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Aging and the Welfare State: The Politico-Economic Conflict between Young and Old, and between Rich and Poor

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Abstract

An income tax is generally levied on both labor and capital. The working young bear mostly the tax on labor income, whereas the retired old, who already accumulated savings, bear the brunt of the capital tax. Therefore, there arise two types of conflicts in the determination of the income tax: the standard intra-generational conflict between the poor and rich, and an intergenerational conflict between the young and the old. The paper studies how aging affects the resolution of these conflicts, and the politico-economic forces that are of play: the changes in the voting pivots and the fiscal leakages from taxpayers to transfer recipients.

JEL classification: H1, H2

1 Introduction

In a nutshell, a welfare state levies taxes on income and redistributes the revenues among its members. As such, it generates a multitude of political forces which interact with each other in forming a politico-economic equilibrium. The main components of the income tax base are labor income and capital income. The incidence of the labor income tax is relatively strongest on the young working individuals. By contrast, these individuals have typically little capital income. It is the (retired) old who have the lion's share of capital income. Furthermore, this type of income is typically the main, if not the sole, source of income of the old. At any point in time, the attitude of a forward looking young towards an income tax is affected not only by how much tax she will pay on her labor income. She is obviously concerned also by the tax on her capital income which, though typically small at present, will increase gradually to become a major source of her income, as she grows older. The retiree is nevertheless concerned only about the capital income tax (save for any altruism towards her offspring). At the same time, as the redistribution done by the welfare state is typically biased in favor of the old (old-age social security, medicare, etc.), she expects her cohort to receive the lion's share of the transfers that the income tax revenues can finance. Thus, the political economics of how the income tax is determined is very subtle. There is a variety of factors at play, some reinforcing each other and some conflicting with one another. In particular, aging of the population has important implications for the transformation of the income tax in the welfare state.[1] In this paper we develop a simple politico-economic model of the welfare state in order to study the implications of aging for the transformation of the political forces at play and their effects on the final design of the income tax.

[1] Oeppen and Vaupel (2002) forecast a continuing strong trend of increasing life expectancy among the best performing economies. Numerous studies investigate the implications of such trends on the welfare state; see e.g. Borsch-Supan, Ludwig and Winter (2003), Tosun (2003) and Razin and Sadka (2005). They did not, however, focus on the intra and intergeneration conflicts around the design of the income tax which is at the center of this paper.

In this paper we consider a representative welfare state which levies taxes on income, and grants a flat benefit (demogrant) to all its members. We employ an overlapping-generations framework in which each generation lives for two periods: in the first period of her life, an individual invests in human capital and work; in the second period she retires. Thus, in each period there is one generation (the young) who has labor income only and another generation (the old) who has capital income only. Assume further that the welfare state has a pay-as-you-go type of financing. That is: the government's budget is balanced every period. This setup yields itself to a two-type political conflict. First, there is an inter-generational aspect of the conflict: In each period the old would like to tax labor, whereas the young would prefer to tax capital. Second, there is the standard intra-generational conflict between the poor (young and old) and the rich (young and old). The income tax is determined as an equilibrium outcome of all these forces[2] [3].

We then study how aging alters the equilibrium outcome[4]. There are two channels through which aging affects the equilibrium tax rates. First, aging increases the political clout of the old who favor low capital taxation and high labor taxation. Second, there is a "leakage" of revenues from one group to the other. On the one hand, the young are more inclined to raise the income tax rate, because its capital component is levied over a larger number of old people. But, on the other hand, the tax revenues from the labor component are "leaked" to a larger number of old beneficiaries. This complex set of considerations is the focus of our paper.

The organization of the paper is as follows. The next section develops a politico-economic model of income taxation in the welfare state. Section 3 studies the equilibrium

[2]Meltzer and Richard (1978, 1981) pioneered the literature on the determination of economic policy in a general politico-economic equilibrium framework.

[3]Alesina and Rodrick (1994) and Alesina and Perroti (1996) address the issue of the political conflict around redistributive policies in the context of economic growth. For some more recent surveys of the politico-economic conflict in other contexts see Persson and Tabellini (2001) and Drazen (1998).

[4]In Razin, Sadka and Swagel (2002) we studied theoretically and empirically the implications of aging for a welfare state which employs a tax on labor income only. In such a framework the role of the old in the political game is reduced to a straightforward pro-tax stand, because they have no labor income to be taxed.

in this model. The effects of aging on the politico-economic equilibrium in the welfare state are analyzed in Section 4. Section 5 concludes.

2 A Politico-Economic Model of Income Taxation

At the heart of any politico-economic equilibrium there must be some underlying distribution of income. For concreteness, our model generates an income distribution based on human-capital formation framework, with an exogenously given heterogeneity in innate ability. We assume an overlapping-generations model in which each generation lives for two periods: A working period and a retirement period.

Evidently, an income tax creates two distortions. As a tax on capital income, it distorts saving-consumption decisions. As a tax on labor income, it distorts human capital investment decisions. In each period only the old have capital income, whereas only the young have labor income. There is therefore an intergenerational conflict (between the young and the old) in the determination of the taxes in each period. In each period the young would prefer to tax only capital income in that period. (The capital income of the young would be taxes only in the next period in another round of voting.) On the other hand, the old would like to tax only labor income (save for altruism for the young offspring).

We assume some kind of an implicit intergenerational contract by which labor and capital are taxed at a uniform rate (τ). The revenues are used to provide a flat benefit (b). The tax rate and the generosity of the benefit are linked through the government's budget constraint. In a multi-period setting such as ours, this simple specification captures the spirit of a pay-as-you-go tax-transfer system. The features of the transfer can include a uniform per capita grant (either in cash or in-kind, such as national health care), as well as age-related benefits such as old-age social security and medicare, or free public education.[5]

[5] Strictly speaking, the transfer is defined per family so that the number of children in the family does not affect the attitude of the family toward the transfer. Therefore, the number of children does not affect the voting decision of the family. Also, each family (whether young or old and irrespective of the number of children) consists of the same number of eligible voters.

