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INPUT MARKETS DEVELOPMENT, PROPERTY RIGHTS, AND EXTRA-MARKET REDISTRIBUTION

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Abstract

The paper links the intensity of re-distributional activities within an economy to the availability of the input markets. When an individual is faced with a choice between productive vs non-productive (re-distributional) activities, the outcome heavily depends on whether this individual can match his/her personal endowment of human resources (labor, entrepreneurial talent, skills etc.) with commensurable quantities of transferable economic inputs, which are required to complement the human resources in production technologies. If the markets for these inputs are missed or impeded, rational individuals could be forced into re-distribution, where "technologies" do not require matching inputs.

However, the development of the input markets alone is not sufficient to suppress re- distributional activities. Another factor to be taken into account is the degree of protection of property rights. An equilibrium model is presented to demonstrate that if property rights are adequately protected, then opening of the input markets undermines the incentive to seek re-distributional gains. On the other hand, if property rights are protected poorly, making input markets available could further stimulate re-distribution, as the society is getting richer, and the rate of return to re-distributional efforts goes up.

Implications of the above observations for institutional change and economic reform are briefly discussed in conclusion.

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1 Introduction

Common wisdom suggests that inequality and growth are positively correlated with each other - hence the trade-off between economic efficiency and equity. The link is usually believed to be incentive-based: excessive redistribution, institutionalized as a public policy, would undermine the power of market forces, including the entrepreneurial energy and responsiveness of economic agents to market signals.

These conjectures, however, implicitly assume that there is indeed an opportunity to respond to inequality in a conventional way - that is, to put economic resources that individuals possess, to better use. It includes human resources which in order to earn a higher return need to be enhanced by acquiring new knowledge and skills, reallocated between areas of occupation, and otherwise moved along the labor market. What is ultimately required is to match in right combination these resources with other factors of production. If such a reaction to inequality is feasible, inequality indeed plays an economically productive role, being a key component of "dynamic disequilibrium" that produces efficiency gains through innovation, adjustment and restructuring. In this case inequality releases its "economic energy" without breeding social and political tension.

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If, however, the opportunities to respond to inequality in the ways described above are foreclosed, it prompts attempts to seek a redress by extra-market redistributional means. This time it is *in*equality that stifles economic growth by undermining security of property rights and diverting valuable resources to socially non-productive activities. In other words, the equity-efficiency trade-off presupposes an adequate market environment; otherwise this trade-off applies in reverse.

The nature of redistributional reaction to inequality depends on political and social institutions. In a functional democracy redistribution in response to widening inequality could be accomplished through majority voting (see e.g. Alesina, Rodrik, 1994). Otherwise, redistribution to alleviate inequality is pursued by means of contention - from political pressure to riots and crime (Ehrlich, 1973; Eaton, White, 1991).

Inequality per se, when it goes beyond the limits of social tolerance, can be a strong driving force for extra-market redistribution. At the same time, redistributional activities which are apparently prompted by inequality, often allow an explanation in terms of individual rationality without resorting to interpersonal comparisons. Namely, an individual decides to invest her human resources (time, entrepreneurship, human capital) into extra-market redistribution, because she does not have sufficient *complementary inputs* (land, capital, workplaces etc.) required to put her human resources into productive use. Extra-market redistribution is much less dependent on complementary inputs, and therefore yields to a deprived person a relatively higher return. As for poverty itself, it is just a consequence of low endowment of complementary inputs, and otherwise has no causal links to redistribution. In other words, extra-market activities are ultimately prompted by a skewed allocation of factors of production, rather than inequitable size distribution of income.

These arguments link behavioral response to inequality of endowments with allocation of human resources (time, entrepreneurship, human capital etc.) over productive and non-productive activities. Such allocation, which has a strong impact on economic welfare and growth, is primarily driven by incentives: whether a rational individual decides to seek economic gains by productive or non-productive means, depends on prevailing institutions, available opportunities, and anticipated payoffs, rather than on this individual's innate preferences and merits (Buchanan, 1980). In particular, Baumol (1990) emphasizes the universality of entrepreneurial skills, which are viewed as an allocable multi-purpose resource. The aggregate supply of this resource exhibits much lower elasticity, than contributions of the enterprise toward either productive purposes or rent seeking. The latter can vary substantially, reflecting evolving social 'rules of the game'.

The above observations stimulated the development of general equilibrium models with human resources subject to allocation between directly productive market activities and redistributional extra-market efforts (Murphy, Shleifer, Vishny, 1991,1993; Usher, 1992; Grossman, 1994; Polishchuk, 1996b). According to most of these studies, extra-market redistribution, or rent seeking (both are viewed in this paper as synonyms), hurts economic efficiency directly - by diverting human resources from production, and indirectly, by further undermining the incentive to produce because of anticipated loss of a big chunk of the output to rent seekers.

The results of comparisons of returns to productive and non-productive activities, and therefore the propensity to engage in rent seeking, depend on the strength of protection of property rights. Other things being equal, productive activities outperform rent seeking as long as the protection of property rights is sufficient to keep the cost of rent seeking above the opportunity cost of human resources in production (Murphy, Shleifer, Vishny, 1993).

The above arguments add another factor - the availability of complementary inputs - which underpins the decision to become a rent seeker. In the absence of complementary inputs the opportunity cost of human resources in production is low for disenfranchised individuals, and rent seeking becomes a dominant option.

Therefore, if complementary inputs are made available to the poor, it would not only allay their plight (see e.g. Adelman, Robinson, 1989), but also suppress the incentives for extra-market redistribution. This conjecture implies, for example (Grossman, 1994), that an agrarian reform, which provides for a land transfer from landlords to peasants, could be an overall Pareto improvement. The potential beneficiaries of such a reform are not only the recipients of land, but the landlords themselves, as their proceeds and estates are no longer threatened by bandits. When heretofore destitute peasants get land, market crop production replaces banditry as an activity which pays the highest return.

Matching allocation of complementary inputs with human resources could be accomplished not only through free transfers of the input endowments, but also through the trade in complementary inputs. A frictionless capital market allows a talented albeit cash constrained entrepreneur to raise money for a productive business, thereby diverting her from "political entrepreneurship" in search of redistributional gains. Likewise, if the labor market poses no serious barriers to accessing jobs, structural and frictional unemployment would not feed extremism and violence.

