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POLITICAL RENTS, PROMOTION INCENTIVES,  
AND SUPPORT FOR A NON-DEMOCRATIC REGIME

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**POLITICAL RENTS, PROMOTION INCENTIVES,  
AND SUPPORT FOR A NON-DEMOCRATIC REGIME**

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**Abstract**

This paper analyzes the economic foundations of a non-democratic political regime, where the ruling bureaucracy captures rents through collective control over state property and job assignment. The model developed here yields the equilibrium in the “political labor market,” where the ruling bureaucracy buys services and political support of activists recruited from the working population. The underlying implicit contract requires that the incumbent bureaucrats retire after a certain time to allow for deferred promotion of activists into rent-paying positions. The major implications are that the stability of a non-democratic regime is consistent with high-income gap between the rulers and the rest of the population, strengthened when government pursues an active investment policy, and is not directly affected by public goods provision or the rate of economic growth. The results of econometric analysis of panel data from former Soviet states for the period of 1956-1968 confirm the predictions of the model.

**Keywords:** non-democratic regimes, bureaucracy, hierarchy, political support, promotion incentives, implicit contract, Soviet Union

**JEL codes:** D72, J45, N44, P30

For millennia, autocracy was the prevalent form of political organization. Despite the advancement of democracy during the last two centuries, the majority of the world's population still lives under regimes that range from outright dictatorship to oligarchy, embellished with nominally democratic institutions. Moreover, during the twentieth century, a number of industrial and many developing countries reverted to authoritarian regimes after periods of significant democratic development. Resilience of non-democratic regimes, recurrence of dictatorship, and conditions that enable transition to democracy are therefore research problems that need to be addressed by economists.

Economic analysis of non-democracy and political transitions is a relatively new and growing area that was probably prompted by the tide of democratic transitions in the developing world and former socialist countries in the late 1980s – early 1990s. Theoretical models developed thus far can be divided into two groups. The first group extends “Leviathan” interpretation of government (Geoffrey Brennan and James Buchanan, 1980) into the area of non-democratic regimes by assuming the rulers who use their power to maximize net revenue raised by taxing the dominated population (Mancur Olson, 1993; Martin McGuire and Olson, 1996; Boaz Moselle and Benjamin Polak, 2001) or to protect their wealth from being redistributed (Daron Acemoglu and James Robinson; 2000, 2001). The second group assumes that political power is valuable per se and the rulers’ objective is to maximize the extent of power or probability of remaining in power (Herschel Grossman and Suk Jae Noh, 1994; Ronald Wintrobe, 1998; Yi Feng and Paul Zak, 1999).

All mentioned works differ in the selection of relevant variables and predictions of their models, sometimes diametrically. Acemoglu and Robinson (2000), (2001) argue that high inequality is the major driving force of democratization, supporting this statement by the

fact that the extensions of franchise in West European countries coincided with periods of the historical peaks of inequality. In Feng and Zak (1999), a democratic transition is likely to occur when a relatively wealthy middle class has a high enough demand for civil liberties (which is a sort of luxury good) and can afford a destructive uprising. This approach implies that the stability of authoritarianism is consistent with high inequality. Another implication is that economic growth undermines a non-democratic regime. At the same time, McGuire and Olson (1996) shows that a secure rational dictatorship promotes economic growth. Wintrobe (1998) also suggests a possibility of a positive relationship between economic growth and the political power of a dictator. The latter work, however, focuses on the loyalty of the population “bought” by the dictator in exchange for public goods and on repression as the major determinants of regime stability. A similar approach is adopted in Dmitriy Gershenson and Herschel Grossman (2001), where the loyalty of the part of the population, coopted into the ranks of the ruling elite, is a substitute for repression. Mark Harrison (2002) explains the collapse of the Soviet regime by the increasing costs of coercion and decreasing reputation of the rulers. The three latter works imply that a stable non-democratic regime is characterized by high levels of public expenditure (which includes but is not limited to police expenditure).

Econometric studies of the determinants of the stability of non-democratic regimes and democratic transitions are almost non-existent. One exception is Feng and Zak (1999), which finds, in agreement with its theoretical predictions, positive effects of low inequality and high levels of education and economic development on the probability of democratic transitions in developing countries. Another cross-country study, Robert Barro (1999), yields generally similar results with respect to the “propensity for democracy,” which is measured

by a subjective index of electoral rights. Finally, Schnytzer and Sustersic (1998) studies the party membership in the republics of former Yugoslavia, which they view as the measure of loyalty, and find some evidence consistent with the theory of Wintrobe (1998).

Two major limitations are characteristic to some extent of the literature reviewed above. First, most of these works assume explicitly or implicitly that the non-democratic regime is imposed upon an economy based on market and private property. Correspondingly, two of the three empirical studies mentioned above exclude socialist countries. Second, they consider the ruler (a dictator or a ruling elite) as a sort of social singularity, an entity that is completely isolated from the rest of the society and has no internal structure. Only Gershenson and Grossman (2001) and Moselle and Polak (2001), allow for a connection between the ruling stratum and the general population.<sup>1</sup>

However the major tendency of a large part of the twentieth century was the rise of the regimes that gave more power to the state than ever before in modern history and either destroyed the institution of private property completely or marginalized independent entrepreneurship. These regimes, often designated as “totalitarian,” spread throughout the world in diametrically different ideological packaging: racist/fascist (Germany, Italy, Spain) communist (USSR, China, Cuba, and many others), nationalist (e.g. Indonesia, Iraq), or theocratic (Iran). They all share a number of common features that provide a stark contrast to the principles of free-market democracy. The most important features include: hierarchical political organization, open for entry from below; bureaucratic control over the economy,

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<sup>1</sup> Moselle and Polak (2001) addresses primarily the issues of anarchy and a primitive “predatory” state and focuses on an individual’s choice to become a “bandit,” a member of a ruling clique.

often backed by direct state ownership of the nation's capital stock; and significant popular support raised through the channels of the ruling party or other similar institutions.

Most of these regimes have been forcefully removed as a result of military defeat (from Nazi Germany in 1945 to Iraq in 2003) or overthrown by popular revolutions (Eastern Europe in 1989-91). The remaining regimes of this kind, such as China, North Korea, or Iran, are still notable players in the world scenes and the direction of their change is an open question. The first and the most lasting regime in this row, the Soviet Union, deserves special attention because of extreme features of its political-economic organization, its influence on the world political development in 1940-80s, and its rapid and peaceful demise in 1991 that occurred despite its seemingly uncompromised coercive power and caused little turnover in the higher tiers of economic management and government.<sup>2</sup> The Soviet experience raises questions about the sources of stability of non-democratic regimes and the limits of their sustainability, as well as the potential for endogenous institutional change. In particular, the end of the Soviet regime suggests a possibility of the ruling bureaucracy initiating the change.

The explanation of these developments can be sought for in the political-economic exchange between the rulers and the population. Non-democratic regimes, both totalitarian and "traditional" dictatorships, are conventionally viewed as based on coercion. Voluntary support for the government is often added as a partial substitute to coercion. Support is costly: the rulers buy it with public goods or transfers. If the rulers value only power per se as in Grossman and Noh (1994) and Wintrobe (1998), then they can be expected to evolve in the long run into welfare-maximizing "benevolent" dictators. If the rulers attempt to protect their

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<sup>2</sup> Relatively high stability in the ranks of economic managers and bureaucracy has been also established for most East European nations (Best and Becker, 1997).

wealth from forceful redistribution (Acemoglu and Robinson, 2000) or destruction (Feng and Zak, 1999) by revolutionaries, then they have to give up its political power. Both approaches capture certain features of non-democratic regimes but cannot explain the durability of numerous “predatory” regimes that extract rents from the population and are characterized by high inequality. The assumption of unchallenged power of the dictator in McGuire and Olson (1996) simply bypasses the problem of the regime stability by leaving no active role to the population.

For a rational, net-revenue maximizing ruler, who only uses political power as an instrument of revenue-collection, public expenditure is simply a tax refund that makes the population better off, while reducing political rents.<sup>3</sup> Associated transaction costs will normally make the net welfare effect strictly negative. If we follow consistently the positive perspective and allow for economic rationality of all involved agents, then we have to look for less costly, in terms of power and rents, mechanisms of raising support. Hierarchical political organization creates one such mechanism that allows for “borrowing” services and political support of activists in exchange for deferred promotion into of the ruling stratum. In this paper, I develop a model of a hierarchical regime that is based on an implicit promotion contract. Stability of this type of a regime is consistent with large income gaps between the rulers and the rest of the population, and active government investment in physical capital, while the rate of economic growth and provision of public goods have no direct effect on the support for the regime.

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<sup>3</sup> Defense and criminal law enforcement seem to be important exceptions. However, these can be considered as a part of the costs associated with revenue production, insofar as they protect the tax base from rival predators (foreign aggressors and domestic bandits).



The paper is organized follows. Section I introduces the notions of political labor market and promotion contract in hierarchies as a mechanism of political-economic exchange between the ruling bureaucracy and the population. A formal model of an implicit contract between the rent-maximizing bureaucracy and the career-seeking activists is developed in Section II. This section also analyzes the characteristics of the equilibrium in the political labor market and establishes the limits of a regime's sustainability. Section III discusses the institutional framework of the Soviet political labor market and describes the data that can be used to estimate the effects of various economic parameters on the activist recruitment. The test of the proposed model using the panel data from former Soviet republics is presented in Section IV. Section V concludes.

## **I. Political-economic exchange in a hierarchy**

The most important feature of many, if not most, non-democratic regimes, overlooked by the existing literature, is that the rulers are not single dictators or isolated cliques but rather top segments of complex hierarchies. There is constant turnover within the ruling strata. A 'median dictator' can hardly keep hold on power for more than a decade, although famous examples of longevity, such as Joseph Stalin in the USSR or Joseph Tito in Yugoslavia, might have created misperceptions on that part. A non-democratic regime, dictatorial or oligarchic, is a political – and often also an economic – monopoly, but paradoxically it creates no impassable barriers to entry to the ruling stratum on the personal level. This feature creates the possibility to raise support in a way that is consistent with the rationality of political-

economic agents: by admission of volunteers to the lowest rank of the ruling hierarchy with a possibility of subsequent promotion to higher-paid positions. The support obtained in exchange for the promise of deferred promotion brings about no losses (transfers to the population). To the contrary, it can increase political rents: by recruiting agents from the population, incumbent rulers provide an incentive for aspirants to the rent-paying positions to volunteer extra effort, for example, in the form of supervisory services that elicit more labor effort from the working population. In other words, the rulers can exchange obligations for support in the national political labor market.

