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Yet Another Reason to Curb Inequality: The Political Economy of Long-Term Capital Spillovers

Mais uma Razão para Combater a Desigualdade: A Economia Política dos Spillovers de Longo Prazo do Capital

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RESUMO

A desigualdade é um dos principais problemas da economia e da formulação de políticas públicas. Uma das principais ferramentas de política pública para lidar com a desigualdade é o sistema tributário, que pode ser usado para redistribuir renda. No entanto, se os impostos são determinados pela decisão coletiva dos eleitores, eles não irão necessariamente maximizar o bem-estar social. Mostramos que quando os eleitores têm dotações de capital diferentes, e o capital produz spillover positivo de longo prazo, uma armadilha de pobreza pode surgir. Eleitores pobres estão dispostos a votar por impostos de capital baixos para se beneficiar do spillover de quando outros investem em capital, mas esse efeito é enfraquecido se os agentes são impacientes e recebem pelo menos parte desse benefício no futuro. Consequentemente, o resultado eleitoral em equilíbrio pode apresentar elevados impostos de capital, prejudicando o investimento. Isso reduz o acúmulo de capital com natureza de bem público nos pobres países, onde baixos estoques de capital normalmente levam a altas taxas de juros, implicando em um grande desconto dos retornos futuros.

Palavras-chave: spillovers de capital de longo prazo; desigualdade; votação; tributação; armadilha da pobreza.

JEL: D62; D63; D72.

ABSTRACT

Inequality is one of the main issues in economics and policymaking. One of the main policy tools to deal with inequality is the tax system, which may be used to redistribute income. However, if taxes are determined by the collective decision of voters, they will not necessarily maximize welfare. We show that when voters have different capital endowments, and capital has a long-lasting spillover effect, a poverty trap may arise. Poor voters are willing to vote for low capital taxes to benefit from the spillover when others invest in capital, but this effect is weakened if agents are impatient and receive at least part of that spillover in the future. Hence the voting equilibrium may exhibit large capital taxes, hurting investment. This reduces the accumulation of capital with a public good nature in poor countries, where low capital stocks typically lead to high interest rates, implying a large discounting of future payoffs.

Keywords: long-run capital spillovers; inequality; voting; taxation; poverty trap.

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1. Introduction

The relationship between growth and inequality is one of the most important topics in policymaking and economic research.³ In democratic societies, this relationship is at least partially determined by the behavior of voters, who (at least indirectly) choose taxes and redistribution parameters. We revisit the role of inequality on the taxes chosen in a majority voting system: these taxes affect investment decisions, and thus have an impact on growth.⁴

In principle, voters with low capital stocks (the poor) should be willing to vote for high capital taxes as they benefit from public expenditures without bearing much of the cost. If the median voter has a capital stock below the average – an implication of inequality – this is the political equilibrium under majority voting, and inequality hurts society's ability to accumulate capital. This effect is softened if capital has a public good feature, i.e. if society as a whole, including poor people, benefit from rich people bearing more capital. In such case, even poor voters benefit from average capital levels and hence from low taxes on capital. Thus, the limited appropriability of some types of capital mitigates the adverse impact of inequality on capital accumulation.

We show however that this public good nature of capital is not enough to avert the negative effect of inequality: it is also necessary that its impact affects society in the short-run, so that voters receive its benefit before making their choices (or, equivalently, that voters are perfectly patient, or altruistic if multiple generations are involved). For long-run spillovers and impatient voters, the adverse impact of inequality is restored: poor individuals vote for high taxes on capital because accumulation has a milder effect on them. Typical cases are human capital and environment-friendly durable goods.⁵

'Impatience' may be interpreted as an environment with high interest rates – typical of low capital countries – leading to a poverty trap: if capital has a long-term positive spillover, the poorest voters in poor countries have the most incentive to choose high taxes on capital.

