

Guard Labor

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Abstract

We explore the economic importance of the private and public exercise of power in the execution of contracts and defense of property rights. We define power and represent it in a model of growth in a modern capitalist economy, borrowing themes from the classical economists (unproductive labor, profit-driven investment), Marx (the labor disciplining effect of unemployment), and the contemporary theory of incomplete contracts (the role of monitoring and enforcement rents). We use this model to identify the resources devoted to the exercise of power, which we term guard labor as we measure these in labor units. Data from the United States indicate a significant increase in its extent in the U.S. over the period 1890 to the present. Cross national comparisons show a significant statistical association between income inequality and the fraction of the labor force that is constituted by guard labor, as well as with measures of political legitimacy (inversely) and political conflict. Some observations on the welfare implications of guard labor conclude the paper.

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1 Introduction

Political economy critically involves the distribution of power...To avoid descriptions taking the place of explanations one needs to specify in advance the institutional conditions and the range of tactics which are most likely to result in the successful conversion of resources into power and then empirically test predictions of systematic outcomes.

Pranab Bardhan, *Scarcity, Conflicts, and Cooperation*.(Bardhan(2005, p.39)[6])

For Pranab Bardhan, whose contributions to science and to society we honor in these pages, power is an essential analytical tool. Its exercise – for better or worse – redirects the course of development and affects the livelihoods of those whose voices and interests are never absent in Bardhan’s work: the world’s least well off (Bardhan (1984)[4], Bardhan (1989)[5]).

We will present historical and contemporary evidence that suggests the economic relevance of power. Indeed recent contributions to the theory of economic growth have incorporated the exercise of power as a central causal mechanism (Acemoglu, Johnson, and Robinson (2004)[1]). While power is often thought to be exercised exclusively by governments or political actors (political power), its exercise by private economic actors is increasingly recognized in the enforcement of property rights and the pursuit of distributional advantage in private transactions. Models of the exercise of power in cases of absent or incomplete contracts have made the concept central to a number of fields of economics including labor, public economics and development. (Dixit (2004)[23], Hart (1995)[36], Hirshleifer (2001)[37], Grossman (1998)[34]).

Yet the term power remains elusive, and can hardly be said to be part of the economists’ toolbox. Bardhan’s warning of “descriptions taking the place of explanation” may provide a partial explanation why. In the same spirit, a distinguished line of economists, from Eugen Böhm-Bawerk, through Joseph Schumpeter, to Oliver Williamson have pointedly eschewed the term power as being irreparably vague. Even the author of the most famous definition of power, Robert Dahl, expressed similar concerns¹ Yet the term seems difficult to dispense with and is increasingly widely used, even in economics.

Common usage suggests several characteristics that must be present in any plausible definition of power. First, power is *interpersonal*, an aspect of a relationship among people, not a characteristic of a solitary individual. Second, the exercise of power involves *the threat and use of sanctions*². Third the concept of power should be *normatively indeterminate*, allowing for Pareto-improving outcomes (as has been stressed by students of power from Thomas Hobbes to Talcott Parsons), but also susceptible to arbitrary use to the detriment of others and in violation of ethical principles. Finally, to be relevant to economic analysis, power must be *sustainable as a Nash equilibrium* of an appropriately defined game. Power may be exercised in disequilibrium situations of course, but as an enduring aspect of social structure, it should be a characteristic of an equilibrium. The fact that sanctions are essential to the exercise of power makes it distinct from other means of securing advantage, including those like wealth, that may operate even in the complete absence of strategic

interaction, as in a Walrasian market setting.

The following sufficient condition for the exercise of power captures these four desiderata: For B to have power over A, it is sufficient that, by imposing or threatening to impose sanctions on A, B is capable of affecting A's actions in ways that further B's interests, while A lacks this capacity with respect to B (Bowles and Gintis (1992)[15])

We here explore the economic importance of the exercise of power and the resources devoted to this end. We focus on the time devoted to the enforcement of claims on resources, including the protection of property rights and efforts to secure distributional advantage where contracts are absent or incomplete, referring to these activities as guard labor. In the next section we provide historical and other empirical examples of the economic importance of the exercise of power. Taking the illumination of cases such as these as our modelling objective, we then present a model of power and growth, and use it to provide a classification of types of guard labor. Data on guard labor in the U.S. and its growth since 1890 are then presented, followed by similar data for a sample of countries in recent years. In the next section we consider possible explanations of the rise in guard labor in the U.S. and the differences in its extent among countries, providing some evidence that guard labor covaries with the level of economic inequality, economic polarization and political conflict and varies inversely with political legitimacy. The penultimate section considers the implications of guard labor for a welfare based measure of net national product. We conclude by suggesting how the burden of guard labor might be lessened.

2 The Economic Importance of Power: Cases

[Lending money] is profitable for those who enforce their authority with the stick.

Harpal, a money lender in Palanpur, Uttar Pradesh.

(Lanjouw and Stern(1998):552)[44]

Historians have never doubted the economic importance of power. An instructive example is the answer offered by Kenneth Pomeranz (2000) to the question: why was it England that was poised for economic take off in the 18th century and not the Yangzi River delta or perhaps Gujarat or some other part of the world? On the eve of its economic takeoff, according to Pomeranz, England's advantage relative to the Yangzi delta was not that its institutions resembled the modern day mainstream economist's ideal of secure individual property, effective competition and limited government. England did indeed have institutional advantages but "they seem applicable to very few endeavors in the pre-1800 world besides war, armed long-distance trade and colonization." (Pomeranz (2000)[54]:166) According to Pomeranz, by contrast to the resource-constrained Yangzi delta, England benefited from abundant coal. But additionally England's military prowess had been honed in centuries of continental warfare, a benefit of which was cheap access to the food, fiber and other raw materials of the New World. The Yangzi delta did not have the political or military

wherewithal to break out of its Ricardian constraints and escape the profit squeeze associated with the resource demands of rapid growth (for a skeptical view, see Brenner and Isset(2002)[20]).