For the purpose of tractability, a political hierarchy can be thought of as composed of two layers. The first layer, “bosses”, consists of the holders of governing positions (party bureaucracy proper). The second, a larger one, “activists,” consists of the aspirants to these positions.<sup>4</sup> The bosses enjoy salaries and benefits well in excess of the national average, while the activists retain ordinary jobs. The activists are required to pay dues, work more, and render additional services, in particular, supervisory services. The incumbent elite – the bosses – enter the implicit contract with activists, according to which the latter pay “dues” in extra labor and supervisory services (as well as in money, e.g. party membership fees) in exchange for the prospect of promotion. As long as the activists are content with the terms of the contract they also provide political support to the incumbent rulers. In the short run, the costs of this arrangement are borne by the activists. Formal admittance to the party does not

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<sup>4</sup> Formal attributes of the two groups vary across political systems and can change over time. For example, in the early period of the Soviet regime, the distinction between the “candidates” – new recruits on probation – and the full party members drew the formal line. As the party was growing, the class of actual activists came to include part of rank-and-file full party members. However, the relative positions of the two groups remained essentially the same.

make them better off immediately. Their positions yield a lower utility than that of an ordinary worker. Moreover, the probability of being promoted in the future may be quite low, because the demand for supervisory agents typically exceeds the number of rent-paying positions. However, high inequality, which is the easier to maintain the poorer the country, makes pursuit of a bureaucratic career a game with high stakes.<sup>5</sup>

The bureaucracy bears its share of costs, too. First, it has to protect its rents against potential rivals and overcome resistance of the working population to redistribution of national income. This requires permanent coercion of some sort that is costly. Second, the incumbent has to repay debt to those activists, who have faithfully performed their duty, by promoting them into boss positions. Unless sustained economic growth creates a sufficient number of new positions to satisfy the activists' demand, the incumbent bosses have to repay the debt by retiring. As long as the bureaucracy is a collective proprietor, a bureaucrat's benefits are largely *ex officio*. The possibilities to accumulate personal wealth are narrow and therefore post-retirement payments are negligible in comparison to bureaucratic rents. Therefore, retirement is a gloomy prospect for a bureaucrat, especially if he internalizes the utility of his offspring.

Incentives for incumbent bureaucrats to enter the contract are determined by returns to the activists' service and the cost of these services – the rents forgone due to “early”

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<sup>5</sup> What Soviet propagandistic literature used to say about a worker joining the party can be interpreted as: more effort, additional duties, promotion to a position in the party bureaucracy or industrial management in the future. For example, a Soviet sociological review of 1970s purports: “Once you become a communist, you assume voluntarily an additional heavy duty to lead the others.” A characteristic career path of a new working class party recruit is described in the following manner: foreman – student in an engineering school – head of the planning department in a large enterprise. The next step would be further up the ladder of industrial management or to an entry-level position in the party bureaucracy. Eighty percent of party bureaucrats of that period followed this career path

retirement in compliance with the contract. Without the contract the bosses expect to stay in office longer, possibly indefinitely long (if they are hereditary autocrats or private proprietors), but the additional rents produced by the activists' services are lost. The outside option of competitive regime based on private property rights always exist potentially. Under certain conditions in the political labor market, it may become more profitable than the hierarchical regime, prompting the rational bosses to initiate a regime change.

The effectiveness of the loyal-service-for-promotion exchange depends on the extent to which a bureaucracy is capable of controlling the sources of income and, therefore, the paths of upward job mobility. Communist states of the twentieth century, by establishing a near monopoly on the ownership of productive capital, created the most favorable conditions for such a control. In the Soviet Union, a *nomenklatura* system of job assignment,<sup>6</sup> run by the ruling party, provided an institutional mechanism for awarding "promotion tickets" in exchange for loyal service. Discussion in this paper focuses on the economic incentives for both bureaucrats and workers-activists and the determinants of demand and supply of activist services under *nomenklatura*-type arrangements drawing mostly from the Soviet historical experience. The Soviet Union is representative for a large class of political-economic structures that rely upon the *nomenklatura*-type exchange between the incumbent rulers and

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(*Rabochii*; pp. 225-234).

<sup>6</sup> M.S.Voslenskii (1984) popularized the use of term *nomenklatura* as a synonym to the Soviet ruling bureaucracy itself. The narrower meaning of "appointment control" is adopted in this paper.

the promotion-seeking activists.<sup>7</sup> Although some of the results may not be applicable to any non-democratic regime, studying the Soviet Union has two major advantages. First, the dominant state ownership and fusion of political and economic administration produces a single hierarchy. The policies with regard to wages, promotion, job assignments, etc. are same or similar in the spheres of administration and production, across industries and regions. Therefore, the Soviet-type political-economic system on the whole can be regarded as one enormous corporation. This simplifies the analysis and allows applying the methods developed for the study of provision of incentives in firms.<sup>8</sup> Second, the high degree of centralized bureaucratic control resulted in accumulation of data by governmental statistical offices. Such accumulation can hardly be expected under a looser regime, in particular in countries where bureaucratic rents come largely from corruption and/or where promotion is based on family ties and clientelism. Moreover, relevant Soviet data are becoming increasingly available. Some of them are used later in this paper to test the predictions of the model.

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<sup>7</sup> State property and command economy are not necessary prerequisites for a nomenklatura-type system. Any governmental intervention in the economy assigns resource allocation power to bureaucracy, and therefore allows capturing political rents through corruption (Andrei Shleifer and Robert Vishny, 1993). Indonesia is an often-cited example. In general, all authoritarian regimes establish some sort of system of bureaucratic control over access to high-income positions beyond the borders of the public sector (licensing of businesses and regulation of access to higher education). The military-bureaucratic pyramids of *Qing* China and Imperial Russia in eighteenth century, medieval Catholic theocracies and monastic orders are just a few of numerous historical analogs to the nomenklatura. Military dictatorships, supported by the hierarchy of army command, are also hierarchical political regimes.

<sup>8</sup> See Canice Prendergast (1999) and Irene Valsecchi (2000) for recent surveys of the literature on promotion-related incentives.

## II. The model

### 2.1. Basic assumptions

Let us consider a population with the size normalized to unity that consists of two groups: the bosses and the workers. The bosses' incomes are essentially political (bureaucratic) rents. Individual rents are identical and equal  $R$ . The bosses retire after  $T_b$  years in office. The rest of the population, the workers and the retired bosses, earn a uniform wage,  $W$ , which is substantially lower than the political rent:  $W \ll R$ . A part of the working population, the activists, provide additional services that benefit the bosses by increasing their rents:  $R = f(N_a) > R_0 > 0$ , where  $f(N_a)$  is the activists' "rent-production function" such that  $f(N_a) \geq 0$  and  $f'(N_a) \leq 0$ ; and  $R_0$  is the bureaucrats' potential per capita rent in the absence of activists.<sup>9</sup>  $R_0$  and  $W$  are positive and assumed exogenous. The bosses and the activists comprise small fractions of the total population:  $N_b \ll 1$ ,<sup>10</sup>  $N_a \ll 1$ . No specific assumptions are made with respect to the ratio of the numbers of bosses and activists.

Activist service requires extra effort on the part of the workers who choose to enlist as activists. No immediate compensation is offered for the service. Each activist volunteers a unit of extra effort. However, the workers are heterogeneous in their idiosyncratic distaste for activist service – the disutility of the extra effort that the activist service calls for. This disutility has an income equivalent of  $\omega_i$ , which is an inverse measure of an individual's predisposition (or ability) for activist service. It is distributed within the population with c.d.f.

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<sup>9</sup>  $R_0$  measures the bureaucrats' own productivity in rent-collection.  $R_0$  is generally greater than zero, since a rational worker will *not* fight corruption or resist predatory taxation beyond the level that equates the losses from the latter and the costs of enforcing the rule of law at the margin.

<sup>10</sup> For all practical purposes, the bosses can be assumed not to exceed one percent of the population.

$Z(\omega)$  such as  $Z(0) = 0$ . The population is homogeneous with respect to all other behavioral parameters. In particular, all agents are risk-neutral and discount the future exponentially at the rate  $r$ .

Following the approach outlined in the previous Section, I assume that the terms of and the returns to the activist service – and consequently the number of activists at any given moment in time – are determined by an implicit contract between the bosses and the activists. This contract offers the participating activists a possibility of promotion into a boss position after  $T_a$  years of service and limits the bosses' tenures to  $T_b$  years in order to facilitate promotion.<sup>11</sup> The probability of promotion is  $\pi$ . Therefore, at the time the contract matures,  $\pi N_a$  activists become bosses, while  $(1-\pi) N_a$  rejoin the ranks of ordinary workers.

All agents maximize the expected utilities of residual life-time incomes. The contract satisfies the participation constraints as long as (a) an activist's disutility is compensated by expected rents after the end of service and (b) extra rents due to activist services compensate incumbent bosses for the loss of rents after retirement. In the absence of contract-based exchange between the bosses and the working population, the former never retire ( $T_b$  is infinite)<sup>12</sup> and acquire the rents equal to  $R_0$ , while the latter earn  $W$  forever. There is no

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<sup>11</sup> Instead of assuming fixed activist effort, variable disutility of service, and random promotion, it could be assumed that the workers' heterogeneity in ability translates into differential productivity in the capacity of an activist, in the spirit of the rank-order wage tournaments (Lazear and Rosen 1981). In the latter model, entry-level employees can compete for promotion to a higher-wage level by exhibiting varying levels of effort, and the winners – the top  $N$  performers – get promotion with probability 1. Both incentive schemes have similar effects as long as an individual worker has little information on the actions of the others and the distribution of ability within the population. The implications would differ with respect to the properties of the bosses: under my approach, average ability of the bosses equals the population average, while wage tournaments should produce an elite in terms of ability. Discussion of this issue goes beyond the scope of this paper.

<sup>12</sup> Infinite tenure means practically that the bosses are able to bequeath their positions at their discretion.

outside option for a worker: the only way to achieve a level of income exceeding  $W$  lies on the bureaucratic career track and it requires activist service.

As far as the contract design is concerned, the bosses behave as a single entity – the representative boss. The contract designed by the incumbent boss is offered to every worker who is not and has never been before an activist.<sup>13</sup> Although the boss dictates the terms of the contract to the activists, he cannot force a worker to enlist as an activist and has to choose the contract terms in anticipation of known voluntary response from the workers, given the chosen values of  $T_a$ ,  $T_b$ , and  $\pi$ , and the exogenous wage,  $W$ .<sup>14</sup> The optimal contract is a subgame-perfect equilibrium in the boss-activists strategic interaction where the boss is the prime mover. The contract is life-long. Once written, it is supposed to be non-renegotiable. However, the contracts offered to successive cohorts of activists may differ.

## **2.2. Supply of activists**

The choice problem facing an individual worker involves a comparison of two life-time income profiles. The first assumes a permanent stay in the ordinary worker position and receiving certain income. The second consists of the period of costly activist service of

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<sup>13</sup> The accuracy of the assumption of no reentry into the ranks of activists depends on the extent of factional struggle within the ruling party. Swings in the power struggle may let previously purged activists restart their careers. Thus, for example, almost all surviving victims of the Cultural Revolution in China (1966-1976) were eventually rehabilitated (Lee 1991).