The paper proceeds as follows. Section 2 describes the basic model. The choice of taxes is described in section 3 for the social planner and for any given individual. Section 4 then builds on these choices to present and analyze the voting equilibrium, highlighting the role of inequality on capital accumulation. Section 5 briefly concludes.

³ For a broad review of this literature, see Ehrhart (2009) and Acemoglu et al. (2013). We also refer the reader to Aghion et al. (1999) for this discussion in the context of new growth theories and to Banerjee and Duflo (2003) for empirical patterns.

⁴ A seminal contribution to this literature is Persson and Tabellini (1994), who study the impact of political decisions on the taxation of investment.

⁵ Tahvonen (2007) discusses long-term environmental externalities, and Carlson (1989) is an early study about pesticides. Filson (2012) studies R&D investment.

2. Model

A continuum of agents differ in their endowments, which may be interpreted as stock of human capital, or any other production factor with a public good nature. Each individual i has an initial individual endowment e_i^i , interpreted as a deviation from the average e_i , with distribution $G(e_i^i)$ (deviations have zero mean). However, the actual capital, again in terms of deviation, is a function $m(e_i^i, e_i) > e_i^i$, and m is increasing in both variables: there is a positive spillover effect within a given generation, as one individual's capital increases in others' endowments. (Formally, the second argument should be a vector of endowments for players j different from i , but this is immaterial in the present model and we use e_i for simplicity.) For example, one individual makes use of a higher level of human capital if others around him have large levels themselves – unlike physical capital, which is rival and excludable as any private good.

We define $f(e_i^i, e_i) = m(e_i^i, e_i) - e_i^i > 0$ to capture the spillover. In the first period, agent i has a total capital $e_i + af(e_i^i, e_i)$, for some a in the interval $[0, 1]$. We interpret a as the short-term impact of the public good (e.g., within the same generation), while $(1-a)$ is the long-term impact – e.g., the impact of educated parents on the level of human capital their children will have.

There are two periods. In the first period, people vote over a lump sum tax t and a corporate tax t_c . The choice is made according to a majority rule. The government uses the lump sum tax to make some investment that increases productivity $A(t)$ in the second period, with $A > 0$ and derivative $A' > 0$. Citizens choose how to split their individual post-tax endowment between current consumption (c_1^i) and investment in individual capital for the second period (e_2^i). For simplicity, and without loss of generality, from now on we make $e_i = 1$ and write, with some abuse of notation, $f(e_i^i, 1) = f(e_i^i)$. The individual budget constraint in period 1 becomes:

$$1 + af(e_i^i) = t + c_1^i + e_2^i$$

In the second period, $A(t)e_2$ is a proxy of GDP per capita: it depends on productivity $A(t)$ and on the average level of capital e_2 , the mean of individual choices e_2^i made in period 1. The government uses a corporate tax t_c to finance public expenditures in the second-period, $g = t_c A(t)e_2$. Each individual also benefits from the long-term positive spillover of capital: $(1-a)f(e_i^i)$. Individual consumption is equal to production less the government's tax on output: $c_2^i = (1-t_c)A(t)e_2^i$.

The benefit for each individual from the public expenditures in the second-period and from the long-term impact of the positive externality may be described by $h(g) + (1-a)f(e_i^i)$ for some function h . Individual i has the following utility, in which b is the discount factor:

$$U^i = \ln(c_1^i) + b[c_2^i + h(g) + (1-a)f(e_i^i)]$$

Endowment is only an input in the production process and has no direct impact on utility. Substituting for consumption levels, one has:

$$U^i = \ln[1 + af(e_i^i) - t - e_2^i] + b[(1-t_c)A(t)e_2^i + (1-a)f(e_i^i) + h(g)]$$

Each agent chooses e_2^i according to the following first-order condition, which is necessary and sufficient for optimality due to the format of the utility function:

$$-1/[1 + af(e_i^i) - t - e_2^i] + b(1-t_c)A(t) = 0$$

The choice of capital is:

$$(e_2^i)^* = 1 + af(e_1^i) - t - [1/b(1-t_c)A(t)]$$

Plugging this into the first-period budget constraint, one obtains:

$$c_1^i = 1 / [b(1-t_c)A(t)]$$

which is independent of $af(e_1^i)$.