In addition to the intergenerational conflict, there is also the standard conflict between the rich and the poor of both generations.

2.1 Skill-Acquisition Decisions

We assume a stylized economy in which there are two types of workers: Skilled workers who have high productivity and provide q_H efficiency units of labor per each unit of labor time, and unskilled workers who have low productivity and provide only q_L efficiency units of labor per each unit of labor time, where $q_L < q_H$. Workers have one unit of labor time during their first period of life, but are born without skills and thus with low productivity. Each worker chooses whether to acquire an education and become a skilled worker or remain unskilled. After the working period, individuals retire, with their consumption funded by savings.

There is a continuum of individuals, characterized by an innate ability parameter, e, which is the time needed to acquire an education. By investing e units of labor time in education, a worker becomes skilled after which the remaining $1-$ e units of labor time provide an amount of $(1-e)q_H$ units of effective labor. Less capable individuals require more time to become skilled and thus find education more costly in terms of lost income (education is a full-time activity). We assume that there is also a positive pecuniary cost of acquiring skills, γ, which is not tax deductible.[6] The cumulative distribution function of innate ability is denoted by $G(e)$, with the support being the interval $[0,1]$. The density function is denoted by $g = G'$.

If an $e-$ individual (namely, an individual with an education-cost parameter e) decides to become skilled, then her after-tax income is $(1-\tau)wq_H(1-e)+b-\gamma$, where w is the wage rate per efficiency unit of labor, τ is the flat tax on labor income, and b is a uniform

[6] This is typically the case in practice where the out-of-pocket cost of investment in human capital is not tax-deductible. In contrast, investment in physical capital is tax-deductible, albeit imperfectly, through annual depreciation allowances (rather than full dispensing).

benefit (demogrant). If she remains unskilled, her after-tax income is $(1-\tau)q_L w + b$. Note that, naturally, acquiring a skill is more attractive for individuals with low cost of education than for individuals with higher costs.

Thus, there exists a cutoff level, e^*, such that those with education-cost parameter below e^* invest in education and become skilled, whereas everyone else remains unskilled. This cutoff level is the cost-of-education parameter of an individual who is just indifferent between becoming skilled or not:

$$(1-\tau)wq_H(1-e^*) + b - \gamma = (1-\tau)q_L w + b.$$

Rearranging terms gives the cutoff level for the education decision:

$$e^*(\tau) = 1 - \frac{q_L}{q_H} - \frac{\gamma}{(1-\tau)q_H w}. \tag{1}$$

Note that the higher is the tax rate the lower is e^*. That is, the fraction of skilled in the labor force falls with the tax rate.

In order to simplify the dynamics of the model we assume that factor prices are not variable. We specify a production function which is effectively linear in labor, L, and capital, K :

$$Y = wL + (1+r)K, \tag{2}$$

where Y is gross output. The wage rate, w, and the gross rental price of capital, $1+r$, are determined by the marginal productivity conditions for factor prices ($w = \partial Y/\partial L$ and $1+r = \partial Y/\partial K$) and are already substituted into the production function. The linearity of the production function can arise as an equilibrium outcome through either international capital mobility or factor price equalization arising from goods' trade. For simplicity, the two types of labor are assumed to be perfect substitutes in production in terms of efficiency units of labor input, and capital is assumed to fully depreciate at the end of the production process.

We assume that the population grows at a rate of n. Because individuals work only in the first period, the ratio of retirees to workers is $1/(1+n)$, and the dependency ratio - retired as a share of the total population - equals $1/(2+n)$.

Each individual's labor supply is assumed to be fixed, so that the income tax does not distort individual labor supply decisions at the margin. The total labor supply does, however, depend on the income tax rate, as this affects the cutoff cost-of-education parameter e^* and thus the mix of high and low skill workers in the economy. This can be seen from equation (1) which implies that e^* is declining in τ, so that the tax system is distortive.[7]

An increase in τ reduces the share of the skilled individuals in the labor force. This, in turn, reduces the effective labor supply and output. We denote by τ_t and b_t the tax rate and the benefit, respectively, prevailing in period t. In this period the total labor supply is given by:

$$L(\tau_t) = \left(\int_0^{e^*(\tau)} (1-e) q_H dG + q_L \{1 - G[e^*(\tau_t)]\} \right) N_0 (1+n)^t = \ell(\tau_t) N_0 (1+n)^t, \quad (3)$$

where $N_0(1+n)^t$ is the size of the working age population in period t (with N_0 the number of young individuals in period 0), and $\ell(\tau_t) = \int_0^{e^*(\tau_t)} (1- e) q_H dG + q_L \{1 - G[e^*(\tau_t)]\}$ is the average (per worker) labor supply in period t. This specification implies that for each e and t, the number of individuals in period t, with a cost-of-education parameter less than or equal to e, is $(1+n)^t$ times the number of such individuals in period 0.

[7] A further distortion is caused in practice by the progression of the income tax, as the opportunity cost of investment in human capital (in the form of foregone income) is typically taxed at a lower rate than the return to investment in human capital.

2.2 Saving Decisions

An individual consumes one consumption good in each period of her life: First-period consumption of an individual born at t is denoted by c_{1t} and second-period consumption of this individual is denoted by c_{2t}. Individuals have identical preferences which are represented by $u(c_{1t},\, c_{2t})$. The life-time budget constraint of an $e-$ individual is:

$$c_{1t} + \frac{c_{2t}}{1+(1-\tau_{t+1})r} = W(e, \tau_{1t}, \tau_{t+1}, b_t, b_{t+1}), \tag{4}$$

where $W(\cdot)$ is her life-time income or wealth:

$$W(e, \tau_t, \tau_{t+1}, b_t, b_{t+1}) = \begin{cases} (1-\tau_t)q_H w(1-e) + b_t + \dfrac{b_{t+1}}{1+(1-\tau_{t+1})r} & \text{if } \; e \leqq e^*(\tau_t) \\ (1-\tau_t)q_L w + b_t + \dfrac{b_{t+1}}{1+(1-\tau_{t+1})r} & \text{if } e \geqq e^*(\tau_t) \end{cases} \tag{5}$$

