Inequality and redistribution: Parties do matter

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Abstract

A large body of literature written by political scientists and social historians has long emphasized the role of political parties in shaping the welfare state policies. The theoretical core of this voluminous literature is that there are significant party differences in welfare state policies (Schmidt, 2010).

In this paper, we study the relationship between inequality and redistribution using two ‘partisan’ models of political competition – the Wittman-Roemer model and what we call the ideological party model. We show that ‘political parties do matter’ in explaining how redistribution changes in response to changes in inequality. As inequality increases, the Left party tends to propose more redistribution, while the Right party tends to propose less redistribution.

The argument that the Left and the Right parties may respond differently to changes in inequality first appeared in Lee and Roemer (2005) as a subsidiary argument, when they mainly studied the inverse U-shaped relationship between inequality and the support for the unionized labor market regime.

This paper improves upon Lee and Roemer’s (2005) analysis. First, their result is based upon numerical calculations. In this paper, we provide an analytically tractable model, and produce a closed form solution. Second, because there was an interaction between political parties and the labor union in Lee and Roemer (2005), it was not clear whether the result is purely driven by partisan politics or to its interaction with the union. We show that the result is a generic feature of partisan politics. Third, we made improvements upon empirical testing of the hypothesis.

JEL Categories: D3, D7, H2

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1. Introduction

Conventional wisdom in the new political economy literature argues that increasing inequality in democracy would cause increasing tax rates and redistribution. Indeed, based upon the Hotelling-Downs model of political competition, Alesina and Rodrik (1994), Meltzer and Richard (1981), and Persson and Tabellini (1994) model a positive relationship between (pre-fisc) income inequality and redistributive tax rates.

The underlying logic behind these models is fairly simple. Since actual income distributions are skewed to the right, median income is always less than the mean. Thus, if all citizens have the vote, and the gap between median income and the mean becomes larger as inequality rises, then a majority of voters (namely, those whose income is less than the mean) would call for a higher tax rate in democracy.

A large body of empirical literature, however, shows that this does not hold in reality (Forbes, 2000; Milanovic, 2000; Perotti, 1996; Rodriguez, 1999). A typical empirical pattern seems exactly opposite to what this theory predicts; in contrast with the conventional wisdom, there appears to be a negative relationship between (pre-fisc) income inequality and redistribution. Compare Sweden and the US, for instance. Observe also that in the past twenty-five years, a period of sharply rising inequality in the US and the UK, the effective marginal income tax rate has fallen. Lindert (2002) calls the mismatch between theoretical predictions of the Hotelling-Downs model and empirical findings the ‘Robinhood paradox.’

In this paper, we study the relationship between inequality and redistribution using two ‘partisan’ models of political competition – the Wittman-Roemer version of partisan model and what we call the ideological party model – and argue that ‘political parties do matter’ in explaining how redistribution changes in response to changes in inequality. In contrast with the Hotelling-Downs model of political competition, where ‘parties do not matter’ at the equilibrium, the partisan models of political competition that the current paper employs implies more nuanced results. We find that (1) the Left party proposes a higher tax rate than the Right party at the equilibrium; and (2) as inequality rises, the Left party proposes more redistribution, while the Right party proposes less redistribution. Thus, not only do the two parties propose different
redistributive tax rates at the equilibrium, but their proposals move in different directions as inequality changes.

The argument that the Left and the Right parties respond differently to changes in inequality first appeared in Lee and Roemer (2005) as a subsidiary argument, when they studied the inverse U-shaped relationship between inequality and the support for the unionized labor market regime. The current paper improves upon Lee and Roemer’s (2005) analysis in several ways.

First, their result is based upon numerical calculations. In this paper, we provide an analytically tractable model, which produces a closed form solution.

Second, because there was an interaction between political parties and the labor union in Lee and Roemer (2005), it was not clear whether the result is purely driven by partisan politics or to the presence of the union. This paper shows that the result is a generic feature of partisan politics.

Third, we made improvements upon empirical testing of the hypothesis.

The idea that poor voters (such as the median voter) whose wealth is less than the mean would call for high redistributive taxes is indeed a revival of the 19th century liberal idea that the poor would expropriate the wealth of the rich if suffrage is extended to the poor. Indeed nineteen century conservatives and Marxists alike joined in the belief that extension of suffrage and capitalism would be incompatible; universal suffrage, in the age of class cleavage, would inevitably deliver more votes to the Left. The framers of the US Constitution extended suffrage only to (male) property holders because they believed that, were the poor to be given the vote, they would soon expropriate the wealth of the rich.

Universal suffrage has not engendered the expropriation of the rich through the tax system, and a variety of reasons have been offered in explanation for why poor voters do not expropriate the wealth of the rich.

First, the citizenry, including the median voter, might recognize that there would be adverse dynamic effects to expropriating the rich, who have scarce productive talents which would cease to be supplied were their holders taxed too harshly, and all would consequently suffer.
Second, the median voter whose wealth lies below the mean might entertain the hope that his/her children will someday become richer than the mean, and he/she shuns high tax rates for fear of hurting his/her future selves or children. Benabou and Ok (2001) modeled this idea and call their model’s prediction the ‘prospect of upward mobility’ (POUM) hypothesis.