Substituting back into U^i , one may compute the indirect utility function:

$$V^i = b(1-t_c)A(t)af(e_1^i) + b(1-a)f(e_1^i) + bh[t_cA(t)e_2] + \ln[1/b(1-t_c)A(t)] + [b(1-t_c)A(t)(1-t) - 1]$$

The first two terms on the right-hand side are idiosyncratic, and the last ones are common to all agents. To simplify notation, define V^c as the sum of the non-idiosyncratic terms:

$$V^c(t, t_c) = bh[t_cA(t)e_2] + \ln[1/b(1-t_c)A(t)] + [b(1-t_c)A(t)(1-t) - 1]$$

Indirect utility becomes:

$$V^i = b[(1-t_c)A(t)a + (1-a)]f(e_1^i) + V^c(t, t_c)$$

One may use the indirect utility function to compute optimal taxes, as shown in the next section.

3. Choice of Taxes

The expression found in the previous section for agent i 's indirect utility, V^i , may be used to compute the optimal taxes t and t_c . To do so, consider a social welfare function that maximizes average (indirect) utility, in which the expectation is taken with respect to the distribution G :

$$W(t, t_c) = E[V^i(t, t_c)] = b[(1-t_c)A(t)a + (1-a)]E[f(e_1^i)] + V^c(t, t_c)$$

Notice that $E[V^c(t, t_c)] = V^c(t, t_c)$ since it does not depend on i (i.e., exactly because it is common to all agents). The first-order conditions with respect to t and t_c are:

$$b(1-t_c)A'(t)aE[f(e_1^i)] + (dV^c/dt) = 0$$

$$-bA(t)aE[f(e_1^i)] + (dV^c/dt_c) = 0$$

These two equations determine the taxes t and t_c that maximize social welfare. We assume that the function b , implicit in $V^c(t, t_c)$, is such that second-order conditions are satisfied and the critical point is a global maximum - i.e., W is strictly concave.

From the individual point of view of an agent with endowment e^i , optimal taxes maximize V^i , leading to the following first-order conditions:

$$b(1-t_c)A'(t)af(e_i^i) + (dV^c/dt) = 0$$

$$-bA(t)af(e_i^i) + (dV^c/dt_c) = 0$$

These conditions determine a different solution than the social planner's allocation whenever $f(e_i^i)$ differs from $E[f(e_i^i)]$, since A and A' are strictly positive: whenever $f(e_i^i)$ is different from its mean, the agent would like to choose a different level of taxation than the welfare maximizing one, irrespective of the short- or long-run impact of the spillover (notice that $V^c(t, t_c)$ does not depend on a). This is summarized in the following proposition.

Proposition 1. If $f(e_i^i) < E[f(e_i^i)]$, then agent i will choose a lower-than-optimal value of t (the lump sum tax) and a higher-than-optimal value of t_c (the corporate tax). If $f(e_i^i) > E[f(e_i^i)]$, then agent i will choose too large t and too low t_c .

Proof. The result follows immediately from the concavity of W .

This proposition extends the main result in Persson and Tabellini (1994) to allow for the possibility that $f(e_i^i, e_i^j)$ differs from e_i^i . The next section considers how this impacts voting and taxation.

4. The Political Economy of Taxation and the Role of Inequality

Under a majority rule, the median voter determines the policy to be implemented. Hence taxes are determined by:

$$b(1-t_c)A'(t)af_{med} + (dV^c/dt) = 0$$

$$-bA(t)af_{med} + (dV^c/dt_c) = 0$$

The variable f_{med} is the median value of $f(e_i^i)$. Income (or capital) inequality implies that the median is lower than the average: $f_{med} < E[f(e_i^i)]$. Hence, policy is distorted from the welfare-maximizing one towards a lower lump sum tax and a higher corporate tax. However, this effect is milder when the spillover effect is present, so that $af(e_i^i) > e_i$. This follows directly from individual i 's first-order conditions and is summarized in the corollary below.

