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Alexandra Pripadcheva, Dmitry Veselov

SOCIAL MOBILITY AND PREFERENCES FOR OPEN ACCESS SOCIETIES

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Social mobility and preferences for open access societies*

Alexandra Pripadcheva† Dmitry Veselov‡

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Abstract

This study investigates a dynamic political economy model that provides a link between the intensity of social mobility in society and the barriers to entry on markets in modern democracies. We use overlapping generation model in which all agents are divided by three groups: unskilled workers, skilled workers and capitalists. Social mobility is determined by the parental endogenous education decision and by the level of barriers to entry on markets, which is a political outcome. We show that a majority of voters may support high barriers to entry if perspectives of upward mobility for high-skilled workers is sufficiently low for every institutional set-up and there are direct payments from incumbent capitalists to a group of unskilled workers. This outcome also leads to persistently lower social mobility for every social group and to a lower level of education in the society. The model provides a theoretical justification of the empirical evidence, suggesting that a higher level of economic inequality is associated with a lower quality of economic institutions in democracies.

Keywords: social mobility, economic barriers, economic institutions, democracy

JEL Codes: J62, O15, O43, P16

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†Research intern, International Laboratory for Macroeconomic Analysis, National Research University Higher School of Economics apripadcheva@hse.ru

‡Senior research fellow, International Laboratory for Macroeconomic Analysis, National Research University Higher School of Economics dveselov@hse.ru

1 Introduction

Democracy is a widely used type of political regime: according to the Democracy Index of the Economist (2019), there are 75 full or flawed democracies in the world. Still, democracies differ from each other in the quality of economic institutions, promoting free entry in markets. Some of democracies have high entry barriers and sluggish growth rates. To show that, we use the data from a number of sources. The quality of economic institutions is measured by Economic Freedom Index 2018 (heritage.org)[1], which capture both the direct measures of entry barriers on the markets, and indirect influential factors for entrepreneurs. The regime type is characterized according to the Polity IV Annual Time Series Data 1800-2018 (systemicpeace.org). The inequality is taken from Standardized World Income Inequality Database (SWIID) in the form of Gini Disposable Income Coefficient.[2]

So, why democracies differ more among themselves in terms of economic institutions? In this paper, we build a simple model that provides a link between the key ingredients of the development: education, social mobility, economic inequality, free entry on markets and economic performance.

Our main aim is to explain the greater variation, which is observed the as democracy level increases. On Fig.1 it is possible to see that despite the positive relation between Polity IV index and Economic Freedom index, there are a number of observations, which are gathered outside of the confidence intervals. Note, that the higher the Polity IV index, thus, the more democratic countries exhibit greater variation in the quality of economic institutions than less democratic/authoritarian countries.

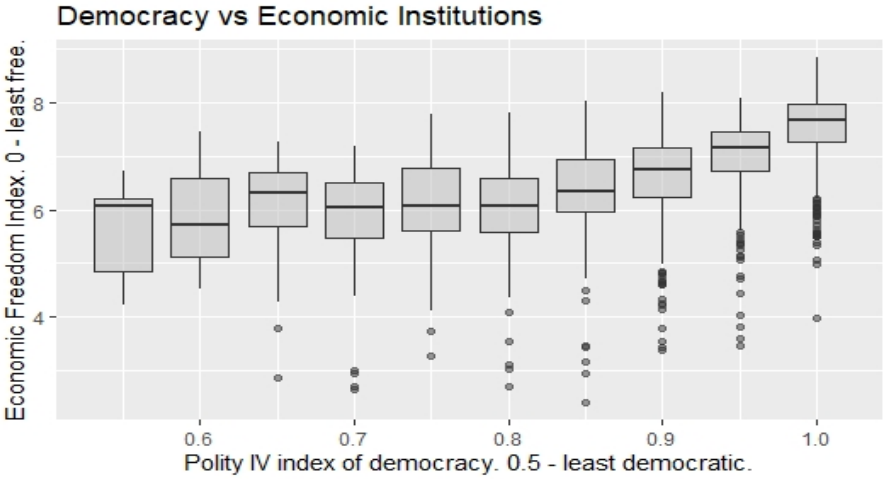

Figure 1: Relationship between the regime and economic institutions' quality

On average, the more democratic the country, the more economic freedom it has, and on Fig.2 this pattern can be clearly seen. But while democracies on average have less restrictive economic

[1]"Economic Freedom" is based on 12 quantitative and qualitative factors, grouped into four broad categories, or pillars, of economic freedom: Rule of Law (property rights, government integrity, judicial effectiveness), Government Size (government spending, tax burden, fiscal health), Regulatory Efficiency (business freedom, labor freedom, monetary freedom), Open Markets (trade freedom, investment freedom, financial freedom)"

[2]We rescale traditional Polity IV index and normilize so that the values range from 0 (perfect autocracy) to 1 (perfect democracy). We also rescale, reverse and normalize it to get a range from 0 (inequality) to 1 (perfect equality).

institutions, there are democracies where economic freedoms are as weak as in autocracies. We aim to understand how such restrictive institutions can arise under democratic regimes.

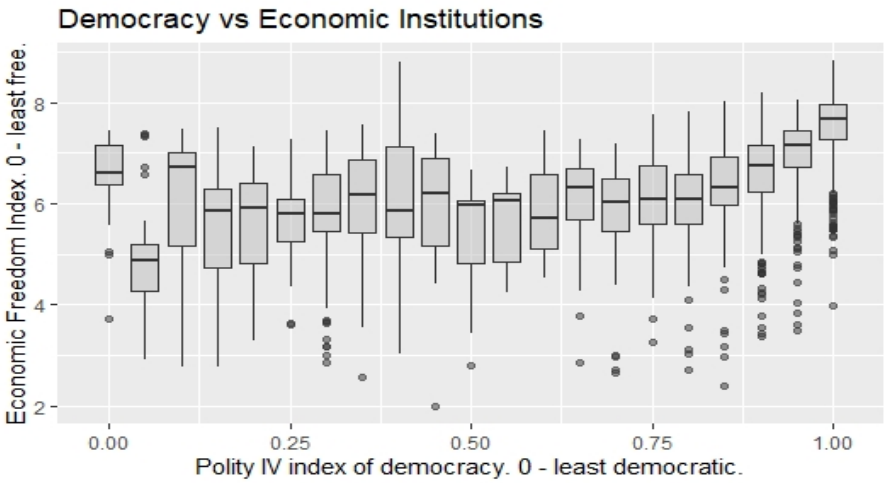

Figure 2: Relationship between the regime (extended) and economic institutions' quality

By this work we want to establish a causality mechanism, which will be able to explain how more restrictive economic institutions are set in democracies. The recent research give the same conjectures about the level of democracy and freedom of economic institutions. Akcigit et al. (2018) show that even in old democracies (Italy) the high entry barriers on markets is a widespread phenomenon. Particularly, the authors showed how connection between the incumbent firms and local politicians can artificially establish market domination of the incumbent. On the contrary to the competitive creative destruction process, no innovation will be needed from the incumbent to survive in the market, if the one is politically connected. Overall, the more political connections for market players - the lower is the industry's dynamics.

