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REDISTRIBUTION AND THE POLITICAL SUPPORT OF FREE ENTRY POLICY IN THE SCHUMPETERIAN MODEL WITH HETEROGENOUS AGENTS[2]

We consider the problem of finding sufficient conditions for political support of liberal, growth-enhancing policy in a quality-ladders model with heterogeneous agents differing in their endowment of wealth and skills. The policy set is two-dimensional: Agents vote for the level of redistribution as well as for the level of entry barriers preventing the creation of more efficient firms. We show that under the majority voting rule there are three possible stable political outcomes: full redistribution, low redistribution and low barriers to entry ("liberal" order), high redistribution and high barriers to entry ("corporatism"). We show that key variables determining the political outcome are the expected gain from technological adoption, the ratio of total profits to total wages, and the skewness of human capital distribution.

JEL Classification: O33, P16, P48

Keywords: economic systems, political barriers for growth, majority voting, quality-ladders model, wealth inequality, talent inequality, economic growth

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1 Introduction

In modern societies poor economic performance is usually a political outcome. In his celebrated book *The Rise and Decline of Nations*, Olson (1982) argues that the main source of politically induced technological backwardness is the presence of narrow interests groups and the myopic behavior of agents. Special interest groups block growth through rent seeking (grabbing) or through blocking the entry of new firms. Parente and Prescott (1999) show that excessive monopoly rights alone could explain large differences in TFP levels between economies. On the example of modern Italy, Alesina et al (2011) demonstrates that vested interests damage technological adoption and growth not only in developing, but also in developed countries. Thus, it is important to know under which conditions society freely chooses the policy that prevents technological adoption and growth.

Current literature on political economy provides two mechanisms that explain the existence of political barriers for growth. In the classic paper of Alesina and Rodrik (1994), a high level of wealth inequality induces workers to vote for higher taxes on capital income that discourages innovation, capital accumulation, and growth. Later, Galor et al (2009) show how inequality in the main preindustrial wealth source – land – adversely influences the emergence of new institutions that promote human capital and, therefore, decelerates the transition to phases of modern growth. Krussell and RiosRull (1995) and Parente and Zao (2006) consider another option in which a majority of voters directly blocks the adoption of new technology by imposing barriers to entry for new firms. In their models, incumbents benefit from the profits of existing firms and have no interest in facing competition from new and more efficient entrants. In a dynamic model these special interest groups have the political majority only temporarily, which leads to cycles of stagnation and growth.

Our paper contributes to this literature in two ways. Firstly, we find the politico-economic equilibrium using a model in which agents differ not only in their wealth, but also in their entrepreneurial talent and level of human capital. Thus, we can analyse the role of wealth, skills, and talent inequality in the formation of high- or low-growth political equilibria. Secondly, agents in our model vote simultaneously for the level of redistribution, as well as for the level of political barriers to entry. Therefore, our theory combines the two main existing approaches to analyzing political barriers to growth in a generalized framework, in which the level of redistribution, growth, and barriers for entry are endogenously determined in a majority-voting equilibrium.

Our theory is based on the one-period version of the quality-ladders model elaborated by Aghion and Howitt (1998) and Howitt and Mayer-Foulke (2005). A society consists of three groups of voters: workers, differing in their human capital level, stakeholders of incumbent firms, and new entrepreneurs that have the talent to organize new more efficient firms. Each entrepreneur decides whether to invest in technological adoption and, with the given probability of success, he/she creates a new, more productive technology and crowds out an incumbent firm.

Before the investment decision, agents vote for parties that simultaneously propose political programs on a two-dimensional policy space, including the profit tax rate and the level of barriers to entry for new firms. The profit tax is collected from the incumbent as well as new entrant firms and is redistributed to workers. As new entrants carry the costs of investment in technological adoption there is a threshold level of profit tax rate for which investments in new technology are profitable. Moreover, the majority could directly block the entry of new firms if they deliberately chose the party that proposes the no-entry policy.

According to Acemoglu (2008) democracy provides free barriers to entry but also imposes distortionary redistributive taxes. In our model democracy does not always mean free entry policy. The high redistribution no-entry policy could be a stable political outcome supported by the majority consisting of stakeholders of incumbents firms and workers. If workers differ in their skill level, then low-skilled workers would support this policy. The gain of workers from growth-promoting policy depends on their individual human capital level, while low-skilled workers benefit more from redistribution, rather than from economic growth.

We show that technology strongly influences political equilibrium. It is straightforward that if the expected gains from the economic growth are sufficiently high, then the majority of voters, including high-skilled workers and entrepreneurs, will support a stable free-entry equilibrium with low or medium redistribution. In the opposite case, the majority will support a no-entry policy or there is no majority voting equilibrium whatsoever. Thus, it creates an additional channel for the poverty-trap phenomena, where small gains from technology adoption leads to inefficient political outcomes.

The more interesting result is that the pre-tax inequality between capitalists and workers and the distribution of the human capital level between workers matters. As Meltzer and Richard (1981) show, the tendency of decreasing the relative wage rate of the median voter could explain the observed pattern of raising the level of redistribution in advanced countries. In our model, a drop in the relative wages of voters would lead not only to more redistribution, but also to the transition from free-entry to no-entry equilibria, as well as to the possible instability of political equilibrium. A drop in the human capital level of decisive voter destroys support for free-entry policy as the gains from economic growth are distributed more unequally. Thus, it could lead to a new coalition between stakeholders and workers that blocks technological adoption. We show that either this coalition is not stable, as consolidated workers always prefer full redistribution in the case of no-growth, or this coalition is stable in a society with insiders and outsiders, where insiders benefit for the targeted transfer and support the status quo.

Thus, our theory can explain the ambiguous relationship between the level of democracy and growth. We show that democracy provides efficient results only under specific assumptions about the relative concentration of talent and wealth, the skewness of human capital distribution, and the expected rate of return from investment projects.

The paper is organized as follows. In section 2 we present the quality-ladders model, which serves as the basis of our analysis. In section 3 we consider agent types and preferences. Section 4 presents the politico-economic equilibrium of the model. In sections 5 and 6 we analyze the extension of the model considering heterogeneous workers and targeted transfer cases. In section 7 we discuss the optimal political outcome, while section 8 concludes.

2 Economic Environment

As a starting point we consider a modification of the quality–ladders models, elaborated by Howitt and Mayer-Foulke (2005) and Aghion et al (2007). There is a single general good, produced by labor and specialized intermediate inputs, according to the following production function

$$Y = \left(\frac{L}{N}\right)^{1-\alpha} \sum_{i=1}^{N} A(i)^{1-\alpha} x(i)^{\alpha} , \qquad (1)$$

where Y is the units of general good, L is the quantity of labor engaged in production and $x(i)$ is a quantity of intermediate input i, $A(i)$ is a current quality of intermediate input i, N measures the number of intermediate inputs, and $1\text{-}\alpha$ is the share of labor income in total output of the general good. The general good can be used interchangeably as consumption or an input in intermediate goods production or R&D input.

