

DO REMITTANCES CROWD OUT THE GOVERNMENT'S REDISTRIBUTIVE POLICY?

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In this paper, we develop a political economy model with a voting equilibrium to analyze the impact of remittances in the government's redistributive policy. Remittances affect the distribution of income and the households' demand for public redistribution. In this paper we consider the impact of remittances on two types of redistributive programs: a universal and a targeted transfer program. For an economy with targeted public transfers, we identify conditions in which an increase in remittances crowds out the social transfers of the government. If the redistributive program is universal then an increase in remittances actually increases the size of the government's transfers.

Keywords: Redistribution, Performance of Government, Electoral Competition, Political Economy, Remittances

JEL classification: H2, H23, H11, H24, P16, F24

1. INTRODUCTION

The transfers of money by foreign workers to their home country, or remittances, are playing an increasingly important role in the economies of many countries. According to a report from the World Bank, the remittances' flow to developing countries are estimated to reach 283 billions in 2008 and in several countries, such as Honduras, Jordan, Lebanon, and México, the share of remittances to GDP reaches significant levels.

There is a growing literature that seeks to explain the dynamic growth of remittances and its economic effects. An issue that has received recent attention is the impact of remittances on the distribution of income of the donor's home country, see for instance Acosta *et al.* (2007), Adams and Page (2005), Cox and Jimenez (1990), and Stark *et al.* (1988, 1986). In particular, Stark *et al.* (1986) identify conditions in which the recipients of remittances are predominantly high (low) income families. Consequently, the flow of

* We would like to thank an anonymous referee for his (her) very useful comments. Of course, all remaining errors are ours.

remittances is likely to increase (reduce) the inequality in the distribution of income which, in turn, might affect the role of the government in redistributing income.¹

Moreover, from the perspective of fiscal policy design, it is important to study the interaction between private and public transfers because this issue is: first, closely related with the analysis of the proper versus the actual role of the government in the economy. Second, it is central in explaining the effectiveness of the government's effort to redistribute income since the government's tax and transfer policy might reduce the private transfers among families in the market economy which in turn might frustrate the government's effort to redistribute income.² For these reasons, in this paper we are interested in asking the following question: Do remittances crowd out the government's redistributive policy?

Moreover, although there is substantial literature that examines how the government's transfers crowd out private transfers, see Becker (1984), Roberts (1984), and Cox and Jimenez (1990), to the best of our knowledge, there is no study that systematically examines how private transfers affect the redistributive policy of the government. Therefore, there are interesting questions to be analyzed such as: If the distribution of private transfers from households working abroad change, such that the average size of remittances increases, then the government increases or reduces its role in redistributing income?, Is the government's response to remittances the same if public redistribution is universal or targeted to the poor?

To answer these questions, we develop a political economy model with a probabilistic voting equilibrium to analyze the impact of remittances on public redistribution. We choose a voting model to characterize the formation of the government because this model leads to empirically verifiable tests between the actual votes of citizens in the election and the policy decisions made by elected governments.

In our economy, two parties compete for votes by selecting a tax on full income and a per capita transfer. Voters observe the parties' redistributive platforms and vote sincerely for the party with the policy that is closest to the voter's own views on public transfers. After the election takes place, the candidate winning the election forms the government and implements his platform on public redistribution. In this context, we are also interested in asking: what is the role of electoral competition in explaining the

¹ To see this, it is sufficient to recognize that policy makers might have incentives to use the tax system to redistribute in favor of low income families. For instance, the normative theory, see Tresch (2002), suggests that a benevolent planner might act on behalf of the society's tastes for pro poor redistribution. The positive theory, see Mueller (2003), argues that policy makers might redistribute in favor of the poor to capture some political gains.

² Families might redistribute income if a high income family provides private transfers to a low income household (for instance the private transfer of a father to a son or vice versa). The literature, see Becker (1984) and Roberts (1984), suggests that the public transfers of the government crowds out the private transfers among families.

response of public transfers to remittances?

In this setting, candidates select the tax rate on full income by considering: first, the electoral costs associated with the distributions of tax burdens and deadweight costs from taxation which in this economy are constituted by distortions of taxes on the supply of labor of households living in the country and crowding out effects of taxes on remittances sent by residents working abroad; second, the tax rate on full income raises public revenue which leads to higher public transfers that provide electoral support to parties.

Remittances affect the parties' fiscal policy by modifying the distribution of the voters' preferences for redistributive policy. For instance, remittances received by households at the highest end of the distribution of income increase their full income and reduce their demand for public redistribution (since models of self interested agents suggest that redistribution is an inferior good) but also increase the demand of redistribution of households with lower than average incomes.³

Hence, remittances affect several aspects that are relevant to the parties' political calculus of fiscal policy design; First, the private transfers sent by migrant workers change the distribution of full income of voters across the economy and therefore the households' tax burdens. Second, remittances also change the distribution of the marginal utility of income across the electorate which in turn modifies the electoral gains from redistributing income. Third, an increase in remittances induces a positive income effect on the government's budget constraint which tends to increase the extent of public redistribution.

However, it is not obvious what is the net effect of remittances on the size of public transfers. The main contribution of this paper is the characterization of sufficient conditions in which an increase in the average size of remittances crowds out the government's transfers in a targeted program but increases the size of public transfers in a universal program.

In our economy, we can trace the response of the government's transfers to an increase in remittances in two components: The first component is the effect of remittances on the tax rate on full income that finances the government's redistributive program. The second component is a positive income effect of remittances on the budget constraint of the government. For an economy with targeted redistribution in which the electoral competition induces parties to produce moderate redistributive policies, the elasticity of remittances with respect taxes is inelastic, and the response of taxes from the government to changes in remittances is elastic then an increase in remittances induces both parties to reduce the tax rate on full income and the per capita social transfer.

³ On the latter claim, it is simple to see that an increase in remittances received by households with higher than average incomes induces a positive income effect on the government's budget which can be translated into higher public transfers (benefits) for low income households.

In the universal program of redistribution, an increase in remittances does not affect the tax rate of equilibrium but affects positively the budget constraint of the government by allowing parties to collect more tax revenue that is translated into higher public transfers. Consequently, in a universal redistributive program, an increase in the average size of remittances increases the size of the government's transfers.

The rest of the paper is structured as follows: The households' choice set is considered in section 2. The electoral equilibrium is characterized in section 3. Section 4 includes the analysis of the impact of remittances on the redistributive policy of the government. Section 5 includes a discussion over possible extensions of our topic and section 6 concludes.

2. THE HOUSEHOLDS' CHOICE SET

Consider an economy in which households residing in the country have preferences given by $\mu(c, \ell) = \gamma c - \ell^2 / 2$, where c is consumption, γ is a positive constant, and $\ell \in [0, 1]$ is the supply of labor.⁴ In this economy the distribution of preferences and abilities are identified by the density $h(n)$ where n is the voter's earning ability (or labor wage) and γ is the marginal utility of consumption. Then $\forall n \exists \gamma > 0 : n \in [n_0, n_{\max}]$ and $\gamma \in [\gamma_0, \gamma_{\max}]$. The opportunity choice set for resident consumers $c = (n\ell + R)(1 - t^k) + T^k$ depends on the structure of the linear income tax system constituted by a tax t^k on full income and a public transfer $T^k \geq 0$ proposed by some party k . The latter is positive in a universal redistributive program for all voters and can be positive or zero in a targeted program depending on whether the consumer beneficiates or not from public transfers. The wage income is $z = n\ell$ and remittances are R .

We rationalize why households working abroad send remittances by assuming that foreign workers are altruistic and care about the well being of their families living in their home countries. Our choice of rationalizing remittances throughout altruism is based on two aspects: First, the phenomenon of altruism has received significant theoretical attention, therefore altruism can be a relevant benchmark to compare with other approaches that seek to explain private, *inter-vivos*, transfers. However, in section 5 we discuss other approaches that seek to explain why individuals provide private transfers. Second, altruism has some empirical support see Juarez (2009), Agrmal and Horowitz (2002), and Banerjee (1984) which makes this approach a relevant starting point for our analysis.⁵

⁴ The assumption of weakly separable preferences between consumption and leisure is for simplicity of the mathematical analysis.