Our model also manages to explain what side effects its main relationship between economic and political institutions has on inequality and education levels. Kotschy & Sunde (2017) showed empirically that there was a negative association between the level of economic inequality and the level of institutional quality in democracies. They found that economic, social and political institutions are determined not by the regime type only: level of equality and other prerequisite conditions can influence the resulting institutions. We can support this thought by providing a glimpse on the data of the democratic countries. Fig.3 shows that the lower the income inequality, the better are the economic institutions.

Many works admit that one of the key ingredients that influences the performance of democracies seems to be the level of education. Acemoglu et al. (2019) found that democracy causes long-run economic growth only for countries with a sufficiently high level of education. Galor & Weil (2000), Galor (2012) consider the increasing investment in education to be the crucial step of the transition from stagnation to growth. During the industrialization period, the physical capital accumulation provides additional incentives to invest in education due to capital-skill complementarity (Galor & Moav

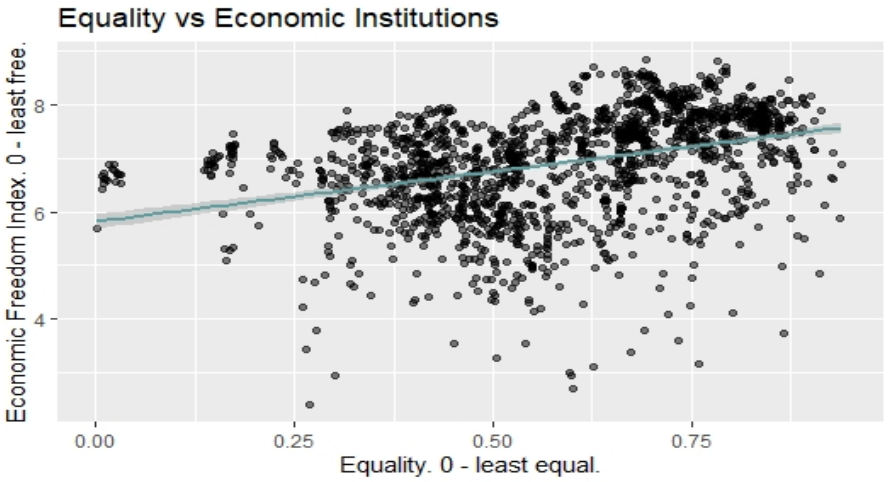

Figure 3: Relationship between the equality and economic institutions' quality

(2004)), and so finally creates societies with stronger middle class. However, the investments in education are endogenous and country-specific. Some economies experienced the surge of investment in education during the industrial revolution (Galor & Moav (2004)), whereas others are lagging behind.

Thus, another stylized fact, which we can see both on the theoretical and the empirical level is the following: the higher the level of education, the better are the economic institutions. The data, depicted on Fig.4 clearly shows that.

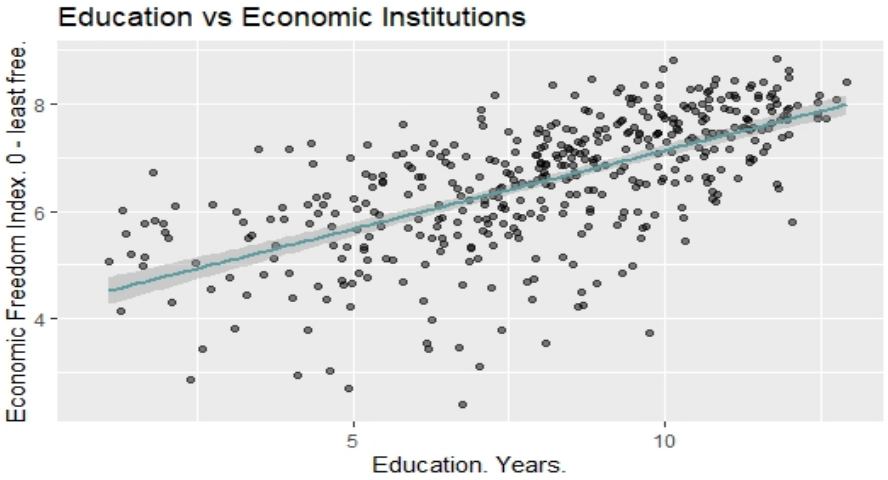

Figure 4: Relationship between the education and economic institutions' quality

To explain why a democratic regime can establish high entry barriers we construct the following model. We assume that each generation consists of 3 groups of citizens: unskilled, skilled workers and capitalists. They differ in their skills, education and income. Each citizen lives for two periods – childhood, when no economic decisions are made; and adulthood, when he works, receives income, invests into his child's education and makes political decisions. They vote for the policies, choosing the income tax, which is a continuous variable from 0 to 1, and the next period entry barriers on

economic markets, which is a binary variable. Under high entry barriers, capitalists inherit a business, and members of other social groups cannot create a business and become capitalists (due to high costs of entry on markets). Under free-entry regime there are entrepreneurs among skilled workers, who are capable to organise new firms, and thus, become new capitalists.

The political framework consists of the agents-voters and the two politicians: an incumbent and a newcomer. They compete for the largest share of the votes to save the office by proposing the level of taxes, the amount of public good and the next period level of the entry barriers. In addition, the incumbent has an opportunity to use a specific public good as a political instrument for patronage. The politician as a patron, provides access to resources in favor of political support (Stokes et al. (2013)). We will call this additional instrument "direct transfers from the capitalists to the unskilled workers", which is a kind of a vote-buying. Thus, these direct transfers can be in the form of the access to public jobs, resources, opportunities or some other benefits. Regarding these proposed instruments, the plurality rule determines the winner at the beginning of the each period.

Analyzing potential equilibrium with forward-looking citizens we show that the initial distribution of wealth which linked to the social status, and the share of skilled workers, who are capable to become entrepreneurs play crucial roles in the determination of the barriers to entry on markets. If the share is high, then all the workers, observing this high probability to become an entrepreneur will refuse to shrink their upward social mobility by setting entry barriers. If, on the contrary, the share is low, then, observing low chances to gain from the social mobility, workers can exchange open access to the markets for some fixed compensation. In the steady-state with high entry barriers on markets, the economy experiences low social mobility, low investments in education, and relatively high inequality. In addition, both the highest-income (capitalists) and the lowest-income groups (unskilled workers) support the policy of setting high barriers to entry. If the share of potential entrepreneurs is enough to provide enough direct transfers, then it becomes profitable for unskilled workers not to invest into education to gain income by becoming capitalists, but to exchange their opportunity of upward social mobility for fixed amount of direct transfers from the incumbent capitalists. On the other side, for incumbent capitalists it also becomes profitable to set high entry barriers to maintain their social status and to posses high incomes in the future, but share a part of income with the unskilled to compensate their potential loss in income.

This paper contributes to the several emerging strands of literature.