Third, the citizenry might believe that the rich person – and indeed everyone – deserves the wealth he/she receives, and hence high tax rates would be unethical.

Fourth, even if there would be few adverse dynamic or social mobility effects from high taxation, as described above, the rich might convince the citizenry that there would be, with propaganda disseminated through the media, which they control.

Our analysis does not rely upon any of these explanations. In this paper, we emphasize the role of political competition between parties that represent different constituencies.

The new political economy literature relies heavily upon the Hotelling-Downs model of political competition, where parties do not matter in shaping policies. In contrast, a large body of literature written by political scientists and social historians has long emphasized the role of political parties in shaping the welfare state policies. The theoretical core of this voluminous literature is that there are significant party differences in welfare state policies (Schmidt, 2010). The ‘parties matter’ literature argues that:

1. The social constituencies of political parties have distinctive social policy preferences;
2. The social policy orientation of political parties mirrors the distinctive preferences of their social constituencies; and
3. The Left tend to propose more redistribution than the Right.

We add the following proposition to the above:

4. The response of redistribution to inequality is different between parties. As inequality rises, the Left party tends to increase the redistributive tax rate, whereas the Right party tends to decrease it.

For our purpose, we adopt the generalized Wittman-Roemer model of two-party competition as a unified model of political competition. The generalized Wittman-Roemer model covers various models of political competition as its special cases. It thus allows us to study the
consequence of changing inequality on the equilibrium of various political models in a unified framework.

We will study three special cases of the generalized Wittman-Roemer model of political competition, which have received much attention among students of political economy. One is the well-known Hotelling-Downs model in which parties maximize their probabilities of victory, and another is the classical Wittman-Roemer model (Roemer, 1997) in which parties maximize the expected utilities of their key constituents. The third is the one, which we call the ideological party model, in which each party sets its policy that is equal to the ideal tax rate of its endogenously-determined average member.

Instead of viewing political competition as occurring between two parties each of which is a unitary actor that maximizes a certain payoff function, the generalized Wittman-Roemer model views political equilibrium as the one obtained from competition between parties with factions that have different goals and Nash-bargain with one another to set the policy. Following Roemer (2001), we assume that there are two factions in each party: the opportunists whose goal is to win the election and the militants whose objective is to maximize the average well-being of their party members. 1

2. The model

Throughout the paper, we will maintain that there are two political parties (or candidates representing them), L and R. The policy space is a subset of the unit interval: $T \subset [0,1]$. A generic element of $T$ will be denoted by $t$, which we call a tax rate or a size of the welfare state. We assume that the party that wins the election implements its announced tax rate.

Because we are modeling an election in large polities, we assume a continuum of voters distributed by a one-dimensional characteristic, $w \in H \subset \mathbb{R}_+$. We assume that its distribution is

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1 A generalized Wittman-Roemer equilibrium, where bargaining power is fixed, can be considered a special case of Roemer’s (2001) party unanimity Nash equilibrium, where bargaining power is not specified a priori.
described by a strictly increasing and continuous function, $F(.)$. We call $w$ an income; its mean is denoted by $\mu$. The associated probability measure will be denoted by $P(.)$.

Suppose $(t_L, t_R) \in T \times T$ is a pair of policy positions of the two parties. Given $t_j$, where $j = L, R$, we assume that voter preferences are given by

$$(1 - t_j)w + h(t_j\mu),$$

where $h : T \rightarrow \mathbb{R}$ is strictly increasing, strictly concave, and finite-valued on $T$.

Our model postulates a perfectly representative democracy where: (1) every voter belongs to one and only one party; (2) each party member receives an equal weight in the determination of the party’s von Neumann-Morgenstern utility function; and (3) each voter votes for the party of which he/she is a member.

Facing $(t_L, t_R)$, voter $w$ (weakly) prefers $L$ to $R$ if

$$(t_L - t_R)w \leq (h(t_L\mu) - h(t_R\mu)).$$

Thus, given $(t_L, t_R)$, the set of voters who prefer $L$ to $R$ is

$$\Omega(t_L, t_R) = \begin{cases} 
\{w \in \mathbb{R}_+ \mid w \leq w(t_L, t_R)\} & \text{if } t_L > t_R, \\
\{w \in \mathbb{R}_+ \mid w \geq w(t_L, t_R)\} & \text{if } t_L < t_R, \\
a \text{random half subset of } \mathbb{R}_+ & \text{if } t_L = t_R
\end{cases} \quad (3)$$

where $w(t_L, t_R) \equiv \max[\frac{h(t_L\mu) - h(t_R\mu)}{t_L - t_R}, 0]$. We are assuming that indifferent voters decide their party membership by flipping a fair coin. This means that the two random half-subsets of $\mathbb{R}_+$ will have exactly the same distributions of voters as $F(.)$. The membership share of party $L$ is then

$$P(\Omega(t_L, t_R)) = \begin{cases} 
F(w(t_L, t_R)) & \text{if } t_L > t_R, \\
1 - F(w(t_L, t_R)) & \text{if } t_L < t_R, \\
\frac{1}{2} & \text{if } t_L = t_R
\end{cases} \quad (4)$$

We now introduce the two factions that Nash-bargain one another in setting the party policy.