⁵ The evidence, however, on the altruism model of private transfers is mixed since several papers find

We consider residents working abroad with strict quasi-concave preferences $\mu^a(c^a, \ell^a, v(t, T, n))$ where c^a is consumption, $\ell^a \in [0, 1]$ is the supply of labor with $\partial\mu^a / \partial\ell^a < 0$, and $v(t, T, n)$ is the indirect utility (to be fully characterized in the next section) of the family living in the home country of the migrant with $\partial\mu^a / \partial v > 0$.⁶ The budget constraint for households working abroad is given by $c^a = n^a \ell^a - R$ where n^a is the household's earning ability with $n^a \in [n_0^a, n_{\max}^a]$. For simplicity, and without loss of generality of our analysis, we ignore international taxes and transfers of migrant households.

In this paper we also assume households have no mobility. This assumption is not because we consider the bi-causality role of migration and public policy is not important but because of mathematical simplicity of the model. In future research we will consider the impact of politically driven redistribution and migration. For the time being, we take as given both the distribution of migrant families working abroad and the distribution of resident households in the donor's home country.

3. ELECTORAL COMPETITION UNDER PROBABILISTIC VOTING AND THE REDISTRIBUTIVE POLICY OF THE GOVERNMENT

In this economy, households have preferences over public redistribution which, among other things, depend on the individuals' earning abilities. The heterogeneity of earning abilities in this economy leads to conflicts among voters over the extent of public redistribution. Therefore, the social choice problem for this economy is to find the society's ideal size of public redistribution. The political institution that solves the society's social choice problem is an election in which candidates of parties propose a redistributive policy, and voters observe the parties' platforms and vote to elect a public official.

We follow the literature on linear income taxes, see Romer (1975) and Roberts (1977), by considering a democracy with a single unit of government and a majoritarian

evidence that is not consistent with the altruism motivation of private transfers, for a brief review of this evidence see Cox (1987) and more recently Juarez (2009).

⁶ This characterization means that households living abroad seek to maximize their well being by deciding their supply of labor and the size of remittances given their preferences and budget constraint, and the preferences and budget constraint of their families in their home countries. At this point we use a general characterization of the indirect utility function of the family of the migrant living in the home country because this function will change depending whether the redistributive program is targeted or universal for households with different wage earning abilities.

electoral system in which the winner takes all.⁷ Parties seek to maximize their probability of winning the election, $\pi^k(t^k, T^k)$, where t^k and T^k are the fiscal policies proposed by parties $k = \{Left, Right\}$. Voters observe the parties' platforms and vote for the party with the tax system that is closest to the voters' own preferences over public redistribution. We assume that only residents of the home country have voting rights while those individuals who have migrated abroad (the remittances' donors) have no voting rights.⁸

Voters are rational and recognize the fiscal exchange, that is, taxes raise public revenue to finance the public transfers that the government provides to eligible households. The preferences of a voter over public redistribution depend on the voter's relative position in the distribution of income. Self interested voters with higher (lower) because they pay higher (lower) than average taxes. To capture the voter's fiscal exchange from the government's redistributive policy, we characterize the ideal fiscal policy of a voter type n by $t^*(n), T^*(n) \in \arg \max v(t, T, n)$ subject to $T = T(t, n, R(t))$, where $v(t, T, n)$ is the indirect utility subject to the public budget constraint in which the per capita public transfer T is financed by taxation.

Candidates design fiscal policy by considering the probability that a voter type n votes for party k . This probability is given by $\Pr^k(\psi^k(n))$ where $\psi^k(n) = v^k(t^k, T^k, n) - v^{-k}(t^{-k}, T^{-k}, n)$ and $T^k = T^k(t^k, n, R(t^k)) \forall k, -k$. The term $\psi^k(n)$ is the net utility for voter type n if party k is elected, and $v^k(t^k, T^k, n)$ subject to $T^k = T^k(t^k, n, R(t^k)) \forall k, -k$ is the utility of the voter when party k selects policies t^k and T^k . Define $f^k(\cdot)$ as the distribution of the marginal probability function over $\psi^k(n)$. The probability that an individual type n votes for party k is

$$\Pr(n \text{ voting for } k) = \int_{-\infty}^{\psi^k(n)} f^k(\psi^k(n)) d\psi^k = F^k(\psi^k(n)), \quad (1)$$

where $F^k: \psi^k \rightarrow [0, 1]$ is a common, continuous, non decreasing function of $\psi^k(n)$.

⁷ The tax structure we study in this paper is also equivalent to a general consumption tax. Therefore our analysis is not only relevant to developed countries that depend heavily on income taxation but also for developing countries that depend more heavily on commodity taxation.

⁸ This assumption is made for simplicity of the model; however, the assumption has empirical support since half of the countries in the world do not grant the right to vote to those citizens who are temporarily or permanently absent from their own country. For further reading on this issue, see the document "handbook on external voting" by the International Institute for Democracy and Electoral Assistance at http://www.idea.int/elections/external_voting.cfm.

The proportion of expected votes for party k in the election is given by ϕ^k such that

$$\phi^k = \int_{n_0}^{n_{\max}} h(n) F^k(\psi^k(n)) dn. \quad (2)$$

The probability that party k wins the election is denoted by the cumulative distribution over the plurality of parties then $W^k : \phi^k - \phi^{-k} \rightarrow [0, 1]$ is a continuous, concave function of t^k , and $W'^k = w^k(\phi^k - \phi^{-k})$ is the marginal probability over the plurality of party k denoted by $\rho^k = \phi^k - \phi^{-k}$.⁹ The probability that party k wins the election is characterized by

$$\pi^k = \int_{-\infty}^{\rho^k} w^k(\phi^k - \phi^{-k}) d\rho^k. \quad (3)$$

The problem of tax policy design for candidates $k = \{Left, Right\}$ is to select t^k that maximizes their probability of winning the election subject to the public budget constraint T^k (defined below). Formally, the problem is

$$\begin{aligned} \text{Max}_{\{t^k\}} \pi^k &= \int_{-\infty}^{\rho^k} w^k(\phi^k - \phi^{-k}) d\rho^k, \\ \text{s.t. } T^k &= \int_{n_0}^{n_{\max}} h(n) t^k \{n \ell^*(t^k, n) + R^*(t^k)\} dn. \end{aligned} \quad (4)$$

The politico-economic equilibrium of this economy involves the strategic interaction of parties, resident households voting in the election, and households working abroad. In figure 1 we depict a three stage dynamic game in which the payoffs of all players are common knowledge. Parties move in the first stage by announcing their tax platforms to maximize their probability of winning the election.

In the second stage of the game, voters (residents of the country) observe the parties' policies and decide their supply of labor, consumption and their choice of the vote that maximizes their well being. The economic choices of resident households recognize their preferences and their budget constraint while their voting behavior is determined by their own preferences over the government's redistributive policy and the policy platforms of parties. Voters vote for the party's platform that is closest to their own

⁹ The assumption of the concavity of π^k is commonly used in the probabilistic theory of voting, see Coughlin 1992, and in its applications to fiscal policy design, see Hettich and Winer (1999) and Mueller (2003).

preferences on the government's redistributive policy.