Similar themes appear in studies by Frederic Lane (1973)[43] of twelfth- and thirteenth-century Venice, whose fleet was devoted to mercantile trade in some years and in others was deployed as a navy to secure tariff exemptions and other advantages from the Byzantine Emperor (sometimes fighting on behalf of the Emperor, sometimes against him): “The government decided whether in a given year ships should be allowed to sail as usual or whether certain trades should be suspended and a fleet prepared for war...Venetian policy from 1082 to 1204 appears an unusually successful use of force to increase national income.” (Lane (1966)[42]:391-2).

Power, when it is deployed by private economic actors, also has demonstrable economic effects. In Bangladesh, for example, the government grants rights to fish in the inland waters to cooperatives of fishermen (Touiqye (1997)[62]. But few fishermen have the defacto power to exclude others and to collect rents from other users. As a result, they commonly sell the fishing rights to wealthier and politically connected money lenders and fish merchants. These ‘water lords’ deploy their network of clients to monitor the waters, and their impunity from legal redress allows the extra-legal enforcement of the rights through seizure of fishing gear and more serious threats. This conforms to the Coasean expectation: the fishing rights are held by those for whom the rights are worth the most. But the waterlords’ ownership of the rights results not from any productive advantage they enjoy vis a vis the fishermen, but rather from their superior property rights enforcement capabilities. Braguinsky and Myerson (2004)[19] suggest that a similar system of ‘oligarchic property rights’ exists in contemporary Russia.

Additional insight into the exercise of power in private economic transactions is given by the crop lien system which came to prominence in the post-Emancipation U.S. South. It was an ingenious solution to the problem of providing credit to asset-poor borrowers, as it substituted the farmer’s unenforceable promise to repay the loan in the future by an action observable by the lender *prior* to the granting of credit, namely the farmers’ having *already* planted cotton, a crop that was readily seized by the merchant and on which the merchant had first claim. Merchants did not accept food crops as collateral as their storage and other transactions costs were much higher than cotton. The result, according to Ransom and Sutch (1977)[55]:170 was that

“A southern tenant was neither owner of his land nor manager of his business ..his independent decision making was limited to the mundane and menial aspects of farming. The larger decisions concerning land use, investments in the farm’s productivity, the choice of technology, and the scale of production were all made for him.”

The merchant’s power to dictate to the farmer did not explain the distribution of property rights (as in the case of Bangladesh fishing), but rather the planting of cotton rather than food crops, on which the returns to the farmer would have been substantially greater, but which could not serve as collateral.

Contemporary studies of the economics of power also suggest its importance. Econometric explorations of the labor discipline problem have developed measures of “enforcement rents” (Bowles and Gintis (1988)[14])—the value of the current transaction in excess of the agent’s next best alternative – sometimes called the ‘cost of job loss’. The agent’s vulnerability to the loss of this rent is the source of the principal’s power to induce the agent to carry out the wishes of the principal, hence the term ‘enforcement’. For example variation over time in the rents enjoyed by employed workers have been found to be robust predictor of strikes (inversely), movements in the rate of profit and investment, and of the rate of productivity growth, in the latter case accounting for a significant fraction of the productivity slowdown in the U.S. economy during the late 60s and early 70s (Schor and Bowles (1987)[59], Bowles, Gordon, and Weisskopf (1983)[16] and the essays in Bowles and Weisskopf (1998)[18].) An estimate the profit maximizing wage based on exogenous elements in the measure of the ‘cost of job loss’ is a strong predictor of real wage movements in the U.S. economy (Bowles (1991)[11]).

Technologies may also be chosen with the objective of improving an employer’s bargaining power vis a vis his employees, reducing monitoring costs, or otherwise improving the labor discipline environment. Here is an example. When U.S. trucking companies installed on-board computers during the 1980s, they vastly improved their ability to monitor the actions of the drivers (Baker and Hubbard(2003))[3]. Trip recorders provided the company with verifiable information on the speed, idle time, and other details of the operation of the truck about which there was a conflict of interest between the driver and the company. For example, the cost of operating the trucks (paid by the company) was increasing and convex in the speed of the truck. Drivers preferred to drive faster than the cost minimizing speed, and to take longer breaks. Drivers who owned their trucks were residual claimants on their revenues minus these and other costs, and hence, of course, internalized the costs of fuel and depreciation, realizing significant savings as a result. For this reason, prior to the introduction of trip recorders, owner- operators successfully competed with company fleets on those runs for which the conflicts of interest between drivers and companies were particularly strong.

Using the trip recorders, companies were able to write contracts based on the speed at which the truck was driven, and to provide drivers other incentives to act in the companies’ interests. Unlike other on board computers, (the electronic vehicle managements systems, or EVMSs), the trip recorders provided no improvement in coordination between truckers and dispatchers, as the information was available to the company only on the completion of the trip The sole function of the trip recorders was to improve the contractibility of aspects of drivers behaviors in which there was a conflicting interest between the drivers and the companies. By improving the companies contractual opportunities, the trip recorders had two effects. First, they brought about a significant decline in the market share of owner-operators. Second, drivers in trucks with recorders drove slower.