These arguments lead to the conclusion that development of the input markets allows not only to reap efficiency gains due to optimal allocation of *transferable inputs*, but also to suppress, if not eliminate, non-productive redistributive activities. Reduced incentives to seek rent increase the supply of *non-transferable human resources* for productive purposes, which further enhances economic efficiency.

The present paper inquires into the validity of these assertions, and puts them in conjunction with another aforementioned component of an institutional setup - the degree of protection of property rights. There are at least two reasons why poor protection of property rights could undermine the positive impact of the trade in factors of production for incentives of economic agents.

First, as transferable inputs change hands to match non-transferable human resources, the society is getting richer. Other things being equal, the bigger is the social pie, the more attractive is the idea to participate in its redistribution (see e.g. Neary, 1995, McGuire, Olson, 1996). This "income effect" works against the "distribution effect" outlined above, and the overall outcome for the propensity to seek rent is unclear.

Second, lack of confidence in property rights diminishes the attractiveness of market production, and consequently stifles the trade in factors of production, even if the required input markets are available. When property rights are not adequately protected, the input markets will be thin, or collapse altogether. It could happen even if there are massive distortions in the initial allocation of transferable inputs, so that in an environment with no threat of extra-market redistribution there would have been plenty of trade.

The paper explores these links between the input markets, property rights protection, and extra-market redistribution within a general equilibrium model. In the model, human resources are subject to allocation between productive activities and rent seeking.

II. Technologies for production and redistribution

Consider a single-product economy with a unit continuum of agents $x \in [0, 1]$. Each agent is endowed with a certain amount of the multi-purpose non-alienable human resource. This resource is distributed across the agents with density $\bar{h}(x)$. Each agent also holds a non-negative quantity of the complementary production input, which is technically transferable from one agent to another. The initial distribution of this input among the agents is given by density $\bar{r}(x)$. The total stocks of the production inputs throughout the economy are as follows:

$$\int_0^1 \bar{h}(x)\, dx = 1; \quad \int_0^1 \bar{r}(x)\, dx = \bar{R}.$$

The first of these equalities fixes the choice of the measurement unit for the human resource. As for the complementary input, its gross amount $\bar{R}$ is an exogenous variable, which in conjunction with the production function f characterizes the economy's technological potential.

Every agent can split her human resources between three different activities: market production, rent seeking, and subsistence production (see e.g. Murphy, Shleifer, Vishny, 1993).

If agent x is engaged in market production, she has an access to the technology $y = f(h,r)$, where y is the output (serving as a numeraire good), and h and r - amounts of the human resource and complementary input, contributed by this agent for production. Production function f is assumed to be concave and strictly quasi-concave, smooth and monotonically increasing, to exhibit constant returns to scale, and meet the condition $f_r \to \infty$, as $r \to +0$, for any $h > 0$.

To capture the assumption that input r is a complement to human resource h, we further require that as r goes up, marginal return to the human resource increases: $f_{hr} > 0$.

As an alternative to market production, an agent can contribute her human resources toward extra-market redistribution (rent seeking). The latter, unlike market production, does not require an input which is complementary to the human resource. The contested rent is

expropriated from other agents; according to Nitzan (1993), this setup could be characterized as a transfer contest with internal source of rent.

Our model of rent seeking technology is a generalization of the one offered by Grossman (1994). Let $h = h(x)$ and $y = y(x)$ be, respectively, the amount of the human resource spent by agent x for rent seeking, and the market product of this agent. Denote

$$Y = \int_0^1 y(x)\,dx\,, \quad H = \int_0^1 h(x)\,dx \tag{1}$$

the gross market product (GMP) and the total amount of human resources invested in redistribution. We make two basic assumptions: (i) that given the level of protection of property rights, the share of the GMP captured by rent seekers depends only on H and monotonically non-decreases as H goes up (so that the amount of contested rent is a function of aggregate efforts invested in the process (Chung, 1996)), and (ii) that the total take of rent seekers is divided among them proportionally to the human resources individually invested into redistribution. The first assumption, apart from other things, captures "the income effect" mentioned earlier: if Y goes up, then, *ceteris paribus*, rent seeking pays more. The second one goes back to the pioneer paper of Tullock (1980) and means that the average return to human resources invested into redistribution is the same across all the participating agents, and, given the total amount H, is independent of an individual contribution.

A redistribution technology can now be described by continuous function $\xi(H, d)$, which relates to H the share of the GMP appropriated by rent seekers. Parameter $d \geq 0$ is introduced into the function to reflect the quality of protection of property rights: the higher is d, the more difficult is it to seek rent, and therefore the smaller is the captured share $\xi(H, d) < 1$ for any given H. Naturally, $\xi(0, d) = 0$.

We can finally recap by putting the proceeds of agent x from rent seeking equal to $h(x)\ \xi(H, d)\, Y / H$, where Y and H are given by (1).

The last assumption about the redistribution technology is non-increasing returns to scale in rent seeking. We will need the following weak form of this assumption: if an agent is contemplating a marginally small contribution of her human resources for rent seeking, then her return will be the highest, if nobody else is involved in the activity. In other words, for any d and $H \geq 0$

$$\eta(0, d) \geq \eta(H, d), \tag{2}$$

where $\eta(H, d) \equiv \xi(H, d) / H, \ H > 0; \ \ \eta(0, d) \equiv \lim_{H \to +0} \eta(H, d)$.

Here are two examples of redistributive technologies. In the first one

$$\xi(H, d) = H / (d + H). \tag{3}$$

The intuition behind this functional form (see also Grossman, 1991) is as follows: the government inelastically supplies a certain amount of efforts, enhanced to the level d by existing legal and political institutions, to offset individuals hankering for rent. The government acts on behalf of market producers, and its share $d/(d + H)$ of the GMP is what these producers will retain. The rest will be captured and redistributed by rent seekers. In another example (Grossman, 1994), which also meets all the aforementioned assumptions,

$$\xi(H, d) = \begin{cases} H / d & for \quad H < d \\ 1 & for \quad H \geq d. \end{cases} \tag{4}$$

Finally, if an agent invests h units of her human resource into subsistence production, the return will be μh, with $\mu = const$. Unlike market production, subsistence production does not require a complementary input (Eswaran, Kotwal, 1989). As another distinction, the subsistence output cannot be appropriated by rent seekers, who operate only within the market domain (Murphy, Shleifer, Vishny, 1993).