Recent works draw attention to the fact that the social mobility declined from 90% to 50% in the US (Chetty et al. (2017)), and tends to be conserved (Johnson & Fisher (2020)), as high inequality is associated with low social mobility. This association can be explained by the lower investments into the human capital (Kearney & Levine (2014)) and social capital (Chetty et al. (2014)). Moreover, people's perceptions of inequality (Gimpelson & Treisman (2018)) and social mobility (Alesina et al. (2004)) often are not accurate enough. However, this perceived social mobility influence the people's understanding of the world and its fairness (Heiserman et al. (2020)), and political decisions (Alesina et al. (2018)). People, who initially underestimate their position in the income distribution, require less

redistribution when their true position is revealed (Karadja et al. (2017)). The same is true for those, who overestimate their position: when they realize their relatively lower wealth, they start require for higher level of redistribution (Cruces et al. (2013)). In our framework the perceived social mobility influences both the redistribution of incomes and the level of barriers to entry. In democracies, in which agents expect that the probability to become capitalists for high-skilled workers is low even under free entry regime, the high entry barriers will be supported in the political equilibrium.

Despite that free entry on the markets is one of the key ingredients for the creative destruction process and is supposed to be favored, there are few studies that consider entry barriers as a political variable, which outcome depends on the wish of the empowered social group. In an influential study, Acemoglu (2008) found that democracies over-perform oligarchic state in the long-run, because of the support of the majority of voters for a free-entry regime. Nevertheless, other studies show that extracting institutions, like high barriers to entry, can persist over time in democracies, if the ruling elite has de-facto high political power (Acemoglu & Robinson (2008)) or voters tolerate some level of corruption in exchange of redistribution (Acemoglu et al. (2013)). Krusell & Rios-Rull (1996) build a dynamic voting game between incumbents and entrepreneurs. They show that the economy experiences the cycles of stagnation and growth, depending on the preferences of majority in power. The game between the principal, who establishes the level of the market entry barriers, and the lobbyists, both in static and dynamic variants are considered by Mukoyama & Popov (2014). Veselov (2019) shows that under two-dimensional policy set, capitalists and low-skilled workers may form a majority coalition, supporting the crony capitalism institutions. Moreover, in this model the supply of skilled is distributed exogenous among workers. We complement to this literature by presenting a taking into account the endogenous education decision and social mobility outcomes.

Our model is also related with a new strand of literature, focusing on the role of historical events in economic development. Initial conditions, influenced by geographical factors and historical events, finally determine the choice of the institutions, education and the level of social mobility. Tracking family names over generations to measure social mobility across countries and periods, Clark demonstrates the striking low social mobility even in open access societies (Clark (2015)). Our results show that perceived social mobility potentially explains the formation of economic institutions in democracies.

This study is organized in the following way: section 2 provides the baseline of the model; section 3 draws the main results for educational decision of parents and social mobility. Section 4 derives the political equilibrium and summarize the main results of the model, concluding with section 5.

2 Basic framework

There are three types of agents in the economy: unskilled workers, skilled workers and capitalists – who differ due to level of education and the level of income. Within each type, the agents are

homogeneous and have the same characteristics. S_t is the number of skilled workers, C_t is the number of capitalists, and L_t is the number of unskilled workers in period t. The total number of agents in the society in any period t is constant and equals N, as there is no population growth

$$L_t + S_t + C_t = N. \tag{1}$$

The model of overlapping generation is used. Each adult has only one descendant, whose future incomes he perceives as his own with the discount factor β. Each individual lives for 2 periods: in the first period, the young agent does not make any decisions, and in the second period the adult agent works and gets income (wage, profit) after taxes and spends it on himself and his child's education. All agents are risk-neutral. There are no other means of investment, except for investment in education. Also, each agent pays income tax and gets the benefit of public good (public services), which is financed by tax payments. The level of taxes in each period, and consequently, the amount of public goods in each period is a political choice.

Thus, the utility function of the agent i is:

$$U_t^i = X_t^i + \Omega(G_t) + \beta I_{t+1}^i, \tag{2}$$

where U_t^i is the utility function of agent i in the period of his adulthood, t; X_t^i is the agent i level of consumption of private good; β – the discount factor, $0 < \beta \leq 1$; I_{t+1}^i is the expected income of the descendant in the next period; $\Omega(G_t)$ is the utility of each agent from the public good, where $\Omega'(G_t) > 0, \Omega''(G_t) < 0$. The budget is balanced, such that

$$G_t = \tau_t y_t N, \tag{3}$$

where τ_t is the level of taxes in the period t, y_t is the average level of income.

The expected income in period $t+1$ is equal to:

$$I_{t+1}^i = \lambda(E_t^i)(1 - \psi_{t+1}^i)w_{t+1}^S + \lambda(E_t^i)\psi_{t+1}^i\pi_{t+1} + (1 - \lambda(E_t^i))w_{t+1}^U, \tag{4}$$

where $\lambda(E_t^i)$ – is probability of the child of agent i being skilled. The probability function is continuous, twice differentiable, $\lambda'(E_t^i) > 0, \lambda''(E_t^i) < 0, 0 \leq \lambda \leq 1$. The higher the amount of the investment in education, E_t^i, the higher the probability of being skilled. ψ_{t+1}^i – the probability of the child of agent i being educated to become a capitalist in period $t+1$ (under the regime of free-entry or high market entry barriers), thus, we interpret it as the share of nascent entrepreneurs, w_{t+1}^S – is the wage for skilled; π_{t+1}– is the profit for capitalist; w_{t+1}^U– is the wage for unskilled in $t+1$. Each of unskilled agents can benefit also from the redistribution of profits in the form of direct transfers from capitalists to unskilled workers, where $z_t^U L_t + z_t^C C_t = 0$ and (z_t^i) are net transfer payments. The disposable income of each type of agent in each period t is spent on private good X_t^i and investment

in education of the descendant, E_t^i,

$$(1-\tau_t)I_t^i + z_t^i \geq X_t^i + E_t^i, \tag{5}$$

2.1 Social mobility

There are two possible states. In the free-entry regime, NB, every educated agent has entrepreneurial skills to manage a firm and becomes a capitalist with a constant probability. The probability of success is the same for all skilled workers, $\psi_{t+1,NB}^i = \psi > 0$. Then, the expected income of the $t+1$ period in the free-entry regime for any i agent is:

$$I_{t+1,NB}^i = \lambda(E_{t,NB}^i)(1-\psi)w_{t+1,NB}^S + \lambda(E_{t,NB}^i)\psi\pi_{t+1,NB} + (1-\lambda(E_{t,NB}^i))w_{t+1,NB}^U \tag{6}$$