Another example of the choice of technology makes clear that the exercise of power is sometimes an explicit motive in the innovation process. A major production bottleneck in the late nineteenth-century California food canning industry was

the highly skilled work of putting tops on the cans, or ‘capping’ as it was called from Phillips and Brown (1986)[53]. The small number of difficult-to-replace cappers exacted substantial rents from their employers, because of their indispensable role in production and the perishable nature of the goods at harvest time. The invention of a contraption called Cox’s capper changed this; but the firms that avidly purchased the device did not initially use it to cap cans, as it was not cost effective at the going wages. Rather, it was deployed as a part of the firms ‘rent-seeking strategy and simply held in abeyance should the (human) cappers’ demands become excessive. Writing 26 years after he invented the contraption, James Cox recalled the canning owners’ strategic need for the mechanical capper: “the helplessness of the canner [vis a vis the human cappers] made him a willing advocate of every mechanical means, and made possible the working out, through frequent failures and heavy losses, the perfected mechanical means now in use.”

These examples indicate that power may be exercised by public bodies (the British Navy and the Venetian fleet) or private individuals (the water lords of Bangladesh, the trucking companies). It may be deployed to expropriate property (and to deter expropriation) or to enforce contractual claims in cases of incomplete contracts (the cotton merchant-lenders). Our model of power and growth to follow and our measure of resources devoted to this end – guard labor – will encompass these aspects of power.

3 Power and Growth: A Classical Model

[T]he efforts of men are utilized in two different ways: they are directed to the production or transformation of economic goods, or else to the appropriation of goods produced by others.

Vilfredo Pareto, *Manual of Political Economy* (1905) (Pareto (1971)[51]:341)

To understand the dynamics of an economy we need to study not only the production of goods and services as conventionally defined but two aspects of reproduction as well. The first is the process of procreation and development of new individuals to replace those retiring from active economic life. The second is the reproduction (or alteration) of the economic institutions governing the process of production. Like production, reproduction is resource-using, and, taken together, the two reproduction processes just mentioned –individual and institutional–account for something like half the work done in most societies. For these and other reasons, the way that reproduction is organized matters critically for the dynamics of the economy and the trajectory through time of the livelihoods of its members. Here we abstract from individual reproduction to focus on the process by which an economy’s institutions are reproduced.

Institutions (as we use the term) are the laws, informal rules, and conventions which give a durable structure to social interactions among the members of a population. Conformity to the behaviors prescribed by institutions may be secured by a combination of centrally deployed coercion (laws), social sanction (informal rules), internalized norms, and mutual expectations (conventions) which make conformity a

best response for virtually all members of the relevant group.

The insight we wish to develop is that securing conformity to institutions can be quite costly, and the cost differs among institutions and across time and space. Conformity achieved through the coordination of expectations or the internalization of norms, for example, may not be very costly, as in the case of driving on one side of the road or the other, or the voluntary compliance with tax laws in some countries. However, where conformity to a society's institutions is secured primarily through governmental coercion or privately deployed sanctions, the resource costs may be substantial. Examples include some authoritarian political systems, colonial regimes, and as we will see, highly unequal capitalist economies.

Consider a closed economy in which owners of firms, acting non-cooperatively, maximize the rate of growth of their wealth by hiring (identical) workers to produce a single output that is sold on competitive markets. Owners individually set wages and hire supervisors to monitor workers so as to minimize the cost of an effective labor unit, taking account of the fact that workers select the (non-contractible) level of work effort. Workers choose an effort level that maximizes the present value of their lifetime expected utility, given both the likelihood of job loss (which is decreasing in the level of effort) and the expected duration of a spell of unemployment, should their employment be terminated.

The following summarizes the employer-employee interaction modeled as a standard contingent renewal principal agent problem. (Bowles 1985[10], Stiglitz and Shapiro 1984[60]). The principal (the employer) knows the agent's (worker's) best effort response, $e(w,m;z)$: given each wage rate (w) and level of monitoring (m), with an exogenously determined worker's fallback position z . At the beginning of a period, the employer selects (so as to maximize profits) and announces: i) a termination probability $t(e,m) \in [0,1]$ with $t_e < 0$ and $t_m > 0$ over the economically relevant ranges; ii) a wage rate, w , and iii) a level of monitoring per hour of labor hired m . Both the wage and the monitoring inputs are measured in the same units as per period output. Following the employer's announcement of her effort incentive strategy, and hence knowing the above, the worker selects e so as to maximize his expected present value of utility, which depends on the wage, the level of effort, and the likelihood of job termination. Finally, at the end of the period, the worker is paid, experiences the utility he incurs as a result of his effort and pay, and his employment is renewed or terminated, the latter occurring with probability $t(e,m)$. If the worker's job is terminated, he obtains a present value of lifetime utility of z and is replaced by an identical worker from the unemployment pool. The worker selects e so as to set $v_e = 0$ which requires:

$$u_e = t_e(e,m)(v-z) \tag{1}$$

Thus the worker will choose the level of effort that equates the marginal cost of effort (that is, u_e the marginal disutility of effort) to the marginal benefit of effort, the latter being the product of the effect of greater effort on the likelihood of retaining the job (recall t_e is negative) times the employment rent associated with the job ($v-z$).

Knowing the worker's best response function given by (1), the firm then maximizes profits by setting the wage and monitoring intensity so that

$$e_w = \frac{e}{(w + m)} = e_m \quad (2)$$

so that the marginal effect on effort of variations in wages and monitoring expenditures are equal to the average level of effort per unit of expenditure on hiring and disciplining labor.

We know that under quite general conditions, the competitive equilibrium of this economy is characterized by positive levels of monitoring, employment rents, and unemployment, and that the effective cost of labor effort is rising in the level of employment (Bowles (2004)[12], chapter 8). The before-tax profit rate (π) will generally be inverted U-shaped in the level of employment (h) because the positive effects of enhanced capacity utilization associated with higher levels of employment will eventually be more than offset by the profit squeeze associated with the rise in the cost of effort. (See, for example, the empirical studies in Bowles, Gordon, and Weisskopf (1989)[17] and Bowles, Edwards, and Roosevelt (2005)[13]). Thus we have $\pi(h)$ with $\pi_h > 0$ for low levels of h and $\pi_h < 0$ for h close to full employment.