III. Equilibria

We will be assuming through the rest of the paper that the distributions $\bar{h}(x)$ and $\bar{r}(x)$ are atomless, and that all the agents behave in a non-strategic fashion, i.e. do not expect to affect by their decisions the prevailing economic environment. (Distributions which coincide almost everywhere over the continuum of agents (i.e. everywhere except for a measure zero subset of [0, 1]) will be viewed hereafter as identical).

Suppose first that there is no market for trade in the complementary input (which is a good proxy to many developing and reforming economies). In this case the initial distribution $\bar{r}(x)$ of this input is not subject to changes, and the only decision variables available to the agents are the allocations of the agents' stocks of the human resource between market production, rent seeking, and subsistence production.

Let h_1 and h_2 be the amounts of the human resource spent by agent x on rent seeking and subsistence production, respectively, with the balance $\bar{h}(x) - h_1 - h_2$ contributed to market production. When choosing h_1 and h_2, the agent is seeking to maximize her total return by solving the problem

$$\max \left\{ (1 - \xi(H_1, d)) f(\bar{h}(x) - h_1 - h_2, \bar{r}(x)) + \eta(H_1, d) Y h_1 + \mu h_2 \right\} \tag{5}$$

s.t. $h_1, h_2 \geq 0$, $h_1 + h_2 \leq \bar{h}(x)$, where H_1 is the total amount of the human resource contributed by all the agents for rent seeking, and Y - the economy's GMP.

We will call an allocation $\{h_1(x), h_2(x)\}$, $x \in [0, 1]$, a *no-trade equilibrium* (no-trade refers to the complementary input), iff for any x the values $h_1(x)$, $h_2(x)$ solve problem (5),

$$H_1 = \int_0^1 h_1(x)\, dx, \quad Y = \int_0^1 f(\bar{h}(x) - h_1(x) - h_2(x), \bar{r}(x))\, dx. \tag{6}$$

Proposition 1. A no-trade equilibrium exists.

Proofs of this and subsequent propositions are placed in the Appendix.

A no-trade equilibrium could provide for extra-market activities for some or all the agents. Given the environment in which an agent operates, her willingness to seek extra-market gains is inversely related to her endowment of the complementary input. One can easily see that as such an endowment goes up, the supply of the agent's human resource for productive purposes, *ceteris paribus*, goes up as well (or stays put at the top level).

Suppose now that an agent who is relatively (to her endowment of the human resource) deprived of the complementary input, can purchase more of this input at an appropriate input

market. Such a transaction will increase for this agent the attractiveness of market production in comparison to extra-market activities.

At the same time, the availability of the input market changes not just individual holdings of the complementary input, but the overall economic environment as well. To capture the full impact of the input market, one has to place these changes in an appropriate equilibrium context. It turns out to be convenient to develop such a context in two steps.

Suppose first that while trading in the complementary input, traders remain myopic, i.e. do not take into account that after trade they still will have a choice between market and extra-market activities. In other words, if traders are myopic, they trade in the complementary input first, ignoring for the time being extra-market activities, and address the choice between different types of economic activities only when this trade is completed. As a result, the economy will arrive to an equilibrium with the uniform, relative to the human resource, distribution of the complementary input. Such an *equilibrium with myopic traders*, although derived under somewhat unrealistic behavioral assumption, is nonetheless a useful reference point, and, as it will be shown later, produces the same aggregate indicators as an equilibrium where traders are fully rational.

A myopic trader first solves the problem

$$\max_{r} \{f(\bar{h}(x), r) + p(\bar{r}(x) - r)\}, \tag{7}$$

where p is the market price of the complementary input. In the equilibrium $r = r^*(x)$,

$$\begin{aligned} f_r(\bar{h}(x), r^*(x)) &= const \quad , \quad \forall x \in [0, 1], \\ \int_0^1 r^*(x)\, dx &= \bar{R}. \end{aligned} \tag{8}$$

Given the technology's constant returns to scale, the resulting allocation of the complementary input among the myopic traders looks as follows:

$$r^*(x) = \bar{R}\bar{h}(x), \quad \forall x \in [0, 1]. \tag{9}$$

After allocation (9) has been arrived to, the agents are back to the choice between different types of economic activities. The results of these choices can be described as a special case of no-trade equilibrium introduced earlier, with the allocation of the complementary input given by (9). Once again invoking the technology's constant returns to scale and putting in (5) $h_i \equiv h_i^o \bar{h}(x)$, we can characterize the eventual equilibrium with myopic traders as follows: for agent $x \in [0, 1]$, $h_i^o = h_i^o(x)$, $i = 1, 2$ solve the following problem (the same for all x):

$$\max_{h_1^o,\, h_2^o} \{\pi_0 f(1 - h_1^o - h_2^o, \bar{R}) + \pi_1 h_1^o + \mu h_2^o\}, \qquad (10)$$
$$s.t.\ h_1^o, h_2^o \geq 0,\ h_1^o + h_2^o \leq 1,$$

with

$$\pi_0 = 1 - \xi(H_1, d), \quad \pi_1 = \eta(H_1, d)\, Y; \qquad (11)$$
$$H_1 = \int_0^1 h_1^o(x)\, \bar{h}(x)\, dx; \quad Y = \int_0^1 f(1 - h_1^o(x) - h_2^o(x), \bar{R})\, \bar{h}(x)\, dx.$$

According to Proposition 1, equilibrium (10), (11) always exists. If $\pi_1 \neq \mu$, h_1^o and h_2^o are the same for all agents (with at least one of these variables equal zero), which allows to skip the argument x. Otherwise let h_1^o, h_2^o be the weighted averages of $h_1^o(x)$, $h_2^o(x)$ with the density $\bar{h}(x)$. One can easily check that the replacement of $h_1^o(x), h_2^o(x)$ by their average values also produces an equilibrium (10), (11). Having performed, if necessary, this operation, we will assume hereafter that in the equilibrium with myopic traders (10), (11) the values $h_1^o(x), h_2^o(x)$ are the same over the continuum of agents, and equal to h_1^o, h_2^o. Notice that $h_1^o = H_1$.