<sup>14</sup> Theoretically, a single boss, who combines political and economic power, could endogenize wage in the present context. However, the division of responsibility within the ruling bureaucracy makes it practically impossible to align the contract design by political leaders with wage setting decisions by production managers (planners), even if the latter belong to the stratum of bosses in terms of my model. Maxim Boycko et al. (1995) argue that the separation of control rights from cash-flow rights under centrally-planned economy was the major source of economic inefficiency of the Soviet system. In the theoretical framework of this paper, it results also in political inefficiency by preventing the designers of the promotion contracts from controlling wage. This issue is further discussed in Section 2.6.



duration  $T_a$ , uncertain promotion to the higher-income boss position thereafter, and retirement after  $T_b$  years in office if promoted respectively. Worker  $i$  makes the choice to become an activist if the expected income along the bureaucratic career path exceeds the income as an ordinary worker, given his personal ability:<sup>15</sup>

$$(1) \quad \int_0^{T_a} (W - \omega_i) e^{-rt} dt + \pi \int_{T_a}^{T_a+T_b} R e^{-rt} dt + (1 - \pi) \int_{T_a}^{T_a+T_b} W e^{-rt} dt \geq \int_0^{T_a+T_b} W e^{-rt} dt$$

Inequality (1) yields the cutoff level of disutility  $\omega^*$  that determines activist participation:

$$(2) \quad \omega^* = \pi(R - W) \frac{1 - e^{-rT_b}}{e^{rT_a} - 1}.$$

The supply of activists – the number of workers for whom  $\omega_i < \omega^*$  holds under a given contract – is then the left tail of the distribution of the disutility from the activist service:

$$(3) \quad N_a^s = Z(\omega^*).$$

Since the activists constitute typically only a relatively small proportion of the total population,  $N_a \ll 1$ ,  $Z$  can be approximated with a linear function so that (3) becomes,  $N_a^s = \zeta \omega^*$ , where  $\zeta$  is a constant. In addition, let us measure time in units of the term of activist service,  $T_a$ , so that  $T_a \equiv 1$ .<sup>16</sup> Then the supply of activists is expressed as:

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<sup>15</sup> Post-retirement income flows are not included in the expression, since they are identical for all agents by assumption.

<sup>16</sup> This approach is justified by the fact that the activist service is typically institutionalized (for example, as a probationary period for a new party member or the length of military service for a recruit) and its duration is fixed at least in the short run. By contrast, the tenures are seldom regulated explicitly and its actual length fluctuates as a result of policy changes or political perturbations. Note that a change in the term of activist service *ceteris paribus* translates, by rescaling the time axis, into an increase in the rate of future discounting and a decrease in the length of boss tenure in an equal proportion.

$$(4) \quad N_a^s = \pi\kappa(R - W)(1 - e^{-rT_b}),$$

where  $\kappa = \zeta / (e^{-r} - 1)$ .

It can be easily verified that the supply of activists increases in the expected rents (boss rent<sup>17</sup> and tenure, and the probability of promotion) and decreases in the value of the next best alternative for a worker (workers' wage):

$$(5) \quad \frac{\partial N_a^s}{\partial R} > 0, \quad \frac{\partial N_a^s}{\partial T_b} > 0, \quad \frac{\partial N_a^s}{\partial \pi} > 0, \quad \frac{\partial N_a^s}{\partial W} < 0.$$

### **2.3. The bosses' problem**

At the core of the representative boss's choice problem is the tradeoff between additional rents provided by the activists and the limitation of tenure that the provision of incentives for the activists implies. The bosses, entering the contract with the activists, seek to maximize their residual life-time rents:

$$(7) \quad \bar{R} = \int_0^{T_b} f(N_a) e^{-rt} dt$$

To achieve this goal, they choose the probability of promotion,  $\pi$ , and the length of tenure,  $T_b$ , taking into account the workers' response expressed in the form of the supply of activists (4).

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<sup>17</sup> Boss rent,  $R$ , as introduced in Section 2.1, is a function of the number of activists. However, an individual worker has no information on the outcomes of the current and future recruitment campaigns at the time he or she is making the decision to become an activist. Therefore,  $R$  in the expression for the supply of activist should be interpreted as an exogenously determined expectation of rent, which does not generally satisfy  $R = f(N_a)$ . This identity should hold in the long-run equilibrium, but since the regimes of the type discussed here are relatively short-lived, the long-run equilibrium may never be reached.

An additional stationarity constraint to their problem results from the necessity to balance the inflow of promoted activists and retiring bosses:

$$(8) \quad \pi N_a = \frac{N_b}{T_b}.$$

To simplify further analysis, let us combine the two constraints, by plugging (8) into (4) and rearranging the terms:

$$(9) \quad N_a = \left[ \kappa N_b \Delta R (1 - e^{-rT_b}) / T_b \right]^{1/2},$$

where  $\Delta R = R - W$  is the boss premium. Hereafter, the combined constraint (9) is referred to as the *feasible supply of activists*.

The representative boss's problem is then:

$$(10) \quad \max_{T_b} \int_0^{T_b} f(N_a) e^{-rt} dt$$

subject to (9).

The bosses' objective function (7) can be characterized by the lines of equal levels of residual life-time rents in the  $(T_b, N_a)$  plane – *isorents*. The optimal solution to the problem (10) – an equilibrium in the regime's political labor market – is attained at the point of tangency of an isorent and the feasible supply curve in the  $(T_b, N_a)$  plane that corresponds to constraint (9). Replacing the left-hand side of (7) with an arbitrary constant, integrating the expression, taking logs, and rearranging term obtains an algebraic expression for the isorent:

$$(11) \quad N_a = f^{-1} \left( \frac{rC}{1 - e^{-rT_b}} \right).$$

The isorent (11) is a downward-sloping and convex curve. It behaves approximately as a hyperbolic curve  $T_b^{-\alpha}$  with  $\alpha > 1$  in the vicinity of  $T_b = 0$  (since  $f(N_a)$  is a concave function) and approaches a horizontal asymptote at  $N_a = f^{-1}(rC)$  as  $rT_b$  approaches infinity.

The derivative of feasible supply (9) with respect to boss tenure is:

$$\frac{dN_a}{dT_b} = \frac{1}{2} \sqrt{\kappa N_b \Delta R} \left[ -T_b^{-3/2} (1 - e^{-rT_b})^{1/2} + T_b^{-1/2} (1 - e^{-rT_b})^{-1/2} r e^{-rT_b} \right]$$

Rearranging terms and substituting (9) into the expression above obtains:

$$(12) \quad \frac{dN_a}{dT_b} = \frac{N_a}{2} \left( -T_b^{-1} + r(e^{rT_b} - 1)^{-1} \right) < 0 \text{ for any } T_b > 0.^{18}$$

Therefore, feasible supply is a downward-sloping curve in the  $(T_b, N_a)$  plane. Its maximum value is reached at  $T_b = 0$  and equals:

$$(13) \quad N_a^{\max} = \sqrt{\kappa N_b r \Delta R}$$

which sets the upper boundary on the number of activists under given regime parameters.<sup>19</sup>

The feasible supply curve is also convex, but its curvature is systematically lower than that of an isorent.<sup>20</sup> This guarantees the existence of a unique interior solution to problem (10). A typical configuration of an isorent and the feasible supply constraint is presented in Figure 1. The first-order condition to the problem (10) is:

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<sup>18</sup> The term in brackets,  $-T_b^{-1} + r(e^{rT_b} - 1)^{-1} < 0$ , can be rearranged to obtain  $rT_b + 1 < e^{rT_b}$ , which holds for any  $T_b > 0$  by the properties of the exponential function.

<sup>19</sup> By the L'Hopital rule,  $\lim_{T_b \rightarrow 0} (1 - e^{-rT_b}) / T_b = r e^{-rT_b} = r$ . In fact, the maximal sustainable number of activists falls short of that given by (13) and is determined by the bosses' participation constraint discussed later in this section.

<sup>20</sup> Proof of this statement can be obtained from the author.

$$(15) \quad \frac{dN_a}{dT_b} f'(N_a(T_b))(1 - e^{-rT_b}) + f(N_a(T_b))r e^{-rT_b} = 0$$

Substituting the expression for  $dN_a/dT_b$  from (12) and rearranging terms obtains:

$$(16) \quad \frac{N_a(T_b) f'(N_a(T_b))}{f(N_a(T_b))} = \frac{2rT_b}{e^{rT_b} - 1 - rT_b}$$

that determines the optimal tenure and, implicitly, the optimal probability of promotion. Representation (16) of the first-order condition separates conveniently the effect of the boss tenure (on the right-hand side) from the productivity of activists services (left-hand side).

To analyze the comparative statics of the equilibrium in the political labor market, let us consider the two sides of (16) as the functions of  $N_a$ , denoting the left-hand side expression  $X(N_a)$  and the right-hand side  $Y(N_a) = Y(T_b(N_a))$ . The inverse feasible supply function,  $T_b(N_a)$ , can be obtained from (12). The solution to (16) is therefore the point of intersection of the two curves  $X(N_a)$  and  $Y(N_a)$ . Under this approach, the position of  $X(N_a)$  depends exclusively on the properties of a given  $f(N_a)$ , while the position of  $Y(N_a)$  is affected by the same parameters as the supply of activists. It can be shown that  $Y(N_a)$  has the following properties:  $Y(N_a) > 0$ ,  $Y'(N_a) > 0$ ,  $Y(0) = 0$ , it has a vertical asymptote at  $N_{\max} = \sqrt{\kappa N_b r \Delta R}$ , and its slope is proportional to the inverse of  $N_{\max}$ .<sup>21</sup> An immediate implication is that the equilibrium number of activists is affected by exogenous changes in bosses rents and wages in the same way as the supply of activists and increases in the number of bosses:

$$(17) \quad \frac{\partial N_a^*}{\partial R} > 0, \quad \frac{\partial N_a^*}{\partial W} < 0, \quad \frac{\partial N_a^*}{\partial N_b} > 0.$$

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<sup>21</sup> Proof of this statement can be obtained from the author.

These three derivatives can be jointly interpreted as a positive effect of expected rent – the product of the boss premium and the probability of promotion – on the equilibrium number of activists.

#### **2.4. Production technology**

Further analysis requires specification of the activists' production function,  $f(N_a)$ . I argued earlier in this paper that activists serve primarily as labor supervisors. Activists-supervisors, whose function is to elicit a higher level of effort from fellow workers, can be considered as a sort of labor-augmenting technology. Then the rent-production function can be represented as:

$$(19) \quad f(N_a) = F\{K, (1+aN_a)L\},$$

where  $K$  is capital,  $L$  is labor,  $a$  is a productivity parameter.  $F(K,L)$  is the production function of the economy such that:  $F_K > 0$ ,  $F_L > 0$ ,  $F_{KK} < 0$ ,  $F_{LL} < 0$ ,  $F_{KL} > 0$ .