The effect of unemployment clearly extends beyond the labor discipline environment. In many countries, property crime increases with the level of unemployment (e.g. Gould, Weinberg, and Mustard (2002)[33], Fougere, Kramarz, and Pouget (2003)[30], Raphael and Winter-Ember (2001)[56]), Edmark (2003)[25]). It is plausible to assume, further, that the owner's risk of loss of wealth by means other than crime (confiscation, governmental imposed populist restrictions of wealth-making e.g) is also increasing in the level of unemployment. Property lost in this way is assumed to simply disappear. The government imposes a linear tax on profits at rate τ , the proceeds of which are devoted to protecting property, incarcerating those convicted of property crimes, and defending the national borders.

We assume that all realized profits (after taxes and net of depreciation) are invested (and that wage and theft income is not invested), so that the rate of growth of wealth (k) is just the after-tax rate of profit minus the rate of losses (per period, as a fraction of the capital stock) through theft or confiscation, δ . Making explicit the relationships of the above variables to the level of employment (h) and the tax rate (τ) we have

$$k(h, \tau) = (1 - \tau)\pi(h) - \delta(h, \tau) \quad (3)$$

where δ is decreasing in both of its arguments. The government determines both τ and h (the latter through monetary policy).

Suppose some entity (the owning class, for example, acting cooperatively, or the state acting on its behalf) sought to adopt policies to maximize k given the (known) best response functions of workers and the resulting profit-maximizing labor-discipline strategies of owners. The resulting first order conditions for a maximum are:

$$\pi(h) = -\delta_\tau \quad (4)$$

$$\pi(1 - \tau) = \delta_h \tag{5}$$

The first, (4), instructs the entity to raise taxes to the point where the deterrence-of-confiscation effect of the resulting governmental property rights enforcement activities (the marginal benefits) equals the profit rate (which is the marginal cost associated with increases in the tax rate). The second, (5), instructs the entity to set employment at a level higher than that which maximizes before-tax profits, trading off the (negative) effect of greater employment on the profit rate (marginal cost) against the (also negative) effect of higher employment on the probability of wealth loss (marginal benefit). We assume that there is at least one allocation meeting these conditions; if there is more than one, the entity should choose that yielding a higher level of k .

Abstracting from the owners (and from those engaged in raising the next generation), the adult population in this economy consists of employed workers, monitors, unemployed workers, prisoners, guards, and military personnel. The first (employed workers) are productive in the sense that their effort is an argument of the firms's production functions. The efforts of the monitors, guards, and military personnel, by contrast, are directed not toward production, but toward the enforcement of claims arising from exchanges and the pursuit or prevention of unilateral transfers of property ownership.

These workers might be called (in the classical sense) unproductive, a term that does not suggest that they are unnecessary, but only that their efforts are directed towards the second kind of activity to which Pareto refers in the headquote to this section, somewhat expanded to include not only the appropriation of goods produced by others, but also preventing such appropriation. Prisoners and the unemployed represent a distinct category. They are unproductive not in the classical but in the everyday sense; but they are not without a function. Their extent results from the entity's selection of the τ and h that maximizes the rate of growth of the owners wealth, and their presence is part of the incentive structures entailed by this solution to the entity's maximum problem.

To emphasize their common role in sustaining the status quo distribution of property rights and claims, we call all but the employed workers *guard labor*³. Supervisors, guards, and military personnel exercise power in the sanction-based sense just defined, while prisoners and the unemployed are the necessary concomitants of the public and private sanctioning systems, respectively.

4 Measures of Guard Labor

An industrial army of workers under the command of a capitalist requires, like a real army, officers (managers), and N.C.O.'s (foremen, overseers) who command during the labor process in the name of capital. The work of supervision becomes their established and exclusive function. ... The leadership of industry is an attribute of capital, just as in feudal times the functions of general and judge were attributes of landed property.

Karl Marx, *Capital*, I (Marx(1976)[47]:450-451)

We have deliberately constructed a model in which productive and guard labor are readily distinguished, because, in the case of supervisors, as Marx put it, “the work of supervision becomes their established and exclusive function.” This world is fictional, in that most types of work combine some of both aspects. Foremen monitor workers and also solve technical or coordination problems that are clearly productive in the sense just defined. Teachers instruct the next generation in essential productive skills; and they also socialize them to internalize the norms contributing to conformity to the society’s institutions. And so on.

Nonetheless it may be of interest to count the fraction of the labor force occupying the roles of guard labor identified in the model: supervisory labor, private guards, police, judicial and prison employees, military and civilian employees of the department of defense (and those producing military equipment), the unemployed, and prisoners. Some supervisors work in segments of the economy for which all employees are counted as guard labor –a supervisor of guards in a prison– and to avoid double counting we have accounted for these as supervisors rather than as employees in a “guard industry”. Ideally we would also include those producing guns for private use, locks, security systems and the like, but we are not able to do so because of the lack of data. To abstract from cyclical effects we have measured guard labor at the peak of the business cycle (and for the last year, 2002, used the unemployment rate of the previous peak, in 2000). We include an estimate of the number of full time equivalent discouraged workers among the unemployed and exclude a measure of the frictionally unemployed. Jayadev (2005)[39] gives the details of our calculations.