Maximization of u, subject to the budget constraint yield the consumption demand functions, $C_i(e, \tau_t, \tau_{t+1}, b_t, b_{t+1})),\ i = 1, 2$, and the indirect utility function, $v(e, \tau_t, \tau_{t+1}, b_t, b_{t+1})$. The saving of an $e-$ young individual is:

$$s(e, \tau_t, \tau_{t+1}, b_t, b_{t+1}) = W(e, \tau_t, \tau_{t+1}, b_t, b_{t+1}) - C_1(e, \tau_t, \tau_{t+1}, b_t, b_{t+1}). \tag{6}$$

Aggregate saving, denoted by $S(\cdot)$, is given by:

$$S(\tau_t, \tau_{t+1}, b_t, b_{t+1}) = \int_0^1 s(e, \tau_t, \tau_{t+1}, b_t, b_{t+1})dG(e). \tag{7}$$

2.3 The Government Budget Constraint

The government balances its budgets period-by-period. Its outlays in period t are $b_t[N_0(1+n)^{t-1} + N_0(1+n)^t]$, as there are $N_0(1+n)^{t-1}$ old people and $N_0(1+n)^t$ young people living in period t. Its revenues come from the income tax on both labor and capital. Only the old have savings and capital income. The saving of an $e-$ (old) individual in period t, which is exogenously given, is denoted by $s_{t-1}(e)$. Average (per old) saving in period t, denoted by S_{t-1} is also given in period t :

$$S_{t-1} = \int_0^1 s_{t-1}(e)dG. \tag{8}$$

Only the young have labor income. Thus, the government's budget constraint in period t is given by:

$$b_t = \frac{\tau_t}{2+n}[rS_{t-1} + (1+n)w\ell(\tau_t)]. \tag{9}$$

In period t, S_{t-1} is given, so that the government's budget constraint determines b_t as a function of τ_t and S_{t-1} : $b_t = B(\tau_t, S_{t-1})$.

3 A Politico-Economic Equilibrium

In period t, the tax rate τ_t is determined by the majority of the people (old and young) alive in this period. (Recall that this choice of τ_t determines also b_t.) The old naturally care only about τ_t (and b_t), because period t is their last period of life. However, the young who will grow to be old in period $t+1$ are aware that their welfare depends also on the tax rate, τ_{t+1}, and the benefit, b_{t+1}, that will be determined in period $t+1$.

We now turn to the description of a politico-economic equilibrium. We look first at the voting decision of an old individual with an education-cost parameter e. Her saving, denoted by $s_{-1}(e)$, has already been predetermined. Her **net** gain from the tax-transfer system, denoted by $V_t^O(e)$, is given by:

$$V_t^O(e) \equiv V^O(e, \tau_t, s_{t-1}^t) = B(\tau_t, s_{t-1}) - \tau_t r s_{t-1}(e). \tag{10}$$

She will vote for raising (lowering) the tax rate τ_t, if $\partial V^O/\partial\tau_t > (<)0$. Note that

$s_{t-1}(e)$ is strictly declining in e for all $e < e^*$ (assuming normality), and then becomes flat for $e \geqq e^*$. Thus, if a certain tax hike benefits an old person with ability parameter e_0, it must also benefit all old people with ability parameter above e_0 (that is, all less able individuals). Conversely, if an (old) e_0- individual favors a certain tax cut, then all persons with a lower e (the more able) will also favor such a tax cut. To see this formally, note from equation (10) that $\partial(\partial V^O/\partial\tau_t)/\partial e = \partial^2 V^O/\partial\tau_t\partial e = -rds_{t-1}/de \geq 0$. This result implies that the old population is always divided just by one cutoff level of e in its attitude toward a tax hike or a tax cut.

Consider next a young individual of type e. Her indirect utility function is denoted by:

$$V_t^Y(e) = v[e, \tau_t, B(\tau_t, s_{t-1}), \tau_{t+1}, b_{t+1}]. \tag{11}$$

She will vote for raising (lowering) the tax if $\partial v/\partial\tau_t > (<)0$. We plausibly assume that $\partial^2 v/\partial\tau_t\partial e \geq 0$. That is, if a certain tax hike benefits a young individual of type e_1, it must benefit all individuals with $e > e_1$ (that is, who are poorer than her); conversely, if a tax cut is beneficial for an e_1- individual, it must also be beneficial for all individuals with $e < e_1$ (that is, who are richer than her). This assumption holds, for instance, with a log-linear utility function. This result implies that the young population is also divided by just one cutoff level of e in its attitude toward a tax hike or a tax cut.

A politico-economic equilibrium can now be specified compactly[8]. Given S_0^* and $s_0^*(e)$ [where $S_0^* = \int_0^1 s_0^*(e)dG(e)$], there is a sequence of triplets $(\tau_t^*, e_t^O, e_t^Y), t = 1, 2...$, such that:

$$\tau_t^* = \arg\max_{\tau_t} V^O(e_t^O, \tau_t, S_{t-1}^*) \tag{12}$$

$$\tau_t^* = \arg\max_{\tau_t} v[e_t^Y, \tau_t, B(\tau_t, S_{t-1}^*), \tau_{t+1}^*, b_{t+1}^*] \tag{13}$$

[8]See Aurbach and Kotlikoff (1987) for a general-equilibrium analysis of the dynamics of taxes in overlapping general setup.

