voters

$$\bar{z}(n) = \int_{\tilde{n}}^{n_{\max}} h(n) n \ell^*(t^{*k}, n) dn .$$

Proof

Voting is only policy oriented then $\theta = 0 \quad \forall \theta$ and $\Psi^k = \Delta v^k = v^k(t^k, T^k, n) - v^{-k}(t^{-k}, T^{-k}, n)$ hence we distinguish the voters' type by their labor earning ability. Thus, the probability that a voter with earning ability $n \in [n, n_{\max}]$

votes for party k is $\Pr(\tilde{\Psi}^k(\Delta v^k)) = \int_{-\infty}^{\tilde{\Psi}^k(\Delta v^k)} f^k(\Psi^k) d\Psi^k$ and the proportion of expected votes is

$$\phi^k(\mathbf{P}^k \times \mathbf{P}^{-k}) = \int_n^{n_{\max}} h(n) F^k(\tilde{\Psi}^k(\Delta v^k)) dn .$$

The probability that party k wins the election is $\pi^k(\bar{\rho}^k) = \int_{-\infty}^{\bar{\rho}^k} w^k(\rho^k) d\rho^k$

for $k = \{D, R\}$. In this case, the optimality condition is:

$$\int_n^{n_{\max}} h(n) f^k(\Psi^k(\Delta v^k)) d\Psi^k / dt^{*k} dn = 0 \quad \text{for } t^{*k} > 0 \quad \forall k \tag{A.2.1}$$

Since parties seek to maximize a continuous function of t^k , share a common system of beliefs over voting behavior, the strategy set is the same for both parties and candidates are not otherwise differentiated then parties converge in

their fiscal platforms (see Coughlin 1992). Hence $\Psi^k = 0 \quad \forall k \Rightarrow f^k(\Psi^k(0)) = f^{-k}(\Psi^{-k}(0)) = c > 0$ where c is a

constant. The first order condition becomes

$$\begin{aligned} & - \int_{\tilde{n}}^{n_{\max}} h(n) \alpha n \ell^*(t^{*k}, n) dn + \left\{ \int_{\forall n} h(n) \alpha dn \right\} \left\{ \int_{\tilde{n}}^{n_{\max}} h(n) n \ell^*(t^{*k}, n) dn \right\} \\ & + \left\{ \int_{\forall n} h(n) \alpha dn \right\} \left\{ -h(\tilde{n}) \tilde{n} \ell^*(t^{*k}, \tilde{n}) d\tilde{n} / dt^{*k} + t^{*k} \int_{\tilde{n}}^{n_{\max}} h(n) \left\{ \partial \ell^* / \partial t^{*k} \right\} n dn \right\} = 0 \end{aligned} \tag{A.2.2}$$

Since $\ell^*(t^{*k}, \tilde{n}) = 0 \quad \forall n \leq \tilde{n}$ then $h(\tilde{n}) \tilde{n} \ell^*(t^{*k}, \tilde{n}) d\tilde{n} / dt^{*k} = 0$. Define $\bar{z}(n) = \int_{\tilde{n}}^{n_{\max}} h(n) n \ell^*(t^{*k}, n) dn$ and

$z(n, \alpha) = \int_{\tilde{n}}^{n_{\max}} h(n) \alpha n \ell^*(t^{*k}, n) dn / \int_{\forall n} h(n) \alpha dn$, the labor supply-price elasticity is $\varepsilon_{\ell-t} = \frac{\partial \ell^*}{\partial t^{*k}} \frac{(1-t^{*k})z(n)}{\ell^*}$, and

$\tilde{\varepsilon}_{\ell-t} = \int_{\tilde{n}}^{n_{\max}} h(n) \varepsilon_{\ell-t} dn$ is the average supply-price elasticity of those who work. Re-arrange terms to obtain

$$\left(\hat{t}^* / 1 - \hat{t}^* \right) = - \left\{ \bar{z}(n) - z(n, \alpha) \right\} / \tilde{\varepsilon}_{\ell-t} .$$