While most of the measurements are straightforward, estimating the number of supervisors in the relevant sense is not. Following Gordon (1994)[32], we use the codes in the Dictionary of Occupational Titles (DOT) which provides detailed information on the nature of each of over a thousand jobs, distinguishing those in which the individual deals primarily with people (as opposed to things or data) and in which their relationship to people is “supervisory”. We find that in 1979, for example, by this definition, supervisors constituted 11.7 percent of the labor force. A partial check on this estimate is possible using Wright (1995)[69] and Wright (1990)[68], which present detailed information on the types and extent of supervisory tasks undertaken by large samples of U.S. and other nations’ labor forces. According to these data for the year 1980, 19.7 percent of the U.S labor force reported that they exercise task supervision meaning that they have more than one subordinate and they decide one or more of the following: the tasks, the tools or procedures to be used, and the pace of work of their subordinates. A slightly smaller fraction (15.4 percent) reported having more than one subordinate whom they can sanction (or cause to be sanctioned) with respect to pay, promotions, or job termination.

The fraction exercising both the task supervision of the first group and the sanctioning supervision of the second were 10.6 per cent of the labor force. Supervisors with ‘unrestrained’ sanctioning power (meaning those who can take sanctioning action without approval by others) were 12.4 percent of the labor force. The U.S census categories “Managers and administrators” constitute 11.2 percent of the labor force

in the same year. These three numbers are very similar to our estimate of 11.7 percent based on the Dictionary of Occupational Titles. (The Census managers and administrators category is very close to the DOT estimate in other years as well, and we use it to estimate the level of supervision in 2002, and for the pre World War II years).

The fact that these various estimates are similar occurs despite the somewhat surprising fact that many who are not managers or administrators exercise supervisory functions, while many who are managers and administrators do not. Ninety-three percent of foremen and eighty-five percent of managers report that they have supervisory authority. But more than half of professionals and technicians and two-fifth's of craft workers report the same.

Table 1 gives our estimates for the total and subcategories of guard labor-supervisors, guards, military, prisoners, and unemployment-expressed as a fraction of the labor force.

[Table 1 about here]

A substantial increase in the guard labor fraction of the labor force is evident, with supervisory labor and the military growing most rapidly over the period 1890-1948, and the growth of prisoners and guards (police, corrections officials and private security personnel) being more rapid during the latter period. The latter period witnessed a substantial decline in the military fraction, which peaked at 5.4 percent in 1966 and fell to 1.5 percent in 2002. About half of those classified as guards (47 percent) were privately employed in 2002, up from 28 percent in 1890.

Our measures of guard labor in the U.S. are necessarily incomplete. While we do not think we have overestimated the number of supervisors, we have certainly missed some types of work that could be termed guard labor. Activities similar to the enforcement of property rights by the waterlords in Bangladesh, or the imposition of cotton on southern farmers by the merchant lenders, or the workers producing the trip recorders monitoring the movement of truckers all fall beyond our purview. Nonetheless differences across nations in the extent of guard labor (measured as this simple model recommends) suggests that the concept may illuminate an aspect of economic structure that is crucial for the process of growth and stagnation.

In order to assess the degree of supervisory labor in a cross-country context, we use the data on occupational classifications derived from labor force surveys and available in the International Labor Organizations SEGREGAT database. These data are collected from the labor force surveys of the respective countries using definitions based on the International Standard Classification of Occupations 1988(ISCO-88). Specifically, we use the category "Major Group 1: Legislators, Senior Officials and Managers" as our measure of supervisory labor. The estimated ratio of supervisors to labor force using this source for the U.S. (14.9%) is very close to that estimated by the methods above (15.7%). Further details of the methods are described in Jayadev (2005)[39].

Using these data, we were able to estimate the numbers of all types of guard labor except the category of guards (police and private security personnel) for eighteen

advanced economies (for details see Jayadev (2005)[39])⁴. The results appear in Table 2.

[Table 2 about here]

First, the differences in the extent of guard labor among countries are substantial, ranging from a tenth of the labor force in Switzerland to over a fifth in the U.K and the U.S. Broadly, three groups are evident: social democratic countries which display low levels of guard labor, English-speaking countries which display high levels of guard labor (with substantial supervision), and Southern European economies which exhibit high unemployment rates and thus, large amounts of guard labor.

Second, differences in the extent of supervisory labor are especially striking ranging from lows of 2.9 percent and 4.4 percent in Italy and Sweden respectively to the U.K. and the U.S. both with at least three times the Swedish level. According to responses to identical questions in the the Wright dataset referred to above, while 39.2 percent of craft workers in the U.S. exercise supervisory authority, only 9.7 percent of Swedish craft workers do. 26 percent of clerks in the U.S. exercise supervisory authority, while half that fraction do in Sweden.

Third, the composition of guard labor differs substantially among the nations, especially in the proportions of the two largest components: supervision and unemployment. In the labor discipline model sketched in section 3, these two types of guard labor provide incentives for the workers' choice of an effort level. From the first order condition that determines the worker's choice of effort (equation (1) above), we can see that increased monitoring or increased unemployment will increase effort (the former by raising t_e and the latter by raising the rent associated with the job ($v-z$)). The top four in guard labor –Spain, the U.K., the U.S. and Greece– for example, devote about a fifth of their labor force to supervision and unemployment combined. But the U.S. is distinctive, with less than half the amount of unemployment of that observed in either Spain or Greece and 50 percent more supervisory labor. A comparison between the English speaking countries suggests a similar story. The U.S displays between 90 and 50 percent more supervisory labor than Canada, Australia and New Zealand, but about 50 percent less unemployment than these countries. The U.K. is intermediate between these countries. Comparing the two paradigmatic social democratic economies – Sweden and Norway – the same pattern emerges. Sweden exhibits two-fifths less supervisory labor than Norway, combined with an unemployment rate that one and a half times that of Norway. In a descriptive sense, unemployment and supervision appear to be substitutes in the labor discipline process.