Producers of the general good are perfect competitors on all markets, so the equilibrium price of intermediate inputs is the marginal product in producing the general good

$$p_x(i) = \alpha A(i)^{1-\alpha} L^{1-\alpha} x(i)^{\alpha-1} N^{\alpha-1} . \qquad (2)$$

We assume that the production of each particular type of intermediate inputs is performed by a monopolistic firm that uses one unit of the general good to produce one unit of input. At the same time, for each variety of intermediate input there is a large number of firms (competitive fringe) that are capable of producing the intermediate input of the lower quality A/γ. In this case from the monopolist problem the equilibrium price will equal

$$p_x(i) = \chi = \min\{\gamma, 1/\alpha\} \qquad (3)$$

From equations (2) and (3) the equilibrium quantity $x(i)$ equals

$$x(i)=\frac{A(i)L}{N}\left(\frac{\alpha}{\chi}\right)^{\frac{1}{1-\alpha}}. \tag{4}$$

Substituting equation (4) into (1) we receive the equilibrium output of the general good

$$Y=\left(\frac{\alpha}{\chi}\right)^{\frac{\alpha}{1-\alpha}} AL, \tag{5}$$

where A is an average quality of intermediate inputs engaged in production. Therefore, the growth rate of final output per capita equals the rate of technological progress, which is measured by the average quality of intermediate inputs[3] (A).

From (3) and (4) the level of profit for each monopolist equals

$$\pi(i)=(\chi-1)\frac{A(i)L}{N}\left(\frac{\alpha}{\chi}\right)^{\frac{1}{1-\alpha}}. \tag{6}$$

The level of profits increases proportionally to the size of labor force and with the level of technology. In symmetric equilibrium[4] with the same level of technology in all intermediate inputs sectors ($A(i)=A$) the level of profits of each monopolistic firm (π) is also the same.

The equilibrium output of the general good can be divided by wage income of workers, monopolistic profits and inputs in the intermediate goods production sector.

$$\pi N + xN + wL = Y. \tag{7}$$

At the same time, from (1), (6) the shares of wages and profits in the final output are constant

$$wL=(1-\alpha)Y, \tag{8}$$

$$\pi N=\frac{\alpha}{\chi}(\chi-1)Y. \tag{9}$$

We denote the ratio of total profits to total wages by ξ

$$\xi=\frac{\pi N}{wL}=\frac{\alpha(\chi-1)}{(1-\alpha)\chi}, \tag{10}$$

where ξ is determined by two parameters – the level of mark-up (χ) and the elasticity of the general good output to intermediate inputs (α). Higher level of α or χ implies a higher level of the ratio of profits to wages ξ.

[3] The number of varieties of intermediate inputs (N) does not influence the level of output of the general good per worker because of the increased specialization effect in the production function (1). A Higher number of varieties induces specialization costs (see f.e. Bucci, 2009).

[4] The assumption about symmetric equilibrium provides the homogeneity of the stockholders relative to their wealth and expected income

3 Agent Types and Preferences

We assume that agents are heterogeneous in two dimensions – that they have a different endowment of wealth and a different level of entrepreneurial talent. In the economy there is only one type of asset: stakes in monopolistic firms. We assume for simplicity that each monopolistic firm is a sole proprietorship. Therefore, the number of stakeholders (M) equals the number of varieties (N) as each stakeholder has 100% shares of a given monopolistic firm.

Another group of agents called entrepreneurs can perform a risky project, raising the quality of intermediate input in a given sector by γ. The project is successful with exogenous probability λ. In the case of success, an entrepreneur drives an incumbent firm out of the market and creates a new monopolistic firm on the market. Under this condition in Bertrand competition, new entrants fix prices χ and in the same time incumbents cannot compete with them. The costs of a risky project are cA, where c is the parameter of the model. Thus, from (6) the profit of new entrants equals $\gamma\pi$ and the expected profit from the risky investment project equals

$$\pi^e = \lambda\gamma\pi - cA . \tag{11}$$

As in the basic model for creative destruction, new entrants have more incentives to innovate, as does an incumbent firm, as their gains from successful projects include not only the net profit increase from the rise of productivity, but also previous incumbent profits. To simplify the analysis, we consider the special case when an incumbent has no incentives to innovate at all[5].

Assumption 1 (Participation is constraint for incumbents and entrepreneurs)

Costs of investment project lie in the interval between $\lambda(\gamma\text{-}1)\pi$ and $\lambda\gamma\pi$.

$$c \in \left[\frac{\lambda(\gamma-1)\pi}{A}, \frac{\lambda\gamma\pi}{A} \right]$$

If assumption 1 holds, the expected profit for entrepreneurs is positive. So they always have incentives to perform a risky investment project in the economy without redistribution. At the same time incumbent firms have no incentives to invest in raising the quality of intermediate input.

5 If we suppose that the costs of innovations are so low that incumbents also have incentives to innovate, then that leads the positive economic growth even in the no-entry case

Workers, the last group of agents, are engaged in the production of the general good. The number of agents with entrepreneurial talent is represented by E and the number of workers is represented by L. Thus, the total number of agents (S) equals

$$S = M + E + L\,. \tag{12}$$

Initially we assume that three groups of agents (stakeholders, entrepreneurs and workers) are homogenous. This assumption will be relaxed in further analysis.

A period of time is divided into two sub-periods. In the first sub-period agents vote on the election for the preferred political party and entrepreneurs decide whether to begin investment projects or not. In the second sub-period, if a project becomes successful in a given sector, a new and more efficient firm crews out an incumbent firm in this sector, incumbent firms as well as new entrants produce goods and pay salaries and dividends from profits.

Each agent maximizes its pay-off on a two-dimension policy set. The first policy instrument is the entry barriers for new firms. This is a Boolean variable. A government blocks the entry of new firms on the intermediate input markets (λ=0), otherwise, the elected government provides liberal reforms to destroy all the barriers to entry (λ>0). The other policy instrument is profit tax τ, which provides a redistribution from wealthy to poor agents. We assume that all collected profit taxes are distributed uniformly between workers as lump-sum transfers[6].

In the case of blocking the entry of new firms (B), worker payoff (V_W) equals the sum of wages and transfer payments

$$V_W^B = w + \frac{\tau_B \pi N}{L}\,. \tag{13}$$

Stakeholder payoff equals the expected profit from an incumbent firm

$$V_M^B = \pi(1-\tau_B)\,. \tag{14}$$

Entrepreneurs cannot organize new firms if entry is blocked, so their payoff equals zero

$$V_E^B = 0\,. \tag{15}$$

If the government eliminates all barriers to entry for new firms, workers benefit from the rise in the labor productivity due to investments in the adoption of technology by new entrants. Now we define the gain of workers from technological adoption. Let θ be the number of entrepreneurs divided by the number of input varieties

[6] In this model, lump-sum transfers can be interpreted as labor subsidies because of the assumption of inelastic labor supply.

$$\theta = \frac{E}{N}. \quad (16)$$

Each entrepreneur increases the quality of an intermediate input with probability λ. Thus the share of intermediate inputs with higher quality in the second sub-period γA equals $\lambda\theta$[7], where $\lambda\theta$ should be less then 1.

Assumption 2. $\lambda\theta<1$.