If there are high barriers to entry on markets, B, there is no social mobility between workers and capitalists. Only descendants of capitalists are capable to run a firm and gets profits. Then, $\psi_{t+1,B} = 0$ for workers and $\psi_{t+1,B} = 1$ for capitalists. Thus, the workers' expected income in the regime with high entry barriers is:

$$I_{t+1,B}^i = \lambda(E_{t,B}^i)w_{t+1,B}^S + (1-\lambda(E_{t,B}^i))w_{t+1,B}^U, \tag{7}$$

where $i = [S, U]$. Capitalists' expected income in the regime with high entry barriers is

$$I_{t+1,B}^C = \pi_{t+1,B}. \tag{8}$$

2.2 Production sector

Following García-Peñalosa & Wen (2008) we describe the production process as the following: each j firm of C_t monopolistic firms produces intermediate good x_j, differentiated in quality, which is used for production of the general private good, where Y_t is the output of the general private good; x_{jt} is the quantity of intermediate good x_j, produced in period t; A_{jt} is the quality of intermediate input of each business in period t. Each of intermediate goods producer are operated by one capitalist (a manager). We assume that firms may function only there is an input in the form of managerial skills. In the overlapping generations framework, the firm of the adult worker survive only if her descendant is capable of running a firm. In the regime with high barriers to entry, any descendent controls the firm of her parents, whereas in the free-entry regime, the distribution of firms depends on the managerial skills of the new generations of adults. Companies are symmetric, and so, $A_{jt} = A_t$, L_t is the quantity of unskilled labor, engaged in the production process of the final good, and S_t is the quantity of skilled labor engaged in the production process of intermediate good. The production function of the general private good is following:

$$Y_t = L_t^{1-\alpha}\sum_{j=1}^{C_t} A_t^{1-\alpha}{x_j}_t^{\alpha}, \tag{9}$$

where α is a constant, $0 < \alpha < 1$. The producers of final good Y_t are perfectly competitive companies. Thus, the marginal product of each unit of x_j is equal to the price of each intermediate good x_j.

$$P_{jt} = \alpha L_t^{1-\alpha} A_t^{1-\alpha} x_{jt}^{\alpha-1}, \tag{10}$$

where P_{jt} – is the price of x_{jt}. Each of monopolistic companies uses one unit of skilled labor to produce one unit of intermediate good x_j and so the problem for a monopolistic firm is the following:

$$\max_{x_j} \{P_{jt} x_{jt} - w_t^S x_{jt}\} \tag{11}$$

Lemma 1 *The equilibrium level of output is given as* $Y_t = S_t^{\alpha} C_t^{1-\alpha} L_t^{1-\alpha} A_t^{1-\alpha}$ *and the output is divided between wages of skilled and unskilled workers and profits of capitalists, where*

$$w_t^S S_t = \alpha^2 Y_t, \tag{12}$$

$$w_t^U L_t = (1-\alpha) Y_t, \tag{13}$$

$$\pi_t C_t = (1-\alpha)\alpha Y_t. \tag{14}$$

Proof. See Appendix A. ■

$\psi < 1 - \alpha$, such that $\pi_{t+1} > w_{t+1}^S$.

As we prove in Appendix if assumption 1 holds any skilled worker has an incentive to become a capitalist, as the transition from worker to capitalist increases their pay-off.

In this model we define income inequality as the income ratio of unskilled and skilled workers: $\frac{w_t^U}{w_t^S}$. The larger the gap, the lower will be this ratio.

2.3 Policy

There are two politicians - the incumbent and the newcomer, who compete on the elections and want to receive the greatest electoral support. They target the largest group or coalition of groups. Each politician proposes a policy, consisting of entry barriers, the tax rate and the amount of public good. The policy is observed by all groups. The incumbent can also create a specific public good z_t^i, by redirecting the current profits of capitalists to unskilled workers. This additional policy instrument is observable only for unskilled workers and capitalists[3]. All the politicians credibly commit the proposed policy instruments.

Although many studies consider this specific public good as a public job (Alesina et al. (1998)), we consider this as another form of public benefit which does not disturb the job market - such as social

[3]This remark helps to formalize the patron-client relationship both through the network effect, which guarantees the absence of moral-hazard problem, (Robinson & Verdier (2013)) and through the necessary knowledge of patron or broker of their voters-clients and their demands, which help to set an effective reciprocal channel (Stokes et al. (2013))

projects and other possible forms of supporting the most unsecured social groups. This contribution from the capitalists can be explained as fundraising for an electoral campaign, vote buying, or as lobbying for specific group's interests. Thus, capitalists offer this part of their profit only if its provision can guarantee a higher utility from the implemented policy. Obviously, there is a trade-off for them between the additional payments to politicians and the regime type $J = [B, NB]$. The unskilled workers also accept this specific public good only if it guarantees a higher utility from the implemented policy - they also face a trade-off between additional income and the entry regime $J = [B, NB]$[4].

We propose that the rules of distribution of the good G_t are public, while the rules of distribution of the specific public good z_t^i are not and depend on the collective agreement of capitalists, politicians and unskilled workers. This model coincides with the non-programmatic distributive politics, especially, with patronage (Stokes et al. (2013)).

The timing of the model is the following:

1. At the beginning of the period $t > 0$, the incumbent credibly promises to unskilled workers to realize a specific redistribution scheme for the current t period, z_t^i, which is given to the incumbent by capitalists. Both politicians choose a policy platform (J, τ_t, G_t) and propose it publicly.

2. All groups observe the proposed policy platforms from the incumbent and the newcomer (J, τ_t, G_t) and unskilled workers and capitalists observe a specific redistribution scheme z_t^i.

3. All the agents vote sincerely and independently for their most preferred policy. If they are indifferent between the proposed policies, they mix among them with equal probabilities. The electoral decision is realized, redistribution schemes become approved and economic barriers are set at the beginning of the next period.

4. During the period production takes place; wages are paid. Agents consume and invest in education, pay taxes and public good is produced. The specific public good is redistributed and politician receives utility from both public goods.

5. The political cycle repeats.

3 Investment in education and social mobility

Given the political vector (J, τ_t, G_t, z_t) all agents make a decision, by choosing the optimal investment in education, which determines the social mobility of their offspring. In the economy with perfect financial markets agents have opportunity to finance fully their educational expenditures and do not

[4]The prevalence of economic voters' characteristics over non-economic has been proved in game theoretical model by Matakos & Xefteris (2017)

face liquidity constraints. Assume initially that the chosen policy is the free-entry regime. The utility function is

$$U^i_{t,NB} = X^i_t + \beta(\lambda(E^i_{t,NB})(1-\psi)w^S_{t+1,NB} + \lambda(E^i_{t,NB})\psi\pi_{t+1,NB} + (1-\lambda(E^i_{t,NB}))w^U_{t+1,NB}) + \Omega(G_t) \tag{15}$$

And the optimization problem

$$\max_{E^i_{t,NB}}\{U^i_{t,NB}\} \tag{16}$$

$$s.t. X^i_t = (1-\tau_t)I^i_t - E^i_{t,NB} + z^i_t \tag{17}$$

From the first order condition it follows that for $E^i_t > 0$, $X^i_t > 0$, $1 = \lambda^{'}(E^i_t)\beta\Upsilon_t$, where Υ_t – is the education premium,

$$\Upsilon_t = (1-\psi)w^S_{t+1,NB} + \psi\pi_{t+1,NB} - w^U_{t+1,NB}. \tag{18}$$

On the one hand, the higher the education premium, the higher the optimal level of investment in education for every agent. On the other hand, a higher number of skilled workers lowers the education premium. There is a unique equilibrium for which the supply and demand for skills equalize each other.