We define the payoff function of the opportunists in party $L$ to be
\[ \pi(t_L, t_R) = \Phi\left( P(\Omega(t_L, t_R)) \right), \]  

where \( \Phi : [0,1] \rightarrow [0,1] \) is a strictly increasing function such that \( \Phi(\frac{1}{2}) = \frac{1}{2} \) and \( \Phi(x) = 1 - \Phi(1 - x) \). In like manner, the payoff function of party R’s opportunists is defined by:

\[ 1 - \pi(t_L, t_R) = 1 - \Phi\left( P(\Omega(t_L, t_R)) \right) = \Phi\left( 1 - P(\Omega(t_L, t_R)) \right). \]

Although our formulation is flexible enough to cover various specifications in the literature on political economy, we will simply call \( \pi(t_L, t_R) \) and \( 1 - \pi(t_L, t_R) \) probabilities of victory throughout the paper. These are the objective functions of the opportunists in the two parties.

We now describe the objective function of the militants. Consider an arbitrary partition of the polity into two sets of party members, \( H_L \) and \( H_R \), such that \( H_L \cup H_R = \mathbb{R}_+ \) and \( H_L \cap H_R = \emptyset \). Assume that a party’s von Neumann-Morgenstern utility function is the average of its members’ utility functions. Thus, for an arbitrary policy \( t \in T \) and party memberships \( H_L \) and \( H_R \), they are:

\[
V(t; H_L) = \begin{cases} 
\frac{1}{P(H_L)} \int_{w \in H_L} ((1-t)w + h(t\mu))dP(w) & \text{if } P(H_L) \neq 0, \\
0 & \text{if } P(H_L) = 0,
\end{cases}
\]  

and

\[
V(t; H_R) = \begin{cases} 
\frac{1}{P(H_R)} \int_{w \in H_R} ((1-t)w + h(t\mu))dP(w) & \text{if } P(H_R) \neq 0, \\
0 & \text{if } P(H_R) = 0.
\end{cases}
\]

In our model, these are the objective functions that the militants would like to maximize.

Because the utility function is quasi-linear, each party’s von Neumann-Morgenstern utility function, defined as the average well-being of its members, is identical to the utility function of the voter whose income equals the mean income of its members; for

\[
\frac{1}{P(H_L)} \int_{w \in H_L} ((1-t)w + h(t\mu))dP(w) = (1-t)w_L + h(t\mu),
\]
and

\[ \frac{1}{P(H_R)} \int_{w \in H_R} ((1-t)w + h(tu))dP(w) = (1-t)w_R + h(tu), \]  

(10)

where \[ w_L = \frac{1}{P(H_L)} \int_{w \in H_L} wdP(w) \] and \[ w_R = \frac{1}{P(H_R)} \int_{w \in H_R} wdP(w). \]

If party L’s factions fail to come to an agreement, party R wins the election by default; the probability of victory for party L is zero and party R’s policy will be implemented. Thus, given \((t_R, H_L)\), the Nash-bargaining solution between the two factions of party L is the policy \(t_L\) that maximizes a Nash product:

\[ (\pi(t, t_R) - 0)^{\gamma_L}(V(t; H_L) - V(t_R; H_L))^{1-\gamma_L}, \]

for some \(\gamma_L \in [0,1]\). Similarly, given \((t_L, H_R)\), party R’s factions Nash-bargain to a policy \(t_R\) that maximizes:

\[ (1 - \pi(t_L, t) - 0)^{\gamma_R}(V(t; H_R) - V(t_L; H_R))^{1-\gamma_R}, \]

for some \(\gamma_R \in [0,1]\).

We now define our equilibrium concept.

**Definition 1:** For given \(\gamma_L, \gamma_R \in [0,1]\), a generalized Wittman-Roemer political equilibrium is a partition of the polity into \(H^*_L\) and \(H^*_R\) and a pair \((t_L^*, t_R^*)\) such that:

1. \(t_L^* \in \arg\max (\pi(t, t_R^*))^{\gamma_L}(V(t; H_L^*) - V(t^*_R; H_L^*))^{1-\gamma_L};\)
2. \(t_R^* \in \arg\max (1 - \pi(t_L^*, t))^{\gamma_R}(V(t; H_R^*) - V(t^*_L; H_R^*))^{1-\gamma_R};\)
3. \(w \in H_L^* \Rightarrow w \in \Omega(t_L^*, t_R^*),\)
6. \(w \in H_R^* \Rightarrow w \in \mathbb{R}_+ \setminus \Omega(t_L^*, t_R^*).\)

The first two conditions in Definition 1 require that given \((H_L^*, H_R^*)\), \((t_L^*, t_R^*)\) be a Nash equilibrium of the game in which each party’s payoff function is a weighted Nash product of the
payoff functions of its two factions. Thus a generalized Wittman-Roemer equilibrium is ‘doubly Nash.’ Each party plays a best-response to the opponent while holding \((H_L^*, H_R^*)\) constant, and the best-response is an outcome of a within-party Nash-bargaining process.