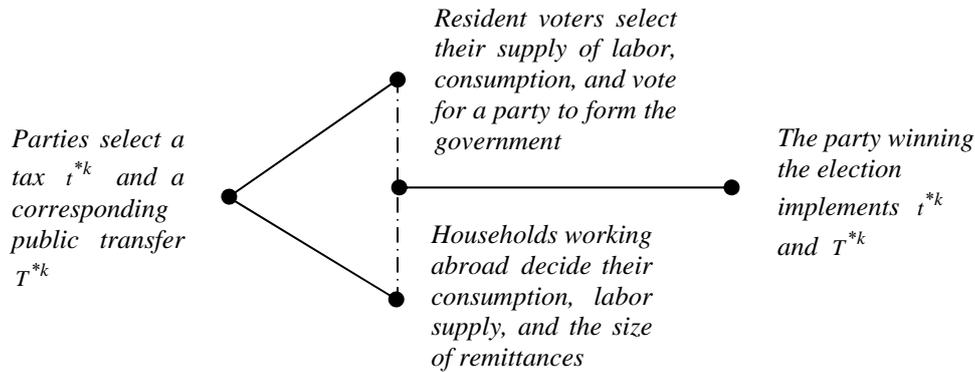


Figure 1. Redistribution for an Economy with Remittances

Moreover, in the second stage of the game, the remittances' donors also observe the parties' tax and transfer policies and maximize their well being by deciding their supply of labor, consumption, and the size of remittances given their preferences and budget constraint, and the preferences and budget constraint of their families in their home countries.¹⁰

In the third stage, the party winning the election implements its tax and transfer platform. In our economy parties commit to their tax platforms, therefore the party that wins the election implements its campaign's tax platform. Therefore, the dynamic inconsistency problem between the parties' campaign promises and the policies implemented by parties while they hold office do not arise in our economy since our candidates are Downsian and they select policies to win and hold public office (they do so because, in the Downs' model, candidates seek the prestige of holding public office).¹¹

Our model is different to the class of models in which parties have preferences over policy (these preferences could be characterized by the tastes for policy of a representative member-activist inside the party) and are dynamically inconsistent see Wittman (1973), Alesina (1987) and Roemer (1997, 2001).¹² In the latter case, parties

¹⁰ The dotted line in Figure 1 means that the moves of recipients and donors of remittances are simultaneous.

¹¹ To see this, note that proposing (in the first stage) and implementing (in the third stage) a tax and transfer policy that maximizes the party's probability of winning the election is sequentially rational. That is, for Downsian parties, there are no profitable deviations from the strategy prescribed above.

¹² Wittman (1973) is the first to point out that parties might have preferences for public policy and might

campaign median or average voter policies but their campaign promises are not dynamically consistent because, after the election, the party winning the election implements the ideal policy of a representative activist inside the party.¹³

Formally our model is characterized as follows:

Definition The subgame perfect Nash politico-economic equilibrium for this economy is characterized as follows:

a) In the first stage, parties select a tax t^{*k} and a corresponding public transfer T^{*k} such that:

$$t^{*k} \in \arg \max \pi^k = \int_{-\infty}^{\rho^k} w^k(\phi^k - \phi^{-k}) d\rho^k \quad \forall k = \{Left, Right\},$$

$$\text{subject to: } T^{*k} = \int_{n_0}^{n_{\max}} h(n) t^k \{n \ell^*(t^{*k}, n) + R^*(t^{*k}, n^a)\} dn.$$

b) In the second stage, all voters type $n \in [n_0, n_{\max}]$ vote for party k if¹⁴

$$\psi^k(n) > 0 \text{ for } \psi^k(n) = \left\{ \begin{array}{l} v^k(t^{*k}, T^{*k}, n) - v^{-k}(t^{*-k}, T^{*-k}, n) \\ \text{st: } T^{*k} = \int_{n_0}^{n_{\max}} h(n) t^{*k} \{n \ell^*(t^{*k}, n) + R^*(t^{*k}, n^a)\} dn \quad \forall k \end{array} \right\}$$

If $\psi^k(n) < 0$, they vote for party $-k$.

c) In the third stage, all households working abroad type $n^a \in [n_0^a, n_{\max}^a]$ decide their labor supply $\ell^{*a}(t^{*k}, n^a)$, consumption $c^{*a}(t^{*k}, n^a)$, and the size of remittances $R^*(t^{*k}, n^a)$ to maximize their utility such that:¹⁵

not select policies to win the election (as it is argued by Downs, 1957) but seek to win the election to design policies. Alesina (1987) emphasizes the dynamic inconsistency problem and provides an application of partisan political competition with dynamic inconsistent parties to explain monetary policy, and Roemer (1997, 2001) provides applications to the analysis of taxation.

¹³ We could expect that parties with preferences over public policy campaign the ideal policy of the median voter in Downsian models of perfect information and the ideal policy of the average voter in Downsian models of imperfect information since these strategies maximize their probability of winning the election and are sequentially rational. For details of the differences of these strategies see Mueller (2003).

¹⁴ Voters vote with probability $1/2$ for any party if $\psi^k(n) = 0$ for all $n \in [n_0, n_{\max}]$.

¹⁵ It should be noted that the policies characterized in (a) are sequentially rational since the parties' tax

$$c^{*a}(t^{*k}, n^a), \ell^{*a}(t^{*k}, n^a), R^*(t^{*k}, n^a) \in \arg \max \left\{ \begin{array}{l} \mu^a(c^a, \ell^a, \nu(t^{*k}, T^{*k}, n)) \\ s.t.: c^a = n^a \ell^a - R \end{array} \right\}.$$

Our definition of the politico-economic equilibrium recognizes that a rational household working abroad decides the size of remittances taking into account the impact that taxes and public transfers have on the economic well being of their families living in their home country. Proposition 1 characterizes conditions in which the best response, $R^*(t^k, n^a)$, of remittances sent by households living abroad on taxes satisfies $dR^*/dt^k \leq 0$. Formally,

Proposition 1 *The best response of the remittances sent by households working abroad is given by $R^*(t^k, n^a)$ satisfying $dR^*/dt^k \leq 0$.*

Proof

By definition, the families working abroad behave as follows:

$$c^{*a}(t^{*k}, n^a), \ell^{*a}(t^{*k}, n^a), R^*(t^{*k}, n^a) \in \arg \max \left\{ \begin{array}{l} \mu^a(c^a, \ell^a, \nu(t^k, T^k, n)) \\ s.t.: c^a = n^a \ell^a - R \end{array} \right\}. \quad (5)$$

The first order conditions for households working abroad are:¹⁶

$$\frac{\partial \mu^a(\ell^a, R, t^k)}{\partial \ell^a} = \frac{\partial \mu^a}{\partial c^a} n^a + \frac{\partial \mu^a}{\partial \ell^a} = 0 \quad \text{for } \ell^{*a}(t^{*k}, n^a) > 0. \quad (6)$$

With $\ell^{*a}(t^{*k}, n^a) = 0$ if $\frac{d\mu^a}{d\ell^a} < 0$. And

and transfer policies incorporate the best responses of voters and donors' of remittances. The voters' best responses over the choice of the vote are given by $\psi^k(n)$ which includes the indirect utilities of individuals and incorporate their ideal choices on consumption and supply of labor. In addition, $R^*(t^{*k})$ is the best response of donors of remittances to the parties' tax and transfer policies.