It is worth mentioning that components h_1^o, h_2^o of an equilibrium with myopic traders do not depend on the initial allocation of the complementary input, and characterize the attractiveness of extra-market activities as alternatives to market production.

We can now drop the assumption that agents are myopic, and consider an equilibrium based on fully rational behavior. In this case decisions to trade in the complementary input,

and to allocate the human resource between different activities, are passed simultaneously and in conjunction with each other. An *equilibrium with fully rational traders* is defined as a triplet $\{r(x), h_1(x), h_2(x)\}$ such that for any $x \in [0, 1]$, $r(x)$, $h_1(x)$, $h_2(x)$ solve the following problem:

$$\max_{r,\, h_1,\, h_2} \left\{ (1 - \xi(H_1, d))\, [f(\bar{h}(x) - h_1 - h_2, r) + p(\bar{r}(x) - r)] + \eta(H_1, d)\, Y h_1 + \mu h_2 \right\}, \tag{12}$$

s.t. $r \geq 0$, $h_1, h_2 \geq 0$, $h_1 + h_2 \leq \bar{h}(x)$, where p is the equilibrium market price of the complementary input (with the market product serving as a numeraire), and

$$H_1 = \int_0^1 h_1(x)\, dx, \quad Y = \int_0^1 f(\bar{h}(x) - h_1(x) - h_2(x), r(x))\, dx, \quad \bar{R} = \int_0^1 r(x)\, dx. \tag{13}$$

It is assumed in the above definition that as the market for the complementary input opens up, it is the agent's market profit (output sales plus net proceeds from trade in the complementary input) that is subject to extra-market redistribution.

The following proposition establishes a link between the introduced equilibria with fully rational and myopic traders.

Proposition 2. A triplet $\{r(x), h_1(x), h_2(x)\}$ with $r \geq 0$, $h_1, h_2 \geq 0$, $h_1 + h_2 \leq \bar{h}(x)$, forms an equilibrium with fully rational traders if and only if there exists an equilibrium with myopic traders h_1^o, h_2^o such that:

(i) $\int_0^1 h_1(x)\, dx = h_1^o$; $\int_0^1 h_2(x)\, dx = h_2^o$;

(ii) $r(x) = \bar{R}(\bar{h}(x) - h_1(x) - h_2(x)) / (1 - h_1^o - h_2^o), \quad \forall x \in [0, 1].$

One can easily verify by invoking the technology f's constant returns to scale that according to Proposition 2 the gross market product in an equilibrium with fully rational traders

$$Y = \int_0^1 f(\bar{h}(x) - h_1(x) - h_2(x), r(x))\, dx = f(1 - h_1^o - h_2^o, \bar{R})$$

is the same, as the GMP in the corresponding equilibrium with myopic traders. We can therefore conclude that limited rationality, although affecting individual decisions, has no impact on the aggregates, including gross amounts of the human resources contributed to various activities, and gross market and subsistence products. This observation allows to use equilibria with myopic traders to study the impact of the input market on the allocation of human resources and overall economic efficiency. Unless the residual differences between equilibria with myopic and fully rational traders are relevant, both types will be referred to hereafter as equilibria with the input market (as opposed to no-trade equilibria).

IV. The impact of the input market

In general, an equilibrium with a market for the complementary input still provides for various types of economic activities, including extra-market redistribution (see below). Therefore, matching allocation of the complementary input and the human resource, being socially optimal in the first-best environment where rent seeking is prohibited, doesn't necessarily preclude rent seeking when the latter remains a feasible option. However, as the following proposition demonstrates, *if* property rights are adequately protected, then the availability of the input market is sufficient to suppress counterproductive incentives.

Proposition 3. There exists a critical level d^* of the quality of protection of property rights, such that with $d \geq d^*$ no equilibrium with the input market provides for extra-market redistribution. The critical level d^* can be found from the equation

$$\eta(0, d^*) = f_h(1, \bar{R}) / f(1, \bar{R}). \tag{14}$$

(If $\eta(0, d)$ is greater than (less than) $f_h(1, \bar{R}) / f(1, \bar{R})$, for all $d > 0$, then d^* equals infinity (equals zero)).

Notice that for the threshold level of property rights protection the return available to the first entrant into rent seeking equals the elasticity of the market production technology to the human resource (provided that the entire stock of this resource is spent for market production).

Proposition 3 suggests that if extra-market redistribution is inequality-driven, it is prompted by the *relative,* not *arithmetic,* inequality in the complementary input's distribution (see also Alesina, Rodrik, 1994). Relative inequality characterizes availability of the complementary input per unit of the human resource, rather than per capita.

Indeed, if the input market has produced allocation (9) of the complementary input, proportional to the endowments with the human resource, the relative inequality is eliminated, and so is extra-market redistribution (given that the cost of rent seeking is sufficiently high). On the other hand, it is conceivable that if the human resource is distributed highly unevenly, an egalitarian allocation of the complementary input would create a mismatch prompting the agents with high endowments of the human resource to seek redistributional gains.

Therefore one can expect that an operational input markets provides a vent for the tension that otherwise would have been released in the form of extra-market redistribution. This conjecture fits with the observation that in a mobile society with various "exit" opportunities high income inequality is more tolerable (Adelman, Robinson, 1989).

Our analysis, however, makes the above conjecture subject to an important qualification. In general, input markets development will suppress extra-market redistribution only if the property rights are adequately protected, so that the return to redistributional activities remains within certain limits.

The latter conclusion does not corroborate with the point made in Grossman (1994) that "a sufficiently effective technology of extralegal appropriation generates an equilibrium distribution of property that is sufficiently egalitarian that no resources are allocated to appropriative activities". This statement implies that an egalitarian distribution, whether it results from voluntary trade in production inputs, or is forced by a threat of expropriations, is in itself sufficient to eliminate rent seeking, even if property rights are poorly protected. Our study's lesson is different: equalization of the resource endowments, unless it is supported by

adequate protection of property rights, could be insufficient to eliminate rent seeking. In fact, as we will demonstrate shortly, such an equalization could boost extra-market redistribution, instead of suppressing it.