The new average quality of intermediate inputs equals $[\lambda\theta\gamma+(1-\lambda\theta)]A$, which equals $[1+\lambda\theta(\gamma-1)]A$. From (5) in this case, the expected growth rate of output

$$g=\lambda\theta(\gamma-1) \quad (17)$$

Thus, the pay-off of workers in the free entry case equals

$$V_W^{NB} = \left(w + \frac{\tau_{NB}\pi N}{L} \right)(1+\lambda\theta(\gamma-1)). \quad (18)$$

Workers always prefer a maximum redistribution rate both in the case of free entry, as well as in the case of no entry. However, in the free entry case (*NB*) the profit tax rate is limited by the participation constraint of entrepreneurs.

From (11) the expected gain from the investment projects of new entrants equal

$$\pi^e = \lambda\gamma\pi(1-\tau) - cA \geq 0. \quad (19)$$

Let us define the threshold level of τ as the expected level of gains from investment projects for entrepreneurs. From (19)

$$\tau' = 1 - \frac{cA}{\lambda\gamma\pi}. \quad (20)$$

From the definition of τ the participation constraint for entrepreneurs can be rewritten as $\tau \leq \tau'$. Thus, workers ideal point is one from $\{B, \tau_B=1\}$ or $\{NB, \tau_{NB}=\tau'\}$. Compare workers payoffs in two cases. Workers prefer full redistribution if

$$V_W^B(\tau_B = 1) \geq V_W^{NB}(\tau_{NB} = \tau').$$

From (13) and (18) it is true when

$$w + \frac{\pi N}{L} > (w + \frac{\tau'\pi N}{L})(1+\lambda\theta(\gamma-1)). \quad (21)$$

After rearrangements we get

$$g < \frac{(1-\tau')\xi}{1+\tau'\xi} = \bar{g} \quad (22)$$

Fig. 1. Workers preferences. a) $g > \bar{g}$, b) $g < \bar{g}$.

[7] We assume that the number of entrepreneurs and sectors are sufficiently high, so the probability of more than one of the entrepreneur projects for the same intermediate input sector merges toward zero.

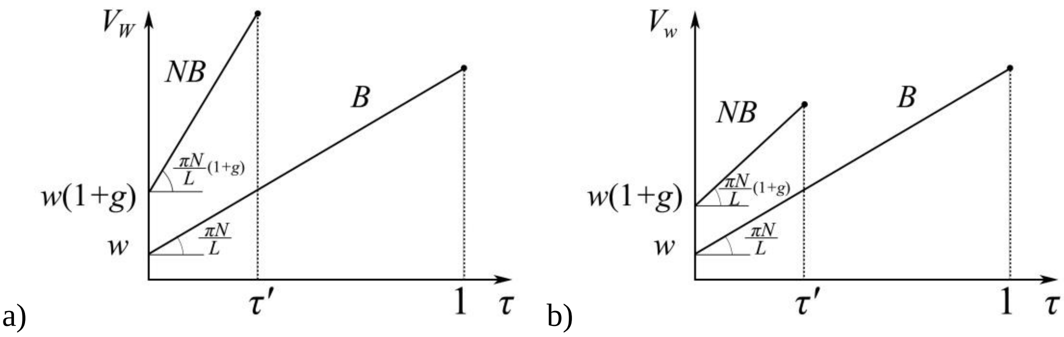


Figure 1 describes the two possible regimes. In the first one (a) the expected economic growth rate is rather high and in this case the bliss point for workers is {*NB*, $\tau_{NB}=\tau'$}. In the second one (b) workers do not gain too much from economic growth and, thus, prefer full redistribution {*B*, $\tau_B=1$}.

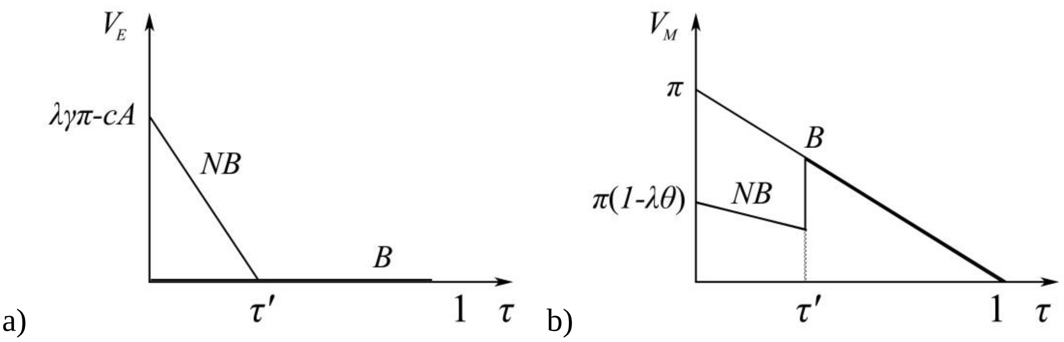
Let us now consider the preferences of stakeholders and entrepreneurs. In the case of free entry, incumbent firms lose their market due to the entry of new firms with a probability of $\lambda\theta$. The expected pay-off of stockholders in this case equals

$$V_M^{NB} = \pi(1-\tau_{NB})(1-\lambda\theta)\,. \tag{23}$$

Entrepreneur pay-off equals the expected profit from an investment project.

$$V_E^{NB} = \lambda\gamma\pi(1-\tau_{NB}) - cA\,. \tag{24}$$

Fig. 2. a) Entrepreneurs preferences. b) Stakeholders preferences.



The ideal policy for stakeholders of incumbent firms is {*B*,τ_B=0}, while for entrepreneurs it is {*NB*, τ_B=0}. Both entrepreneurs and stakeholders prefer the zero rate of profit tax. At the same time stakeholders prefer high entry barriers for new firms in order to prevent losses in profits. In contrast to them, entrepreneurs prefer zero entry barriers. Opposite to entrepreneurs and stakeholders, workers prefer the highest possible profit tax rate. As it will be shown further, worker preferences relative to barriers to entry depend on the parameters of the model.

Table 1. Variables and parameters of the model

Y	Output of the general good
L	Number of workers
N	Number of intermediate inputs
$A(i)$	The quality of intermediate input i
$x(i)$	The quantity of intermediate input i
A	The average quality of intermediate inputs
X	The level of mark-up of monopolistic firms
$\pi(i)$	The level of profits of monopolistic firms
ξ	The ratio of total profits to total wages
C	Costs of risky investment projects
Γ	The size of innovation in the case of success
Λ	The probability of success of investment project
M	The number of stakeholders (equals the number of sectors – N)
E	The number of entrepreneurs
θ	The ratio of the number of entrepreneurs to the number of stakeholders (E/M)
g	Output growth rates in the free-entry case ($=\lambda\theta(\gamma-1)$)
S	Total number of agents
π^e	The expected profit of entrepreneurs from investment projects
$\tau_{B,NB}$	The profit tax rate in the case of free entry (*NB*) or no-entry (*B*)
$V_J^{B,NB}$	Pay-off of individuals from a group J in the case of free entry (*NB*) or no-entry (*B*)
τ'	The maximum level of profit tax for which the expected profit of entrepreneurs from investment projects is positive
Ω	The wage rate per unit of human capital
$\bar{h}$	The average level of human capital stock for workers
B	The share of profits that is paid as targeted transfers

4 Political Equilibrium

In the model we have three homogenous groups of voters – stockholders, entrepreneurs, and workers – who differ in their preferences on a 2-dimensional policy space. We determine a political process as the competition between two Dawnsian parties who wish to maximize the probability for winning elections. They simultaneously propose a political program $\{J, \tau_J\}$, where $J=\{B, NB\}$. The party that receives a majority of votes wins elections. We assume that each party has no incentives to break promises, meaning that they credibly propose a political program before the election.