Corollary 1. All else equal, corporate taxes are lower under the spillover effect ($af(e_i^i) > e_i$) than in its absence ($af(e_i^i) = e_i, a = 1$).

To grasp the intuition, consider a model without this spillover effect. Individuals with capital stocks below the average bring little capital into the second period; hence they do not gain much from increased productivity in the future. It follows that they have little incentive to vote for a large value of the lump sum tax t , i.e., they do not support taxation for investment. As for corporate taxation, it does little harm to them exactly because they have little capital, but benefit from the public expenditures financed by this tax. In short, poor individuals (those with little capital) vote for low lump sum taxes and high corporate taxes. This effect is softened or reversed when there is a public good feature to capital accumulation within a given generation: an increase in the capital stock of one individual affects positively all other agents. In this case, even agents with low individual endowments benefit from capital accumulation for society as a whole: there is

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a spillover effect. Accordingly, they are hurt by high corporate taxes as it may affect the ability of others to accumulate capital and share its benefits, even involuntarily and without relevant costs, with other members of society.⁶

If $a = 1$, then the discount factor b becomes irrelevant and one has an unaltered ‘public good feature within a given generation’ as described above. If $a < 1$ but $b > 0$ (and sufficiently high), then one may recover or at least approach the case with $a = 1$: part of the effect of the positive spillover materializes in the future, but the decision-maker takes that into account because $b > 0$, which may be interpreted as altruism if future utility accrues to the next generations (e.g., in models of overlapping generations).

If $b = 0$, one has the following result. (As long as suitable continuity assumptions are imposed on the primitives, Proposition 2 holds for low but positive discount factors.)

Proposition 2. If $b = 0$, a lower value of a increases the corporate tax chosen by voters.

Proof. Notice that $af(e_i^i) > e_i^i$ and the left-hand side is decreasing in a . Hence a lower a makes the benefit to individual i closer to what he obtains in the absence of the spillover, since there is no other benefit (because $b=0$).

If $a < 1$ and $b = 0$, part of the effect of the spillover materializes in the future (because $a < 1$), which is irrelevant to the decision-maker (because $b = 0$). It follows that the impact of the public good nature is softened: when compared to short-term spillovers, long-term ones induce higher corporate taxes and lower capital accumulation – at least as long as decision-makers are impatient. This should be the case under high interest rates, which consistently happen precisely under low capital stocks, as in developing countries, so that the need for long-lasting goods with positive spillovers may generate a poverty trap.

5. Final Remarks

The relationship between inequality and growth is one of the most important topics in economic development. While the public good nature of some forms of capital may incentivize individuals to vote for taxes that foster capital accumulation, so that inequality might have little or no impact on growth, this effect decreases when positive externalities are distributed over time and voters are impatient. This applies to capital with long-run spill-overs in countries with low stocks of capital (and thus high interest rates), and may cause a poverty trap.

In this setting, inequality has a negative impact on growth especially where it is most needed. This interaction between poverty and inequality restores the need for policy to curb inequality directly, instead of relying on capital spillovers to generate voting equilibria that promote capital accumulation.

⁶ Similar results have been established in Persson and Tabellini (1994) and Gradstein and Justman (1997) in the context of capital accumulation and growth (one may then interpret too-low corporate taxes as a factor that fosters economic growth, leading to a relationship between growth and inequality). The former is achieved in the present model with $a = 1$ and $f(e_i^i) = e_i^i$ (no externality) and the latter with $a = 1$ and $f(e_i^i) > e_i^i$ (short-run externality). See Humphreys (2010) for a simplified version of Persson and Tabellini (1994) similar to the one we use.

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