In this set-up the following proposition holds:

Proposition 1 *In the free-entry regime all agents have the same preferences regarding the level of education for their children. The probability of transition to any social group is identical for all agents.*

Proof. See Appendix B. ■

This case implies that even if there is an initial inequality in incomes, there is a perfect equality of opportunities, as all agents have access to all markets. Therefore, the probability to become a capitalist is the same for all skilled agents, and parents have identical incentives to educate their children.

In the no-entry regime the utility function for a worker i is

$$U^i_{t,B} = X^i_t + \beta(\lambda(E^i_{t,B})w^S_{t+1,B} + (1-\lambda(E^i_{t,B}))w^U_{t+1,B}) + \Omega(G_t) \tag{19}$$

The utility function for a capitalist is

$$U^C_{t,B} = X^C_t + \beta\pi_{t+1,B} + \Omega(G_t) \tag{20}$$

And the optimization problem for a worker:

$$\max_{E^i_{t,B}}\{U^i_{t,B}\} \tag{21}$$

$$s.t. X^i_t = (1-\tau_t)I^i_t - E^i_{t,B} + z^i_t \tag{22}$$

The optimization problem for a capitalist is not necessary to solve, as their status is independent from their investments into the education. Thus, $E^C_{t,B} = 0$.

The education premium for a worker is $\Upsilon_t = w^S_{t+1,B} - w^U_{t+1,B}$.

Proposition 2 *In the no-entry regime all workers have the same preferences regarding the level of education (denoted as $E^U_{t,B}$) for their children, and the optimal level of education for them is lower than in the free-entry regime. In addition, in the no-entry regime inequality between salaries of unskilled and skilled workers become larger.*

Proof. See Appendix C. ■

3.1 Taxes

Individuals' tax preferences are determined by the level of their incomes. From (18), (21), the first-order condition implies that for internal equilibrium, $E^i_t > 0$, $X^i_t > 0$, $\Omega'(\tau^i_t Y_t) = I^i_t / Y_t$. So, the lower the individual income level, the higher the desired level of taxation, τ^i_t. The intuitive explanation is straightforward: a lower level of income means that the main burden of taxes will be distributed across other agents, and so, low-income individuals prefer a higher level of taxation.

3.2 Barriers

High entry barriers, B, reduce workers' expected income as they reduce the probability to become a capitalist. Moreover, in the general equilibrium, a lower number of capitalists leads to lower wages. Hence, workers prefer the free-entry regime, that guarantees the increase of wages and the opportunity of successful social mobility.

Capitalists have the opposite preferences. Low enough number of capitalists in the free-entry regime implies that the individual level of profits is higher in the B regime, than in NB. Taking into account that capitalists can be replaced with some probability, if entrepreneurs are allowed to enter the market, capitalists strictly prefer high barriers to free-entry.

4 Political equilibrium

Assume that initially unskilled workers form a majority. So the redistribution will be high and barriers will be low, thus, there will be free-entry regime: the winning policy according to relative majority is $(NB, \tau^{U*}_t, G(\tau^{U*}_t))$. As the politician can arrange a redistribution scheme, it can be shown that both capitalists and unskilled workers may agree to change the regime from low to high entry barriers: if there exists a value of direct transfers z^i_t, such that the losses of the unskilled from the high entry barriers are over-weighted by the gains of the capitalists, then the redistribution scheme becomes

possible. Equivalently, if the initial number of capitalists and unskilled, and their optimal investments into the education are such that:

$-L_t E^U_{t,B} + C_t^{1-\alpha}(1-\lambda(E^U_{t,B}))^{1-\alpha}(\lambda(E^U_{t,B}))^{\alpha}\beta((1-\alpha)\frac{C_t}{(1-\lambda(E^U_{t,B}))} + L_t(1-\alpha+\alpha^2)) \geq (\beta I^i_{t+1,NB} - E^i_{t,NB})(L_t + C_t)$,

then high entry barriers regime will become more preferable.

The higher the ψ parameter, the share of nascent entrepreneurs, the greater the future expected income under free-entry regime, and, thus, the less likely high entry barriers regime will be set and less likely patronage mechanism will be evoked.

However, it is important to note that ψ parameter does not influence the level of taxation and public good provision. If the initial shares of social groups such that unskilled is the majority, the taxation level remains as this group's desired level.

Proposition 3 *In an economy where there is the redistribution of profits in the form of direct transfers from capitalists to workers, the majority of voters are likely to prefer high entry barriers, if the ψ, the share of nascent entrepreneurs, is low enough.*

Proof. See Appendix D. ■

The possible interpretation of the parameter ψ is the expected level of upward social mobility between high-skilled workers and capitalists in open access societies. If low-skilled agents believe that the probability is sufficiently high, they take into account the upward social mobility and vote for the free-entry regime. This result shows that the perspective of upward social mobility potentially effects not only the level of redistribution (see Alesina & Giuliano (2015), Benabou (2002)), but also the quality of institutions in democracies. A low probability of transition from the group of skilled workers to capitalists under free-entry regime implies that the low-skilled majority supports the high barriers with direct transfers from capitalists to unskilled workers. In these circumstances, the average level of education will be lower and the level of social mobility will be lower. It also means that the regime with high barriers implies a higher level of inequality in incomes. A lower number of capitalists and a lower number of skilled workers leads to a higher ratio in wages between skilled agents and unskilled agents and a higher ratio of profits to unskilled wages. In the steady state, there is a society with a higher income inequality, lower social mobility, and the high barriers to entry on markets.

5 Conclusion

This paper develops a theoretical model that explain the persistence of low-quality economic institutions in democracies. We show that the possibilities of patronage and high economic inequality creates a steady-state equilibrium with low mobility among social groups and the inequality of opportunities. This policy is supported by the coalition of the elite in power and social groups, accepting the patronage incomes. The transition to open access society is possible only if the indirect payments of the

elites will be lower than the general gain from the increasing social mobility. In the long run, the stability of this equilibrium depends on ψ parameter - the share of nascent entrepreneurs. The lower this share, the lower the chance to observe free economic institutions. This parameter also shows to be the reason for consequential lower educational level and higher income inequality which are correlated with low-quality economic institutions. Thus, the model helps to explain a number of stylized facts about political, economic institutions, inequality and education.

Such a model can be useful for further investigation of a large number of phenomena, such as political populism, the effects of education on the political outcomes, and voting behaviour in democracies. This model may be useful for testing of the empirical relationship between the income inequality, distribution of skills and the quality of economic institutions in democracies.