In a single-issue election with one-peaked voter preferences, if two parties compete for the majority of voters, then they optimally locate at the median voter (unique core point). At the same time, in a multi-issues election there is a problem regarding the plausible intransitivity of majority preferences. As McKelvie (1980) shows, a higher number of policy dimensions leads to the dissipation of the core. As Roemer (1999, p.402) argues, the natural concept of political equilibria in a 2-dimensial policy-space is a Nash equilibrium in pure strategies, in which each party plays the best response to the other party's actions in a simultaneous game. We show that, in our model, under some conditions this equilibrium exists and is unique.

When any homogenous group of voters forms a majority, the existence and uniqueness of Nash equilibria in the game between political parties is trivial.

Case 1: Workers majority[8] (L≥S/2).

Proposition 1. (Political equilibrium in the case of worker majority)

If workers form a majority, the political equilibrium is full redistribution $\{B, \tau_B = 1\}$ *if* $\theta > \bar{\theta}$ *. In the opposite case, the political equilibrium is partial redistribution and free entry policy* $\{NB, \tau_{NB} = \tau'\}$ *where*

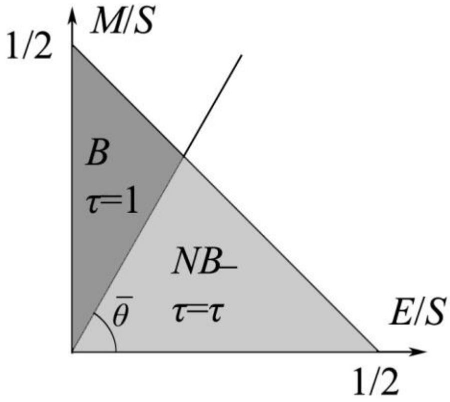
$$\bar{\theta} = \frac{(1-\tau')\xi}{\lambda(\gamma-1)(1+\tau'\xi)} \tag{25}$$

Proof. From the inequality (22) and the definition of g, (17), we could deduce (25)■

The result of proposition 1 is visualized on figure 3. On the horizontal axis is depicted the share of entrepreneurs in the total population, while on the vertical axis is the share of stockholders. If workers constitute a majority, the following condition holds M+E<S/2, and so M/S+E/S<1/2. From inequality (25) workers prefer a free-entry (NB,τ') policy if θ is higher than a given threshold θ', which depends on the parameters of the model.

Fig. 3. Case of worker majority.

[8] The case of a majority of entrepreneurs or stakeholders are trivial. In this case the equilibrium will be (NB,0) and (B,0) accordingly



If θ is relatively high, meaning that a society has a relatively high share of entrepreneurs, then, all things being equal, workers support free-entry and a medium profit tax rate policy because of the expected high-economic growth rate. In the opposite case with a sufficiently low θ, workers vote for full redistribution policy, which leads to zero-incentives for innovation. The probability of success for entrepreneurs, as well as the gain from investing in new technologies (λ,γ), has the same influence on worker preferences. If $\lambda(\gamma$-1) is sufficiently low, even a high number of talented entrepreneurs will not prevent workers from voting for full redistribution. In the least developed countries, the probability of success for technological adoption is rather low (Howitt and Mayer-Foulke, 2005). This case describes the tragedy of an underdeveloped country in which a majority of voters prefer to redistribute income rather than to create new one.

The second crucial factor determining the preferences of workers is the ratio of profits to wages (ξ). A larger share of profits in value-added (high level of ξ) also means a higher level of income inequality between capitalists and workers. As in canonical political economy models, (Mehlum, 1986; Alesina and Rodrik, 1994) it creates incentives for the average voter to vote for a higher tax rate. In our model, a higher inter-group income inequality between capitalists and workers induces workers to prefer full redistribution.

The last factor influencing worker preferences is the relative costs of entrepreneur investment projects ($cA/\gamma\pi$), which determine the rate of return for entrepreneurs, as well as the maximum profit tax rate (τ'), for which investments are possible. In an economy with a low rate of return for new entrepreneurs, τ' is also low and, thus, workers prefer a full-redistribution policy rather than a partial-redistribution, free-entry policy.

Case 2: No simple majority ($L<S/2$).

Let us consider the case when each group of agents (entrepreneurs, stockholders, and workers) cannot form a majority without the support of another group.

Theorem 1 (Political equilibrium in no simple majority case)

If any two of the three groups of agents form a majority, then society chooses a zero profit tax rate and a free-entry policy {*NB*,τ_{NB}=0} *if* $\xi \le \gamma - 1$.

If $\xi > \gamma - 1$ *and condition (26) holds, then society chooses high redistribution and high barriers for entry* {*B*, $\tau_B = \tau_1$}, *where* $\tau_1 = \lambda\theta$ *if L>M, and* $\tau_1 = \tau'(1+g)+g/\xi$ *if M>L.*

If $\xi > \gamma - 1$ *and condition (26) does not hold, then Nash equilibria in pure strategies in the game between two parties does not exist.*

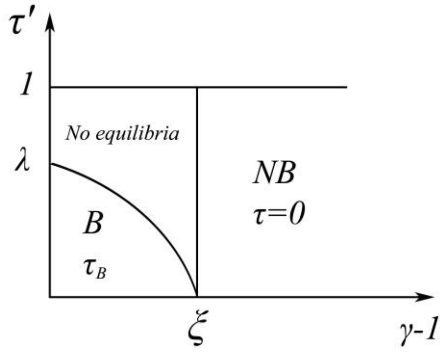
$$\tau' < \frac{1-\frac{\gamma-1}{\xi}}{\frac{1}{\lambda}+\gamma-1}. \qquad (26)$$

The proof is presented in appendix A.

Theorem 3 gives a simple condition under which a society supports a "liberal" order with free entry for new firms and a zero redistribution rate. This is true if the gain from new projects in terms of higher productivity (γ-1) exceeds the relative level of profits to wages (ξ). This political equilibrium is the bliss point for entrepreneurs[9]. This equilibrium is stable only if stakeholders and workers do not prefer higher redistribution of profits, but also high barriers for entry. If ξ is low, then the share of profits to wages is sufficiently low and workers do not gain too much from the taxation of profits. So they can support only a very high level of profit tax (τ_B) in a no-entry case. But for stakeholders it is not lucrative to support this high level of profit tax even if the barriers to entry appear. If γ is high, then workers will also prefer a free-entry policy because of the benefits from technological adoption and growth. Thus, they also demand only a very high level of profit tax (τ_B) in a no-entry case, which is not an interesting offer for stakeholders.

Fig. 4. Politico-economic equilibria in a case with no simple majority.

[9] The preference for zero redistribution for entrepreneurs is justified by the assumption that entrepreneurs are risk-neutral. If entrepreneurs are risk-adverse, then positive redistribution should be preferable for them as an insurance against the risk of investment projects failing (see Garcia-Penalosa and Wen, 2008).