$$G(e_t^O) + G(e_t^Y)(1+n) = (2+n)/2 \tag{14}$$

$$S_t^* = S(\tau_t^*, \tau_{t+1}^*, b_t^*, b_{t+1}^*) \tag{15}$$

$$s_t^*(e) = s[e, \tau_t^*, \tau_{t+1}^*, b_t^*, b_{t+1}^*] \tag{16}$$

$$b_t^* = B(\tau_t^*, S_{t-1}^*) \tag{17}$$

This implies that in each period there is a pair of individuals, one old (with an ability parameter e_t^O) and one young (with an ability parameter e_t^Y), who each plays the role of a "pivot" for her respective generation. Note that in equilibrium these pivots' preferred choice must be the **same** tax rate τ_t^* - see equations (12) and (13). Together, these pivots divide the total population (of the old and the young) evenly, so that the preferred tax rate τ_t^* is consistent with the outcome of majority voting. All old individuals with ability parameters above e_t^O and all young individuals with ability parameters above e_t^Y would prefer a higher tax rate than (or, at least, the same tax rate as) τ_t^*. All old individuals with ability parameters below e_t^O and all young individuals with ability parameters below e_t^Y would prefer a lower tax rate than (or the same tax rate as) τ_t^*. To see that these pivots divide the total population (of the old and the young) evenly, note that the number of old people with ability parameters below e_t^O is $G(e_t^O)N_0(1+n)^{t-1}$. Similarly, the number of young individuals with ability parameters below e_t^Y is $G(e_t^Y)N_0(1+n)^t$. The rest of the population (who favor a higher tax rate than τ_t^*) is $[(1-G(e_t^O)]N_0(1+n)^{t-1} + [1-G(e_t^Y)]N_0(1+n)^t$. Equating the latter expression with $G(e_t^O)N_0(1+n)^{t-1} + G(e_t^Y)N_0(1+n)^t$ yields equation (14).

In period t, the young individual's choice of the tax rate and the benefit for this period depends on her expectations about the tax rate, τ^*_{t+1}, and the benefit, b^*_{t+1}, that will prevail in period $t+1$. We further assume that these expectations are self-fulfilling. This is the essence of equations (15)-(17). Note that voters internalize the "no-free-lunch" principle of economics, in the sense that they realize that the benefit in each period depends on the tax rate in the same period. (Thus, they do not trust candidates that over-promise to cut taxes without a corresponding cut in benefits). This is reflected in having the argument $B(\tau_t, S_{t-1})$, rather than simply b_t, in the function $v(.)$ in equation (13). But we assume, for the sake of tractability, that they do not internalize the effect of their voting outcome today on the voting outcome of tomorrow. This explains why we put τ^*_{t+1} and b^*_{t+1}, as exogenously given arguments in the utility function $v(.)$ in equation (13).

4 The Effect of Aging

Recall that the dependency ratio is equal to $1/(2+n)$. Thus, as the growth rate of the population (n) declines, the population ages and the dependency ratio rises. We investigate in this section how the aging process alters the size of the welfare state, namely the magnitudes of the tax and benefit parameters. For tractability we resort to numerical simulations of steady-state equilibria. In the simulations, the utility function is $U(c_1, c_2) = \log c_1 + \log c_2$ and e is uniformly distributed over the interval $[0, 1]$.

4.1 Labor Tax

In order to provide the intuition behind the results, we start with a benchmark special case of our framework in which the income tax is levied only on labor income. In this case there are two factors at play when the population ages (that is, n declines). First, note that the old who have no labor income are all for raising the income tax. Therefore,there is only one pivot, who is a young individual, and she is the median voter. Her cost-of-education parameter is $e^Y = (2+n)/2(1+n)$. As n decline, e^Y rises. That is, as the population ages, a poorer individual becomes the median voter. Naturally, being poorer than the previous median voter, the new median voter benefits (weakly) more from the welfare state system (she pays less taxes and gets the same transfer). This factor works in the direction of hiking the tax rate when the population ages. [We refer to this factor as the shift of the pivot (or the median voter).] But, there is a second factor which works in the opposite direction when the population ages. The median voter realizes that tax revenues are spread now more thinly across the population, including herself, as they must support more old beneficiaries (who receives the transfer but pay no taxes). Therefore, her appetite for tax hikes is tanned. This factor works in the direction of trimming the size of the welfare state, when the population ages. (We refer to this factor as the fiscal leakage[9].)

Note that all unskilled individuals have the same income regardless of their cost-of-education parameter (because they do not engage in the education activity). Therefore they have the same attitude towards τ and b. Thus, when the median voter is an unskilled individual, the first factor is nil, and only the fiscal leakage factor is at play. Hence, as the population ages (that is, n declines), the tax rate falls. This is depicted in Figure 1.

Now we turn to the case when the median voter is a skilled individual. Now, the two conflicting factors are at play. One cannot apriori determine which of these two factors dominates. In Figure 1, the first factor (the shift in the median voter) dominates the second factor (the fiscal leakage): when the population ages (that is, n declines), the tax rate rises.