Under these conditions, the left-hand side of (16) becomes:

$$(20) \quad X(N_a) = aN_a F_L L/F.$$

Obviously,  $X(N_a) > 0$ ,  $X(0) = 0$ . In addition,  $X'(0) > 0$ , and  $X(N_a)$  reaches the maximum at a certain point, which may or may not lie within the range of admissible values of  $N_a$ , to the left of  $\min(1, \sqrt{\kappa N_b r \Delta R})$ . To verify the latter properties, let us differentiate  $X(N_a)$  with respect to the number of activists:

$$(21) \quad \frac{dX}{dN_a} = \frac{aL}{F^2} \left[ (F_L + aLN_a F_{LL})F - aLN_a (F_L)^2 \right] = \frac{aL}{F^2} \left[ F_L + aLN_a \left( F_{LL} - \frac{(F_L)^2}{F} \right) \right]$$

At  $N_a = 0$ , (21) collapses into  $aLF_L/F^2$  and therefore  $X'(N_a) > 0$  at low levels of  $N_a$ . Since the factor in round brackets is negative and the second term increases in absolute value with an increase in  $N_a$ ,  $X''(N_a) < 0$ .<sup>22</sup>

A typical configuration of  $X(N_a)$  and  $Y(N_a)$  for this specification is presented in Figure 2. The number of activists in equilibrium is determined by the intersection of the two curves. A change in the parameters that leads to an increase in  $N_{\max} = \sqrt{\kappa N_b r \Delta R}$  causes a rightward shift of  $Y(N_a)$  and consequently an increase in the optimal number of activists. The position of  $X(N_a)$  is affected by the changes in labor and capital employed in the economy. To determine how, let us consider the derivatives of  $X(N_a)$  with respect to capital and labor. The position of  $X(N_a)$  depends on the elasticity of output with respect to labor input  $F_L L/F$ . If the production technology has unitary elasticity of substitution between labor and capital,  $F_L L/F$  does not depend on factor proportions.<sup>23</sup> If the elasticity of substitution is less than unity, then  $F_L L/F$  increases and  $X(N_a)$  curves fan out as the capital-labor ratio increases. Since less-than-unitary elasticity of substitution is the only practically relevant possibility on the macroeconomic level,<sup>24</sup> we can expect:

$$(22) \quad \frac{\partial N_a^*}{\partial K} > 0, \quad \frac{\partial N_a^*}{\partial L} < 0.$$

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<sup>22</sup> The second term may exceed  $F_L$  to the right of some point  $N^{\wedge}$ . In that region,  $X(N_a)$  bends down. Alternatively,  $X'(N_a)$  may remain positive as  $N_a \rightarrow \infty$ . In both cases,  $X(N_a)$  is concave.

<sup>23</sup>  $X(N_a) = aN_a(1 - \alpha)/(1 + aN_a)$  in the case of Cobb-Douglas production function, where  $\alpha$  is the capital share.

<sup>24</sup> Numerous empirical studies show that the elasticity of substitution between labor and capital is typically less than one for most modern economies. In particular, this applies to the Soviet economy. See further discussion in Section 4.1.

An important implication is that government investment in physical capital calls for increasing numbers of activists. The intuition behind this result is that, with a substantial degree of complementarity between effective labor input and capital, more activists-supervisors have to be hired to elicit additional effort from workers to match an increase in capital. The opposite is true with respect to an increase in the labor force, since activists-supervisors are technically substitutes for crude labor input by assumption. Note also that the marginal effect of an increase in the capital-labor ratio on the magnitude of  $F_L L/F$ , and consequently on the position of  $X(N_a)$ , curves diminishes as the capital-labor ratio increases. This means that the link between investment policy and the recruitment of activists is going to weaken with the accumulation of capital in the economy.

### ***2.5. Bosses' participation constraint and regime change***

I now turn to the discussion of conditions that make the equilibrium in the political market unattainable. An alternative to the regime with collective ownership and rotation of the ruling bureaucracy is the one that is based on private property rights and lacks the support of activists. Rational bosses will choose not to renew the contract with the activists if the latter option promises an absolute advantage over the former. Let us assume that the bosses have a time horizon of  $T_m$ , which is determined exogenously and reflects the perceived stability of the regime.  $T_m$  may be infinite (if the current regime is believed to be everlasting) and in any case:  $T_m > T_b$ . The bosses choose to enter into a promotion contract with the workers at a moment  $T=0$  if the rents accumulated over the period of tenure,  $T_b$ , are expected to exceed those in the absence of activists' support ( $R_0$  per period of time for  $T_m$  periods):



$$(24) \quad \int_0^{T_b} f(N_a) e^{-rt} dt \geq \int_0^{T_m} R_0 e^{-rt} dt .$$

Integrating, taking logs, and rearranging term yields

$$(25) \quad rT_b \geq -\ln\left(1 - \frac{R_0}{f(N_a)}(1 - e^{-rT_m})\right).$$

The numerator of the fraction in (25) lies between 0 and 1. Under the assumption that the activist services contribute significantly to the bosses' capability to collect rents,  $f(N_a) \gg 1$ , the bosses' contract participation constraint approximates as:

$$(26) \quad N_a \geq f^{-1}\left(R_0 \frac{1 - e^{-rT_m}}{rT_b}\right),$$

which is a hyperbolic curve.

Expression (26) determines the lower boundary of a region in the  $(T_b, N_a)$  plane, where the contracts acceptable for the bosses are located. The point of tangency between the participation constraint curve and a feasible supply curve is the boundary optimal contract. At this point the bosses are indifferent between maintaining the contract and the change of regime (Figure 3). Its location is determined by the productivity of activists captured by the parameters of the function,  $f$ , and the bosses' perception of the regime's durability,  $T_m$ . In particular, it follows from (26) that insecure geopolitical environment and/or internal instability, by decreasing  $T_m$ , depress the participation constraint curve and expand the region of acceptable contracts, adding flexibility to the regime. Conversely, a declining threat of aggression or uprising causes the region determined by (26) to shrink, thus making it more

likely that the bosses choose not to enter in the promotion contract and abandon a collectivist regime. Another theoretical possibility is a reduction in the effective rate of future discounting,  $r$ , due to expectations of sustained economic growth. Higher expected rates of growth reduce  $r$ , and consequently increase the argument of  $f^{-1}$  in (26), shifting the participation constraint curve upwards. This implies that bureaucratic regimes may be incompatible with permanent high rates of economic growth.<sup>25</sup>

It is not only the change in the bosses' expectations that, by affecting the location of the participation constraint, can cause regime change but also a downward shift of the supply curve. Real wage increases are of particular importance in this context. As was noted earlier, wage setting in a most centralized command economy is a matter of economic decision-making. This process is institutionally separated from the design of optimal contracts for the political labor market. The industrial bureaucracy may find it beneficial to increase wages to stimulate higher productive effort on the part of ordinary workers, especially when the productivity of activists-supervisors does not yield desirable results. Paul Gregory (2003) argues that the efficiency wage considerations were not foreign to the Soviet leadership and their influence on the economic policy was notable. Therefore, economic efficiency and political support are generally contradictory objectives. While pursuing the former, bureaucrats-managers can lower boss premiums. This depresses the supply of activists to the point when the bosses' participation constraint can no longer be satisfied.

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<sup>25</sup> This is unconditionally true only if all the bureaucrats and workers expect their rents and wages respectively to grow at the same constant rate, which is a restrictive assumption. However, low growth rates are typical of most historical non-democratic regimes. The rates of Soviet GDP per capita growth seldom exceeded three percent per year, and higher rates of growth did not always translate into significant increases in per capita consumption (see Gur Ofer, 1987). Therefore, growth rates per se never appeared to challenge the stability of the regime in the USSR. The future development of the PR

Finally, the ability of the ruling bureaucracy to raise support in the political labor market depends on its ability to control the paths of upward income mobility. Thorough control is never possible. Two major avenues lead to higher incomes that are, at least in part, independent from the bureaucratic control: higher education and the shadow economy. In a small and primitive economy, this problem can be contained. A more complex economy requires, on the one hand, more human capital. This brings about opportunities for higher incomes for “apolitical” professionals. On the other hand, there is more space for illicit economic activity, especially in services. Both undermine the regime by carrying off potential activists, who respond to economic incentives outside of the state-controlled economy. Therefore, modern economic development produces downward pressure on the supply of activists and sets the natural limits to the growth of hierarchical regimes.

### **III. The Soviet political labor market: Institutional framework and data sources**

The dataset I use to test the model is a panel of nine states (republics)<sup>26</sup> of the former Soviet Union. The data cover the period of 1956-1968, roughly coinciding with the leadership of Nikita Khrushchev. This period is characterized by rebounding influx of activists (increasing admission of candidates to the party) after a trough of the mid-1950s. Economic development of the period is characterized by the relatively high rate of growth (about 4% per year) and active investment policy, although there was a marked decelerating trend. There were no significant political and economic shocks during this period, and the institutional

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China may inform us on the impact of sustained growth on the stability of a bureaucratic regime.

setting remained largely unchanged. Neither purges in the ruling party nor massive recruitment campaigns occurred during that period. Therefore, equilibrium promotion contracts should dominate throughout this period.

The primary goal is to show that the changes in the number of communist party candidates – activists in terms of the model – can be explained by changes in the variables that can be associated with certain parameters of the model. In the overview that follows I describe the institutional features of the Soviet political labor market and the available data that can be used in the empirical analysis.

### ***3.1. Institutional setting***

Hierarchy. The Soviet communist party hierarchy was almost an exact match to the hierarchy of administrative (territorial) units. The latter include (top down): union, republic, oblast, district/independent city/urban district, primary party organization (PPO). The Russian Federation, the largest Soviet republic, had no separate party structure, its oblasts administrations reported directly to the union (national) government and oblast party committees directly to the party Central Committee. “Independent city” is a relatively large city subordinated directly to oblast and is not affiliated with any district. Urban districts existed only in large cities and were comparable in population to rural districts and most ordinary independent cities. PPOs were typically associated with industrial enterprises. Most primary party organizations had no paid officials on top. Secretaries of PPOs were paid only in the largest enterprises.

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<sup>26</sup> No reliable data is available for the remaining six republics.

The number of bosses and average boss salaries by republic are the functions of the number of territorial units in every hierarchical level. Changes in administrative (territorial) structure translate automatically into creation and destruction of party bodies and, consequently, changes in the number of paid positions for party officials, i.e. the number of bosses in terms of the theoretical model. Territorial structure was subject to frequent reshuffling. Districts were split and merged every year; independent status could be given to a city and withdrawn a year after. This implies that changes in territorial structure provide for substantial cross-sectional and intertemporal variation in the number of bosses and salaries.

Party membership. The rules of the Soviet Communist party (as in other communist countries) specified a trial period for new members. During this time, new party recruits were titled *candidates*. Upon passing the candidate review successfully, they became *full* party members. Although the probability of promotion into the full membership exceeded 90%, only a small share of the latter actually remained on party career tracks and was able to reach a position in the party bureaucracy. The latter constituted around one percent of total party so that the probability of promotion into the “bosses” (in terms of the model developed in this paper) was of the order of 0.01. The remaining majority of rank-and-file full party members enjoyed minor non-pecuniary benefits of membership (such as softer punishment in case of criminal prosecution, preferential right to occupy certain types of jobs, etc.) and typically remained in the party until death.

The proportion of candidates in the total party membership declined from about eight to five percent over the period of 1956-69 on average. There was, however, a substantial variation in the rate and even the direction of change across republics. The reduction was

largely due to increasing numbers of full party members, resulting from a rapid mortality decline in this period. At the same time, the ratio of party candidates to the total labor force fluctuated around 1:100 without any significant trend.

Benefits of party membership. Party membership was normally a prerequisite for appointment to a top managerial position in all spheres of the economy or for pursuing a career in government: civil administration, economic control, or party. A position of a “leading party worker” (party bureaucrat) was of the utmost importance. There is no indication that party membership per se did pay, but party bureaucracy did receive substantial rents in the form of high salaries and fringe benefits. A major part of the party organizations expenditure, according to national party budgets (RGASPI), was geared to provide benefits to paid party officials, the remainder being used to cover operational expenses and to finance propaganda campaigns. Salaries of paid party officials constituted only a minor portion of their rents. Fringe benefits (health and child care subsidies, relocation packages, etc.) and non-monetary rewards, such as free housing financed from party budgets, constituted a more significant part of their real incomes.