The third condition endogenizes party membership; it states that no member of either party is better represented by the other party at the equilibrium. Baron (1993) first uses the idea here (‘voting with feet’) in the context of political competition, although our formulation is closer to those of Ortuno-Ortin and Roemer (1998) and Roemer (2001: page 92).

Some remarks are in order.

First, if we set \(\gamma_L = \gamma_R = 1\), we have the Hotelling-Downs model. In this model, the militants have no bargaining power in both parties.

Second, if we set \(\gamma_L = \gamma_R = 0\), we have the model of political competition between two purely ideological parties in which the opportunists have no say in determining party policies. We call a political equilibrium in this case an ideological-party equilibrium.

Finally, if \(\gamma_L = \gamma_R = \frac{1}{2}\), then we have the classical Wittman-Roemer model, adapted for endogenous party membership, where the two factions have equal bargaining power in both parties. (For details of the classical Wittman-Roemer model, see Roemer (2001: Chapter 3).)

3. Inequality and redistribution

So far we described our model in its full generality. We now specialize to the case where:

1. \(w\) is uniformly distributed over \(H \equiv \left[\frac{1}{2} - a, \frac{1}{2} + a\right] \) with mean \(\mu = \frac{1}{2}\);

2. \(h(t\mu) = -2(t\mu - \mu)^2 = -2\mu^2(t - 1)^2\);

and

3. \(\Phi(x) = \frac{1}{2\beta}(x - \frac{1}{2}) + \frac{1}{2}\).
Parameter $a$ captures the degree of inequality in the current model; a larger value of $a$ corresponds to a greater level of inequality. Specifically, for $a'$ and $a''$ such that $a' > a''$, the income distribution with parameter $a''$ is a mean-preserving spread of the income distribution with parameter $a'$; the distribution with $a'$ Lorenz-dominates the distribution with $a''$.

Because of assumptions (1) and (2), the policy preference of voter type $w \in H$ is:

$$v(t, w) = (1 - t)w - \frac{1}{2}(t - 1)^2.$$  (13)

Therefore, assuming that $t_L > t_R$ and that equilibrium exists in the interior of $H$, we compute the set of voters who prefer L to R as

$$\Omega(t_L, t_R) = \{w \in H \mid v(t_L, w) > v(t_R, w)\} = \{w \in H \mid w < (1 - \frac{t_L + t_R}{2})\},$$  (14)

and the membership share of party L as

$$P(\Omega(t_L, t_R)) = F(1 - \frac{t_L + t_R}{2}) = \frac{1}{2a} (1 - \frac{t_L + t_R}{2}) - \frac{1}{2} + \frac{1}{4a} (1 - t_L - t_R) + \frac{1}{2}.\quad (15)$$

Because of assumption (3), we then have:

$$\pi(t_L, t_R) = \frac{1}{2\beta} (P(\Omega(t_L, t_R)) - \frac{1}{2}) + \frac{1}{2} = \frac{1}{4a\beta} (2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2}).\quad (16)$$

**Ideological party equilibrium**

Political parties in this model are not strategic; each party simply chooses the ideal policy of its average member. Without endogenous party membership, this model would be trivial. With endogenous party membership, however, the model is no longer trivial. Although each party puts forth the ideal policy of its average member, the membership is endogenously determined; this in turn changes the policy of the two parties.

Because the distribution of $w$ is symmetric, we start with a reasonable conjecture of equilibrium partition of constituency; $H_L = [\frac{1}{2} - a, \frac{1}{2}]$ and $H_R = [\frac{1}{2}, \frac{1}{2} + a]$. (We will confirm later that this is indeed an equilibrium partition supported by equilibrium tax rates.) Also we conjecture
that $w_L$ and $w_R$ take the following form at the equilibrium: $w_L = \frac{1}{2} - \varepsilon$ and $w_R = \frac{1}{2} + \varepsilon$, where $0 < \varepsilon < a$. The payoff functions of the militants under these specializations are given by:

$$V(t, H_L) = (1-t)\left(\frac{1}{2} - \varepsilon\right) - \frac{1}{2}(t-1)^2$$ for party L;

and

$$V(t, H_R) = (1-t)\left(\frac{1}{2} + \varepsilon\right) - \frac{1}{2}(t-1)^2$$ for party R.

Differentiating $V(t_L, H_L)$ with respect to $t_L$ and setting the equation equal to zero yields $t_L^* = \frac{1}{2} + \varepsilon$. Likewise, differentiating $V(t_R, H_R)$ with respect to $t_R$ and setting the equation equal to zero yields $t_R^* = \frac{1}{2} - \varepsilon$.