4.2 Capital Tax

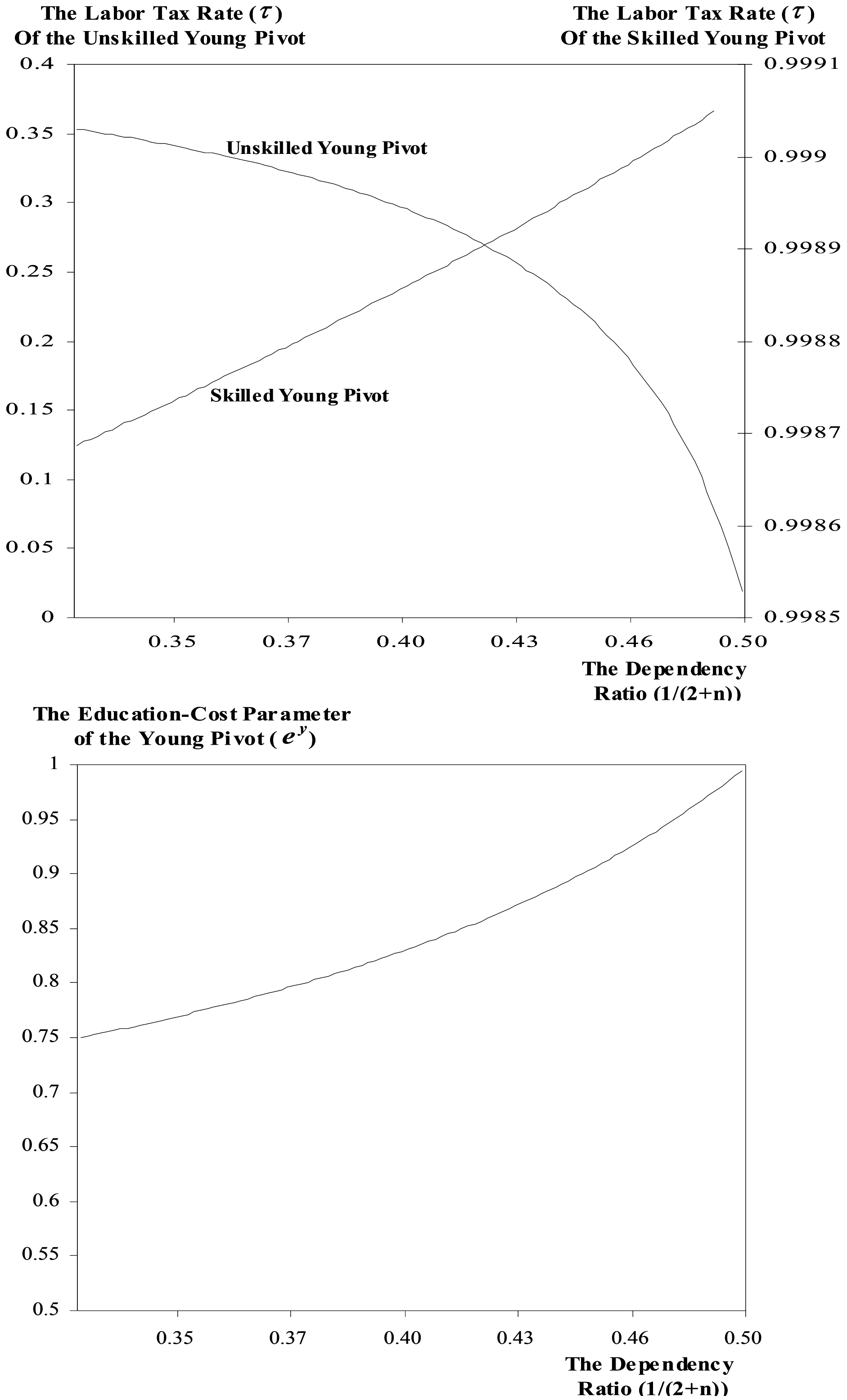
A second benchmark case is of capital taxation only. This is a very simple case. As long as the population grows (that is, $n > 0$), then the young constitute the majority of the population. The young have no capital income. Also, as the savings of the old are predetermined, there is no distortion created by taxing capital, so that raising the tax will

[9] See also Becker (1998).

Figure 1: Labor Tax

(a)

(b)



Notes:

Parameter Values are:

a. **Unskilled Pivot: r=5, w=2, q_H=1, q_L=0.25, γ =0.5, β =0.5.**

b. **Skilled Pivot: r=2, w=5, q_H=1, q_L=0.001, γ =0.0001, β =0.5.**

always generates more tax revenues for the benefit of all (young and old). Therefore, the majority will opt for a 100% tax on capital (as in the standard time-inconsistency context).

4.3 Income Tax

We now return to study the object of interest in this paper, which is the effect of aging on the income tax (on both labor and capital). Unlike the labor tax case where the old were all for raising the tax, now, as the tax is levied on capital income too, the old are no longer unanimous in their attitude towards the tax; the rich old may well be against the income tax. Therefore, the old pivot is also relevant for the determination of the tax transfer system. Thus, each one of the two cases studied under the labor tax (the pivot young being either skilled or unskilled) must be separated into two cases according as to whether the old pivot is skilled or unskilled. Therefore, there are altogether four cases that we will investigate below.

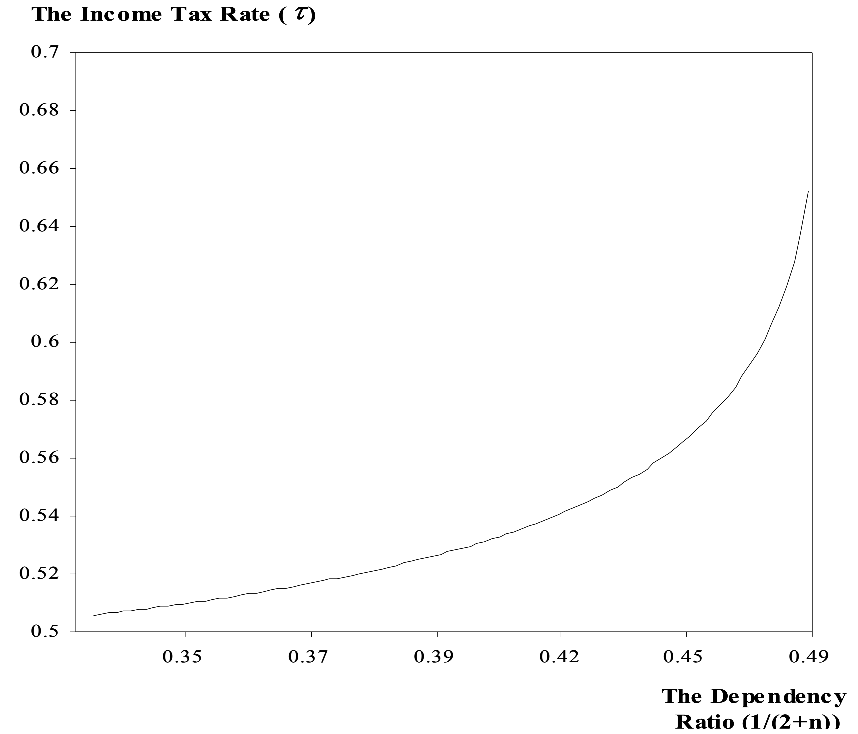
Note in general that the fiscal leakage factor is no longer clear-cut. As the income tax base includes both labor and capital income, then the labor tax component of the income tax is levied on the young only, but the revenues from it "leak" to the old as well. Similarly, the capital tax component is levied on the old only, but the revenues from it "leak" to the young as well. Therefore, the fiscal leakage factor becomes ambiguous.