¹⁶ From (6) and (7) we obtain $\ell^{*a}(t^{*k}, n^a)$ and $R^*(t^{*k}, n^a)$ while $c^{*a}(t^{*k}, n^a)$ is obtained by imposing $\ell^{*a}(t^{*k}, n^a)$ and $R^*(t^{*k}, n^a)$ in the budget constraint, that is, $c^{*a}(t^{*k}, n^a) = n^a \ell^{*a}(t^{*k}, n^a) - R^*(t^{*k}, n^a)$.

$$\frac{\partial \mu^a(\ell^a, R, t^k)}{\partial R} = -\frac{\partial \mu^a}{\partial c^a} + \frac{\partial \mu^a}{\partial v} \frac{\partial v}{\partial c} (1-t^k) = 0 \quad \text{for } R^*(t^{*k}, n^a) > 0. \quad (7)$$

And $R^*(t^{*k}, n^a) = 0$ if $\frac{d\mu^a}{dR} < 0$. Totally differentiate the first order conditions $\frac{\partial \mu^a(\ell^a, R, t^k)}{\partial \ell^a}$ and $\frac{\partial \mu^a(\ell^a, R, t^k)}{\partial R}$ with respect $d\ell^a$, dR and dt^k to show:

$$\begin{bmatrix} \frac{\partial^2 \mu^a}{\partial^2 \ell^a} & \frac{\partial^2 \mu^a}{\partial \ell^a \partial R} \\ \frac{\partial^2 \mu^a}{\partial R \partial \ell^a} & \frac{\partial^2 \mu^a}{\partial^2 R} \end{bmatrix} \begin{bmatrix} d\ell^a \\ dR \end{bmatrix} = \begin{bmatrix} 0 \\ -\frac{\partial^2 \mu^a}{\partial R \partial t^k} dt^k \end{bmatrix}, \quad (8)$$

where $-\frac{\partial^2 \mu^a}{\partial R \partial t} = \frac{\partial \mu^a}{\partial \mu} \frac{\partial \mu}{\partial c}$. By assumption, $\mu^a(c^a, \ell^a, v(t, T, n))$ is a strict quasi-concave preference relation which implies that H_{μ^a} is a negative definite matrix therefore $\partial^2 \mu^a / \partial^2 \ell^a < 0$ and $|H_{\mu^a}| = \{\partial^2 \mu^a / \partial^2 \ell^a\} \{\partial^2 \mu^a / \partial^2 R\} - \{\partial^2 \mu^a / \partial \ell^a \partial R\}^2 > 0$. It follows that the best response of remittances to taxation is given by

$$\frac{dR^*}{dt^k} = \frac{\begin{bmatrix} \frac{\partial^2 \mu^a}{\partial^2 \ell^a} & 0 \\ \frac{\partial^2 \mu^a}{\partial R \partial \ell^a} & -\frac{\partial \mu^a}{\partial \mu} \frac{\partial \mu}{\partial c} \end{bmatrix}}{|H_{\mu^a}|} = \frac{1}{|H_{\mu^a}|} \left\{ \frac{\partial \mu^a}{\partial \mu} \frac{\partial \mu}{\partial c} \right\} \left\{ \frac{\partial^2 \mu^a}{\partial^2 \ell^a} \right\} \leq 0. \quad (9)$$

Because $|H_{\mu^a}| > 0$, $\frac{\partial \mu^a}{\partial \mu} \frac{\partial \mu}{\partial c} \geq 0$, and $\partial^2 \mu^a / \partial^2 \ell^a < 0$ then $dR/dt \leq 0$. The size of remittances falls or remains unchanged with increases in the optimal tax rate on full income. ■

Condition (7) shows that two factors explain the size of remittances: first, the

¹⁷ To obtain the first order conditions use $v(t^{*k}, T^k, n) = \mu((n\ell^* + R)(1-t^{*k}) + T^k, \ell^*)$ to state the following: $\mu^a(c^a, \ell^a, v(t, T, n)) = \mu^a(n\ell^a - R, \ell^a, \mu((n\ell^*(T^k, n) + R)(1-t^*) + T^k, \ell^*(t^k, n)))$. From the expression above find $d\mu^a/d\ell^a$ and $d\mu^a/dR$.

opportunity cost for the donor of sending \$1 to relatives (this is $-\partial\mu^a/\partial c^a$). Second, the marginal utility gain for the donor of the last \$1 sent to a relative in the donor's home country, this incentive is given by $\frac{\partial\mu^a}{\partial v}\frac{\partial v}{\partial c}(1-t^k)$ where $\frac{\partial\mu^a}{\partial v}\frac{\partial v}{\partial c}$ is the change in the well being of the donor from remittances.

The possibility that the government's actions might crowd out monetary transfers among families (the result in proposition 1) has been first pointed out by Becker (1984) and Bernheim *et al.* (1985).¹⁸ Here we just identify conditions that imply this result. Full crowding out of the government's taxes on remittances occurs when the condition $d\mu^a/dR < 0$ is satisfied for a given tax t^k , while some partial crowding out occurs when $d\mu^a/dR = 0$ such that $R^*(t^{*k}, n^a) > 0$.

In our economy, the optimal redistributive policy of the government at the subgame perfect Nash equilibrium takes into account the crowding out possibilities discussed above. For mathematical tractability, we consider only the case in which the marginal effect of taxes on private transfers, $dR^*(t^k, n^a)/dt^k = \chi < 0$ satisfies $d^2R(t^k, n^a)/d^2t = 0$, and the elasticity of remittances and taxes given by $\varepsilon_{R-t} = \{dR^*(t^k, n^a)/dt^k\} \{t^k/R^*\} = \varepsilon < 0$ is constant.

4. TARGETED AND UNIVERSAL PUBLIC REDISTRIBUTION AND REMITTANCES

In this section we analyze the impact of remittances on the size of transfers of the government. We consider two types of redistributive programs that have received attention in the literature: on the normative theory of public economics, the analysis over targeted versus universal redistribution has been centered around the tradeoff between equity and efficiency see Saez (2006) and Thresch (2002). Targeted redistributive programs are considered to produce lower deadweight costs from taxation relative those of universal programs but also tend to penalize more heavily the effort of low income families who are in the vicinity of the poverty line by creating high differentials in their taxes and public transfers.

The theory of political economy has also been interested in the comparative analysis of targeted versus universal public programs, see Myerson (1993) and Persson and Tabellini (2005). In particular, some branch of this theory is interested in studying how political institutions (i.e., the structure of electoral systems) create incentives to policy makers to design public programs with broad benefits versus public programs that seek

¹⁸ There is also empirical evidence supporting the hypothesis that the government's fiscal policies crowd out private transfer. For a survey on this issue see Cox and Jimenez (1990).

to benefit minorities. Acemoglu and Robinson (2001a) are interested in explaining why governments implement inefficient targeted redistribution. They argue that if the political process can not commit to future policy (rents), inefficient redistribution is a tool to sustain the political power of a special interest group.

In a targeted program of transfers to the poor, only those individuals with earning abilities below a predetermined earning ability threshold receive transfers from the government. In our economy, \tilde{n} is the cutoff point that divides the participation earning ability threshold, therefore all individuals with $n \leq \tilde{n}$ are poor and eligible for public transfers while individuals with earning abilities higher than \tilde{n} are not eligible for social transfers. We also analyze a universal public program in which all individuals in the economy receive transfers from the government.

The rest of the analysis of this section is structured as follows: in proposition 2 we identify the optimal labor supply of poor and non poor households under the different redistributive programs analyzed in this paper. These results are then used to characterize proposition 3 which contains the government's response to remittances when public transfers are targeted to the poor, while proposition 4 considers the reaction of the government to remittances when the redistributive program is universal.

Proposition 2 *For an economy in which a tax t^k is applied to full income of all resident households and social transfers can be universal or targeted to the poor, the supply of labor of poor and non poor households are characterized by*

$$\ell^*(t^k, n) = n(1 - t^k) \forall n \in [n_0, n_{\max}]. \quad (10)$$

Proof

We omit the formal characterization of the households' labor supply. The result, however, is trivial we just solve the first order conditions of the household's problem to obtain $\ell^*(t^k, n)$. ■

Proposition 3 *For an economy with a tax on full income with $t^* > 0$ and the government's redistributive efforts targeted to the poor, there is a crowding out effect of remittances on the size of the per capita social transfer of the government if*

a) *The elasticity of the government's response of taxes to changes in remittances, $\xi_{t-R} \in (-\infty, -1]$ is negative and elastic or unitary, and*

b) *The remittance-tax elasticity ε_{R-t^*} is inelastic.¹⁹*

¹⁹ The assumption that the remittance-tax elasticity is inelastic has empirical support. For a review of this

Proof

See the appendix. ■

Proposition 3 identifies sufficient conditions in which a change in remittances crowds out the government's transfer policy.²⁰ In our economy, all parties converge in selecting $t^{*k} = t^{*-k} = t^*$ and $T^{*k} = T^{*-k} = T^*$ (see the appendix) and the response of the government's transfers to a change in remittances depends on: first, the effect of remittances on the tax rate of equilibrium t^* with transfers T^* changing in the same direction as the change of t^* . Second, a positive income effect of remittances on the budget constraint of the government that tends to increase T^* .