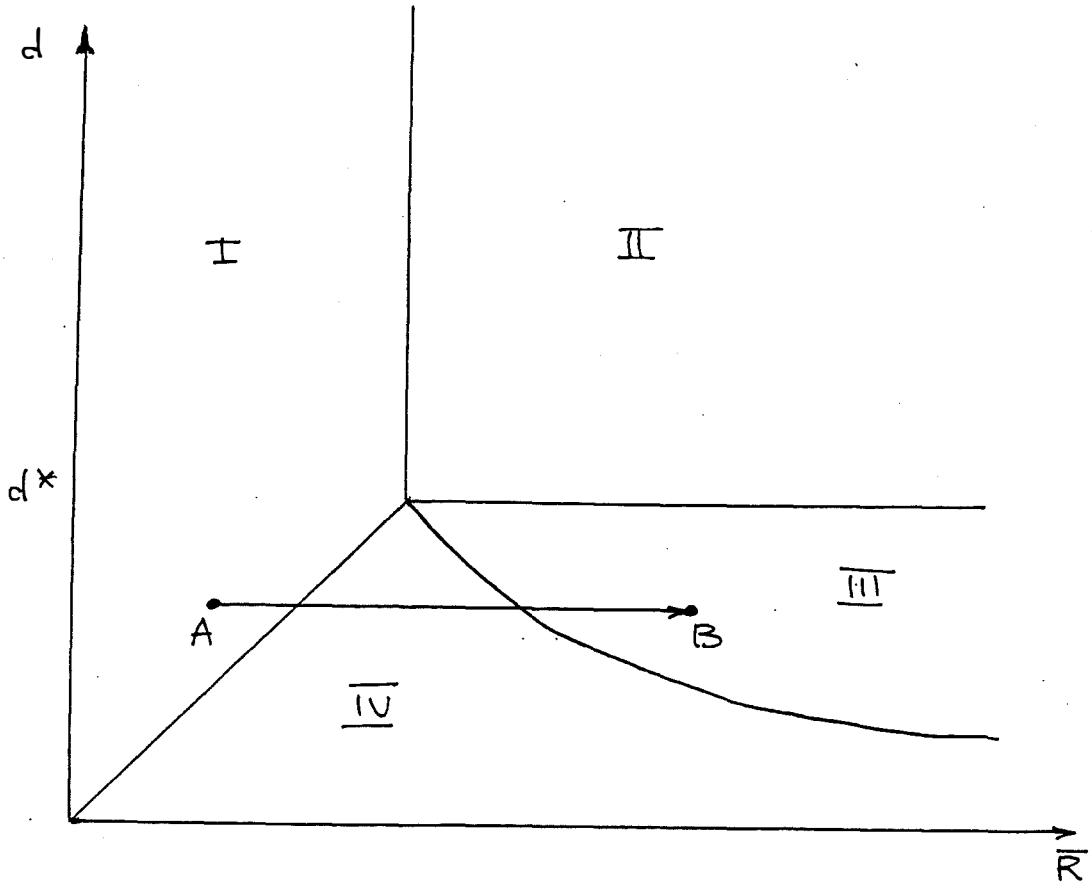
Rent seeking could be driven away from an equilibrium with the input market not only by well-protected property rights, but also by sufficiently high return to the subsistence production. The latter, according to the following proposition, could serve as a partial substitute for the protection of property rights in elimination of extra-market redistribution.

Proposition 4. An equilibrium with the input market excludes rent seeking if and only if the quality of protection of property rights meets the requirement $d \geq \Delta^*(\mu)$, where

$$\Delta^*(\mu) \begin{cases} = d^*, & 0 \leq \mu \leq f_h(1, \bar{R}) \\ \textit{monotonically} & \\ \textit{decreases} \quad \textit{for} & \mu > f_h(1, \bar{R}). \end{cases} \tag{15}$$

The following example summarizes the above analysis. The example illustrates how an equilibrium with the input market depends on the degree of protection of property rights, and the economy's capacity represented by the gross stock of the complementary input $\bar{R}$. In the example, production technology is a Cobb-Douglas one, with $f(h,r) = 2(hr)^{1/2}$, redistributive technology is given by (3), and the return to subsistence production is unity. The following diagram (see next page) shows a partition of the space of the parameters $\bar{R}$, d into areas with different regimes of economic activities..

According to the diagram, there are four possible patterns of extra-market activities. In area I subsistence production is the only extra-market activity - rent seeking is excluded by sufficiently strong protection of property rights and/or lack of complementary input, which makes the GMP too small to invite rent seeking, and subsistence production prevails - in full agreement with Proposition 4. In area II there is no place for extra-market activities, as rent seeking is excluded by sufficiently high d, and subsistence production - by its low return which is less than the marginal productivity $f_h(1, \bar{R})$ of the human resource contributed towards market production. In area III, rent seeking prevails over subsistence production, being prompted by poor protection of property rights and sufficiently high GMP available for grab. Finally, in area IV market production, subsistence production and rent seeking co-exist, yielding the same return to the human resource.



Finally, we turn to the two possible traps outlined in the Introduction, that preclude reaping the benefits of trade in the complementary input. In the first trap, as the input market brings about an efficient allocation of the transferable input, the gross market product Y goes up, and so does the return to rent seeking $\eta(H, d) Y$. As a result, although the *absolute* return to the human resource go up for agents who initially lacked the complementary input and who have purchased additional quantities of this input, the return to market production *relative* to rent seeking could decrease, thereby making rent seeking even more attractive than before. (For a similar phenomenon in a different context see (Murphy, Shleifer, Vishny, 1993)). Of course, according to Proposition 3, such a counterintuitive reaction to the availability of the input market is possible only if property rights are poorly protected, i.e. $d < d^*$.

To demonstrate this possibility in the most striking version, we will describe an economy which was free of rent seeking prior to the opening of the input market, and which develops pervasive rent seeking when such market becomes available. Namely, let the human resource

be uniformly distributed across the agents, whereas the bulk of the complementary input is possessed by a small fraction of the agents (the haves), and the rest is evenly divided among the havenots. In this case there is no extra-market redistribution of the market output in the no-trade equilibrium: the haves are busy spending their human resources in full for market production (high endowments with complementary inputs guarantee hefty returns), whereas the havenots' only extra-market activity is subsistence production, as the gross misallocation of the complementary input makes the GMP Y too small to invite any rent seeking. As the number of haves diminishes, their contribution to the GMP tends to zero, and we can approximate the situation by discarding altogether the haves and the stock of the complementary input they possess (point A on the diagram above).