(a) Young pivot - skilled; old - pivot skilled

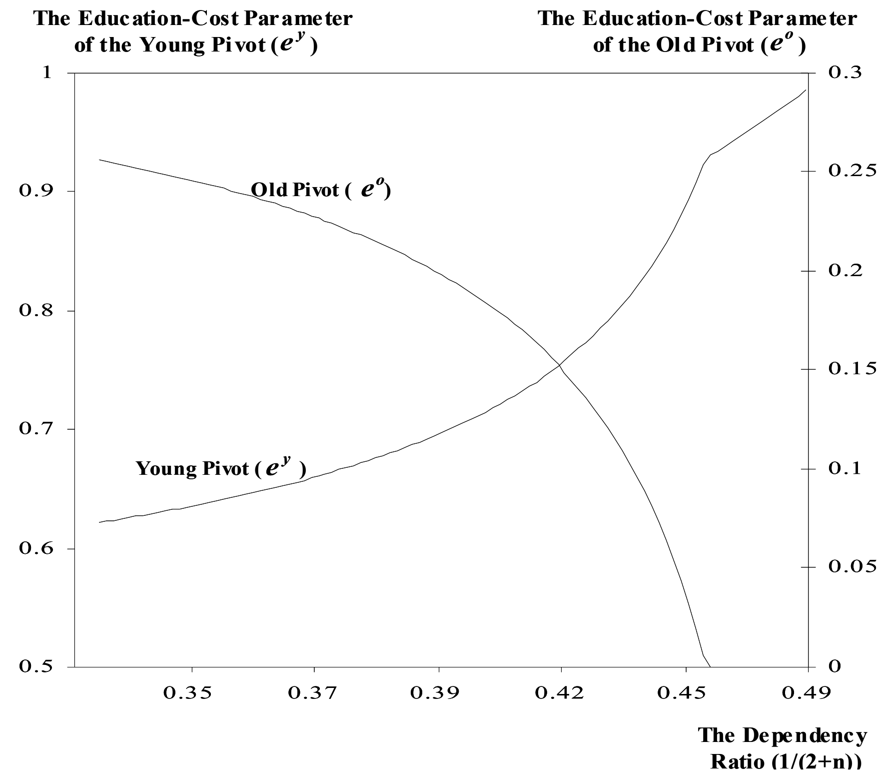
Recall that with a tax on labor only, the first factor vanishes (because the young is unskilled) and the second (the fiscal leakage) factor decreased the tax rate as population ages. But, with an income tax, the first factor (the change of the pivot) reemerges because the old pivot is skilled. As can be seen in panel (b) of Figure 2, e^O, the education-cost parameter of the old pivot, declines as population ages. That is, the old pivot changes to a richer (more skilled) individual whose anti-tax attitude is stronger and she would have preferred to lower the tax. However, apparently the fiscal leakage effect becomes strongly in favor of raising the tax, as the young are now more motivated to raise the tax because

Figure 2: The Income Tax
Young Pivot-Unskilled; Old Pivot-Skilled

(a)



(b)



Notes:
Parameter Values are:
r=4 , w=2 , q_H=1 , q_L =0.1 , γ =0.5 , β =0.5.

there are more old people to be taxed, so that more revenues from the capital tax can leak to the young. The latter effect dominates and the politico-economic equilibrium tax rate rises as the population ages.

(b) Young pivot - unskilled; old pivot - unskilled

This configuration cannot in general produce an equilibrium. When a pivot, whether young or old, is unskilled, then a small change in the identity of the pivot does not change her attitude towards the tax. When both pivots are unskilled, then small changes in the identities of both pivots do not produce a change in the preferred tax rate. At the same time, both pivots must prefer the same tax rate in a politico-economic equilibrium. Such a single tax rate need not exist.

(c) Young pivot - skilled; old pivot - skilled

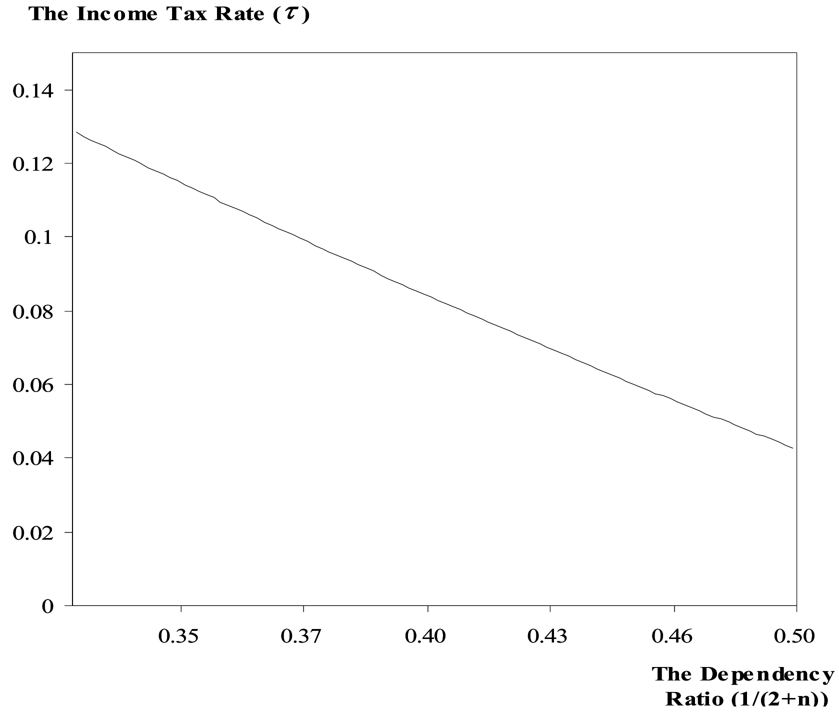
As can be seen in panel (b) of Figure 3, the young pivot changes to a poorer (less skilled) individual who would also like to expand the size of the welfare state. Similarly, the old pivot also changes in the same direction, and the new old pivot would like to hike the tax. But apparently, the fiscal leakage factor stemming from the tax revenues (and especially those from the labor tax component) being spread over a larger population of the old, dominates: as population ages, the income tax rate declines.