Condition (3.2) is a sufficient condition in which an increase in remittances reduces t^* . In this case, the first effect of remittances tends to reduce T^* while the second effect tends to increase it. Condition (3.1) is a sufficient condition for the first effect to dominate the second effect leading to the outcome in which an increase in remittances implies a fall of T^* . To see this, let's define $dT^*/dE[R]$ and $dt^*/dE[R]$ as the marginal changes in the equilibrium fiscal instruments T^* and t^* due to a change in the average size of remittances $E[R]$.²¹

From the government's budget constraint at the politico-economic equilibrium, it follows that $\frac{dT^*}{dE[R]} = \frac{dt^*}{dE[R]} \left\{ \int_{n_0}^{n_{\max}} h(n)n\ell^*(t^*, n)dn + \int_{n_0}^{n_{\max}} h(n)R(t^*)dn \right\} + t^*$, where

$\int_{n_0}^{n_{\max}} h(n)n\ell^*(t^*, n)dn$ is the average gross labor income and $E[R] = \int_{n_0}^{n_{\max}} h(n)R(t^*)dn$.

The effect of remittances on the parties' tax policy is given by $\frac{dt^*}{dE[R]} \left\{ \int_{n_0}^{n_{\max}} h(n)n\ell^*(t^*, n)dn + \int_{n_0}^{n_{\max}} h(n)R(t^*)dn \right\}$ while t^* is the positive income effect of remittances on the budget constraint of the government.

In proposition 3 we show that parties set the tax rate on full income at the point in which the electoral costs and gains from a marginal change in t^* are equalized (see condition A.1 in the appendix). The parties' political calculus is the following: On the one hand, an increase in t^* creates disincentive effects that lead to a net fall in remittances, labor income, and the consumption opportunities of all households. In this

evidence see Cox and Jimenez (1990).

²⁰ On what follows, and to save space, we just simply refer to an increase in remittances when there is a change in the distribution of remittances such that the new distribution has a higher mean of remittances.

²¹ Assuming a change in the average size of remittances $E[R]$ is a shortcut to consider the case in which the earning ability of some donors increase and leads to higher remittances sent by the donors to resident households with some earning ability n .

case, an increase in t^* leads to a loss on the voters' welfare and to an increase in the marginal electoral costs from taxation for parties. On the other hand, higher t^* leads to higher tax revenue and public transfers. This, in turn, increases the parties' electoral support.

In a targeted redistributive program, if the elasticity of foreign transfers to taxation, ε_{R-t^*} , is inelastic then the parties' electoral costs and gains from a marginal change in t^* are positively related with the size of remittances. To see this, note that tax revenues from remittance-income is given by $t^*E[R(t^*)]$. Derive this expression with respect to t^* to see that the marginal public transfers that can be financed by remittance-tax revenue is $(1 - \varepsilon_{R-t^*})E[R]$.

Hence, a marginal increase in t^* causes two effects on public transfers: one is a direct increase in tax revenues, which is given by $E[R]$, and the other is a disincentive effect of t^* on $E[R]$ which reduces tax revenues and it is given by $\varepsilon_{R-t^*}E[R]$. If ε_{R-t^*} is inelastic then the net effect of a marginal increase in t^* is higher tax revenues and public transfers which provide higher electoral support to parties. A similar analysis explain why an increase in remittances increases tax burdens for voters and the marginal electoral costs from taxation for parties when ε_{R-t^*} is inelastic (see the formal analysis in the appendix).²²

Moreover, if ε_{R-t^*} is inelastic then the increase in the electoral costs of taxation associated with a positive change in remittances outweighs the corresponding marginal increase in the parties' transfers and electoral gains in a targeted redistributive program.²³ As a result, a change in the average size of remittances induces parties to reduce both the tax rate on full income and the per capita transfer.²⁴ However, recall that the second effect of remittances over T^* is a positive income effect which tends to increase T^* . In proposition 3, the sufficient condition in (3.1) implies that the first negative effect of remittances on t^* and T^* dominates the second positive effect leading to a net fall of T^* (for the formal proof see the appendix).

²² In contrast, if $\varepsilon_{R-t^*} \in (-\infty, -1)$ then ε_{R-t^*} is elastic. In this case, the electoral costs of taxation and the electoral gains from public transfers are negatively associated with a positive change in remittances.

²³ See the discussion about this result after equation (A.8) of the appendix.

²⁴ The opposite holds if $\varepsilon_{R-t^*} \in (-\infty, -1)$ and higher remittances induces parties to increase t^* . Recall that the electoral costs of taxation and gains from public transfers are negatively associated with a positive change in remittances. As before, the fall in marginal electoral costs for parties from higher remittances outweighs the corresponding fall in political gains and higher remittances induces parties to increase t^* .

Of particular interest is the fact that the elasticity ξ_{t-R} depends on how the political process aggregates the preferences for redistribution of voters. To recognize this, we need to acknowledge that parties choose a redistributive policy by weighing the preferences from those voters who support public redistribution against the interests of voters who oppose redistribution. The impact of this political calculus on the government's response to remittances can be easily traced if we define $\theta = \int_{n_0}^{n_{\max}} h(n)\alpha dn / \int_{n_0}^{\tilde{n}} h(n)\alpha dn$ where θ is a cost-benefit welfare ratio of the targeted redistributive program.

The numerator of θ is a measure of the welfare cost for the society when the government takes away \$1 from tax payers to fund the public transfers while the denominator of θ is the welfare gain of transferring \$1 to qualified (poor) voters in the targeted program. The higher θ the more elastic is the government's response of taxes to an increase in private transfers from migrants working abroad and the lower is the government's transfers to the poor for the case $dt^* / dE[R] < 0$ (for the formal analysis see conditions A.10 and A.12 in the appendix).

4.1. Remittances and Universal Public Transfers

In this section we consider an economy with a universal redistributive program. The main difference of this section with our previous analysis relies in the eligibility requirement of resident households for receiving public transfers. Under a universal redistributive program, resident households pay a tax on full income t^* and receive a public transfer from the government T^* regardless of their earning abilities. Our findings are the following:

Proposition 4 *For an economy with a tax $t^* > 0$ applied to full income and universal social transfers (all households receive T^*), an increase in the size of average remittances increases the size of the government's redistributive transfer.*

Proof

See the appendix. ■

In a universal redistributive program, an increase in the average size of remittances increases the parties' electoral gains and costs in the same proportion. For this reason, an increase of the average remittances leaves unchanged the tax rate on full income. However, as a result of higher remittances, there is a positive income effect on the budget constraint of the government which increases the size of the public transfer.

In propositions 3 and 4 we evaluate how different distributions of remittances with

different means affect the government's redistributive policy.²⁵ Of related interest is to study changes in the private transfers received by households at the upper (lower) end of the distribution of income. In Kochi and Ponce-Rodríguez (forthcoming) we provide such analysis for a government ruled by a benevolent social planner. In general, this analysis suggests that an increase in remittances for households at the lower end of the distribution of income reduces the inequality of income, but the response of the government's public transfers to an increase in remittances is ambiguous.²⁶

Nevertheless, in our analysis we characterize a set of equilibriums in which higher remittances to households at the lower end of the distribution of income are more likely to crowd out public transfers under the universal redistributive program in relation to the targeted program. In particular, if remittances are received by households with an earning ability \hat{n} that is below the threshold earning ability \tilde{n} that allows the family to benefit in the targeted redistributive program, taxes are low before the increase in remittances, the remittance-tax elasticity is inelastic, ξ_{t-R} is negative and elastic, and the household's social marginal utility is decreasing with income, then an increase in the remittances received by households with $\hat{n} < \tilde{n}$ leads to a fall in the inequality in the distribution of income and induces the government to reduce public transfers in the targeted and the universal redistributive.