After trade the whole stock of the complementary input is uniformly distributed across the continuum of agents (point B; recall that we can assume that traders are myopic without affecting the conclusions about patterns and scopes of economic activities). In this case the GMP is much higher due to efficiency gains available after initial misallocation has been corrected by the market trade, and the combination of the increased wealth and poor protection of property rights produces rent seeking. In the equilibrium with myopic traders (which is according to Proposition 2 also an equilibrium with fully rational traders) everybody participates in extra-market redistribution by contributing the same share of individually held human resources. For other equilibria with fully rational traders the gross amount of the human resource contributed towards rent seeking by all agents remains the same, with individual contributions varying according to the particular outcome of trade in the complementary input.

The above conclusions corroborate with those made in (Neary, 1995), that neither relative nor absolute poverty are necessary conditions to breed redistribuitonal activities, and that in fact these activities can get a boost as the society is becoming wealthier and more egalitarian. Our arguments in support of the second of these statements are, however, different from those in (Neary, 1995), where more equitable distribution of wealth is viewed as a source of additional resources that the former poor could invest in re-distribution. In this paper equitable (relatively to the human resource) allocation of the complementary input could spur rent seeking indirectly through an increase of the aggregate wealth.

We now turn to another trap, where the complementary input market, being nominally available and unimpeded, remains nonetheless idle, because incentives to trade in this input are suppressed by lack of security of property rights on the output produced in the market domain. In other words, since the complementary input could only be used for market

production, and since the latter loses out in its attractiveness to extra-market activities, trade in this input will be limited, if at all, despite the allocative efficiency gains that could have been reaped in the first-best economic environment with secured property rights.

The technical intuition behind this possibility is that the equalization across the community of agents of returns to the complementary input, which will ensue in the presence of the complementary input market, could be accomplished in two ways. Given constant returns to scale of the production technology f, such an equalization requires that all the agents should be equally endowed with the complementary input per unit of their human resources *contributed towards market production.* However, since there are alternatives to market production, an agent for whom the endowment of the complementary input is relatively low (so that the return to this input is relatively high) could correct this mismatch by either purchasing more of the input at the input market, or by spending some of her human resource for purposes other than market production. If property rights for the market output are poorly protected, the second option could be more attractive, and there will be little or no trade in the complementary input.

More precisely, according to Proposition 2, any allocation of the complementary input $r(x)$, which meets balance constraint (13), could be a part of an equilibrium with fully rational traders as long as this allocation could be supported by outlays $h_1(x)$ and $h_2(x)$ of the agents' human resources which meet conditions (i) and (ii) of Proposition 2. It is easy to verify that the last requirement could be met iff

$$r(x) \leq \bar{R} / (1 - h_1^o - h_2^o), \quad \forall x \in [0, 1]. \tag{16}$$

Condition (16) outlines a no-trade area which includes all spreads of the gross stock $\bar{R}$ of the complementary input over the unit continuum [0, 1] such that for no agent x her endowment of this resource $r(x)$ exceeds the (first-best optimal) average $\bar{R}$ more than $1/(1 - (h_1^o + h_2^o))$ times. In particular, if the initial allocation $\bar{r}(x)$ itself meets condition (16), such allocation could sustain in the presence of the complementary input market, and this newly opened market will have no impact on the previous no-trade equilibrium. Trade will only be necessary if the input r is so heavily concentrated in the hands of some of the agents, that their $\bar{r}(x)$ "shoot out" of the no-trade band (16). In this case, however, the complementary input market, while being functional, will remain thin and be required only to bring the distribution $r(x)$ into the band (16) with no further trade, despite of disparities which

remain within this band and could be quite profound.

The width of the no-trade area (16) is inversely related to 1 - ($h_1^o + h_2^o$) - the share of the gross stock of human resources that is spent for market production (if the model with myopic traders has more than one equilibrium, minimum of 1 - ($h_1^o + h_2^o$) over all such equilibria should be taken). This share does not depend on the initial distribution $\bar{r}(x)$ of the complementary input, and could be viewed as the relative scope of market production among other potentially available activities. If property rights are poorly protected and/or the gross stock of the complementary input is low, market production is crowded out by its alternatives - redistribution and subsistence production. The more of the human resources the latter consumes, the deeper, according to (16), will be misallocations of the complementary input that the input market will fail to correct.

While condition (16) provides an "internal" description of the no-trade area, the latter also allows the following "external" characterization - in terms of observable patterns of economic behavior prior to opening of the input market.

Proposition 5. If in a no-trade equilibrium with no access to the complementary input market every agent was involved in an extra-market activity, then this equilibrium will sustain as an equilibrium with fully rational traders when the input market becomes available.

Under the conditions of Proposition 5, extra-market activities pay so well (relatively to market production) that even the agents with high endowments of the complementary input find it profitable to spend a portion of their human resources outside of the market domain. It fully corroborates with our earlier conclusion that if misallocations of the complementary input are commensurable with relative attractiveness of extra-market activities, the input market remains unattended.

V. Conclusions and Policy Implications

The paper emphasizes indivisibility of the bundle of property rights. Economic efficiency requires both well-protected custody rights, which secure profits earned in the market, and unhampered opportunities to trade in production inputs, which constitutes alienation rights. Partial provision of property rights could be counterproductive - in full agreement with the second best dictum. In particular, it is shown in the paper that opening up an input market,

which facilitates alienation rights, might stimulate extra-market redistribution, if there is no concurrent improvement on the side of custody rights. Vice versa, if custody rights alone are vigorously enforced without providing adequate means to correct misallocations of economic resources, it could as well divert disenfranchised individuals from productive activities towards extra-market appropriation (Eaton, White, 1991; Grossman, 1994).

Enforcing property rights in their complexity requires appropriate public policy measures, which in its turn calls for a constituency (in a democratic environment - a voting majority) in support of such policies. It is often asserted that full-fledged property rights, as well as other efficiency enhancing economic institutions, will emerge spontaneously, being driven by the grass-roots economic interests, and the government will accommodate these interests by responding to the pressure of private parties.