If $\xi>\gamma$-1, then it exists the coalition of workers and stakeholders of incumbent firms, which agree to block the entry of new firms as well as to imply higher redistribution of profits. This outcome is stable only if the costs of innovation are sufficiently high and, therefore, τ' is sufficiently low, such that condition (24) holds. If τ' is relatively high, then there is no stable political outcome because of the cycle of preferences.

It is interesting that the probability of innovation (λ) has a positive influence on the stability of no-entry equilibrium. A higher probability of innovation implies higher expected costs for incumbents from a free-entry policy. Thus, it induces stockholders to propose to workers a higher redistribution rate in no-entry case (B), which leads to more stable equilibria.

5 Political Equilibrium with a Heterogeneous Labor Force

In the previous section, we assume that all workers are identical. This is an unreal assumption because workers differ in their level of human capital. They also differ in wage levels. In this section, we extend our model by considering a case when each worker has an individual level of human capital h_j. We show the effect that the human capital distribution between workers has on the political outcome.

Economic environment

Suppose that the production of a general good is described by the following production function.

$$Y=\left(\frac{H}{N}\right)^{1-\alpha}\sum_{i=1}^{N}A(i)^{1-\alpha}x(i)^{\alpha}\ , \qquad (27)$$

where H is the total stock of human capital that is defined as the average level of human capital ($\bar{h}$) multiplied by a quantity of workers

$$H=\bar{h}L\,. \qquad (28)$$

On a competitive labor market, the marginal product of labor equals the wage, so

$$w_j = \frac{h_j}{\bar{h}} \frac{(1-\alpha)Y}{L}. \quad (29)$$

Thus, the wage rate would be proportional to the individual stock of human capital. The level of profit of each incumbent firm (π_h) in symmetric equilibrium (5) can be rewritten as

$$\pi_h = (\chi - 1)\frac{AL}{N}\left(\frac{\alpha}{\chi}\right)^{\frac{1}{1-\alpha}} \bar{h} = \pi\bar{h}. \quad (30)$$

Consequently, a level of profit is proportional to the total stock of human capital. As previously, the equilibrium output of the general good is divided by wages, profits, and inputs in the intermediate goods production sector. Equations (7)-(10) remain the same.

Workers preferences

The difference in human capital levels determines the differences in worker payoffs in both the free-entry and no-entry cases. High-skilled workers benefit more from the entry of new firms as the increase in productivity is proportional to the level of human capital[10]. Let us define ω as the wage per unit of human capital.

The pay-off of workers in the case of no-entry and free-entry policy equals

$$V_W^B(h_j) = \omega h_j + \frac{\tau_B \pi \bar{h} N}{L}, \quad (31)$$

$$V_W^{NB}(h_j) = \left(\omega h_j + \frac{\tau_{NB} \pi \bar{h} N}{L}\right)(1 + \lambda\theta(\gamma - 1)). \quad (32)$$

Thus, worker preferences toward a policy regulating the entry of new firms depend on an individual's level of human capital.

Workers prefer a free-entry policy if

$$V_W^{NB}(\tau_{NB}) \geq V_W^B(\tau_B). \quad (33)$$

From (31), (32) and the definition of ξ[11]

$$\frac{h_i}{\bar{h}} > \frac{\xi(\tau_B - \tau_{NB})}{\lambda\theta(\gamma - 1)} - \xi \quad (34)$$

Given τ_B, τ_{NB}, and other parameters, there is a threshold level h' for which if $h_j \geq h'$, then the worker j bliss point is the free-entry partial redistribution policy (NB, $\tau=\tau'$), if $h_j < h'$, the bliss point is the no-entry full redistribution policy (B, τ=1).

[10] In the real world, the gains from new technologies of skilled and unskilled workers may be even more skewed toward high-skilled workers as technological changes could lead to the rise of a wage-skills premium. In this case, even the support of blocking technological adoption can receive even more support from low- and average-skilled workers.

[11] In the model with the human capital we could rewrite ξ as $\xi = \frac{\pi_h N}{wL} = \frac{\pi N}{\varpi L}$

From (34)

$$h' = \bar{h}\left[\frac{\xi(1-\tau')}{\lambda\theta(\gamma-1)} - \xi\right] \quad (35)$$

Thus, workers are divided into two groups according to their preferences. We define them as growth supporters ($h_j \geq h'$) and redistribution supporters ($h_j < h'$). Let the number of workers supported redistribution be denoted by L_{LS} and the number of growth supporters be denoted as $L_{HS.}$ So, $L_{HS}+L_{LS}=L$.

The threshold level h' is determined by three parameters of the model. A higher possible level of the profit tax rate in the free-entry case (τ'), as well as an expected growth rate in the free-entry case ($\lambda\theta(\gamma$-1)) leads to the decrease of h' and thus to the increase of the number of workers which prefer free-entry policy. At the same time, if L_{LS}>0, the rise in the ratio of profits to wages (ξ) increases the threshold level h' and leads to a higher number of workers who prefer full redistribution.

From (35) it follows that at least some workers prefer full redistribution (L_{LS}>0) if

$$\tau' + \lambda\theta(\gamma-1) < 1. \quad (36)$$

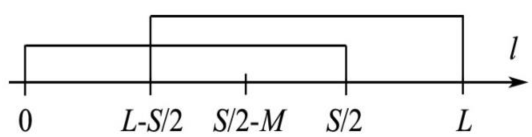
If the expected economic growth rate is high or the costs of innovations are sufficiently low such that condition (36) does not hold, then all workers prefer a free entry policy over a full redistribution policy independently of their human capital level. Even if the human capital level is close to 0, then the gains from the redistribution of newly created goods exceed alternative costs in terms of gains from a full-redistribution policy.

If condition (36) holds, then society consists of four groups with different preferences, which are described in the table 2.

Table 2. The bliss point of agents

	Bliss point
Low-skilled workers (L_{LS})	(B,1)
High-skilled workers (L_{HS})	(NB,τ')
Entrepreneurs (E)	(NB,0)
Stakeholders (M)	(B,0)

Fig. 5. Average levels of workers in different coalitions.



From the distribution function of workers human capital levels, we find three characteristics that determine the equilibrium outcome. As the entire population consists of workers, entrepreneurs, and stakeholders, the decisive voters are different in the case of different coalitions. If redistribution supporters alone form a majority, then they must have at least S/2 amount of workers supporting their policy. If redistribution supporters form a coalition with stakeholders, then S/2-M amount of workers is needed for the majority.

Suppose that h(x) is the human capital level, such that for x number of workers, h<h(x). Now we can formalize a theorem about political equilibrium in the model with a heterogeneous labor force.

Theorem 2. (Political equilibrium in an economy with a heterogeneous labor force)

A) If h(S/2)<h', then the majority (L_{LS}) *chooses* {*B,1*} *policy.*

B) If h(L-S/2)>h', then the majority (L_{HS}) *chooses* {*NB,τ'*} *policy.*

C) If h(L-S/2)<h'<h(S/2) and $\frac{h(S/2-M)}{\bar{h}\xi} > \frac{1-\tau'}{\gamma-1} - 1$ *the Nash equilibrium in two party game is* {*NB,τ'*} *policy.*

D) If $\frac{h(S/2)}{\bar{h}} > \mu > \frac{h(L-S/2)}{\bar{h}}$ *and* $\frac{h(S/2-M)}{\bar{h}\xi} < \frac{1-\tau'}{\gamma-1} - 1$ *there is no Nash equilibrium in poor strategies in two-party game.*

Proof. The results A and B follow from equation (34). If a majority of workers (*S*/2) prefer policy (*B*,1) or (*NB*,*τ'*), then it will be realized as a political outcome. From (34), in the case of C and D, neither growth supporters nor redistribution supporters between workers form a majority. Thus they have to form a coalition with entrepreneurs or stakeholders.