However, if $\tilde{n} < \hat{n} < E(n)$ where $E(n)$ is the average earning ability, then an increase in the remittances received by households with \hat{n} leads to a fall in the inequality in the distribution of income and induces the government to reduce public transfers in the universal redistributive program but it increases public transfers in the targeted program. This result is intuitive and explained as follows: in a targeted redistributive program, \tilde{n} divides the distribution of beneficiaries (those who receive transfers) from the distribution of net contributors to the financing of the program (those who pay taxes but do not receive transfers). In this case, Pareto efficient redistribution is indeed reducing the inequality of the distribution of income between beneficiaries and net contributors to the financing of the government's program.

Thus, higher remittances for those with $\hat{n} : \tilde{n} < \hat{n} < E(n)$ reduce the inequality of the overall distribution of income of the economy but spread the socially relevant distribution of income that the government seeks to equalize. As a result, the government increases

²⁵ Another justification for the analysis of propositions 3 and 4 is that this approach is useful for empirical analysis with macro data.

²⁶ This outcome is explained by tradeoffs that are similar to those identified in this paper: higher remittances received by the poor affect the socially optimal tax structure of the government with taxes going up or down depending on certain parametric values of the donor's reaction to taxes and on the distribution of the social marginal utility of income. Moreover, these private transfers also induce a positive shock on the budget constraint of the government which tends to increase Pareto efficient transfers. In general, however, higher remittances to the poor lead to an ambiguous effect on the government's transfers.

transfers in a targeted program. Moreover, in the universal redistributive program, the distinction between the socially relevant and actual distribution of income disappears. Hence, higher remittances for households with \hat{n} reduce the inequality of the distribution of income and public transfers fall.

Finally if $\tilde{n} < E(n) < \hat{n}$ then an increase in the remittances received by households with \hat{n} leads to an increase in both the socially relevant and the actual inequality in the distribution of income and induces the government to increase public transfers in the targeted and the universal redistributive program.

5. DISCUSSION

In this section we discuss some possible extensions to our analysis: first, the role of democracy versus autocracy in determining public redistribution. Second, the motivation for private transfers, whether remittances are explained by altruism or by other incentives, and the response of public transfers to changes in remittances.

With respect the role of democracy versus autocracy in determining public redistribution, the model of Downs (1957) of electoral competition predicts that parties propose a moderate redistributive policy that seeks to appeal to a majority of voters. In contrast, Boix (2003) and Acemoglu and Robinson (2001b) argue that autocratic systems might exclude a substantial part of individuals from the decision making process and, therefore, the extent of redistribution in non democratic economies could be smaller (or zero) relative the size of redistributive spending in democratic regimes.²⁷

The analysis of Acemoglu and Robinson identifies a class of equilibria in which no redistribution takes place in non democratic regimes. An application of this equilibrium to the issue analyzed in this paper could suggest that an increase of remittances to residents of non democratic economies might lead to an increase in tax revenues, zero redistribution, and maybe an increase in military spending. The last conjecture follows from the analysis of Olson (1993) who argues that non democratic regimes could use military spending to create barriers to political participation for those individuals who may oppose the government. Mulligan, Gil and Sala-i-Martin (2004) show evidence that non democratic regimes have, indeed, higher shares of military spending to GDP relative democracies and also tend to create barriers for the development of political opposition.

The literature has also acknowledged that autocratic governments might seek some form of broad political support to maintain power. Hettich and Winer (1999) have provided a model in which policy makers design tax policy to maximize political

²⁷ This hypothesis is consistent with empirical evidence by Husted and Kenny (1997) that suggests that the U.S. voting acts of the 1960s and 1970s increased the voting franchise and turnout of the poor and led to an increase in welfare spending. Aidt *et al.* (2006) also find that the removal of voting restrictions is positively associated with government spending in 12 European countries.

support to the regime. Although Hettich and Winer (1999) are mainly concerned with tax policy in democratic regimes, the model is general enough to be applied to the analysis of fiscal policy of autocratic governments. In their model, the function of political support is a weighted sum of the household's utilities and there is a class of equilibria in which autocratic regimes might redistribute in favor of the poor. In this case, the tradeoffs for policy makers of tax and transfer policy promoted by changes in the size of remittances identified in this paper might still be valid.²⁸

With respect the issue of how we rationalize remittances, the literature explains *inter-vivos* private transfers through altruism, see Becker (1984), in which donors provide private transfers because their utility depends on the welfare of their relatives. Bernheim *et al.* (1985) and Cox (1987), argue that donors could behave according to pure self interest and remittances arise because donors expect to receive benefits from their parents (such as services, care, attention and inheritances).

Lucas and Stark (1985) suggest that remittances can also be explained by tempered altruism or enlightened self-interest. In this case, remittances are part of a mutual risk spreading or investment contract between the migrant and her family. Self interest induces all parties to recognize that there are economic gains to be shared if some members become migrants while altruism might also play a role in enforcing the contract.²⁹

In this paper we have limited our attention to altruism as the rationale for remittances. However, rational governments will recognize that, contingent to the motivation of international private transfers, the response of voters and donors of remittances might vary to the government's tax and transfer policies.³⁰ This might change the distribution of tax burdens and deadweight costs from taxation as well as the distribution of gains from public transfers which, ultimately, will have an impact over the welfare and political calculus of public redistribution in a way that is not obvious. Future research would be desirable to address these and other issues relevant for policy making when remittances are explained by self interest or tempered altruism.

²⁸ This is true for the particular case in which the utilities of households are equally weighted in the function of political support to be maximized by the government.

²⁹ For example, a household might seek to spread risks by allocating some members to international migration. Initially, the family might support the migrant while remittances could be claims that flow to the family at times of hardship. In this setting, altruism might induce all parties to enforce the expected duties of each member of the contract.

³⁰ For example consider the case in which remittances are explained by economic exchange between the donor and the recipient. In this case a net increase of public transfers to some household might lead to the recipient to reduce her supply of services to the remittances' donor. Hence, the donor might be forced to increase her payments (remittances) to the recipient in order to keep her services. In this case, higher public redistribution might lead to higher remittances. The opposite might hold for those voters with a net fall of public transfers in which case remittances might fall.

6. CONCLUSIONS

In this paper, we develop a political economy model with a voting equilibrium to study whether an increase in remittances crowds out the redistributive policy of the government of the donor's home country. We also examine if the impact of remittances over public transfers differs under two different redistributive policies: a universal and a targeted transfer program.

In our voting equilibrium, the political process leads to a formation of a government that designs a redistributive policy to please the average voter of the economy (the government produces middle of the road policies). The preferences of voters over public redistribution depend on the voter's relative position in the distribution of income. An increase in the flow of remittances changes the distribution of the voters' preferences for public redistribution since remittances change the full income of resident households and the parties' political gains and costs from public redistribution.

For the economy assumed in this paper, the response of the government's public transfer to remittances depends on the effect of remittances on the tax rate of equilibrium that funds the government's transfers, and on a positive income effect of remittances on the budget constraint of the government which tends to increase public transfers. In general, the net effect of a change in the distribution of remittances on taxes is ambiguous.

In this paper we show that if the government produces moderate policies, the elasticity of remittances with respect taxes is negative and inelastic, and the response of taxes from the government to changes in the distribution of income due to remittances is negative elastic or unitary, then an increase in the average size of remittances reduces both the tax rate on full income and the size of the government's transfers when the redistributive program is targeted to the poor.