### **3.2. Available data**

Party membership. Numbers of candidates and full members are available on the national level for the whole period of the existence of the Soviet communist party. Republic level data are available for 1956-1968 (UFFA). Significant lacunae in the time series restrict the dataset to only nine republics: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Latvia, Tajikistan, Turkmenistan, and Uzbekistan. In post-Stalin years, the candidate trial period was close to one year, so the number of candidates for a given year equals approximately the

number of new activists. As demonstrates, there is a significant variation in the rates of recruitment across the republics, although the end of the period is marked with convergence, probably due to increasing pressure from the central party leadership.

Party budget, available from archival sources (RGASPI), records total expenditures of the Central Committee (actually, including a number of affiliated central bodies) and territorial organizations. The latter are the aggregate numbers for all administrative units below the national level. The breakdowns by particular republics and oblasts are available only for 1962 and 1964. No data for lower-level units are available. Notwithstanding its limitations, this source is indispensable and, to the best of my knowledge, has never been published, let alone used for analytical purposes.

Party bureaucracy. Numbers of bureaucratic positions and salaries are available for most years from 1940 to 1965 separately for each hierarchical level. Breakdowns by republic are available for 1950, 1962, and 1964. Comparison of national aggregates of party payrolls and total expenditure by territorial party organizations shows that payrolls constituted an almost fixed percentage of party budgets:  $5.8 \pm 0.3\%$  in 1955-65. Since no budget data on any units below the national level is available, I use the data on salaries (averages by republic and by level in the hierarchy) as a proxy for bureaucratic earnings/rents. The same sources provide office size data (the number of bosses per administrative unit).

Salaries vary significantly (30%) with the level in the hierarchy but exhibit very low variation across republics – 2-3% within each hierarchical level. Therefore, the territorial structure of a republic (numbers of units in each level) is likely to be the most important determinant of variation in the party payroll and, consequently, in the average salaries by

republics. Although salary constituted only a part of the total remuneration of a party bureaucrat, it is quite likely that fringe benefits varied with salaries. Anecdotal evidence suggests that illicit incomes of corrupt officials might also have been significant. However, no reliable data are available on the extent of corruption.

No precise information is available on party bureaucrats' tenures. The period of Nikita Khrushchev's leadership was characterized by relatively high rates of job mobility within the bureaucracy, especially until 1961 when the last of Stalin's lieutenants were ousted from the Central Committee.

Territorial structure data are available from published sources (*Narodnoe khoziaistvo SSSR*) for 1956-1968 (as well as later years) for every republic in the sample.

Demographic and economic data are available from published sources, mostly from annual statistical compilations (*Narodnoe khoziaistvo SSSR*). Series of interest include labor force,<sup>27</sup> nominal wages, retail sales, various indicators of public consumption, indices of industrial output, and annual investment in the economy. Capital stock data are not available. All nine republics in the sample are relatively small and internally homogenous. The largest republics are Uzbekistan and Belarus (population around 8 million each, in 1959); the smallest republic is Estonia (just below 1 million).

### **3.3. Reconstruction of missing data**

Testing the model requires data on the number of paid party positions (the number of bosses) and their salaries for each republic for each year. Complete cross-tabulations of this

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<sup>27</sup> Labor force practically equaled employment in the USSR. Published labor force data do not include employed in largely subsistence collective farms, around one fifth of the total working age population.



sort are available only for one year – 1962. In addition, the numbers of bosses and their average salaries by republic (without separation into hierarchical levels) are available for 1964. My approach is based on the assumption that changes in territorial structure are the major source of changes both in the number of bosses (due to change in the total number of units) and in average salaries (due to change in the hierarchical level mix). An advantage of this approach is that it relies on the data on territorial structure that are easily verifiable and hardly could be subject to any deliberate distortion unlike many other series of policy-related data.

I use two methods to impute missing data on the salaries and the size of party bureaucracy. Under the first method, assuming constant republic differentials in pay and office size (the number of bosses per unit) by level (from 1962 data) and applying common trend in these variables (from the annual national data), I calculate the numbers for each level for each republic and aggregate them to obtain republican average salaries and the total numbers of bosses. The second method is to regress average republican salary and office size data for 1962 and 1964 against territorial structure data and national averages for these years, and use predictions of these models. The numbers of PPOs and the salaries of their personnel exhibit relatively high variation across republics and are strongly correlated with the total number of urban settlements by republic. Moreover, higher numbers of these units and salaries are characteristic of more urbanized and industrial republics. For these reasons, I use a common “all cities” variable, as well as republic-specific coefficients, in the regressions. Regression models for imputing salaries and boss numbers are reported in Table 1. Aggregate dynamics calculated on the basis of thus imputed salaries and boss numbers is in good

agreement with national trends with the exception of 1958, when the two largest republics in the sample, Belarus and Uzbekistan, underwent territorial reorganization unmatched in its scale in the rest of the country.

## IV. Empirical implementation and estimation results

### 4.1. Empirical specification

Empirical studies (Martin Weitzman (1970), William Easterly and Stanley Fisher (1995)) show that the Soviet economic growth is consistent with a CES production function with the elasticity of substitution of 0.4.<sup>28</sup> Therefore the generic specification (19) can be replaced with:

$$(27) \quad f(N_a) = [K^\rho + ((1 + aN_a)L)^\rho]^{\varepsilon/\rho}, \quad \varepsilon \leq 1, \rho < 0.$$

Accordingly:

$$(28) \quad X(N_a) = \varepsilon a N_a^\rho [(K/L)^\rho + (1 + aN_a)^\rho]^{-1}.$$

Since reasonable numbers of activists are small ( $N_a \sim 10^{-2}$ ), (28) can be approximated for negative values of  $\rho$  (less than unitary elasticity) and with:

$$(29) \quad X(N_a) = akN_a^\alpha (K/L)^\beta, \quad \text{where } k > 0, 0 < \alpha < 1, 0 < \beta < 1.^{29}$$

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<sup>28</sup> Although some authors (see Padma Desai, 1987) find that Soviet postwar economic growth is consistent with unitary elasticity of substitution, elasticity below one seems to be typical for developing economies. It has been identified, for example, for the South Korean economy (Ky-hyang Yuhn, 1992) and many others. John Duffy and Chris Papageorgiou (2000) find that less developed economies, as a group, are characterized by less-than-unitary elasticity of substitution.

<sup>29</sup> Note that  $\alpha$  and  $\beta$  here are only to parameterize the approximation of  $X(N_a)$  and bear no meaningful relationship to  $\rho$  and other parameters of (28). Estimation of the latter is beyond the scope of the present research.

Similarly, it can be shown that for reasonable values of the number of activists and parameters:

$$(30) \quad Y(N_a) \cong bN_a^\gamma (\kappa N_b r \Delta R)^\delta, \quad \text{where } \gamma > 1, \delta < 0.$$

Figure 4 presents an example of a family of  $X(N_a)$  curves (28) and their approximations (29) corresponding to the elasticity of substitution 0.4 ( $\rho = -1.5$ ), constant returns to scale, various capital-labor ratios in the vicinity of  $K/L = 1$ , and the productivity parameter  $a = 10$ . Parameter values in (29) –  $k = 0.204$ ,  $\alpha = 0.838$ ,  $\beta = 0.684$  – were obtained by minimizing the unweighted sum of squared errors of approximation over the range of  $N_a$  from 0.002 to 0.06.

Combining (29) and (30), taking logs, rearranging terms, and relabeling coefficients obtains the reduced form equation:

$$(31) \quad \ln(N_a) = \beta_0 + \beta_1 \ln(N_b) + \beta_2 \ln(\Delta R) + \beta_3 \ln(K/L),$$

where  $\beta_1 > 0$ ,  $\beta_2 > 0$ ,  $0 < \beta_3 < 1$ , as follows from (29) and (30).

I use the number of party candidates for the number of activists. This is an accurate proxy, since the candidate term in the studied period was about one year on average. The part of the population relevant in the context of activist recruitment is practically limited to young male workers – a vast majority of new candidates were recruited from this stratum. Because of the absence of adequate age and gender distribution data, the total labor force is used instead. The bureaucratic premium,  $\Delta R$ , is the gap between bureaucratic rents,  $R$ , and the workers' real wages. The former are approximated with average salaries of the party officials. Several variables are used as the indicators of the real wages. Because of the typical for the Soviet economy price distortions, pervasive shortages in consumer markets and absence of

opportunities for private investment, nominal wage data are of little use. Retail sales,  $RS$ , per worker is therefore a measure of consumption expenditure per wage earner.  $RS$  should have a negative effect on the number of activists. Three indicators of public consumption – enrollment in higher education institutions,  $ST$ , new public housing construction in square meters,  $NH$ , and physicians per capita,  $PH$  – should also have a non-positive effect (negative if provision of public goods is correlated with wages and zero otherwise). In addition, enrollment in the institutions of higher education serves as a proxy for the availability of the “outside option” for potential activists: non-party professional careers.<sup>30</sup> Therefore, enrollment is likely to have a strictly negative effect on the number of activists. Finally, investment measures, investment per worker and the change in investment rate, used here as correlates of the changes in the capital-labor ratio should have positive effect of less-than-unitary magnitude.

The model is estimated using first-order log differences in order to exclude the time trend and fixed effects. The complete empirical specification is given by:

$$(32) \quad \Delta \ln(N_{a\ it}) = \beta_0 + \beta_1 \Delta \ln(N_{b\ it}) + \beta_2 \Delta \ln(R_{it}) + \beta_3 \Delta \ln(RS_{it}) + \beta_4 \Delta \ln(L_{it}) \\ + \beta_5 I_{it} + \beta_6 \Delta \ln(ST_{it}) + \beta_7 \Delta \ln(PH_{it}) + \beta_8 \Delta \ln(NH_{it}) + \varepsilon_{it},$$

where  $I_{it}$  replaces  $K/L$  in the prototype specification (31) and is alternatively log of investment per worker,  $\ln(I/L)$ , or the change in investment rate,  $\Delta \ln(I/Y)$ .

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<sup>30</sup> Because all education was free of charge, demand for college education (number of applicants) typically exceeded admission. Therefore, total enrollment is equivalent to the number of “promotion tickets” available to the population outside of the party promotion machine. Although party membership was a plus for an applicant, it was not a prerequisite for admission and higher education is therefore a distinct alternative to activist service.

Labor force,  $L_{it}$ , is present in (32) as the denominator for the other variables (except investment and physicians per capita). The theoretical model deals with the numbers of activists and bosses as shares of labor force, and the wage (retail divided by labor). Enrollment and housing also should be measured with respect to the total labor force. Therefore, the net effect of the labor force is given by:

$$(33) \quad \beta_{NL} = \beta_1 + \beta_3 + \beta_4 + \beta_6 + \beta_8 - 1.$$

This net effect should equal zero if the linearized model (29) is sufficiently accurate and the proxies for the change in capital-labor ratio are adequate.

Predictions of the promotion contract model with respect to the empirical specification (32) are summarized in Table 2.