Because $H_L = \left[\frac{1}{2} - a, \frac{1}{2}\right]$ and $H_R = \left[\frac{1}{2}, \frac{1}{2} + a\right]$, the average income in each party is $w_L = \frac{1}{2} - \frac{a}{2}$ and $w_R = \frac{1}{2} + \frac{a}{2}$; thus $\varepsilon = \frac{a}{2}$. The ideological equilibrium with endogenous party membership is $(t_L^*, t_R^*)$ such that $t_L^* = \frac{1}{2} + \varepsilon = \frac{1}{2} + \frac{a}{2}$ and $t_R^* = \frac{1}{2} - \varepsilon = \frac{1}{2} - \frac{a}{2}$.

We now verify that the equilibrium partition of constituency is precisely equal to the one we started the analysis with. Note that $\Omega(t_L, t_R) = \{w \mid w < (1 - \frac{t_L + t_R}{2})\}$. Thus

$$H^*_L = \Omega(t_L^*, t_R^*) = \left[\frac{1}{2} - a, \frac{1}{2}\right].$$

Note that $t_L^* > t_R^*$; party L’s tax rate is bigger than party R’s tax rate at the equilibrium. Also an increase in the value of $a$ increases $t_L^*$ but decreases $t_R^*$.

Wittman-Roemer equilibrium
This is the case where $\gamma_L = \gamma_R = \frac{1}{2}$. As in the ideological party model, we will start with
$H_L = \left[ \frac{1}{2} - a, \frac{1}{2} \right]$ and $H_R = \left[ \frac{1}{2}, \frac{1}{2} + a \right]$ as a correct conjecture of the partition of constituency. We also conjecture that $w_L$ and $w_R$ take the following form at the equilibrium: $w_L = \frac{1}{2} - \varepsilon$ and $w_R = \frac{1}{2} + \varepsilon$, where $0 < \varepsilon < a$. (Again we confirm later that they are correct conjectures.)

We first compute that:

\[
V(t_L; H_L) - V(t_R; H_L) = (t_L - t_R)(\frac{1}{2} + \varepsilon - \frac{t_L + t_R}{2});
\]

and

\[
V(t_R; H_R) - V(t_L; H_R) = (t_R - t_L)(\frac{1}{2} - \varepsilon - \frac{t_L + t_R}{2}).
\]

Thus party L’s payoff function becomes

\[
\pi(t_L, t_L)(V(t_L; H_L) - V(t_R; H_L)) = \frac{1}{4a\beta}(2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2})(t_1 - t_2)(\frac{1}{2} + \varepsilon - \frac{t_L + t_R}{2}).
\]

Differentiating it with respect to $t_L$ yields

\[
-\frac{1}{2}(t_L - t_R)(\frac{1}{2} + \varepsilon - \frac{t_L + t_R}{2}) + (2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2})(\frac{1}{2} + \varepsilon - \frac{t_L + t_R}{2}) + (2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2})(t_L - t_R)(\frac{1}{2}) = 0
\]

Merging the second and the third terms, you may reduce it to:

\[
(t_L - t_R)(-(\frac{1}{2} + \varepsilon) + \frac{t_L + t_R}{2}) = 2(2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2})(-(\frac{1}{2} + \varepsilon) + t_L).
\]

In like manner, you may compute that the first order condition for party R reduces to:

\[
(t_L - t_R)(-(\frac{1}{2} - \varepsilon) + \frac{t_L + t_R}{2}) = 2(2a\beta - \frac{1}{2} + \frac{t_L + t_R}{2})(-(\frac{1}{2} - \varepsilon) + t_R).
\]

Symmetric structure of the model suggests that we try for a solution of the form $t_L = \frac{1}{2} + \delta$ and $t_R = \frac{1}{2} - \delta$. Substituting these values into the first order conditions yields a
solution of \( \delta = \frac{2a\beta \varepsilon}{2a\beta + \varepsilon} \). As in the case of the ideological party equilibrium, \( \varepsilon = \frac{a}{2} \). Thus the Wittman-Roemer equilibrium with endogenous party is \((t_{L}^{**}, t_{R}^{**})\) such that:

\[
t_{L}^{**} = \frac{1}{2} + \frac{2a\beta \varepsilon}{2a\beta + \varepsilon} = \frac{1}{2} + \frac{a\beta}{2\beta + \frac{a}{2}} ;
\]

and

\[
t_{R}^{**} = \frac{1}{2} - \frac{2a\beta \varepsilon}{2a\beta + \varepsilon} = \frac{1}{2} - \frac{a\beta}{2\beta + \frac{a}{2}} .
\]

Note that the policies at the Wittman-Roemer equilibrium are more moderate than the policies at the ideological party equilibrium; \( t_{R}^{*} < t_{R}^{**} < t_{L}^{**} < t_{L}^{*} \). Still, rising inequality makes the two parties respond differently; an increase in the value of \( a \) increases \( t_{L}^{**} \) but decreases \( t_{R}^{**} \).

Hotelling-Downs equilibrium

In the Hotelling-Downs model, a pair of Condorcet winners constitutes a political equilibrium. Because the unique Condorcet winner in this model is the policy preferred by the voter with median income, the Hotelling-Downs equilibrium is \( (t_{L}^{0}, t_{R}^{0}) = \left( \frac{1}{2}, \frac{1}{2} \right) \).