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A Proof of Lemma 1

It follows that the equilibrium level of the price of intermediate input

$$P_{it}^* = \frac{w_t^S}{\alpha} \tag{A.1}$$

And so, the equilibrium quantity of an intermediate input is:

$$x_{it}^* = (w_t^S)^{1/(\alpha-1)}\alpha^{2/(1-\alpha)}L_t A_t \tag{A.2}$$

From the equilibrium on the labor market for skilled labor $x_{it}^* C_t = S_t$. Then, the equilibrium wage of skilled unit of labor is

$$w_t^S = \alpha^2 L_t^{1-\alpha} C_t^{1-\alpha} S_t^{\alpha-1} \tag{A.3}$$

The equilibrium profit of each monopolistic company can be found from (A.1) and (A.2):

$$\pi_t^* = P_{it}^* x_t^* - w_t^S x_t^* = w_t^S x_t \frac{1-\alpha}{\alpha} \tag{A.4}$$

$$\pi_t^* = (1-\alpha)\alpha L_t^{1-\alpha} C_t^{-\alpha} S_t^{\alpha} = (1-\alpha)\alpha \frac{Y_t^*}{C_t} \tag{A.5}$$

The equilibrium output of the general good can be found, using (6) and (A.2):

$$Y_t^* = C_t L_t^{1-\alpha} x_i^{*\alpha} = C_t L_t^{1-\alpha} (\frac{S_t}{C_t})^{\alpha} = C_t^{1-\alpha} L_t^{1-\alpha} S_t^{\alpha} \tag{A.6}$$

Then, the wage of unskilled workers can be calculated as the marginal product of labor production of a general private good Y^*:

$$w_t^U = \frac{\partial Y^*}{\partial L_t} = (1-\alpha) S_t^{\alpha} C_t^{1-\alpha} L_t^{-\alpha} A_t^{1-\alpha} = \frac{(1-\alpha)Y_t^*}{L_t} \tag{A.7}$$

while the wage of skilled workers is equal to

$$w_t^S = \alpha^2 S_t^{\alpha-1} C_t^{1-\alpha} L_t^{1-\alpha} A_t^{1-\alpha} = \frac{\alpha^2 Y_t^*}{S_t} \tag{A.8}$$

B Proof of Proposition 1

For agent i optimization problem is the following:

$$U_{t,NB}^i = X_t^i + \beta(\lambda(E_{t,NB}^i)(1-\psi)w_{t+1,NB}^S + \lambda(E_{t,NB}^i)\psi\pi_{t+1,NB} + (1-\lambda(E_{t,NB}^i))w_{t+1,NB}^U) + \omega(G_t) \tag{B.1}$$

s.t. $X_t^i = (1-\tau_t^{i*})I_t^i - E_{t,NB}^i$.

Differentiating with respect to $E^i_{t,NB}$, we will obtain

$$\beta(\lambda`(E^i_{t,NB})(1-\psi)w^S_{t+1,NB} + \lambda`(E^i_{t,NB})\psi\pi_{t+1,NB} - \lambda`(E^i_{t,NB})w^U_{t+1,NB}) = 1 \tag{B.2}$$

The second order condition will be satisfied for any values:

$$\lambda``(E^i_{t,NB})\beta((1-\psi)w^S_{t+1,NB} + \psi\pi_{t+1,NB} - w^U_{t+1,NB}) < 0 \tag{B.3}$$

Thus, the optimal internal choice of the representative agent is:

$$\lambda`(E^i_{t,NB}) = 1/\beta((1-\psi)w^S_{t+1,NB} + \psi\pi_{t+1,NB} - w^U_{t+1,NB}), \tag{B.4}$$

where $(1-\psi)w^S_{t+1,NB} + \psi\pi_{t+1,NB} - w^U_{t+1,NB}$ is the premium from education. Let $(1-\psi)w^S_{t+1,NB} + \psi\pi_{t+1,NB} - w^U_{t+1,NB} = \Upsilon_t$. Note, the higher the premium, the lower is the marginal probability of being educated; but higher the investment into education, according to our assumptions about the derivatives of the probability function.

Consider the function $\lambda`(E^i_{t,NB})$. It is decreasing from $+\infty$ to 0 with the value of $\lambda$, as higher argument $(E^i_{t,NB})$ causes lower value of $\lambda`(E^i_{t,NB})$ - as long as the function was assumed to have $\lambda''(E^i_t) < 0$ - but causes higher total value of $\lambda(E^i_t)$.

The function $\frac{1}{\beta\Upsilon_t}$ is increasing with λ from $\frac{1}{\beta\alpha(\psi)^{1-\alpha}N^{1-\alpha}(1-\psi)^{\alpha}}$ to $+\infty$. To show that, replicate Υ_t:

$(1-\psi)\alpha^2 C^{1-\alpha}_{t+1,NB}L^{1-\alpha}_{t+1,NB}S^{\alpha-1}_{t+1,NB}+\psi(\alpha-\alpha^2)C^{-\alpha}_{t+1,NB}L^{1-\alpha}_{t+1,NB}S^{\alpha}_{t+1,NB}-(1-\alpha)C^{1-\alpha}_{t+1,NB}L^{-\alpha}_{t+1,NB}S^{\alpha}_{t+1,NB}$

$(1-\psi)\alpha^2(N\psi\lambda(E^i_{t,NB}))^{1-\alpha}(N(1-\lambda(E^i_{t,NB})))^{1-\alpha}(N\lambda(E^i_{t,NB})(1-\psi))^{\alpha-1}+\psi(\alpha-\alpha^2)(N\psi\lambda(E^i_{t,NB}))^{-\alpha}(N\lambda(E^i_{t,NB})))^{1-\alpha}(N\lambda(E^i_{t,NB})(1-\psi))^{\alpha}-(1-\alpha)(N\psi\lambda(E^i_{t,NB}))^{1-\alpha}(N(1-\lambda(E^i_{t,NB})))^{-\alpha}(N\lambda(E^i_{t,NB})(1-\psi))^{\alpha}$

$\alpha(\psi)^{1-\alpha}(N(1-\lambda(E^i_{t,NB})))^{1-\alpha}(1-\psi)^{\alpha} - \lambda(E^i_{t,NB})(1-\alpha)(N\psi)^{1-\alpha}(1-\lambda(E^i_{t,NB}))^{-\alpha}(1-\psi)^{\alpha}$

The dependence of Υ from λ is: $\Upsilon' = -(1-\alpha)\alpha(\psi)^{1-\alpha}N^{1-\alpha}(1-\lambda(E^i_{t,NB})))^{-\alpha}(1-\psi)^{\alpha} - (1-\alpha)(N\psi)^{1-\alpha}(1-\lambda(E^i_{t,NB}))^{-\alpha}(1-\psi)^{\alpha} - \lambda(E^i_{t,NB})(1-\alpha)(N\psi)^{1-\alpha}(1-\lambda(E^i_{t,NB}))^{-\alpha-1}(1-\psi)^{\alpha} < 0$ for all the values of $\lambda(E^i_t)$. Then, Υ decreases from $\alpha(\psi)^{1-\alpha}N^{1-\alpha}(1-\psi)^{\alpha}$ to 0.