Suppose that in political competition one of the parties proposes (*NB*,*τ'*) policy. What would be the best response of the other party to win the election? The policy (*NB*, $\tau<\tau'$) is preferred by stakeholders and entrepreneurs, but $M+E<S/2$. Thus, it is not an optimal response. The only political program that may be preferred to policy (*NB*, *τ'*) is a policy that is supported by a coalition of low-skilled workers and stakeholders (*B*, τ_B). This is possible only if

$$V_M^B(\tau_B) > V_M^{NB}(\tau'). \qquad (37)$$

From (14) and (23), equation (38) results in

$$\tau_B < \tau' + \lambda\theta(1-\tau'). \qquad (38)$$

A coalition of stakeholders and workers is possible only if political program (*B*, τ_B), in which τ_B satisfies inequality (39), is preferable for the worker, which is the average voter in a coalition with stakeholders. From (34), it is true if

$$\frac{h_{med}^{M}}{\bar{h}} < \frac{\xi(1-\tau')}{(\gamma-1)} - \xi \ . \qquad (39)$$

At the same time, policy (B, 1) is always better for all workers than policy (B, τ_B). Moreover, policy (B,1) is always blocked by a coalition of high-skilled workers, entrepreneurs, and stakeholders who prefer (NB,τ'). Thus, if neither low-skilled nor high-skilled workers do not form a majority and inequality (40) holds, then there is no stable political equilibrium ■

Comparative statics of political equilibrium

Now we discuss the main factors explaining the transition from no-entry and no-growth to free-entry and high-growth equilibrium. As in the previous settings, the parameters, which determine the effectiveness of investment in technological adoption (γ,τ'), as well as the relative diffusion of talents (θ) positively influence the probability of free-entry political outcome.

The other factor explaining the transition from no-entry to free-entry policy is a decrease in inter-group income inequality, expressed as the ratio of profits to wages (ξ). The last factor is a change in the skewness of human capital. The rise in the level of human capital for decisive workers leads also to a transition from no-entry to free-entry policy.

At the same time, the opposite path is also possible. If new technologies lead to an increase in the ratio of profits to wages or to a decrease in the human capital level of a decisive voter, then free-entry political equilibrium could be eliminated.

Numerical example

Let us consider a simple numerical example, which explains the effect of human capital distribution on the political outcome. Suppose that the maximum level for a tax rate in a free-entry case is τ'=0.25 and the probability of innovation is λ=0.5. For simplicity's sake, the number of entrepreneurs equals the number of stakeholders, making the ratio of entrepreneurs to workers θ=1. The size of innovation is γ=1.5 and the ratio of profits to wages is ξ=1/2.

Workers make up 80% of the population, while the share of entrepreneurs and stakeholders equals 10%. In this case, $h(S/2)$ is the human capital level of 50/80=0.625 percentile, $h(L\text{-}S/2)$ is the human capital level of 30/80=0.375 percentile. From (35) $\mu = 1$.

Thus, from theorem 2 in this numerical example, if $h_{0,625} < \bar{h}$, then the human capital distribution is high and skewed to the left, meaning that a majority of low-skilled workers prefer full-redistribution policy; if $h_{0,375} > \bar{h}$ the majority of high skilled workers chooses a free-entry policy with $\tau=\tau'$. If $h_{0,375} < \bar{h} < h_{0,675}$ and $h_{0.4} > 0.25\bar{h}$, then society also chooses a free-entry policy with $\tau=\tau'$, while if $h_{0,375} < \bar{h} < h_{0,675}$ and $h_{0.4} < 0.25\bar{h}$ there is no political equilibrium.

6 The Targeted Transfers Case

In the previous section, we show that if workers in this setup have a heterogeneous level of human capital, then the political outcome (B,τ_B) could not be obtained as a political equilibrium because the majority, consisting of all workers, always prefer a full redistribution policy over outcome (B,τ_B). Simultaneously, full redistribution is also not stable, because the coalition of entrepreneurs, stakeholders, and high-skilled workers always prefer free-entry policy to full-redistribution policy.

Furthermore, a no-entry partial redistribution policy could be a stable political outcome in two cases: First, if workers are the minority (section 3) and, secondly, if only a group of workers (insiders) benefit from transfer payments.

In previous sections, we assume that the wealthy stakeholders of incumbent firms, as well as workers and entrepreneurs have the same level of political power in elections. In reality, even in democracy wealth can usually be transformed into political power through lobbing, corrupted voters, influencing opinions, and financially supporting the most preferred parties. Alesina et al (2011) consider the political life of modern Italy and come to a conclusion that the winning party is usually a coalition of the richest agents supporting the status quo and poorer insiders (union members, government workers, etc.) who also benefit from the status-quo in the form of direct or indirect transfers. In this section we modify our model by assuming that the richest agents (stakeholders) can credibly promise[12] to pay targeted transfers to special interest groups (e.g. unions) after the election.

Let us consider a sequential game in which during the first step stakeholders choose a group of workers (insiders) for whom they agree to pay β part of profits as targeted transfers. On the second stage four groups of agents (stakeholders, entrepreneurs, insiders, and outsiders) vote in the elections. We show that in this case a policy of no-entry and partial redistribution could be a stable political equilibrium.

From (33) and (34), stockholders are interested in forming a coalition with low skilled workers. High-skilled workers support free-entry policy, because of the higher benefit from economic growth. Thus, they demand a higher level of transfer payments for their support of no-entry policy than do low-skilled workers.

[12] The obvious question is why the rich will respect their promises to pay targeted transfers after the elections. Here we assume that the government must be supported by a majority of voters even after the elections. In this case, the rich have to keep their promises.

Suppose that stakeholders choose the number of workers for a targeted transfer (insiders). The optimal number of insiders for stakeholders is *S*/2-*M*. In this case, insiders and stakeholders form a majority. Let $V_W^B(h_j)$ be the pay-off of insiders in a targeted transfer and where the β-share of profits finances targeted transfers. Thus,

$$V_W^B(h_j) = \omega h_j + \frac{\beta \pi \bar{h} N}{S/2 - N}. \tag{40}$$

In a free-entry case there are no insiders; the outsiders division and all workers have pay-offs dependent on their human capital level as in the previous section

$$V_W^{NB}(h_j) = \left(\omega h_j + \frac{\tau_{NB} \pi \bar{h} N}{L} \right)(1 + \lambda\theta(\gamma - 1)). \tag{41}$$

From (40) and (41), insiders support (*B*,*β*) policy if

$$\beta > \left[\left(\frac{h_{med}^M}{\xi \bar{h}} + \tau' \right) \lambda\theta(\gamma - 1) + \tau' \right] \frac{S/2 - N}{L} = \beta'. \tag{42}$$

To understand the readiness of stakeholders to pay β’ share of profits in the form of targeted transfers, we must know the alternative political outcome.