In this case, the Hotelling-Downs equilibrium does not change with respect to changes in inequality. This is because we postulated a symmetric distribution in which the median is always identical to the mean. In the case where the median is less than the mean, however, both parties will increase the tax rate as inequality rises.

4. Empirical assessment of the implications of the various models

The main results of our model in the previous sections can be summarized into the following two hypotheses:

First, the Left party proposes higher redistributive taxes than the Right party.
Second as inequality rises, the Left party proposes more redistribution, while the Right party proposes less redistribution.

In this section, we test these two implications of our model using an unbalanced panel of 20 OECD countries during the period of 1980 – 2001.

A. Data

The 20 OECD countries studied are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the UK, and the US. The average time period covered by each country is approximately 20 years.

We employ social transfers as a percentage of GDP as a measure of redistributive tax rates. We use the one compiled by Peter Lindert.\(^2\) He constructed this variable using the data provided by OECD. The social transfers include the following: non-contributory public pensions, public health expenditure, the sum of family cash benefits, family service expenditures and expenditures on active labor market policies, and the sum of unemployment compensation, early retirement for labor market reasons, and severance pay.\(^3\) This variable is the dependent variable in the following regressions.

We use two measures of inequality compiled by the University of Texas Inequality Project: the estimated household income inequality (EHII) and the Theil index. We use them because they provide largest sample sizes. Regarding the number of observations, EHII is slightly more comprehensive. The total sample sizes of EHII and the Theil are 406 and xxx, respectively.

Parties are important in explaining redistributive tax rates in our model. We measure the strength of the Left party by the Left party strength in cabinets and parliaments. We constructed

\(^2\) The web address of Peter Lindert’s homepage is http://lindert.econ.ucdavis.edu/.

\(^3\) We have also tried total social transfers which include housing subsidies and other compensations but the main results are not sensitive to the choice of redistributive tax rates.
our measure of the strength of Left parties based upon the political parties dataset complied by Duane Swank. Swank (1999) classifies political parties in OECD countries into three categories – the leftist, the centrist, and the rightist parties – and reports each party’s cabinet portfolios (as a percentage of all cabinet portfolios) and its legislative seats (as a percentage of all legislative seats). We take the average of the cabinet portfolio percentage and the legislative seats percentage as a measure of a party’s strength. Since there are only two parties (Left party and Right party) in our model, we allocate the centrist party’s strength equally to the leftist and rightist parties. Also, since we cannot expect policy switches to occur immediately with a change in the party governance, we use a cumulative measure of Left party strength, denoted by $\textit{LCUM}_t$; it is defined as the sum of the strengths of Left party from 1977 until time $t$.\footnote{1977 is dictated by data availability. Swanks’ data for Spain starts from 1977.}

In addition to the variables capturing inequality and the strength of Left parties, we include the following variables as regressors. The data for these variables are taken from Peter Lindert’s homepage.

(1) Trade openness: We use trade openness (which is the sum of import and export as a percent of GDP) as a regressor because previous studies such as Cameron (1978), Katzenstein (1985), Garrett (2001), Garrett and Mitchell (2001), and Rodrik (1998) emphasize the impact of trade openness on welfare state regimes.

(2) Country size: Alesina and Wacziarg (1998) challenge the argument that openness is an important determinant of redistribution by showing that the relationship becomes fragile if country size is appropriately controlled for. Their explanation is that trade openness can easily take on a negative correlation with country size, due to the fixed costs in establishing a set of institutions and because small countries can achieve the same economies of scale as large countries by engaging in foreign trade. We use total population size (POP) as a proxy for country size.

(3) Size of the labor force measured by the population size between 15 and 64 years old.\footnote{http://www.marquette.edu/polisci/faculty_swank.shtml is the web address of Duane Swank’s homepage.}

\begin{footnotesize}
\begin{itemize}
    \item[4] http://www.marquette.edu/polisci/faculty_swank.shtml is the web address of Duane Swank’s homepage.
    
\end{itemize}
\end{footnotesize}
(4) Dependency ratio measured by the sum of the percentage of total population over 65 years and the percentage of total population under 15 years have been claimed to be a major determinant of social spending by some authors (Lindert, 1996).

(5) per capita GDP: Wagner observed a positive correlation between social expenditure and a country’s level of per capita GDP (RGDPC).

B. Model Specification

Two main implications from our theoretical model are that the overall impact of Left party strength on redistributive tax rates is positive, and that the response of redistributive tax rates to inequality is conditional on the strength of Left or Right parties. In order to test these implications, we set the following panel regression with an interaction term:

\[
\text{REDIST}_{it} = b_0 + b_1 \text{INEQ}_{it} + b_2 (\text{INEQ}_{it} \times \text{LCUM}_{it}) + b_3 \text{LCUM}_{it} + \sum b_k \text{CONTROLS}_{it} + \sum b_i \text{COUNTRY}_{it} + \sum b_j \text{YEAR}_{it} + \epsilon_{it},
\]

where \( \text{REDIST}_{it} \) denotes redistributive tax rates for country \( i \) at time \( t \), \( \text{INEQ}_{it} \) denotes inequality measure for country \( i \) at time \( t \), \( \text{LCUM}_{it} \) denotes the measure of Left party strength for country \( i \) at time \( t \), and \( \text{CONTROLS}_{it} \) denotes other control variables such as trade openness, real GDP, population size, labor force size and the dependency ratio. In addition to these control variables, we included country dummies, to control for factors specific to each country, and year dummies, to capture shocks specific to year \( t \) but common to all countries (e.g. global business cycles or changes in oil prices).