(d) Young pivot - skilled; old pivot - unskilled

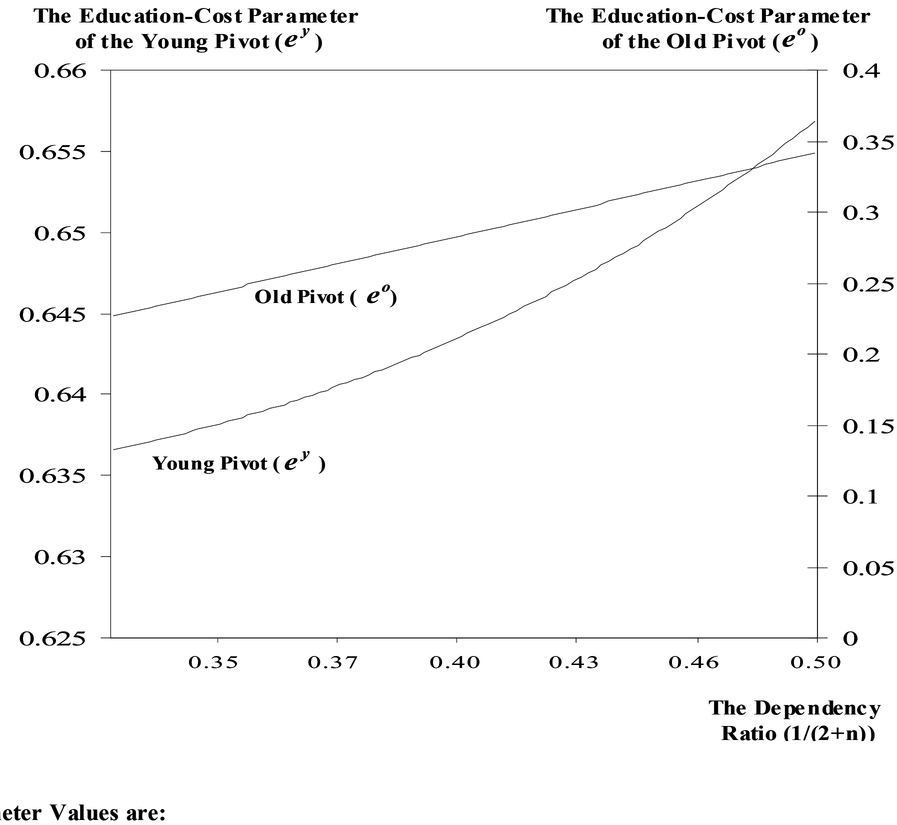
This case is depicted in Figure 4. As the population ages, the identity of young pivot, who is skilled, changes to a more able individual (with a lower cost-of-education parameter). This new pivot would like to cut the tax rate. The identity of the old pivot changes too to a more able individual; but this change does not have any effect on the preferred tax rate of the old pivot, as she is unskilled. In case (c) above, the skilled young pivot became less able and more pro-tax. Nevertheless, the fiscal leakage effect dominated, and the tax rate declined, as the population aged. In our case, the tax certainly has to decline as the population ages, because the young skilled pivot becomes more able and more anti-tax.

Figure 3: The Income Tax
Young Pivot-Skilled; Old Pivot-Skilled

(a)



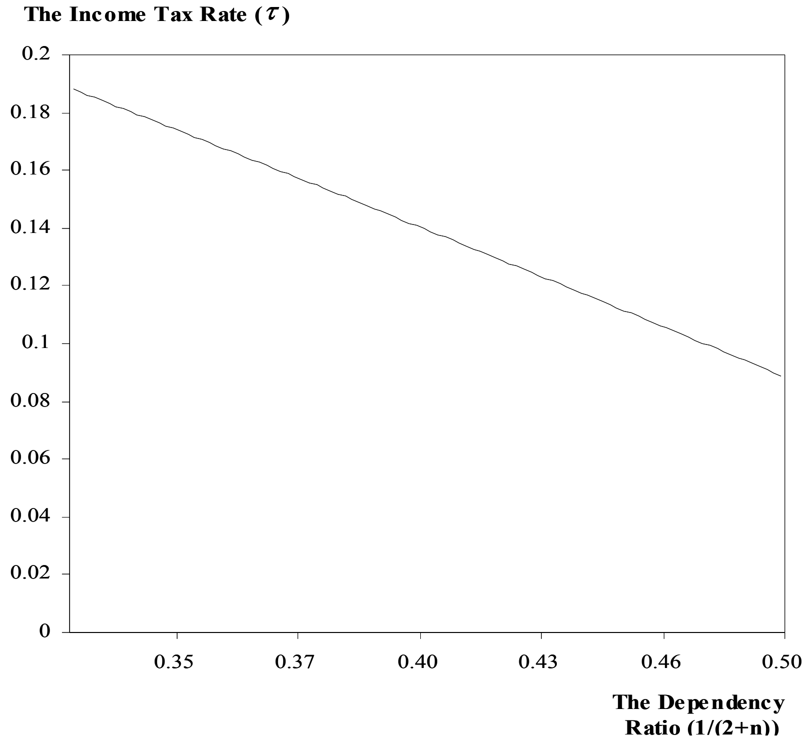
(b)