Data limitations preclude the estimation of all of the components of guard labor for other countries. However, using the ILO SEGREGAT data again, we are able to compare supervision intensity across a sample of 27 low- and middle-income countries. Table 3 shows a remarkable diversity in the ratio of supervisory labor to employed labor. Botswana, Romania, and Mexico exhibit supervision intensities akin to those observed in Sweden and Italy, the low-supervision OECD economies. By contrast, supervision intensities in Estonia, Latvia and Egypt are almost at the level of the United States. Notice that the 13 ex-Communist economies are themselves highly diverse.

[Table 3 about here]

5 Correlates of Guard Labor

..A population can be very successful in spite of a surprising diversion of time and energy into aggressive displays, squabbling and outright fights. The examples range from bumble bees to European nations.

William Hamilton, “Innate Social Aptitudes of Man: an Approach from Evolutionary Genetics.” (Hamilton (1975)[35]:

How are we to explain the marked increase in guard labor in the U.S. and the significant differences in its extent among countries? First, the large differences in the supervisory component of guard labor might be explained by differences in technologies or the composition of output across countries and over time. For example, as firms grow larger, additional layers of supervision must be added, increasing the ratio of supervisors to productive workers. However this effect is likely to be very small: if each supervisor directs only 5 subordinates, then the firm supervisory ratio rises from 0.24 for a firm of 25 productive workers (five foremen and one CEO) to 0.25 for a firm with 15,625 productive workers. Sufficient data on aggregate cross national measures of firm size are difficult to obtain because of differences in measurement across countries(Bartelsman et al, 2005[2]). Using data collected and harmonized by them, the correlation of supervision and firm size (defined as the share in employment of firms with less than 20 employees as a percentage of all employment) is -0.01 for 10 European economies and the U.S. Fafchamps and Söderbom[26] use consistently collected firm level data from nine African countries and perform a non parametric analysis of supervisory ratios which provide strong evidence of a *negative* relationship between firm size and supervisory ratios. Thus, there is no good evidence for a positive firm size-supervisory intensity relationship. Differences in the extent of self employment and the preponderance of very small firms might explain some of the variation across countries. The remarkably low supervisory ratio in Italy(Falchi 1999[27]), for example, may be the effect, in part, of the high level of self employment and prevalence of very small firms there .

Other differences in technology (or different distributions of labor across sectors of the economy) may account for some of the differences. However, the data on supervision intensity by manufacturing sector in five sub-Saharan African countries shown in Table 4 suggests large country effects independent of the composition of output. Supervisory intensities in Zambia’s ‘wood and furniture’ and ‘food processing’ industries, are twice and five times Ghana’s respectively. A country-and-industry fixed effects regression indicates that Zambia’s supervision intensity conditioned on industrial structure is two and a half times Ghana’s. Of course these differences could reflect within sector variation among countries in output composition or technologies, but there is no way to determine how much (if any) of the estimated country effects are due to this.

[Table 4 about here]

We also explored if supervision intensity was related to more advanced technologies generically. However, in the advanced economy dataset (shown in table 2) the value added of knowledge intensive sectors as a share of gross value added was substantially uncorrelated with the supervisory ratio ($r = 0.14$).

While the data are inadequate to provide a compelling test of the hypothesis, we thus find little evidence that the increase in guard labor in the U.S. or the differences across the countries is due to differences in output composition and technology. A more likely explanation is what we term “enforcement specialization.”. Economic development proceeds through a process of specialization and increasing division of labor; the work of perpetuating a society’s institutions is no exception to this truism. Over history’s long sweep, the tasks of punishing those who violate norms, defending a peoples territory and ones own property, and inducing hard work towards common ends have become increasingly specialized. Gossip, ostracism, shunning, and (sometimes violent) group level collective sanctioning played a larger part in maintaining earlier social orders (Boehm 2001[9]). Most if not all engaged in these activities at least some of the time. The fact that these functions are increasingly specialized in occupations that we have termed guard labor allows us to measure their extent. But it should also caution against too literal an interpretation these measures. Our data indicate that the United States devotes well over twice as large a fraction of its labor force to guard labor as does Switzerland. This may occur in part because peer monitoring and informal sanctioning play a larger role in Switzerland, as well as the fact that ordinary Swiss citizens have military defense capacities and duties and are not counted in our data as soldiers.

The increasingly explicit nature of norm enforcement that proceeds with modernization may explain why per capita income and supervision intensity co-vary. Returning to the economy-wide supervisory intensity measure of from the ILO SEGREGAT database higher income countries are characterized by higher levels of supervision relative to the level of unemployment in the year 2000. For economies in which the gross domestic product per capita (averaged over the years for which data are available) is less than \$10000 (exchange rate conversion), there are on average half as many supervisors as there are measured unemployed. Among these economies, the ratio of supervisors to the unemployed is unrelated to per capita income. However for the 33 countries with per capita income greater than \$10000 there are 20 percent more supervisors than unemployed. Moreover, the ratio of supervision to unemployment varies strongly with the level of income among these high income countries; a standard deviation difference in income is associated with more than a half of a standard deviation (0.57) difference in the supervisor/unemployment ratio.

The fact that the labor discipline mechanisms in high income countries are more supervision intensive and less unemployment intensive is something of a puzzle. A possible explanation is that supervisors are involved in training and problem solving on the job, and the greater skill intensity of the production processes in the higher income countries explains the relationship. Another explanation consistent with the data is that nutritional effects of the wage are important in low income countries, as in the initial version of the efficiency wage model due to Leibenstein (1957) and others. If this is the case the firm’s incentives to offer wages above the worker’s next

best alternative include not only the disciplinary value of the employment rent, but also the contribution of the wage to the nutritional and health status of the worker, and hence the level of effective work done for a given level of subjective effort by the worker. If this is the case firms will devote more resources to wage costs and fewer to monitoring costs than in an economy in which variations in the wage have less significant effects on worker strength and health.