#### **4.2. Estimation results**

The model (32) is estimated using the feasible GLS method with three error term specifications: random effects, cross-sectional heteroskedasticity, and cross-sectional correlation.<sup>31</sup> Specifications with salaries and numbers of bosses imputed using the two methods described in Section 3.3 yield similar results, although the second method (regression) produces coefficients with higher levels of significance. Only the results from the estimations that rely on the second method are reported. Both proxies for the change in capital-labor ratio produce similar results (reported in Table 3a), with the exception of the effect of investment itself, which has higher significance if log change in investment rate is

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<sup>31</sup> First-differencing practically removes cross-sectional variation: between-variance accounts for less than two percent of the overall variance in  $\Delta \ln(N_{a it})$ . If (32) is estimated using fixed effects, the null hypothesis (all fixed effects equal zero) cannot be rejected. I also find no evidence of first-order serial correlation. These two types of specifications are not reported in this paper.

used (columns (4-6) in Table 3a). All these estimates are robust against sample selection. In particular, truncation of the time period on either or both sides or removal of one to four cross-sections at random does not affect the sign and the order of magnitude of any parameter estimate. Experimenting with various subperiod dummies, I find that an additional constant for the years after 1961 improves the results most significantly. Estimates with the *After\_1961* dummy are reported in Table 3b.

The signs and magnitudes (whenever applicable) of the parameter estimates are consistent with the promotion contract model. The number of bosses,  $N_b$ , has a positive coefficient as expected. Bureaucratic rent (boss salary),  $R$ , also has positive effect, although its significance is low. Signs and magnitudes of both investment indicators are consistent with the production technology with low elasticity of substitution between labor and capital. Net effects of labor force, insignificantly different from zero, suggests that linearized model (29) is appropriate. The variables that measure public consumption – enrollment in higher education institutions,  $ST$ , new public housing construction,  $NH$ , and physicians per capita,  $PH$ , – also have expected signs or are insignificant ( $NH$ ). These effects provide additional support for the theoretical result that the wages of the working population (broadly conceived) should have a destimulating effect on the supply of activists. This result can be also considered within the framework of the models of political dictatorship discussed in the Introduction (Grossman and Noh, 1994; Wintrobe, 1998). Their prediction that the power-maximizing dictatorship should produce public goods that are valued by the population in order to buy loyalty of the latter is not supported by my results. The approach employed in this paper produces the results that are in a better agreement with the data. Enrollment,  $ST$ , can be also interpreted, as I argue earlier, as an indicator of the availability of alternative

opportunities for vertical income mobility which was not introduced explicitly in the theoretical model. The negative effect of this variable is in agreement with this interpretation. It can be argued, however, that the ruling bureaucracy values an educated ‘cadre’ and, therefore, higher education increases the chances for promotion and/or is one possible sort of reward for the activists. This contradicts the alternative-opportunity function of higher education. The low significance of *ST* in most specifications can be, therefore, considered as resulting from the counteraction of the two effects of the higher education on the incentives to join the party. Finally, significant negative estimates of the *After\_1961* dummy can be explained by the elevated expectations of promotion on the part of the activists due to the temporary increase in the rate of turnover within the bureaucracy in 1956-61, when Stalin’s cohort of bosses was largely forced to retire.

A distinctive feature of the results is the higher significance of variables that correspond to the negative stimuli to join the party (retail sales, enrollment in higher education, etc.) vs. low significance of positive ones (the number of bosses and their average salary). The contribution of the latter into the explained variation is one order of magnitude lower than that of the former. Although the proxy for bureaucratic rents used here – salary – accounts for only a portion of the total remuneration of the bureaucrats, there might be a more general explanation for the relative strength of the “push” to seek for political careers, as opposed to the “pull” of expected rents. The variables that determine the latter are far from perfectly observable for a worker considering the choice to become an activist. The information on the number of positions in the bureaucracy and the bosses’ salaries and benefits is hardly public domain under any non-democratic regime. It could be acquired

indirectly and distorted in transmission. Given the high noise-to-signal ratio for this type of information and the large gap between the bureaucratic rents and the consumption of an ordinary worker, it is not surprising that the elasticity of response to the short-term fluctuations in the latter is much higher. An important corollary to this finding is that future empirical research on hierarchical regimes is not going to be significantly hampered by the lack of access to the data that pertain to the opaque higher tiers of the ruling bureaucracies, as long as economic variables corresponding to the negative incentives can be observed.

In part, these results reconfirm earlier findings by Schnytzer and Sustersic (1998) for the former Yugoslavia. The essence of their findings is that the lower wages and employment, the higher the supply of activists, as revealed in the party recruitment rates. In other words: the worse for the country, the better for the bureaucracy. The negative treatment effect of the post-1961 period indirectly contradicts the positive effect of repression on the support for the regime identified by these authors, since it was the period of 1956-61 that was characterized by more liberal policies in the Soviet Union. My results are also in general agreement with the results of the cross-country studies by Feng and Zak (1999) and Barro (1999), although the difference in theoretical premises and variable definitions makes a direct comparison difficult. Both studies reveal positive correlation between low inequality and high level of education with the probability of democratic transitions (the former) or propensity for democracy (the latter). Both these findings and my results are consistent with the assumption of the rent-maximizing ruling bureaucracy and the rational population, responsive to promotion incentives. The analysis in this paper, however, shows clearly that both sides of the political labor market influence the observed outcomes significantly. Economic incentives for both



incumbent bureaucrats and activists determine the equilibrium number of party candidates under a hierarchical regime.

## **V. Conclusion**

Collective bureaucratic control rights over the economy, as opposed to private property rights, create the possibilities for the incumbent bureaucracy to “buy” support and rent-augmenting services of the activists in exchange for promises of deferred promotion. Institutional forms that facilitate the political-economic exchange of this type vary historically and across countries. What they all have in common is the turnover within the hierarchical ruling stratum and implicit promotion contracts that provide participation incentives for both the workers and the ruling bureaucracy. Efficiency of this exchange is a function of the income gap between workers and bureaucrats: the more thorough the bureaucratic control over the paths of upward income mobility in the society, the closer its position is to the monopsony in the political labor market, the more rents can the bureaucracy capture. It also depends on production technology. Activists’ supervisory service is essentially a labor-augmenting technology. In an economy with low elasticity of substitution between labor and capital, this produces a positive correlation between the bureaucrats’ demand for activists and public investment.

The two groups of factors affecting the supply of activists and the rulers’ demand for activist services are responsible for the emergence of hierarchical regimes. Most such regimes were established in the 20<sup>th</sup> century in the countries that were characterized by high inequality and were facing developmental challenges (Russia, China, Iran, etc.) or were experiencing

prolonged economic stagnation (Germany, Spain). The same factors can lie behind endogenous democratic transitions. The regime analyzed in this paper, USSR in the 1950s-60s, is an example of a stable hierarchical regime, probably far removed from its bosses' participation constraint. However, we are able to observe the impact of the economic parameters of the promotion contract on the political. Economic development may bring the equilibrium of such a regime to its participation constraint thus causing a political transition. In fact, the general logic of modern economic development makes this political development inevitable. On the one hand, as an economy on the modern growth path becomes more complex, the rulers gradually lose control over the earnings. If the rates of economic growth are relatively low, then the bureaucratic premium will decrease. If the rates are high, the expectations of sustained growth are likely to make the certain earnings of ordinary workers preferable to the lottery of activist service. In either case the supply of activists is affected adversely. On the other hand, the demand effect of investment policy fades away with the accumulation of capital in an economy with a low elasticity of capital-labor substitution. Adoption of modern labor-substituting technologies reverses this effect altogether. Again, in either case the economic foundation of a hierarchical regime is bound to decay. It should be added that throughout this paper the promotion contract was assumed enforceable, while in fact neither it can be enforced by a third-party due to its implicit nature nor it is in general self-enforcing. Autocracy (personal dictatorship) can prevent the bureaucrats from renegotiating the contract thus undermining long-term stability of a regime. However, in the absence of an extreme threat to the regime, the costs borne by individual bureaucrats under dictatorial rule are excessive, and they choose oligarchic rule. Unable to keep the tenures of incumbents from rising, it accelerates the movement towards the abolition of the hierarchical regime in an

economy at a sufficiently high level of development. A scenario of this kind realized in the former Soviet Union and Eastern Europe. Simultaneous analysis of political variables and economic parameters of the promotion contract could also shed a light on the prospects of the contemporary political monopolies such as China, North Korea, and Iran.

## References

### *Literature*

- Acemoglu, Daron, and James Robinson. 2000. "Why Did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective." *Quarterly Journal of Economics*. 115: 1167-99.
- Acemoglu, Daron, and James Robinson. 2001. "A Theory of Political Transitions." *American Economic Review*. 91: 938-63.
- Barro, Robert. 1999. "Determinants of Democracy." *Journal of Political Economy*, 107, 158-83.
- Best, Heinrich, and Ulrike Becker (eds.), 1997. *Elites in transition*. Leske+Budrich, Opladen.
- Brennan, Geoffrey, and James Buchanan. 1980. *The Power to Tax: Analytical Foundations of a Fiscal Constitution*. Cambridge University Press, Cambridge, Mass.
- Desai, Padma. 1987. *The Soviet Economy: Problems and Prospects*, Blackwell: Oxford.
- Duffy, John, and Chris Papageorgiou. 2000. "A Cross-Country Empirical Investigation of the Aggregate Production Function Specification." *Journal of Economic Growth*, 5, 87-120.
- Easterly, William, and Stanley Fischer. 1995. "The Soviet Economic Decline." *World Bank Economic Review*, 9, 341-71.
- Feng, Yi, and Paul Zak. 1999. "The Determinants of Democratic Transitions." *Journal of Conflict Resolution*. 43, 162-77.
- Gershenson, Dmitriy, and Hershel Grossman. 2001. "Cooption and Repression in the Soviet Union." *Economics and Politics*, 13, 1-17.
- Gregory, Paul. 2003. *Political Economy of Stalinism*. Cambridge University Press, Cambridge, Mass.
- Grossman, Herschel, and Suk Jae Noh. 1994. "Proprietary Public Finance and Economic Welfare." *Journal of Public Economics*, 53, 187-204.
- Harrison, Mark. 2002. "Coercion, Compliance, and the Collapse of the Soviet Command Economy." *Economic History Review*, 55, 397-433.
- Lazarev, Valery. 2001. "Political Economy of the Soviet Regime and Its Post-communist Transformation." University of Warwick, PERSA Working Paper: 11.
- Lazear, Edward, and Sherwin Rosen. 1981. "Rank-Order Tournaments as Optimum Labor Contracts." *Journal of Political Economy*, 89, 841-64.