Since the exact timing about from when the effect from Left party strength on redistributive tax rates becomes significant is not known \textit{a priori}, we have tried four values for the lag in the regression. That is, we examine all cases of \( h=0, h=1, h=2, \text{and } h=3 \). However, the results are remarkably similar across different values of lags considered in this study.

C. Estimation Results
The regression results are presented in Table 1, which shows the cases where the lag is set to zero and two. The first two columns present results when EHII is used as the inequality measure, and the next two columns show the results when the Theil index is used. The goodness of fit is reasonably high for our regressions, with an adjusted $R^2$ of 0.67 – 0.68.

We observe several interesting facts from Table 1.

First, the coefficient for inequality measure is not significant at all while the coefficient for the interaction term $\left(INEQ_{t,c} \times LCUM_{t,c}\right)$ is mostly significantly positive. These results contradict the implication of the Hotelling-Downs models. Were the prediction of the Hotelling-Downs model correct, the overall sign of the coefficient for inequality would have been negative regardless of the size of Left party strength.

Second, examination of the sign of $b_2(INEQ_{t,c}) + b_3$ allows us to test the first implication of our model: that the overall impact of Left party strength on redistributive tax rates is positive. Since $b_3$ is negative in some cases while $b_2$ is positive in all cases, we compute $b_2(INEQ_{t,c}) + b_3$ with various values of $INEQ_{t,c}$. Table 2 reports values of $b_2(INEQ_{t,c}) + b_3$ for the minimum value of $INEQ_{t,c}$, the mean value of $INEQ_{t,c}$, and the maximum value of $INEQ_{t,c}$. The results in Table 2 are consistent with our model; $b_2(INEQ_{t,c}) + b_3$, the overall coefficient of $LCUM_{t,c}$, is positive for practically all possible values of the inequality measure.

Third, the second implication of our model was that the impact of inequality on redistributive tax rates depends on who governs. More specifically, our model implies that when Left party strength is low, the overall coefficient of inequality $b_1 + b_2(LCUM_{t,c})$ is negative. However, $b_1 + b_2(LCUM_{t,c})$ increases with $LCUM_{t,c}$ and becomes positive for high values of
Since $b_2$ is mostly negative and $b_3$ is always positive in Table 1, our prediction appears to be supported by data. In order to check this more clearly, we compute $b_1 + b_2(LCUM_{1t2})$ with various values of $LCUM_{1t2}$. Table 3 reports values of $b_1 + b_2(LCUM_{1t2})$ for the minimum value of $LCUM_{1t2}$, the mean value of $LCUM_{1t2}$, and the maximum value of $LCUM_{1t2}$. $b_1 + b_2(LCUM_{1t2})$ is always negative for the minimum value of $LCUM_{1t2}$ except only one case, where the Theil index is used as the inequality measure and the lag (h) is set to zero. Since $b_1 + b_2(LCUM_{1t2})$ increases with $LCUM_{1t2}$, it becomes positive for the mean value of $LCUM_{1t2}$ and the maximum value of $LCUM_{1t2}$. These results are consistent with the implication of our theoretical model that when the Left party is politically weak, the response of redistributive tax rates to inequality will be negative, but the response increases with the strength of Left party and becomes positive for large values of $LCUM_{1t2}$.

[Table 3 about here]

5. Conclusion

We have presented a model that portrays political competition as one between partisan parties, and show that the relationship between inequality and redistribution takes on a completely different cast than what the Hotelling-Downs model predicts. Furthermore, our regressions indicate that the conventional empirical assessments of politico-economic models may be open to more thorough and careful investigation.

In sharp contrast to the predictions of the Hotelling-Downs model, we did not find a positive relationship between inequality and redistribution from our panel data set of 20 OECD countries. Rather the relationship was negative without the interaction term.

Empirical papers, to date, have derived contradictory results on the relationship between inequality and redistribution, depending on the data set used and time period covered. From this
apparent lack of robustness, some authors have concluded that politico-economic models are not empirically sound. But what these empirical papers tested is the Hotelling-Downs model, a model that is politically simplistic and unrealistic. We have proposed a politico-economic model that generates differentiated policies, and an econometric model specification that distinguishes the Hotelling-Downs model from a partisan political economic model. We suggest that future empirical research take the difference between the two types of political economic model into account.

Some caveats should be filed against our model.