In the universal program of redistribution, an increase in remittances does not affect the tax rate of equilibrium but affects positively the budget constraint of the government by allowing parties to collect more tax revenue that is translated into higher public transfers. As a result, in a universal redistributive program, an increase in the average size of remittances actually increases the size of the government's social transfers in a universal redistributive program.

Appendix

Proposition 3 *For an economy with a tax on full income $t^* > 0$ and the government's redistributive efforts targeted to the poor, there is a crowding out effect of remittances on the size of the per capita social transfer of the government if*

a) *The elasticity of the government's response of taxes to changes in remittances, $\xi_{t-R} \in (-\infty, -1]$, is negative and elastic or unitary, and*

b) The remittance-tax elasticity ε_{R-t^*} is inelastic.

Proof

The first order condition for the government's redistributive policy with an interior solution $t^{*k} > 0$ satisfying $\frac{d\pi^k}{dt^{*k}} = 0$ is equivalent to

$$\int_{n_0}^{n_{\max}} h(n) f^k \frac{dv}{dt^{*k}} dn + \int_{n_0}^{\tilde{n}} h(n) f^k \frac{dv}{dT^{*k}} \frac{dT^{*k}}{dt^{*k}} dn = 0. \quad (\text{A.1})$$

The distribution of the tax burden implied by the structure of the linear income tax means^{31,32}

$$dv/dt^{*k} = -\alpha \{ n \ell^*(t^{*k}, n) + R^*(t^{*k}) - (1-t^{*k}) dR^*/dt^{*k} \} \forall n \in [n_0, n_{\max}], \quad (\text{A.2})$$

where $dv/dT^{*k} = \alpha$ is the household's marginal utility of income. Use (A.2) to rewrite condition (A.1) as follows

$$\begin{aligned} & - \int_{n_0}^{n_{\max}} h(n) f^k \alpha \{ n \ell^*(t^{*k}, n) + R^*(t^{*k}) - (1-t^{*k}) dR^*/dt^{*k} \} dn \\ & + \left\{ \int_{n_0}^{\tilde{n}} h(n) f^k \alpha \{ dT^{*k}/dt^{*k} \} dn \right\} = 0. \end{aligned} \quad (\text{A.3})$$

Since parties share a common system of beliefs over voting behavior and the strategy policy space and candidates are not otherwise differentiated, then parties converge in their fiscal platforms toward $t^{*k} = t^* \forall k$ (for a formal proof of this result see Coughlin 1992). It follows, $\psi^k = \psi^{-k} = 0$ implies $f^k(0) = f^{-k}(0) = c$ where $c > 0$ is a non negative constant $\forall n \in [n_0, n_{\max}]$. Use condition (10) of proposition 2 and our

³¹ To obtain the results in (A.2) consider the following:

$v(t^k, T^k, n) = \text{Max} \{ \mu(c^*(t^{*k}, n), \ell^*(t^{*k}, n) + \alpha[(n \ell^*(t^{*k}, n) + R^*(t^{*k}, n^a))(1-t^{*k}) + T^{*k} - c(t^{*k}, n)]) \}$, where $c^*(t^{*k}, n)$ and $\ell^*(t^{*k}, n)$ are the consumer's optimal consumption and supply of labor. Then

$$dv/dt^{*k} = \frac{\partial \mu}{\partial c^*} \frac{\partial c^*}{\partial t^{*k}} + \frac{\partial \mu}{\partial \ell^*} \frac{\partial \ell^*}{\partial t^{*k}} + \alpha \left[n(1-t^{*k}) \frac{\partial \ell^*}{\partial t^{*k}} - \frac{\partial c^*}{\partial t^{*k}} + (1-t^{*k}) \frac{\partial R^*}{\partial t^{*k}} \right] - \alpha [n \ell^*(t^{*k}, n) + R^*(t^{*k}, n^a)].$$

Use the first order conditions of the consumer's choice in the condition above to conclude

$$dv/dt^{*k} = -\alpha \{ n \ell^*(t^{*k}, n) + R^*(t^{*k}) - (1-t^{*k}) dR^*/dt^{*k} \} \forall n \in [n_0, n_{\max}].$$

³² From now on we will write $R^*(t^{*k}, n^a)$ as $R^*(t^{*k})$ when we find convenient.

definitions for $dR^*/dt^* = \chi$ and $\varepsilon_{R^*-t^*} = \{dR^*(t^*)/dt^*\} \{t^*/R^*\} = \varepsilon$ to re-express the first term of (A.3) as follows

$$\begin{aligned} & - \int_{n_0}^{n_{\max}} h(n) f^k \alpha \{n \ell^*(t^*, n) + R^*(t^*) - (1-t^*) dR^*/dt^*\} dn \\ & = -(1-t^*) \int_{n_0}^{n_{\max}} h(n) \alpha n^2 dn - \{1 + \varepsilon\} \int_{n_0}^{n_{\max}} h(n) \alpha R^* dn + \chi \int_{n_0}^{n_{\max}} h(n) \alpha dn. \end{aligned} \quad (\text{A.4})$$

Using the definition of the covariance between X and Y , $\sigma[X, Y]$, the next condition 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 the product XY . Redefine, $X = \alpha$ and $Y = R^*$ and use this expression to state the following

$$\int_{n_0}^{n_{\max}} h(n) \alpha R^* dn = \sigma[\alpha, R^*] + \int_{n_0}^{n_{\max}} h(n) \alpha dn \int_{n_0}^{n_{\max}} h(n) R^* dn. \quad (\text{A.5})$$

Define $E[R] = \int_{n_0}^{n_{\max}} h(n) R^*(t^*) dn$ as the average size of remittances received by resident households. Hence condition (A.4) is now

$$\begin{aligned} & - \int_{n_0}^{n_{\max}} h(n) f^k \alpha \{n \ell^*(t^*, n) + R^*(t^*) - (1-t^*) dR^*/dt^*\} dn \\ & = -(1-t^*) \int_{n_0}^{n_{\max}} h(n) \alpha n^2 dn - \{1 + \varepsilon\} \sigma[\alpha, R^*] \int_{n_0}^{n_{\max}} h(n) \alpha dn \\ & \quad - \{1 + \varepsilon\} E[R] \int_{n_0}^{n_{\max}} h(n) \alpha dn + \chi \int_{n_0}^{n_{\max}} h(n) \alpha dn. \end{aligned} \quad (\text{A.6})$$

The government's budget constraint for an economy with a linear income tax system in which taxes on full income are applied to all voters is given by

$$\begin{aligned} T^* & = \int_{n_0}^{n_{\max}} h(n) t^* n \ell^*(t^*, n) dn + \int_{n_0}^{n_{\max}} h(n) t^* R^*(t^*) dn \\ & = t^* (1-t^*) \int_{n_0}^{n_{\max}} h(n) n^2 dn + t^* \int_{n_0}^{n_{\max}} h(n) R^*(t^*) dn. \end{aligned} \quad (\text{A.7})$$

It follows that

$$dT^* / dt^* = (1 - 2t^*) \int_{n_0}^{n_{\max}} h(n)n^2 dn + \{1 + \varepsilon\} \int_{n_0}^{n_{\max}} h(n)R^*(t^*) dn. \quad (\text{A.8})$$

From (A.6), it is simple to see that if $\varepsilon_{R-t^*} \in (-1, 0)$ then an increase in $E[R]$ induces an increase in the households' tax burdens and the parties' electoral costs with the latter given by $-\{1 + \varepsilon\}E[R] \int_{n_0}^{n_{\max}} h(n)\alpha dn$. Moreover, from (A.3) and (A.8) an increase in $E[R]$ also leads to higher tax revenues, public transfers, and electoral gains for parties from public redistribution. This last effect is given by $\{1 + \varepsilon\}E[R] \int_{n_0}^{\tilde{n}} h(n)\alpha dn$. In contrast, if $\varepsilon_{R-t^*} \in (-\infty, -1)$ then an increase in $E[R]$ induces a fall in the electoral costs and gains for parties.