- Lee, Hong Yung. 1991. *From Revolutionary Cadres to Party Technocrats in Socialist China*. University of California Press, Berkeley, Los Angeles, Oxford.
- McGuire, Martin, and Mancur Olson. 1996. "The Economics of Autocracy and Majority Rule: The Invisible Hand and the Use of Force." *Journal of Economic Literature*, 34, 72-96.
- Moselle, Boaz, and Benjamin Polak. 2001. "A Model of a Predatory State." *Journal of Law, Economics, and Organization*. 17, 1-33.
- Ofer, Gur. 1987. "Soviet Economic Growth." *Journal of Economic Literature*, 25, 1767-1833.
- Olson, Mancur. 1993. "Dictatorship, Democracy, and Development." *American Political Science Review*, 87, 567-76.
- Prendergast, Canice. 1999. "The Provision of Incentives in Firms." *Journal of Economic Literature*, 37, 7-63.
- Schnytzer, Adi and Janez Sustersic, 1998. "Why Join the Party in a One-party System?: Popularity versus Political Exchange." *Public Choice*, 94, 117-34.
- Shleifer, Andrei, and Robert Vishny. 1993. "Corruption." *Quarterly Journal of Economics*, 108, 599-617.
- Valsecchi, Irene. 2000. "Job Assignment and Promotion." *Journal of Economic Surveys*, 14, 31-51.
- Voslenskii, M. S. 1984. *Nomenklatura: the Soviet Ruling Class*. Doubleday, Garden City, N.Y.
- Wintrobe, Ronald, 1998. *The Political Economy of Dictatorship*. Cambridge University Press, Cambridge, New York and Melbourne.
- Yuhn, Ky-hyang. 1991. "Economic Growth, Technical Change Biases, and the Elasticity of Substitution: a Test of the De La Grandville Hypothesis." *Review of Economics and Statistics*, 73, 340-6.

### ***Data sources***

- Andreev, Darskii, and Kharkova. 1993. *Naselenie Sovetskogo Soiuza, 1922-1991 [Population of the Soviet Union, 1922-1991]*. Nauka, Moskva.
- Ezhgodnik BSE [Great Soviet Encyclopedia; Annual Appendices]*, 1971-1990. Sovetskaia entsiklopediia, Moskva.

*Narodnoe khoziaistvo SSSR* [*National economy of the USSR*]. Various issues, 1956-1969.  
Statistika, Moskva.

*Rabochii klass SSSR. 1966-1970. [Working class of the USSR in 1966-70.]* 1979. Nauka,  
Moskva

*RGASPI: Russian State Archive of Socio-Political Information. Fond 17 (Central Committee of the Communist Party of the Soviet Union): Opis 7 (Statistical department), Opis 75 (Finance department).* Hoover/Chadwick-Healey. Soviet State and Party Archives Microfilm Series.

*UFFA: John Scherer, ed. USSR Facts and Figures Annual.* Various issues: 1977-1980.  
Academic International Press.

## Tables

**Table 1a. Imputation of boss salaries; regression model.**

| Variable           | Coefficient | Std. Error | p-level |
|--------------------|-------------|------------|---------|
| OBLAST             | 2.1024      | 0.3416     | 0.0005  |
| INDEPENDENT_CITY   | 0.5523      | 0.0610     | (0)     |
| SALARY_NATIONAL    | 0.9226      | 0.0172     | (0)     |
| URBAN_DISTRICT     | 2.4715      | 0.3155     | 0.0001  |
| ALL_CITIES         | -0.4402     | 0.1466     | 0.0199  |
| ALL_CITIES*AZERBAI | -0.2294     | 0.0784     | 0.0222  |
| ALL_CITIES*BELARUS | -0.2633     | 0.1068     | 0.0433  |
| ALL_CITIES*ESTONIA | 0.3361      | 0.0753     | 0.0029  |
| ALL_CITIES*GEORGIA | -0.3007     | 0.0797     | 0.0070  |
| ALL_CITIES*LATVIA  | 0.2558      | 0.0982     | 0.0352  |
| ALL_CITIES*UZBEK   | -0.5832     | 0.1269     | 0.0025  |

$$R^2 = 0.9867$$

**Table 1b. Imputation of number of bosses; regression model.**

| Variable           | Coefficient | Std. Error | p-level |
|--------------------|-------------|------------|---------|
| RURAL_DISTRICT     | 8.0712      | 0.9059     | (0)     |
| BOSSSES_NATIONAL   | 0.0081      | 0.0009     | (0)     |
| ALL_CITIES         | -11.4004    | 4.7940     | 0.0414  |
| ALL_CITIES*AZERBAI | 21.4338     | 3.2951     | 0.0001  |
| ALL_CITIES*BELARUS | 36.5713     | 4.2045     | (0)     |
| ALL_CITIES*ESTONIA | 8.1200      | 2.5207     | 0.0105  |
| ALL_CITIES*GEORGIA | 20.9038     | 3.1715     | 0.0001  |
| ALL_CITIES*LATVIA  | 14.5777     | 3.3752     | 0.0019  |
| ALL_CITIES*UZBEK   | 47.8951     | 3.7113     | (0)     |

$$R^2 = 0.9988$$

**Table 2. Expected effects in the empirical model**

| Variable                | Expected effect |
|-------------------------|-----------------|
| Number of bosses        | $> 0$           |
| Average boss salary     | $> 0$           |
| Retail sales            | $< 0$           |
| Students                | $< 0$           |
| Physicians per capita   | $\leq 0$        |
| New housing             | $\leq 0$        |
| Investment              | $(0, 1)$        |
| Labor force, net effect | $0$             |



**Table 3a. Estimation results.**

|                         | (1)                    | (2)                   | (3)                    | (4)                    | (5)                    | (6)                    |
|-------------------------|------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|
| Constant                | 0.0280<br>(0.0613)     | -0.0175<br>(0.0456)   | 0.0372<br>(0.0654)     | 0.0684<br>(0.0521)     | 0.0382<br>(0.0372)     | 0.0801<br>(0.0568)     |
| Number of bosses        | 0.5774***<br>(0.2227)  | 0.3239<br>(0.2049)    | 0.5606**<br>(0.2457)   | 0.4589**<br>(0.2214)   | 0.2632<br>(0.1940)     | 0.4664*<br>(0.2401)    |
| Average boss salary     | 0.4252<br>(0.4278)     | 0.2998<br>(0.3318)    | 0.3848<br>(0.4711)     | 0.4752<br>(0.4368)     | 0.2223<br>(0.2951)     | 0.4558<br>(0.4613)     |
| Retail sales            | -1.4120***<br>(0.4587) | -0.4808<br>(0.3541)   | -1.4476***<br>(0.4940) | -1.3328***<br>(0.4464) | -0.5925*<br>(0.3201)   | -1.4012***<br>(0.4851) |
| New housing             | -0.0143<br>(0.1040)    | 0.0278<br>(0.0559)    | 0.0056<br>(0.1177)     | -0.0117<br>(0.1038)    | -0.0105<br>(0.0569)    | -0.0001<br>(0.1140)    |
| Physicians per capita   | -1.1415**<br>(0.5540)  | -0.4954<br>(0.3209)   | -1.0911*<br>(0.6109)   | -0.8666<br>(0.5452)    | -0.6055**<br>(0.3094)  | -0.8351<br>(0.5678)    |
| Students                | -0.6093**<br>(0.2865)  | -0.4236**<br>(0.1835) | -0.5329*<br>(0.3149)   | -0.6835**<br>(0.2734)  | -0.5730***<br>(0.1628) | -0.6104**<br>(0.3033)  |
| Investment              | 0.0888*<br>(0.0484)    | 0.0682*<br>(0.0409)   | 0.0788<br>(0.0524)     | 0.3629**<br>(0.1483)   | 0.2621***<br>(0.0706)  | 0.3469**<br>(0.1564)   |
| Labor force             | 2.6532***<br>(0.5922)  | 1.7546***<br>(0.3219) | 2.4696***<br>(0.6364)  | 2.5069***<br>(0.5986)  | 1.7100***<br>(0.3002)  | 2.2844***<br>(0.6377)  |
| Labor force, net effect | 0.1950<br>(0.7277)     | 0.2019<br>(0.4503)    | 0.0554<br>(0.7985)     | 0.0623<br>(0.7245)     | 0.2027<br>(0.4077)     | 0.2609<br>(0.7885)     |
| $R^2$                   | 0.283                  | 0.237                 | 0.285                  | 0.303                  | 0.267                  | 0.305                  |

## Notes:

- 1) Standard errors in parentheses.
- 2) Error term specifications: (1-2), (4-5) – cross-sectional heteroskedasticity; (2), (5) – cross-sectional correlation; (3), (6) – random effects..
- 3) Investment: (1-3) –  $\log(I/L)$ ; (4-6) –  $\Delta \ln(I/Y)$ .
- 4) Significance: \* – 10%, \*\* – 5%, \*\*\* – 1%.

**Table 3b. Estimation results (with time period dummies).**

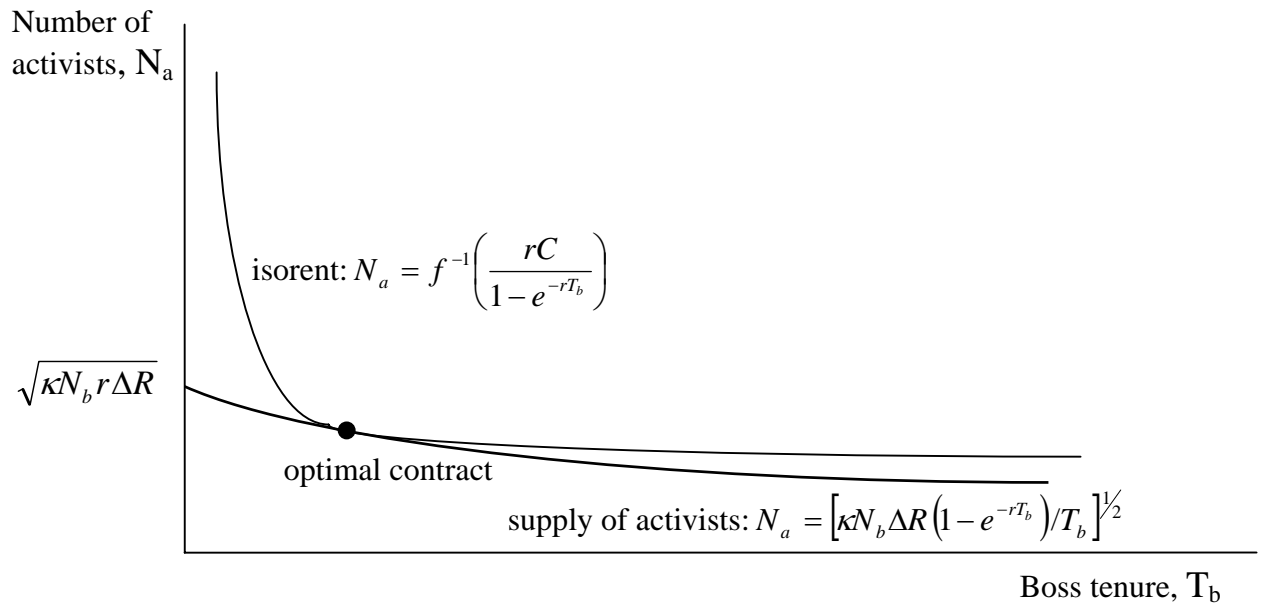
|                            | (1)                    | (2)                    | (3)                   |
|----------------------------|------------------------|------------------------|-----------------------|
| Constant                   | 0.1196**<br>(0.0532)   | 0.1274***<br>(0.0490)  | 0.1220**<br>(0.0587)  |
| After 1961                 | -0.1004***<br>(0.0361) | -0.1257***<br>(0.0478) | -0.0904**<br>(0.0404) |
| Number of bosses           | 0.6692***<br>(0.2212)  | 0.4328**<br>(0.1859)   | 0.6431***<br>(0.2479) |
| Average boss salary        | 0.8327*<br>(0.4260)    | 0.4386<br>(0.2704)     | 0.7239<br>(0.4670)    |
| Retail sales               | -0.7922*<br>(0.4769)   | -0.3916<br>(0.3078)    | -0.8910*<br>(0.5267)  |
| New housing                | -0.1447<br>(0.1066)    | -0.1016*<br>(0.0577)   | -0.1083<br>(0.1216)   |
| Physicians per capita      | -1.1092**<br>(0.5191)  | -0.7823***<br>(0.2990) | -0.9642*<br>(0.5586)  |
| Students                   | -0.3384<br>(0.3025)    | -0.3270**<br>(0.1595)  | -0.2858<br>(0.3304)   |
| Investment                 | 0.3442**<br>(0.1410)   | 0.2441***<br>(0.0639)  | 0.3352**<br>(0.1531)  |
| Labor force                | 1.8242***<br>(0.6313)  | 1.3426***<br>(0.2988)  | 1.6451**<br>(0.6865)  |
| Labor force,<br>net effect | 0.2181<br>(0.7054)     | -0.0448<br>(0.4198)    | 0.0031<br>(0.7805)    |
| $R^2$                      | 0.339                  | 0.314                  | 0.342                 |