Thus, given the increasing right-hand side and decreasing left-hand side of (B.4), the solution is unique. It will always exist, as long as $\frac{1}{\beta\alpha(\psi)^{1-\alpha}N^{1-\alpha}(1-\psi)^{\alpha}} > 0$ for any values of the parameters.

C Proof of Proposition 2

Recall (B.4) and modify it according to the restrictions for a worker. Thus, the optimal internal choice of the representative worker U is:

$$\lambda`(E^U_{t,B}) = 1/\beta(w^S_{t+1,B} - w^U_{t+1,B}), \tag{C.1}$$

As the function $\lambda`(E^U_{t,B})$ is still decreasing from $+\infty$ to 0, and the restricted education premium is

still decreasing from $+\infty$ to 0. To show that, replicate restricted version of Υ_t:

$\alpha^2 C_{t,B}^{1-\alpha} L_{t+1,B}^{1-\alpha} S_{t+1,B}^{\alpha-1} - (1-\alpha) C_{t,B}^{1-\alpha} L_{t+1,B}^{-\alpha} S_{t+1,B}^{\alpha}$

$\alpha^2 C_{t,B}^{1-\alpha} (1-\lambda(E_{t,B}^U))^{1-\alpha} (\lambda(E_{t,B}^U))^{\alpha-1} - (1-\alpha) C_{t,B}^{1-\alpha} (1-\lambda(E_{t,B}^U))^{-\alpha} (\lambda(E_{t,B}^U))^{\alpha}$

Thus, given the increasing right-hand side and decreasing left-hand side of (C.1), the solution is unique and is equal for skilled and unskilled workers. But, as $\beta(w_{t+1,B}^S - w_{t+1,B}^U) < \beta((1-\psi) w_{t+1,NB}^S + \psi \pi_{t+1,NB} - w_{t+1,NB}^U)$ (because $\alpha^2 C_t^{1-\alpha}(1-\lambda(E_{t,B}^U))^{1-\alpha} \lambda(E_{t,B}^U)^{\alpha-1} - (1-\alpha) C_t^{1-\alpha}(1-\lambda(E_{t,B}^U))^{-\alpha} \lambda(E_{t,B}^U)^{\alpha} < \alpha^2 (N\psi)^{1-\alpha}(1-\lambda(E_{t,NB}^i))^{1-\alpha}(1-\psi)^{\alpha} + (\alpha-\alpha^2)\psi^{1-\alpha}(N(1-\lambda(E_{t,NB}^i)))^{1-\alpha}(1-\psi)^{\alpha} - (1-\alpha)\lambda(E_{t,NB}^i)(N\psi)^{1-\alpha}(1-\lambda(E_{t,NB}^i))^{-\alpha}(1-\psi)^{\alpha}$ even if $C_t = N\psi$ and $(1-\psi)^{\alpha}\lambda(E_{t,NB}^i) = \lambda(E_{t,NB}^i)^{\alpha}$ - which is impossible by setting, for any $\lambda(E_{t,NB}^i) = \lambda(E_{t,B}^U)$), the decision about education will be lower under high entry barriers.

Regarding the inequality level we can show that inequality rises under high entry barriers. Take the ratio of the incomes $w_t^U = \dfrac{(1-\alpha)Y_t^*}{L_t}$ and $w_t^S = \dfrac{\alpha^2 Y_t^*}{S_t}$:

$\dfrac{w_t^U}{w_t^S} = \dfrac{(1-\alpha)S_t}{\alpha^2 L_t}$

If $E_{t,NB}^i > (E_{t,B}^i)$, then $L_{t,NB} < L_{t,B}$ and $S_{t,NB} > S_{t,B}$. Then, $\dfrac{w_t^U}{w_t^S}_{NB} = \dfrac{(1-\alpha)S_{t,NB}}{\alpha^2 L_{t,NB}}$ and $\dfrac{w_t^U}{w_t^S}_{B} = \dfrac{(1-\alpha)S_{t,B}}{\alpha^2 L_{t,B}}$. Thus, $\dfrac{w_t^U}{w_t^S}_{NB} > \dfrac{w_t^U}{w_t^S}_{B}$ - the gap between skilled and unskilled workers is larger under high entry barriers.

D Proof of Proposition 3

From the assumption 2, we analyse $1 = \lambda'(E_{t,B}^U)\beta\Upsilon_{t,B}$, and find that $\lambda'(E_{t,B}^U) > \lambda'(E_{t,NB}^U)$. Then, educational expenses are lower under high barrier regime, $E_{t,B}^U < E_{t,NB}^U$.

Recall the utility (2) of the unskilled worker: it will include the current wage minus educational costs, and his future income. Thus, the utility function is:

$$U_t^U = w_t^U - E_t^U + \beta I_{t+1}^U + \Omega(G_t) \tag{D.1}$$

Then, making a decision about proposed barriers, the worker will compare at time t the utility under free-entry regime and high barriers entry regime. If

$$U_{t,B}^U - U_{t,NB}^U = (w_t^U - E_{t,B}^U + \Omega(G_t) + \beta I_{t+1,B}^U) - (w_t^U - E_{t,NB}^U + \Omega(G_t) + \beta I_{t+1,NB}^U) > 0 \tag{D.2}$$

then the unskilled will prefer to have high barriers. Plugging in (4), get

$U_{t,B}^U - U_{t,NB}^U = E_{t,NB}^U - E_{t,B}^U + \beta(I_{t+1,B}^U - I_{t+1,NB}^U)$

$U_{t,B}^U - U_{t,NB}^U = E_{t,NB}^U - E_{t,B}^U + \beta(\lambda(E_{t,B}^U) w_{t+1,B}^S + (1-\lambda(E_{t,B}^U)) w_{t+1,B}^U - \lambda(E_{t,NB}^U)(1-\psi) w_{t+1,NB}^S - \lambda(E_{t,NB}^U)\psi\pi_{t+1,NB} - (1-\lambda(E_{t,NB}^U)) w_{t+1,NB}^U)$

If the politician will be able to cover $(U^U_{t,B} - U^U_{t,NB})L_t$ by $z^U_t L_t$ then,

$$(U^U_{t,B} - U^U_{t,NB})L_t + z^U_t L_t \geq 0, \tag{D.3}$$

the high barriers are possible.

The politician can cover expenses of unskilled by the direct payments from capitalists. Moreover, the capitalists should agree to pay them: their gains must exceed their expenses. Then,

$$(U^C_{t,B} - U^C_{t,NB})C_t \geq z^C_t C_t \tag{D.4}$$

$U^C_{t,B} - U^C_{t,NB} = E^C_{t,NB} - E^C_{t,B} + \beta(I^C_{t+1,B} - I^C_{t+1,NB})$

$U^C_{t,B} - U^C_{t,NB} = E^C_{t,NB} - E^C_{t,B} + \beta(\lambda(E^C_{t,B})\pi_{t+1,B} + (1-\lambda(E^C_{t,B}))w^U_{t+1,B} - \lambda(E^C_{t,NB})(1-\psi)w^S_{t+1,NB} - \lambda(E^C_{t,NB})\psi\pi_{t+1,NB} - (1-\lambda(E^C_{t,NB}))w^U_{t+1,NB})$

Then, if $(U^C_{t,B} - U^C_{t,NB})C_t \geq z^C_t C_t$, where z_t - aggregated direct transfers, the majority of voters will prefer the regime B, taking into account direct transfers. Capitalists will prefer to pay these transfers to implement the regime B.