This "classical" scenario of institutional change is, however, contingent upon implicit distributional assumptions. In a sufficiently equitable society aggregate efficiency gains indeed trickle down to a majority that will endorse needed policies. Otherwise the process of institutional change becomes a distributional conflict (Knight, 1992), and could be captured by narrow interests.

Asymmetry of potentially available benefits is, however, not the only obstacle to the establishment of fully enforceable and tradable property rights. Even if a vast majority would be a potential beneficiary of such an institution, the latter's establishment could be blocked by political processes triggered by economic inequality. It is shown in the paper that if a society with sufficient economic wealth features skewed distribution of transferable production inputs, poorly protected property rights and clogged input markets, rent seeking will be a major mode of economic behavior. In such a society, instead of efficiency-enhancing market trade in production inputs, broad extra-market redistribution of the market output will take place.

Redistribution gives rise to various interest groups which pool political resources to compete with each other and are aiming at securing footholds in the government. This incapacitates the government whose primary concern becomes to accommodate the lobbies rather than implement necessary policy measures and provide needed public goods such as protection of property rights and removal of barriers segmenting the market. As a result, economic mismatches are sustained, and in their turn reproduce incentives for counterproductive activities. In other words, inequality and institutional deficiencies feed upon each other (Keefer, Knack, 1995).

It appears therefore that both "bad" and "good" institutional frameworks, the first based on full set of competitive markets and secure property rights, and the second - on extra-market redistribution, are stable equilibria, each with its own "area of gravitation", and the depth of misallocation of economic resources determines which of these equilibria will prevail.

This conclusion conforms with the experience of economic reforms in post-communist countries. While all of these countries have inherited from the central planning structural distortions created by non-market allocation decisions, the scale of these distortions varies from one country to another. If the distortions were relatively modest (most notably in the Czech Republic and some other Central European nations), the political case for protection of property rights was strong enough to suppress rent seeking by prevailing market-based interests. On the other hand, if economic mismatches are profound - as they are, most dramatically, in Russia - it is the market interests that are overridden by rent seeking. Numerous examples drawn from the Russian experience (Polishchuk, 1996a) clearly illustrate a strong correlation between the propensity to seek redistributional gains, on the one hand, and the inability to do well in the marketplace - on the other.

Thus, the more distorted is a formerly centrally planned economy prior to the reform, the more difficult it is not just to perform required restructuring (which would be natural to expect), but, worse yet, to develop institutions required for the task. It means that countries like Russia are in double jeopardy, as not only the scope of structural corrections is extraordinarily broad, but precisely because it is so broad, it is more difficult to produce tools required for bridging the gap. The same arguments applied in reverse could serve to explain the success stories of economic reform. If initial structural distortions are limited, the supply of resources contributed towards rent seeking would be relatively modest, and the process of institutions building will not be held up by lobbies. With these institutions in place, restructuring and growth follow promptly.

Appendix

Proof of Proposition 1.

We will establish the existence of a no-trade equilibrium by applying an appropriate fixed-point theorem. To that end, consider for a non-negative couple $\pi = (\pi_0, \pi_1)$ and given $x \in [0, 1]$ the problem

$$\max \left\{ \pi_0 f(\bar{h}(x) - h_1 - h_2, \bar{r}(x)) + \pi_1 h_1 + \mu h_2 \right\} \tag{A.1}$$

s.t. $h_1, h_2 \geq 0$, $h_1 + h_2 \leq \bar{h}(x)$. Given the assumptions about technology f, the function $h \to f(\bar{h}(x) - h, \bar{r}(x))$ is strictly concave, and if $\pi_1 \neq \mu$, problem (A.1) has a unique solution $h_1 = h_1^*(\pi_0, \pi_1; x)$, $h_2 = h_2^*(\pi_0, \pi_1; x)$. Let

$$H_1^*(\pi_0, \pi_1) = \int_0^1 h_1^*(\pi_0, \pi_1; x)\, dx,$$
$$Y^*(\pi_0, \pi_1) = \int_0^1 f(\bar{h}(x) - h_1^*(\pi_0, \pi_1; x) - h_2^*(\pi_0, \pi_1; x), \bar{r}(x))\, dx,$$

and

$$\begin{aligned} \Pi_0(\pi_0, \pi_1) &= 1 - \xi(H_1^*(\pi_0, \pi_1), d); \\ \Pi_1(\pi_0, \pi_1) &= \eta(H_1^*(\pi_0, \pi_1), d)\, Y^*(\pi_0, \pi_1). \end{aligned} \tag{A.2}$$

Denote $\Pi(\pi) = (\Pi_0(\pi_0, \pi_1), \Pi_1(\pi_0, \pi_1))$.

Now let $\pi_1 = \mu$. In this case for any $x \in [0, 1]$ there exists a unique $h^* = h^*(\pi_0, \pi_1; x)$ such that all the solutions of problem (A.1) could be described by the inequalities $h_1, h_2 \geq 0$, $h_1 + h_2 \leq h^*(\pi_0, \pi_1; x)$. Denote

$$H^*(\pi_0, \pi_1) = \int_0^1 h^*(\pi_0, \pi_1; x)\, dx ,$$

and introduce a set

$$\begin{aligned} \Pi(\pi) &= \{(\Pi_0, \Pi_1) \mid \Pi_0 = 1 - \xi(H, d), \\ \Pi_1 &= \eta(H, d) \int_0^1 f(\bar{h}(x) - h^*(\pi_0, \pi_1; x), \bar{r}(x))\, dx, \\ & 0 \le H \le H^*(\pi_0, \pi_1) \}. \end{aligned} \tag{A.3}$$

Consider a compact convex set

$$\Omega = \left\{ (\pi_0, \pi_1) \mid 0 \le \pi_0 \le 1,\ 0 \le \pi_1 \le \eta(0, d) \int_0^1 f(\bar{h}(x), \bar{r}(x))\, dx \right\},$$

and a mapping (in general - multivalued) Π: $\Omega \to \Omega$, which associates with a pair $(\pi_1, \pi_2) \in \Omega$ vector (Π_1, Π_2) given by (A.2), when $\pi_1 \neq \mu$, and set (A.3), when $\pi_1 = \mu$. One can easily check that Ω has a closed graph, and transforms points into either points or continuous paths. Both are contractible (homotopy-equivalent to points), and therefore the Eilenberg-Montgomery theorem applies (Eilenberg, Montgomery, 1946). According to this theorem, mapping Ω has a fixed point $\pi^* = (\pi_0^*, \pi_1^*)$. If $\pi_1 \neq \mu$, this fixed point generates a no-trade equilibrium with the allocations $h_i(x) = h_i^*(\pi_1^*, \pi_2^*; x)$, $i = 1,2$. If $\pi_1 = \mu$, any division of $h^*(\pi_1^*, \pi_2^*; x)$ into $h_1(x)$ and $h_2(x)$ produces a no-trade equilibrium.