If low-skilled workers form a majority (from theorem 3), then the alternative political outcome is full redistribution. In this case, stakeholders are ready to pay the targeted transfer if *β’*<1.

$$\begin{cases} \dfrac{h(S/2)}{\bar{h}} < \xi \left[\dfrac{1-\tau'}{\lambda\theta(\gamma-1)} - 1 \right] \\ \left[\left(\dfrac{h(S/2 - M)}{\xi \bar{h}} + \tau' \right) \lambda\theta(\gamma - 1) + \tau' \right] \dfrac{S/2 - N}{L} < 1 \end{cases} \tag{43}$$

As $h(S/2) > h(S/2 - M)$ and *L*>*S*/2-*N*, the system of inequalities (44) is always held.

Thus, stakeholders always prefer to pay targeted transfers to insiders rather than to suffer from a full-redistribution policy. If the alternative political outcome for stakeholders is (*NB*,*τ’*) policy, then stakeholders prefer targeted transfers if

$$V_M^B(\beta) > V_M^{NB}(\tau'). \tag{44}$$

From (14) and (18) it is true if

$$(1-\beta) > (1-\tau')(1-\lambda\theta). \tag{45}$$

Thus,

$$\beta < \tau' + \lambda\theta(1-\tau') \tag{46}$$

Then, if condition (47) holds

$$\left[\left(\frac{h_{med}^M}{\xi\bar{h}}+\tau'\right)\lambda\theta(\gamma-1)+\tau'\right]\frac{S/2-N}{L}<\tau'+\lambda\theta(1-\tau') \tag{47}$$

Stakeholders prefer targeted transfer to policy (*NB,τ'*).

Four parameters unambiguously influence the equilibrium choice in the case of targeted transfers: ξ, h_{med}^M=h(S/2-M), γ, and S/2-N. With a sufficiently high γ, inequality (48) does not hold. In this case, the alternative costs of no-entry policy in terms of lost gains from economic growth would be sufficiently high. Thus, the demanded level of transfer by insiders would be so high that stockholders voluntary support a free-entry policy. The number of insiders (S/2-N) also matters. A high number of insiders imply higher costs of targeted transfers for stakeholders.

The crucial parameter that influences equilibrium choice is the human capital level of the average worker (in coalition with stockholders). Lower levels of human capital for the average voter would lead to a lower level of demanded transfers and, thus, decrease the costs of targeted transfer regimes for stockholders. Finally, a higher ratio of inequality between groups (ξ) also increases the probability of a no-entry regime, because it increases the relative gain of inside workers from the redistribution of profits.

We summarize all results in table 3.

Table 3. Results summary

		Full redistribution order (B,τ=1)	"Corporatist" order (B, $\tau=\tau_B>\tau_{NB}$)	No stable equilibrium	"Liberal" order (NB, $\tau=\tau_{NB}$)
Homogenous workers case	Majority of workers	High ξ Low τ',λ,θ,γ			High τ',λ,θ,γ Low ξ
	No simple majority		$\xi>\gamma-1$ High λ,θ Low τ',ξ	$\xi>\gamma-1$ High τ',ξ Low λ,θ	$\xi\le\gamma-1$
Heterogeneous workers case	Majority of workers	Low τ',λ,θ,γ, h(S/2)		High ξ Middle τ',λ,θ,γ Low h(L-S/2), h(S/2-M)	High τ',λ,θ,γ, h(L-S/2), h(S/2-M) Low ξ
	Insiders-outsiders case		Targeted transfer High ξ Low γ, h_{med}^M		High γ, h_{med}^M Low ξ

Note: Table 3 summarizes results about comparative statistics in all versions of the model. If each of exogenous the variables unambiguously affects the equilibrium choice, then this effect is presented in the table.

7 Welfare Analyses

In the previous section we show that, under some circumstances, the society chooses high barriers to entry. This policy is detrimental for economic growth, because it limits competition between incumbent firms and outsiders and destroys incentives to invest in technological adoption. But are barriers for growth always detrimental for welfare? The answer is no, because of the replacement effect, found in the literature on economic growth. New firms can overinvest in R&D projects because they do not take into account the losses of the current profits to incumbent firms.

To show this, let us consider a welfare function, which is simply the sum of agent pay-offs.

$$W = V_W L + V_E E + V_M M \qquad (48)$$

Proposition 2. Optimality condition of free-entry policy[13]

Free-entry policy maximizes social welfare (49) only if

$$(\gamma - 1)\left(\frac{\alpha}{\chi}\right)^{\frac{\alpha}{1-\alpha}} > c \qquad (49)$$

Proof. We compare the expected total gain from the innovation project and the costs of the innovation project

$$(\gamma - 1)Y > cAN\,. \qquad (50)$$

From (5), inequality (51) can be rewritten as (50) ■

Now we compare political equilibrium in targeted transfers and the optimal outcome. Assume that inequality (48) holds. Therefore, there is a stable (B,β) political outcome. This outcome is not optimal if inequality (50) holds. From (4) and the definition of τ', the equation (48) can be rewritten as

$$(\gamma - 1) > \lambda\gamma\frac{\alpha}{\chi}(\chi - 1)(1 - \tau')\,. \qquad (51)$$

So, political equilibrium (B,β) is not optimal if the following system of inequalities holds.

[13] We consider her the second-best option when distorting effect of monopolies are always in place.

$$\begin{cases} \left[\left(\frac{h_{med}^{M}}{\xi \bar{h}} + \tau' \right) \lambda\theta(\gamma - 1) + \tau' \right] \frac{S/2 - N}{L} < \tau' + \lambda\theta(1 - \tau'), \\ (\gamma - 1) > \lambda\gamma \frac{\alpha}{\chi}(\chi - 1)(1 - \tau'). \end{cases}$$

Let us provide a numerical exercise that shows that an inefficient political outcome is possible in the model. As previously, we assume that the probability of innovation is λ=0.5 and, for simplicity, that the number of entrepreneurs equals the number of stakeholders. Thus, the ratio of entrepreneurs to workers is θ=1. The size of innovation is γ=1.5 and, if χ=2 and α=1/2, then from (10) ξ=1/2 the ratio of profits to wages equals 0.5. For these parameters, inequality (49) always holds. Thus, free-entry is the optimal regime. However, a free-entry regime is not always political equilibrium. It will be a political equilibrium only if

$$2\frac{h_{med}^{M}}{\bar{h}} + \tau' > 4. \qquad (52)$$

In the opposite case, (B,β) will be an inefficient political outcome.

8 Concluding Remarks

Our analysis gives new positive results concerning the reasons as to why there is a formation of different economic institutions in democracies. We show that the features of technology may strongly affect political outcomes. The three main factors that determine majority preference for a liberal order with free entry of new firms and a medium or low level of tax are the expected rate of return on technology adoption projects, the ratio of profits to wages, and the skewness in the distribution of human capital. If the rate of return of technology adoption decreases, then the human capital level of decisive voters decreases or the ratio of profits to wages increases such that a certain threshold is passed and the majority choice changes from a free-entry and low profit tax equilibrium, to a no-entry and high tax equilibrium.