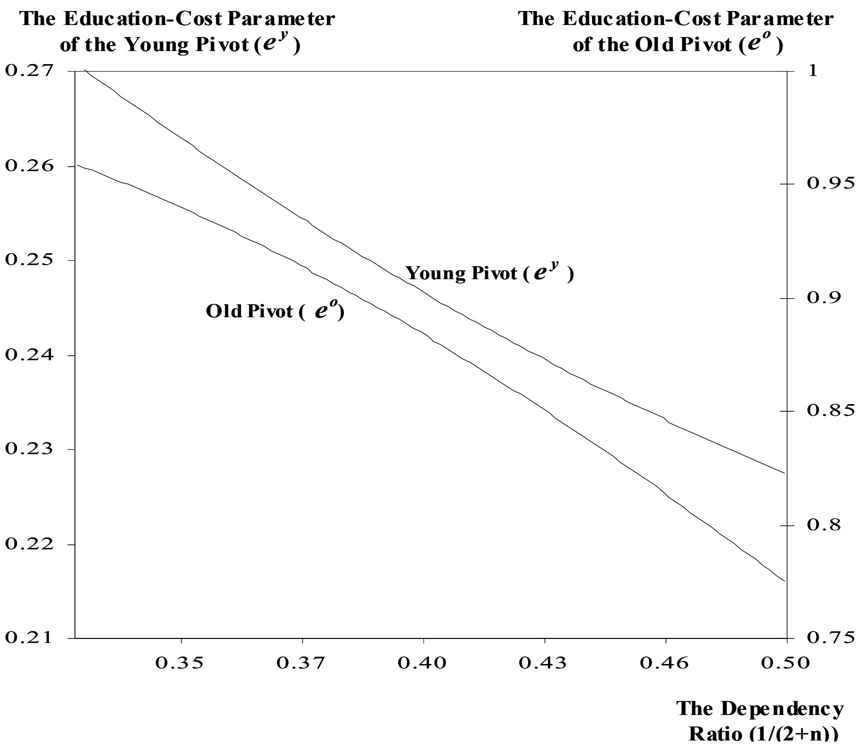
Notes:
Parameter Values are:
r=2 , w=5 , q_H =1 , q_L =0.001 , γ =0.0001 , β =0.5.

Figure 4: The Income Tax
Young Pivot-Skilled; Old Pivot-Unskilled

(a)



(b)



Notes:
Parameter Values are:
r=5 , w=2 , q_H=1, q_L =0.6, γ =0.1, β =0.5.

The results of the above cases are summarized in Table 1.

Table 1: Aging, Labor and Income Taxes

		Young pivot	
		Skilled	Unskilled
Old pivot	Skilled	τ^L $\uparrow$	τ^L $\downarrow$
		τ $\downarrow$	τ $\uparrow$
	Unskilled	τ^L $\uparrow$	τ^L $\downarrow$
		τ $\downarrow$	No Equilibrium

Notes:

τ^L - the labor tax

τ - the income tax

An upward arrow indicates an increase in the tax rate as population ages

An downward arrow indicates a decline in the tax rate as population ages

5 Conclusion

We study two politico-economic forces that determine the size of the welfare state, when its population ages: changes in the voting pivots and fiscal leakages from tax payers to transfer recipients. Tax revenues are generally biased in favor of the old (old-age social security, medicare, etc.). Therefore, one would expect the pro-tax coalition to gain more political clout as population ages; consequently, aging should tilt the political power balance in favor of expanding the welfare state. However, a careful scrutiny of the politico-economic equilibrium reveals more factors at play. First, the equilibrium is governed by the preferences of two voting pivots, one young and one old. Aging may change the young pivot to a richer, more anti-tax individual. Second, the fiscal leakage of revenues from the larger number of old taxpayers of the capital tax component of the income tax to the young may encourage the latter to vote for more taxes. But, on the other hand, the fiscal leakage from the young taxpayers of the labor tax component of the income tax to a larger number of old beneficiaries may tame the appetite of the young for more taxes. As a result, the welfare state does not necessarily expands, when its population ages.

As a matter of evidence, we elsewhere separated between the tax on labor and the tax on capital [see Razin and Sadka (2005)]. The results are depicted in Table 1. We present OLS, 2SLS and 3SLS results about the determinants of the labor and capital tax rates. As identifying exclusion restrictions, we use the stock of foreign direct investment (FDI) and the stock of foreign portfolio investment as explanatory variables in the capital-tax equation only, because these variables are more relevant for capital taxation in our era of international tax competition. Indeed, the total dependency ratio has a negative effect on the labor tax. On the other hand, the ratio of the old (the main holders of capital) in the population has a positive effect on the capital tax, reflecting, perhaps, the increased incentive of the young to tax the larger number of old.

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Table 1: Determinants of Capital and Labor Tax Rates (169 observations)

	OLS		2SLS		3SLS	
	Capital	Labor	Capital	Labor	Capital	Labor
Old/population	2.033		3.532		2.820	
	(2.23)		(2.58)		(2.27)	
Dependency ratio		-0.438		-0.443		-0.443
		(-3.59)		(-3.43)		(-3.61)
Capital tax rate				-0.054		0.030
				(-0.68)		(0.41)
Labor tax rate			2.493		2.295	
			(1.60)		(1.63)	
FDI stock	0.199		0.001		0.116	
	(1.90)		(0.00)		(0.77)	
Portfolio stock	-0.335		-0.418		-0.440	
	(-3.84)		(-3.83)		(-4.41)	
Trade openness	-0.026	0.117	-0.285	0.113	-0.282	0.113
	(-0.38)	(5.19)	(-1.60)	(4.63)	(-1.74)	(4.87)
Govt job share	0.876	0.827	-1.805	0.907	-1.512	0.907
	(3.26)	(10.94)	(-1.06)	(6.36)	(-0.98)	(6.68)
GDP growth	-0.711	-0.073	-0.603	-0.116	-0.594	-0.116
	(-4.18)	(-1.25)	(-3.04)	(-1.31)	(-3.25)	(-1.38)
Income skewness	-0.152	0.077	-0.313	0.069	-0.309	0.070
	(-3.04)	(4.12)	(-2.73)	(3.64)	(-2.95)	(3.82)
R^2	0.432	0.204	0.178	0.241	0.897	0.960

Note: All specifications include country fixed effects (coefficients not shown). t-values in parentheses.