Both conditions (D.3) and (D.4) hold, if:

$$(U^C_{t,B} - U^C_{t,NB})C_t \geq (U^U_{t,NB} - U^U_{t,B})L_t \tag{D.5}$$

$(E^C_{t,NB} - E^C_{t,B} + \beta(\lambda(E^C_{t,B})\pi_{t+1,B} + (1-\lambda(E^C_{t,B}))w^U_{t+1,B} - \lambda(E^C_{t,NB})(1-\psi)w^S_{t+1,NB} - \lambda(E^C_{t,NB})\psi\pi_{t+1,NB} - (1-\lambda(E^C_{t,NB}))w^U_{t+1,NB}))C_t \geq (E^U_{t,B} - E^U_{t,NB} + \beta(\lambda(E^U_{t,NB})(1-\psi)w^S_{t+1,NB} + \lambda(E^U_{t,NB})\psi\pi_{t+1,NB} + (1-\lambda(E^U_{t,NB}))w^U_{t+1,NB}) - \lambda(E^U_{t,B})w^S_{t+1,B} - (1-\lambda(E^U_{t,B}))w^U_{t+1,B})L_t$

then the high entry barriers are possible.

Shortly, if note that under free-entry regime and no credit constraints all the agents invest the same amount $E^i_{t,NB}$, and $I^i_{t+1,NB}$ is equal for all agents:

$(E^i_{t,NB} - E^C_{t,B} + \beta(\lambda(E^C_{t,B})\pi_{t+1,B} + (1-\lambda(E^C_{t,B}))w^U_{t+1,B} - I^i_{t+1,NB})C_t \geq (E^U_{t,B} - E^i_{t,NB} + \beta(I^i_{t+1,NB} - \lambda(E^U_{t,B})w^S_{t+1,B} - (1-\lambda(E^U_{t,B}))w^U_{t+1,B})L_t$

$-L_t E^U_{t,B} - C_t E^C_{t,B} + \beta(C_t\lambda(E^C_{t,B})\pi_{t+1,B} + C_t(1-\lambda(E^C_{t,B}))w^U_{t+1,B} + L_t\lambda(E^U_{t,B})w^S_{t+1,B} + L_t(1-\lambda(E^U_{t,B}))w^U_{t+1,B}) \geq (\beta I^i_{t+1,NB} - E^i_{t,NB})(L_t + C_t)$

Recall (A.5), (A.7), (A.8):

$-L_t E^U_{t,B} - C_t E^C_{t,B} + \beta(C_t\lambda(E^C_{t,B})(1-\alpha)\alpha\frac{Y^*_{t+1,B}}{C_t} + C_t(1-\lambda(E^C_{t,B}))(1-\alpha)\frac{Y^*_{t+1,B}}{L_{t+1,B}} + L_t\lambda(E^U_{t,B})\alpha^2\frac{Y^*_{t+1,B}}{S_{t+1,B}} + L_t(1-\lambda(E^U_{t,B}))(1-\alpha)\frac{Y^*_{t+1,B}}{L_{t+1,B}}) \geq (\beta I^i_{t+1,NB} - E^i_{t,NB})(L_t + C_t)$

$-L_t E^U_{t,B} - C_t E^C_{t,B} + Y^*_{t+1,B}\beta(\lambda(E^C_{t,B})(1-\alpha)\alpha + (1-\lambda(E^C_{t,B}))(1-\alpha)\frac{C_t}{L_{t+1,B}} + \lambda(E^U_{t,B})\alpha^2\frac{L_t}{S_{t+1,B}} + (1-\lambda(E^U_{t,B}))(1-\alpha)\frac{L_t}{L_{t+1,B}}) \geq (\beta I^i_{t+1,NB} - E^i_{t,NB})(L_t + C_t)$

$-L_t E^U_{t,B} - C_t E^C_{t,B} + C_t^{1-\alpha}(N - N\lambda(E^U_{t,B}))^{1-\alpha}(N\lambda(E^U_{t,B}))^{\alpha}\beta(\lambda(E^C_{t,B})(1-\alpha)\alpha + (1-\lambda(E^C_{t,B}))(1-\alpha)\frac{C_t}{(N-N\lambda(E^U_{t,B}))} + \lambda(E^U_{t,B})\alpha^2\frac{L_t}{(N\lambda(E^U_{t,B}))} + (1-\lambda(E^U_{t,B}))(1-\alpha)\frac{L_t}{(N-N\lambda(E^U_{t,B}))}) \geq (\beta I^i_{t+1,NB} - E^i_{t,NB})(L_t + C_t)$

$-L_t E^U_{t,B} - C_t E^C_{t,B} + C_t^{1-\alpha}(1-\lambda(E^U_{t,B}))^{1-\alpha}(\lambda(E^U_{t,B}))^{\alpha}\beta(N\lambda(E^C_{t,B})(1-\alpha)\alpha + (1-\lambda(E^C_{t,B}))(1-$

$\alpha)\frac{C_t}{(1-\lambda(E^U_{t,B}))} + L_t(1-\alpha+\alpha^2)) \geq (\beta I^i_{t+1,NB} - E^i_{t,NB})(L_t + C_t)$

Thus, if there are such high initial number of unskilled and capitalists and such low share of nascent entrepreneurs, ψ, that this inequality holds - high entry barriers become preferable for the relative majority.

Utilising the fact that $E^C_{t,B} = 0$, get:

$-L_t E^U_{t,B} + C_t^{1-\alpha}(1-\lambda(E^U_{t,B}))^{1-\alpha}(\lambda(E^U_{t,B}))^{\alpha}\beta((1-\alpha)\frac{C_t}{(1-\lambda(E^U_{t,B}))} + L_t(1-\alpha+\alpha^2)) \geq (\beta I^i_{t+1,NB} - E^i_{t,NB})(L_t + C_t)$

Taking the derivative by ψ, get positive value $(L_t + C_t)\beta(\lambda(E^i_{t,NB})(\pi_{t+1} - w^S_{t+1}))$. Thus, increase in the share of nascent entrepreneurs has linear influence on the conditions, which make the agreement between capitalists and workers less likely.

Authors:

1. Pripadcheva A., Research intern, International Laboratory for Macroeconomic Analysis, National Research University Higher School of Economics, apripadcheva@hse.ru, +79151058345

2. Veselov D., Senior research fellow, International Laboratory for Macroeconomic Analysis, National Research University Higher School of Economics, dveselov@hse.ru