Many authors underline the role of human capital accumulation in the development process (Galor and Weil, 2000). In our model, the relative level of human capital of decisive voters matters. If technological progress creates a large demand for a high-skilled labor force, then this leads to permanent support for free-entry, high-growth policy. At the same time, the opposite process could also occur. The degradation of the decisive voter relative to the human capital level and a decrease in the size and probability of innovation could switch the majority voting outcome to support a no-entry, high redistribution policy.

Appendix A

Theorem 1 (Political equilibrium in the case of no simple majority)

If any two from three groups of agents form a majority, then society chooses a zero tax rate and free-entry policy $\{NB, \tau_{NB}=0\}$, *if* $\xi \le \gamma - 1$. *If* $\xi > \gamma - 1$ *and condition (26) holds, then society chooses high redistribution and high barriers to entry* $\{B, \tau_B=\tau_1\}$, where $\tau_1=\lambda\theta$ *if* $L>M$, *and* $\tau_1=\tau'(1+g)+g/\xi$ *if* $M>L$. *If* $\xi > \gamma - 1$ *and condition (26) does not hold, then a Nash equilibrium in pure strategies in the game between the two parties does not exist.*

$$\tau' < \frac{1-\frac{\gamma-1}{\xi}}{\frac{1}{\lambda}+\gamma-1}. \qquad (26)$$

The proof is presented here in appendix A.

Proof. Suppose that one of the parties proposes the following political program (B, τ_B). What would be the best response of the other political party? The choice (B, τ'_B), where $\tau'_B \neq \tau_B$, does not provide an election victory for the second party because workers prefer a higher rate of tax, while capitalists prefer a lower rate of tax. At the same time entrepreneurs are indifferent regarding the level of redistribution in a no-entry case. The case of $(NB, \tau>\tau')$ gives the same result as (B, τ'_B), so it does not guarantee a victory for the second party.

The best response for the second party could be (NB, τ_{NB}) if no more than two groups of voters support this program. Entrepreneurs always prefer a free-entry (NB) policy if the profit tax rate are sufficiently low ($\tau<\tau'$). Thus, the policy (NB, τ_{NB}) can be supported by two alternative groups of voters: {entrepreneurs, workers} or {entrepreneurs, stakeholders}. In both cases, (NB, τ_{NB}) is the optimal response of the second party to the (B, τ_B) political program of the first party.

Now we will find the conditions under which stakeholders prefer policy (NB, τ_{NB}) to policy (B,τ_B).

$$V_M^{NB}(\tau_{NB}) > V_M^B(\tau_B). \qquad \text{(A1)}$$

From (14) and (18)

$$(1-\tau_{NB})(1-\lambda\theta) > (1-\tau_B). \qquad \text{(A2)}$$

Rearranging (A2) we receive

$$\tau_{NB} < 1-\frac{1-\tau_B}{1-\lambda\theta}. \qquad \text{(A3)}$$

If the level of redistribution in a case of free-entry is sufficiently low, stakeholders of incumbent firms prefer a free-entry policy despite the expected losses in profits from the entry of new firms.

From (A2) and from the restriction $\tau_{NB}>0$, if condition (A4) holds

$$1-\frac{1-\tau_B}{1-\lambda\theta} < 0, \qquad \text{(A4)}$$

policy (B, τ_B) could not be blocked by a coalition of entrepreneurs and stakeholders. (A4) can be simplified to

$$\tau_B < \lambda\theta. \qquad \text{(A5)}$$

Now we find the conditions under which workers prefer policy *(NB,* τ_{NB}) to policy *(B,* τ_B)

$$V_W^{NB}(\tau_{NB}) > V_W^B(\tau_B). \qquad \text{(A6)}$$

From (14) and (18)

$$\left(w + \frac{\tau_{NB}\pi N}{L}\right)(1+\lambda\theta(\gamma-1)) > w + \frac{\tau_B \pi N}{L}. \qquad \text{(A7)}$$

After rearranging, we get

$$\tau_{NB} > \frac{\tau_B - \dfrac{\lambda\theta(\gamma-1)}{\xi}}{1+\lambda\theta(\gamma-1)}. \qquad \text{(A8)}$$

If the redistribution rate in the free-entry case will be sufficiently high, workers will vote for policy (*NB,*τ_{NB}). The maximum redistribution rate that is also supported by entrepreneurs in the NB case is τ'. From (A8), if inequality (A9) holds, workers always prefer (*B,*τ_B).

$$\tau_B > \tau'(1+\lambda\theta(\gamma-1)) + \frac{\lambda\theta(\gamma-1)}{\xi}. \qquad \text{(A9)}$$

If (A5) and (A9) do not hold, so τ_B is such that

$$\tau'(1+g) + \frac{g}{\xi} < \tau_B < \lambda\theta$$

This is possible only if

$$\tau'(1+g) + \frac{g}{\xi} < \lambda\theta \qquad \text{(A10)}$$

In this case, policy *(B,* τ_B) could not be blocked by a coalition of entrepreneurs.

If two parties maximize the probability of winning the election and entrepreneurs randomly chose their vote between political programs (B,τ_1) and (B,τ_2). If L>M both parties will play (B, $\tau_B=\lambda\theta$) to gain from the support of the largest group (workers). If L<M they will play (B, $\tau_B=\tau'(1+g)+g/\xi$) which means a lower tax rate.

Suppose that condition (A10) does not hold. In this case, policy (*B,*τ_B) cannot be a political equilibrium because it can be blocked by a majority coalition. Therefore, the first political party will not play (*B,* τ_B), but it could propose an alternative policy (*NB,* τ_{NB}). In this case, the second political party always plays (*NB,* $\tau_{NB}=0$), which is supported by a coalition of entrepreneurs and stakeholders. Therefore, it is rational for the first political party to also propose policy (*NB,* $\tau_{NB}=0$). This is the best political outcome for entrepreneurs. In this case, the second party must choose the same policy (*NB,*$\tau_{NB}=0$) or try to propose an alternative (*B,* τ_B) to form a coalition of workers and stakeholders.

This coalition is possible only if

$$\begin{cases} V_M^B(\tau_B) > V_M^B(\tau_{NB}=0), \\ V_W^B(\tau_B) > V_W^{NB}(\tau_{NB}=0). \end{cases} \qquad \text{(A11)}$$

From (A5) and (A9), the system of inequalities (A11) holds if

$$\begin{cases} \tau_B < \lambda\theta, \\ \tau_B > \dfrac{\lambda\theta(\gamma-1)}{\xi}. \end{cases} \quad \text{(A12)}$$

From (A12), if $\xi \le \gamma - 1$, then there is no majority coalition that would prefer any other alternative policy to policy (*NB,* $\tau_{NB}=0$). If $\xi > \gamma - 1$, then there is a majority consisting of workers and stakeholders that prefers a policy of no free entry with

$$\tau'_B \in \left(\frac{\lambda\theta(\gamma-1)}{\xi}; \lambda\theta \right)$$

over policy (*NB,* $\tau_{NB}=0$).

Thus, if $\xi > \gamma$-1 and (A10) does not hold, then there is a cycle of preferred political programs and there is no equilibrium in the model. Inequality (A10) can be rewritten as

$$\tau' < \frac{1 - \dfrac{\gamma-1}{\xi}}{\dfrac{1}{\lambda} + \gamma - 1} \quad \text{(A14)}$$

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