A fourth possible explanation of the differences among nations and over time in the extent of guard labor is that societies do indeed differ in some underlying structural aspects that affect the marginal benefits and costs of guard labor and hence its amount. It is plausible that highly unequal or class-polarized economies, or societies in which ethnic, political or other divisions are marked might deploy more guard labor. Similarly, high levels of political legitimacy might reduce the benefits and raise the costs of guard labor.

The first two panels in figure 1 show that the extent of guard labor varies with the degree of inequality and a measure of income polarization in 1995 due to Duclos, Esteban and Ray (2004)[24]. Their measure of polarization is intended to capture two aspects of an income distribution which Duclos, Esteban and Ray term identity and alienation. Identity is measured by how close one is to one's nearest neighbors. Alienation is measured by how far one and ones neighbors are from others more distant in the income distribution.

Countries in which conflicts between classes, ethnic or racial groups and political factions are greater may be expected to devote more resources to guard labor. We measured 'political conflict' as the normalized sum of three indices for our 18 countries: Ethno-linguistic fragmentation in 1960, average annual general strikes, and average annual 'riots' over the years 1960 to 1998. In all cases we have selected long time periods as we would like to capture underlying structural characteristics of the nations that are unlikely to be the consequence of the level of guard labor in the 1990s. The correlation of the resulting political conflict index with the guard labor ratio (shown in Figure 1 panel 3) is 0.61.

Where social conflicts are channeled into legitimate political and other legal channels and where citizens are incorporated into these processes rather than alienated from them, it may be that we would observe less guard labor. We included two (summed normalized) measures in our index of political legitimacy: average voter participation as a fraction of voting age population in all elections since 1945 and the number of consecutive years to the present in which universal male suffrage in competitive elections obtained. We chose male suffrage rather than male and female because guard labor as we have measured it is not involved in the mediation of male female conflicts to any important measure⁵. As the graph in figure 1 panel 4 shows, the correlation between our political legitimacy index and the guard labor ratio is -0.57.

In addition, we explored several other theoretically plausible correlates of guard labor. Union density, constructed as net union membership (total membership less self-employed and retired) divided by the total dependent labor force, yielded a correlation of -0.45 ($p=.13$). A more conceptually accurate measure of the gini coefficient (post tax and transfer gini from Röhme [57]) which was available for a smaller sample

showed a correlation of 0.48 ($p=.15$). Other correlations were less impressive. Technological differences, when measured by investment in knowledge as a percentage of GDP, displayed a low correlation(-0.29). Per capita GDP, trust (from Knack and Keefer[40]), and a standard measure of corruption (the business international index) yielded low negative correlations (-0.22, -0.14 and -0.20 respectively)

[Figure 1 about here]

None of the statistical associations we have presented are properly identified causal relationships, of course, because the determination of all of the correlates of guard labor (excepting the English language, arguably) are endogenous, as the model in section 3 makes clear. The empirical patterns we have identified are sufficient to suggest questions, not answers. In particular our suggestion that the extent of guard labor be a consequence of the degree of underlying economic inequality and social conflict is simply a plausible speculation that has not yet been adequately tested.

6 Some Welfare Implications

Both productive and unproductive labourers, and those who do not labour at all, are all equally maintained by the annual produce of the land and the labour of the country... [but] the whole annual produce, .. [is] the effect of productive labour.

Adam Smith , *The Wealth of Nations*, 1937[61] :315

John Hicks (1946)[38] famously defined the income of an individual as ‘the maximum value that he can consume during a week and still expect to be as well off at the end of the week as he was at the beginning’ (p. 172). This concept is often extended to national income and given an explicit welfare interpretation, as in the definition of what William Nordhaus (2000)[50] calls Fisherian income, namely “the maximum amount that a nation can consume while ensuring that members of all current and future generations can have expected lifetime consumption or utility that is at least as great as current consumption or utility” (p. 259). Both the Fisherian and Hicksian definitions represent income as a maximum flow consistent with the maintenance of the current stock of productive capacities. Thus it must be measured net of any use of output required to maintain these stocks, the most obvious subtraction being the stock of productive resources used up during the period in question. Nordhaus and others have proposed the additional netting out of changes in the stock of economically relevant natural resources (Vellinga and Withagen (1996)[63]). Martin Weitzman (1976)[66], for example, writes that in taking account of depreciation, the measure of capital should be ‘more general than the usual equipment, structures, and inventories. ... pools of exhaustible natural resources ought to qualify as capital, and so should states of knowledge...’(p 158).

Given compelling arguments for institutions as a determinant of output and growth (North (1990)[49], Acemoglu, Johnson, and Robinson (2004)[1]), we follow Weitzman and represent the quality of a nation’s economically relevant institutional

environment as a stock, measuring its contribution to the production. The stock varies with the level of trust, work ethic, honesty, effective protection from confiscation and the like. It is maintained in part by the activities of those we call guard labor, for these make theft, shirking, foreign invasion and the like unattractive strategies to pursue and hence sustain the expectations, incentives and norms associated with what have come to be called ‘good institutions’. Should this institutional stock be degraded for some exogenous reason, equilibrium output would fall. Following Weitzman, should the costs of maintaining this stock not be subtracted from gross output in calculating a welfare relevant concept of net national product?

Suppose for example, that many members of a society convert to a religion that condones theft, and that in response to the ensuing spread of lawlessness, individuals purchase more private security services, thereby reallocating some workers from the production of consumption goods to guard labor. Because their activities would be counted as output whether they were producing consumer goods or safer streets, and assuming that the workers’ incomes were unaffected by the reallocation, there would be no direct effect of the reallocation of labor effect on measured gross output. But welfare certainly would be lower as a result of the change. The amount that members of the society could consume without encroaching on their future consumption would have fallen, indicating a lower income in the welfare relevant (Hicksian or Fisherian) sense. If, as Weitzman (1976) and many since have advocated, ‘net national product is..a proxy for the present discounted value of future consumption’ (p. 157) it would be difficult to avoid the conclusion that in the example just given, net product properly measured has fallen, and that subtracting the value of the labor services shifted from producing consumption goods to protecting property would be a way of taking account of this.