Proof of Proposition 2.

Conditions (i), (ii) are necessary. Indeed, trade in the complementary input equalizes marginal return to this input across all the agents:

$$f_r(\bar{h}(x) - h_1(x) - h_2(x), r(x)) = p = const ,$$

so that given the technology f's constant returns to scale, the ratio of the human resource spent for market production to the complementary input is also constant, which gives (ii). To prove that h_1^o, h_2^o is an equilibrium with myopic traders, one has to check optimality conditions for problem (10), that is, to demonstrate that $h_1^o > 0$ ($h_2^o > 0$) implies that the marginal product $f_h(1 - h_1^0 - h_2^0, \bar{R})$ equals π_1 (equals μ). To that end, notice first that due to (ii)

$$Y = \int_0^1 f(\bar{h}(x) - h_1(x) - h_2(x), r(x))\, dx = f(1 - h_1^o - h_2^o, \bar{R}),$$

which means that for every x the values $h_1(x)$, $h_2(x)$ solve the problem

$$\max_{h_1, h_2} \{\pi_0 f(\bar{h}(x) - h_1 - h_2, r(x)) + \pi_1 h_1 + \mu h_2\}, \tag{A.4}$$

$$s.t.\ h_1, h_2 \geq 0,\ h_1 + h_2 \leq \bar{h}(x).$$

with π_0, π_1 given by (11). Now if, say, $h_1^o > 0$, it means that $h_1(x) > 0$ for some x, so that

$$\pi_1 = \pi_0 f_h(\bar{h}(x) - h_1 - h_2, r(x)) = \pi_0 f_h(1 - h_1^0 - h_2^0, \bar{R}).$$

A similar conclusion could be made about h_2^0. Therefore the optimality conditions with regard to $h_1(x)$, $h_2(x)$ for problem (A.4) imply the similar optimality conditions for h_1^o, h_2^o in problem (10), so that h_1^o, h_2^o indeed form a no-trade equilibrium. The same arguments applied in reverse show that the conditions of Propositions 2 are not only necessary, but sufficient as well (if $h_i^o = 0$, then due to (ii) $h_i(x) = 0$ almost everywhere on [0, 1], and according to the agreement to ignore measure zero discrepancies, $h_i(x)$ could be assumed to be equal zero for all x).

Proof of Proposition 3.

According to Proposition 2, it suffices to establish that if $d \geq d^*$, then for every equilibrium with myopic traders $h_1^o = 0$. If, on the contrary, $H_1 = h_1^o > 0$, then optimality conditions for problem (10) imply

$$(1 - \xi(H_1, d)) f_h(1 - H_1 - h_2^0, \bar{R}) = f(1 - H_1 - h_2^0, \bar{R}) \; \eta(H_1, d),$$

which together with f's strict concavity in h yields

$$f(1 - H_1 - h_2^0, \bar{R}) = \left(\frac{1}{\eta(H_1, d)} - H_1\right) f_h(1 - H_1 - h_2^0, \bar{R}) >$$

$$\left(\frac{1}{\eta(H_1, d)} - H_1\right) f_h(1, \bar{R}).$$

Again invoking strict concavity of the technology in the human resource, one has

$$f(1 - H_1 - h_2^0, \bar{R}) < f(1, \bar{R}) - H_1 f_h(1, \bar{R}).$$

Combination of the two last inequalities gives

$$\frac{1}{\eta(H_1, d)} - H_1 < \frac{f(1, \bar{R})}{f_h(1, \bar{R})} - H_1 \leq \frac{1}{\eta(0, d)} - H_1,$$

so that

$$\eta(H_1, d) > \eta(0, d),$$

which contradicts to non-increasing returns to scale in rent seeking (condition (2)).

Proof of Proposition 4.

As before, Proposition 2 allows to confine the proof to equilibria with myopic traders. Such an equilibrium excludes rent seeking either when it provides only for market production, or for market and subsistence production. In the former case one has

$$f_h(1, \bar{R}) \geq \eta(0, d) f(1, \bar{R}), \quad f_h(1, \bar{R}) \geq \mu,$$

or, in other words,

$$d \geq d^*, \; f_h(1, \bar{R}) \geq \mu.$$

In the latter case for some $h_2^0 > 0$

$$\mu = f_h(1 - h_2^0, \bar{R}) \geq \eta(0, d) f(1 - h_2^0, \bar{R}),$$

and in particular $\mu > f_h(1, \bar{R})$. In the following system of equations for two unknown variables d, h_2^0

$$\mu = f_h(1 - h_2^0, \bar{R}),$$
$$\mu = \eta(0, d) f(1 - h_2^0, \bar{R})$$

let $d^*(\mu)$ be the value of the first variable; it is easy to see that such value is unique and monotonically decreases in μ. Combination of the above two cases gives condition (15).

Proof of Proposition 5.

If in a no-trade equilibrium every agent is involved in an extra-market activity, it means that the marginal return to the human resource available for market production is the same for all the agents:

$$f_h(\bar{h}(x) - h_1(x) - h_2(x), \bar{r}(x)) = \text{const} \quad , \quad x \in [0, 1] .$$

(Notice that if rent seeking and subsistence production are both present in the above setting, returns to these activities should be the same). Given the technology f's constant returns to scale, it means that the marginal return to the complementary input is also constant across the continuum of agents:

$$f_r(\bar{h}(x) - h_1(x) - h_2(x), \bar{r}(x)) = \text{const} \quad , \quad x \in [0, 1] ,$$

so that there will be no trade in the complementary input, even if a required market becomes available.

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