Notes:

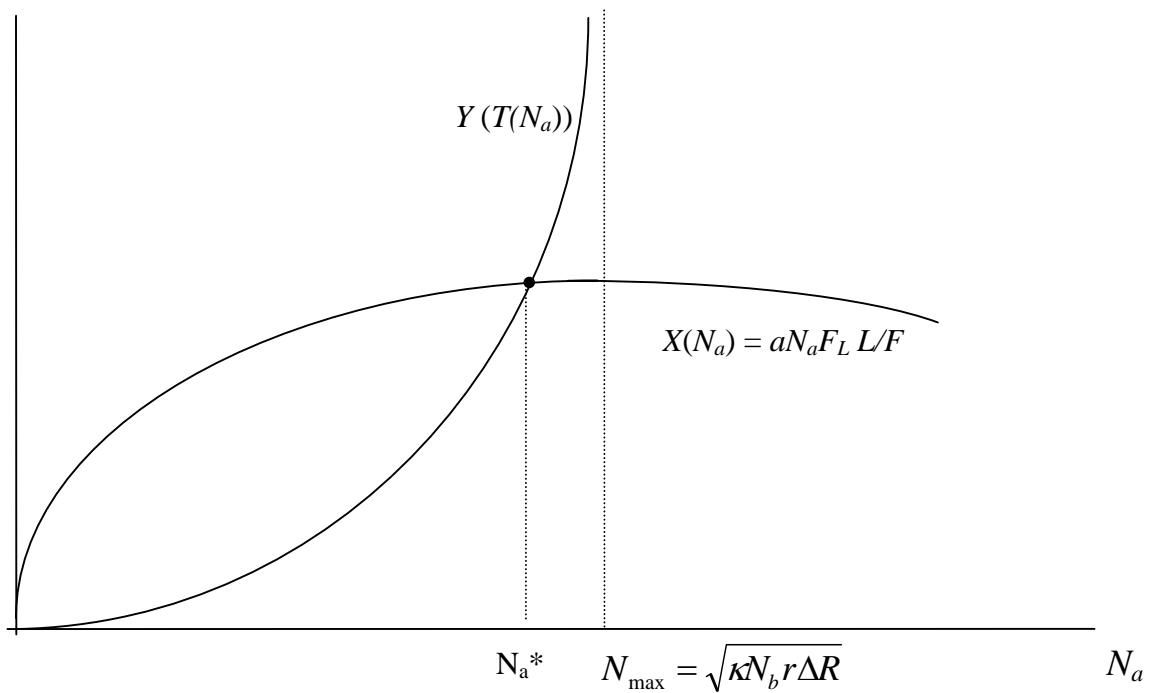
- 1) Standard errors in parentheses.
- 2) Error term specifications: (1-2) – cross-sectional heteroskedasticity; (2) – cross-sectional correlation; (3) – random effects..
- 3) Investment:  $\Delta \ln(I/Y)$ .
- 4) Significance: \* – 10%, \*\* – 5%, \*\*\* – 1%.

## Figures

**Figure 1. Geometry of a promotion contract.**



**Figure 2. Configuration of  $X(N_a)$  and  $Y(N_a)$  and the equilibrium number of activists.**



**Figure 3. Bosses' participation constraint and the point of regime change.**

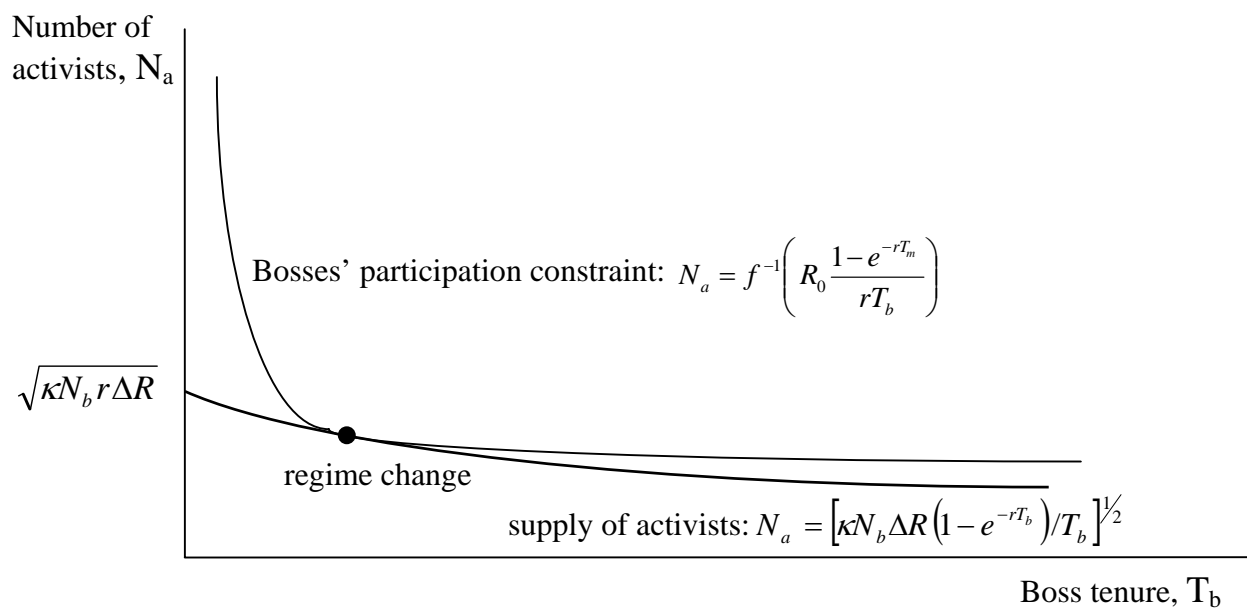
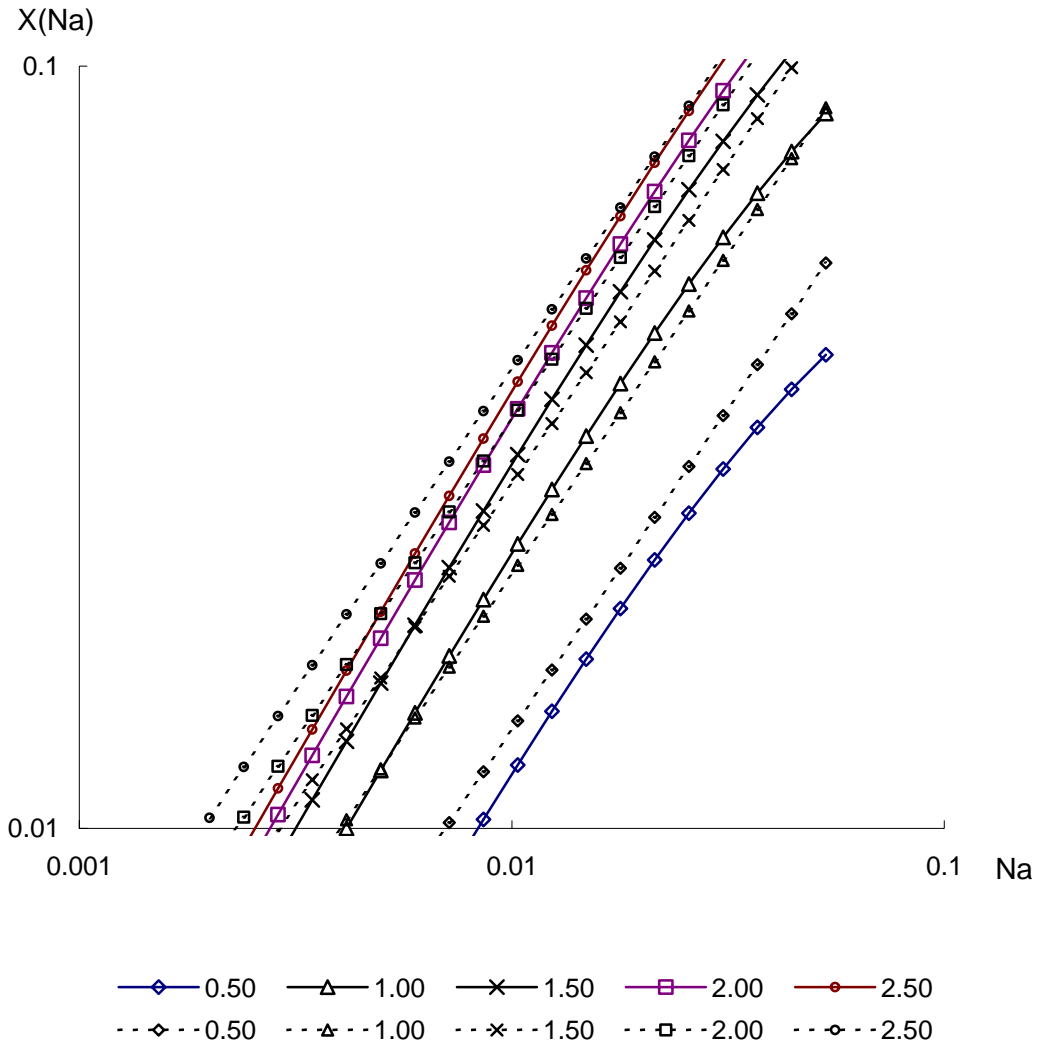


Figure 4. Approximation of  $X(Na)$  for CES production function.



Solid lines:  $X(N_a) = \varepsilon a N_a^\rho [(K/L)^\rho + (1 + a N_a)^\rho]^{-1}$ ,  $\rho = -1.5$ ,  $a = 10$ ,  $r = 0.03$ ,  $\varepsilon = 1$ .

Dashed lines: approximations  $X(N_a) = a k N_a^\alpha (K/L)^\beta$ ,  $k = 0.204$ ,  $\alpha = 0.838$ ,  $\beta = 0.684$ .