In our paper, we model political competition as the one between Left and Right over a one-dimensional policy space. In reality, the policy space over which political parties compete is multi-dimensional and, consequently, the Left and Right parties are very diverse. Not only Left parties but also some Right parties, such as Christian democratic parties and nationalist-populist parties favor public social protection while accepting high levels of taxation. Non-economic issues, such as religion or nationalism, are important in modern politics, and elsewhere one of the authors of this paper studied the interaction between economic and non-economic issues and the effect of the latter on the former. We restricted our analysis to a one-dimensional policy space to emphasize the importance of political parties in the simplest setting.
Table 1. Regression Results on the Determinant of Redistributive Tax Rates

<table>
<thead>
<tr>
<th></th>
<th>Inequality=EHII</th>
<th></th>
<th>Inequality=THEIL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H=0</td>
<td>H=2</td>
<td>H=0</td>
<td>H=2</td>
</tr>
<tr>
<td>$INEQ_{it,t}$</td>
<td>-0.0412</td>
<td>-0.1936</td>
<td>15.0913</td>
<td>-18.8654</td>
</tr>
<tr>
<td></td>
<td>(0.1122)</td>
<td>(0.1095)</td>
<td>(30.4026)</td>
<td>(31.1489)</td>
</tr>
<tr>
<td>RGDP</td>
<td>-0.0003</td>
<td>0.0001</td>
<td>-0.0005*</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0001)</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
</tr>
<tr>
<td>Open</td>
<td>-0.0720*</td>
<td>-0.1090**</td>
<td>-0.0734*</td>
<td>-0.1128**</td>
</tr>
<tr>
<td></td>
<td>(0.0287)</td>
<td>(0.0240)</td>
<td>(0.0281)</td>
<td>(0.0259)</td>
</tr>
<tr>
<td>POP</td>
<td>0.0001</td>
<td>4.05e-06</td>
<td>-0.0001</td>
<td>-0.0000</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
</tr>
<tr>
<td>Dependence Ratio</td>
<td>0.3725</td>
<td>0.5866*</td>
<td>0.4926</td>
<td>0.7016*</td>
</tr>
<tr>
<td></td>
<td>(0.2710)</td>
<td>(0.2371)</td>
<td>(0.2926)</td>
<td>(0.2549)</td>
</tr>
<tr>
<td>Labor force size</td>
<td>-0.0001</td>
<td>-0.0000</td>
<td>0.0002</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>(0.0003)</td>
<td>(0.0003)</td>
<td>(0.0003)</td>
<td>(0.0003)</td>
</tr>
<tr>
<td>$LCUM_{it,t}$</td>
<td>-0.0073</td>
<td>-0.0124**</td>
<td>0.0043</td>
<td>0.0035*</td>
</tr>
<tr>
<td></td>
<td>(0.0046)</td>
<td>(0.0033)</td>
<td>(0.0021)</td>
<td>(0.0017)</td>
</tr>
<tr>
<td>$INEQ_{it,t} \times LCUM_{it,t}$</td>
<td>0.0003**</td>
<td>0.0005**</td>
<td>0.0623</td>
<td>0.1305**</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0343)</td>
<td>(0.0315)</td>
</tr>
<tr>
<td>No.obs</td>
<td>406</td>
<td>424</td>
<td>389</td>
<td>406</td>
</tr>
<tr>
<td>R²</td>
<td>0.6736</td>
<td>0.6678</td>
<td>0.6778</td>
<td>0.6794</td>
</tr>
</tbody>
</table>

Notes: Numbers in parentheses are robust standard errors. ‘*’ and ‘**’ denote that coefficients are significantly different from zero at the 5% level and 1% level, respectively. All regressions include country dummies and year dummies but coefficients for these dummies are suppressed.
Table 2. The Conditional Relationship between Left Party Strength and Redistribution

<table>
<thead>
<tr>
<th></th>
<th>Inequality=EHI</th>
<th>Inequality=THEIL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H=0</td>
<td>H=2</td>
</tr>
<tr>
<td>Min(INEQ_{t,z})</td>
<td>0.0017</td>
<td>0.0009</td>
</tr>
<tr>
<td>Mean(INEQ_{t,z})</td>
<td>0.0049</td>
<td>0.0055</td>
</tr>
<tr>
<td>Max(INEQ_{t,z})</td>
<td>0.0087</td>
<td>0.0113</td>
</tr>
</tbody>
</table>

Notes: This table examines the overall impact of Left party strength on redistributive tax rates. The impact depends on inequality level.
Table 3. The Conditional Relationship between Inequality and Redistribution

<table>
<thead>
<tr>
<th></th>
<th>Inequality=EHII</th>
<th>Inequality=THEIL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H=0</td>
<td>H=2</td>
</tr>
<tr>
<td>Min(LCUM_{i,t})</td>
<td>-0.0200</td>
<td>-0.1798</td>
</tr>
<tr>
<td>Mean(LCUM_{i,t})</td>
<td>0.1738</td>
<td>0.0803</td>
</tr>
<tr>
<td>Max(LCUM_{i,t})</td>
<td>0.5530</td>
<td>0.6083</td>
</tr>
</tbody>
</table>

Notes: This table examines the relation between inequality and redistributive tax rates. The impact depends on the level of Left Party strength.