Moreover, it is also simple to see that if $\varepsilon_{R-t^*} \in (-1, 0)$ then an increase in $E[R]$ leads to a net loss of electoral support to parties while if $\varepsilon_{R-t^*} \in (-\infty, -1)$ then an increase in $E[R]$ leads to a net gain of electoral support to parties.

Use (A.6) and (A.7) in condition (A.3) and rearrange terms to obtain

$$\begin{aligned} & -\frac{(1-t^*) \int_{\tilde{n}}^{n_{\max}} h(n)\alpha n^2 dn}{\int_{n_0}^{\tilde{n}} h(n)\alpha dn} + \{1 + \varepsilon\} \int_{n_0}^{n_{\max}} h(n)R^* dn \left\{ 1 - \frac{\int_{n_0}^{n_{\max}} h(n)\alpha dn}{\int_{n_0}^{\tilde{n}} h(n)\alpha dn} \right\} \\ & - \frac{\{1 + \varepsilon\} \sigma[\alpha, R^*]}{\int_{n_0}^{\tilde{n}} h(n)\alpha dn} + \chi \frac{\int_{n_0}^{n_{\max}} h(n)\alpha dn}{\int_{n_0}^{\tilde{n}} h(n)\alpha dn} + (1 - 2t^*) \int_{\tilde{n}}^{n_{\max}} h(n)n^2 dn = 0. \end{aligned} \quad (\text{A.9})$$

Use the condition $\int_{n_0}^{n_{\max}} h(n)\alpha dn = \int_{n_0}^{\tilde{n}} h(n)\alpha dn + \int_{\tilde{n}}^{n_{\max}} h(n)\alpha dn$ to show

$$\theta = \int_{n_0}^{n_{\max}} h(n)\alpha dn / \int_{n_0}^{\tilde{n}} h(n)\alpha dn = 1 + \int_{\tilde{n}}^{n_{\max}} h(n)\alpha dn / \int_{n_0}^{\tilde{n}} h(n)\alpha dn > 1. \quad (\text{A.10})$$

Re-arrange terms in (A.8) to obtain

$$t^* = \frac{E[z] - E^\omega[z]\theta - \{1 + \varepsilon\}E[R]\{\theta - 1\}}{\{2E[z] - E^\omega[z]\theta\}} + \left\{ \frac{-\{1 + \varepsilon\}\sigma[\alpha, R^*] / \int_{n_0}^{\tilde{n}} h(n)\alpha dn + \chi\theta}{\{2E[z] - E^\omega[z]\theta\}} \right\}. \quad (\text{A.11})$$

In (A.11), $E[z] = \int_{n_0}^{n_{\max}} h(n)n^2 dn$ is the average gross labor income of resident households and $E^\omega[z] = E[z] = \int_{n_0}^{n_{\max}} h(n)\alpha n^2 dn / \int_{n_0}^{n_{\max}} h(n)\alpha dn$ is a weighted average of the gross labor income. Moreover, note that models of linear income tax systems with $t^* > 0$ usually imply that the numerator and denominator of (A.11) are both positive.

At the political equilibrium rational parties will select taxes such that $dT^*/dt^* > 0$.³³ It follows that the marginal effect of remittances on the size of the per capita transfer can be obtained by calculating $dT^*/dE[R]$. To do so, we first find $dt^*/dE[R] < 0$ in condition (A.12):

$$\frac{dt^*}{dE[R]} = \frac{-\{1 + \varepsilon\}\{\theta - 1\}}{2E[z] - E^\omega[z]\theta} < 0. \quad (\text{A.12})$$

Since by assumption $2E[z] - E^\omega[z]\theta > 0$ and $\varepsilon_{R-t^*} \in (-1, 0)$, hence $\{1 + \varepsilon\} > 0$ and

$$\{\theta - 1\} = \frac{\int_{\tilde{n}}^{n_{\max}} h(n)\alpha dn}{\int_{n_0}^{\tilde{n}} h(n)\alpha dn} > 0. \text{ Finally, from condition (A.7) obtain } dT^*/dE[R] \text{ to show}$$

$$\frac{dT^*}{dE[R]} = \frac{dt^*}{dE[R]} \left\{ (1 - 2t^*) \int_{n_0}^{n_{\max}} h(n)n^2 dn \right\} + t^* \{\xi_{t-R} + 1\}, \quad (\text{A.13})$$

where $\xi_{t-R} = \frac{dt^*}{dE[R]} \frac{E[R]}{t^*}$. The first expression of the right hand side of (A.13) is

³³ Rational parties will not set a tax rate on income that reduces marginal tax revenue, or $dT^*/dt^* < 0$, since there are feasible lower taxes that reduce their electoral costs from taxation and increases their electoral gains from a higher tax revenue that is translated into a higher per capita transfer. For this reason, a tax rate that produces $dT^*/dt^* < 0$ cannot belong to a subgame perfect Nash equilibrium.

negative since $dT^*/dE[R] < 0$ and $dT^*/dt^* > 0$ implies that $(1-2t^*) > 0$.³⁴ Moreover, by (a) $\xi_{t-R} \in (-\infty, -1]$ hence $\{\xi_{t-R} + 1\} \leq 0$. It follows that $dT^*/dE[R] < 0$. Therefore, we conclude that the conditions identified in proposition 3 imply that an increase in the average size of remittances crowds out the government's social transfers. ■

Proposition 4 *For an economy with a tax $t^* > 0$ applied to full income and universal social transfers (all households receive T^*), an increase in the size of average remittances increases the size of the government's redistributive transfer.*

Proof

For this economy the parties' dominant tax strategy is

$$\begin{aligned} & - \int_{n_0}^{n_{\max}} h(n) f^k \alpha \{ n \ell^*(t^*, n) + R^*(t^*) - (1-t^*) dR^*/dt^* \} dn \\ & + \left\{ \int_{n_0}^{n_{\max}} h(n) f^k \alpha dn \right\} \{ dT^*/dt^* \}. \end{aligned} \quad (\text{A.14})$$

Following similar steps as those shown in proposition 3, it is simple to show that

$$t^* = \frac{E[z] - E^\omega[z] - \{1 + \varepsilon\} \sigma[\alpha, R^*] / \int_{n_0}^{\tilde{n}} h(n) \alpha dn + \chi}{\{2E[z] - E^\omega[z]\}}. \quad (\text{A.15})$$

Therefore $dt^*/dE[R] = 0$. Finally, from (A.7) we conclude

$$\frac{dT^*}{dE[R]} = \frac{dt^*}{dE[R]} \left\{ (1-2t^*) \int_{n_0}^{n_{\max}} h(n) n^2 dn \right\} + t^* \left\{ \frac{dt^*}{dE[R]} \frac{E[R]}{t^*} + 1 \right\} = t^* > 0. \quad (\text{A.16})$$

This implies that the response of the government to an increase in the average size of

³⁴ From condition (A.6) $dT^*/dt^* = (1-2t^*) \int_{\tilde{n}}^{n_{\max}} h(n) n^2 dn + \{1 + \varepsilon\} \int_{n_0}^{n_{\max}} h(n) R(t^*) dn > 0$.

The term $\{1 + \varepsilon\} \int_{n_0}^{n_{\max}} h(n) R(t^*) dn > 0$ therefore for $dT^*/dt^* < 0$ to hold it must be satisfied that $(1-2t^*) < 0$.

³⁵ To obtain (A.14) follow similar steps to those shown in conditions (A.4), (A.5), and (A.6) of proposition 3.

remittances is an increase in the government's social transfers. ■

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Received October 19, 2009, Revised March 30, 2010, Accepted October 15, 2010.