The above argument and the example suggests that *in a welfare sense* the workers producing new machinery to repair that used up in the production process and the typically larger number who are engaged in the guard labor activities (excepting prisoners and the unemployed) that sustain the economically relevant institutional stock are performing analogous tasks. They both are producing something that the market has demanded, and both are thereby sustaining the productive assets of the economy (material capital and institutions respectively). When defining a welfare based measure of net output, the case for netting out the output produced by those maintaining the stock of capital goods is of course uncontroversial.

We wonder if a similar case could be made for netting out the services produced by those who maintain the economically relevant institutional stock. The suggestion is more conceptual than practical, as the statistical difficulties associated with such a re-calibration of net income might be insurmountable for the reasons apparent in our efforts to measure guard labor in this paper. Were such an adjustment made, however, our estimates of guard labor suggest that the impact on growth rates and relative income levels across countries might be substantial. This would be especially true for the United States where roughly one in five workers are performing guard labor (not counting prisoners and the unemployed), something like double the number of those producing the investment goods making up the depreciation of the capital stock.

7 Conclusions

...it is lamentable to think how a great proportion of all efforts and talents in the world are employed in merely neutralizing one another. It is the proper end of government to reduce this wretched waste to the smallest possible amount, by taking such measures as shall cause the energies now spent by mankind in injuring one another, or in protecting themselves against injury, to be turned to the legitimate employment of the human faculties...

J.S. Mill, *Principles of Political Economy* (1848) (Mill(1965):979)

Could the reallocation of guard labor to productive employment promote economic development and enhance the livelihoods of the least well off? We cannot answer this in any definitive way; but the following speculative conclusions may point towards partial answers.

First, the costs of reproducing an economy's institutions arise in large measure because of conflicts of interest over things that cannot specified in complete contracts that are enforceable at low cost. These conflicts provide incentives for the costly exercise of power by private economic actors. Policies that result in more fully and clearly defined property rights and attenuated conflicts of interest would reduce the cost of institutional reproduction.

Second, conflicts over non-contractible goods and services are exacerbated when many economic actors lack the assets necessary to become residual claimants on the results of their own non-contractible actions or to engage in other efficient contracts (Rosenzweig and Wolpin (1993)[58], Laffont and Matoussi(1995)[41], Bardhan, Bowles, and Gintis (2000)[7]).

Third, enforcement strategies adopted by wealthy principals facing wealth-poor agents typically confer a rent on the agent, who is then monitored by the principal. Both the rent and the resources devoted to monitoring are private costs, but only monitoring involves a social cost (the rent is a transfer, not an additional claim on resources that have alternative uses). As a result, private enforcement strategies are technically inefficient:if a larger rent were paid, the same output could be accomplished with less monitoring inputs and not more of any other input. Thus private enforcement exhibits an endemic 'too much stick, not enough carrot' technical inefficiency (Bowles (1985)[10]). Private bargaining typically cannot eliminate the resulting inefficiency for the same reason that the labor contract is incomplete: efficient bargaining will be impeded by asymmetric information concerning the effort of the agent and commitment problems facing the principal. .

Fourth, illegitimate inequalities are costly to sustain. While cultures often justify vast differences in power and access to valued resources, the mind is not a blank slate on which such ideas as the divine right of kings or the superiority of the 'white race' can be etched at will. Two decades of behavioral experiments have provided convincing evidence that humans in dozens of cultures are inequality averse, and that violations of norms or reciprocity often lead to costly conflicts (Fehr and Gaechter (2000)[29], Falk, Fehr, and Fischbacher (2003)[28])

Endnotes

¹ Dahl's definition (1957)[21]:202-203: "A has power over B to the extent that he can get B to do something that B would not otherwise do."

² Many political theorists regard sanctions as the defining characteristic of power. Lasswell and Kaplan (1950)[45]:75 make the use of "severe sanctions ... to sustain a policy against opposition" a defining characteristic of a power relationship, and Parsons (1967):308 regards "the presumption of enforcement by negative sanctions in the case of recalcitrance" a necessary condition for the exercise of power. The definition below limits 'power' to a particular way of affecting the behavior of others, namely through the use of sanctions, and in this respect it differs from Dahl's (which encompasses general equilibrium effects through market interactions, as when A purchases a commodity from B.)

³ Guard labor bears no obvious relationship to transactions costs. In a standard labor discipline model, for example, monitors are guard labor, and the cost of employing them are transactions costs. But what of that wages are paid in excess of the workers' next best alternative to elicit higher levels of labor effort? Is this excess also not part of transactions costs? And while prison guards or military personnel represent guard labor, it is unclear which transactions their costs underwrite. Wallis and North (1986)[64] present a time series on transactions costs in the U.S. economy, analogous to our series for guard labor.

⁴ In contrast to the U.S. historical estimates our measure of supervisory labor is restricted to civilians; military supervisors are counted as military personnel

⁵ Remarkably, the U.S. attained universal male suffrage only with the passage of the 1965 Voting Rights Act. However the results are substantially the same if one uses the end of the Civil War (1864) as the date at which universal male suffrage was attained. Following Robert Dahl, (1971)[22] we chose the 1965 date due to the systematic exclusion of African Americans from voting from 1877 onward until the late 1960s (Woodward (1974))[67]

Table 1: Guard Labor and its Components as a Percentage of the Labor Force in the United States: 1890-2002

	1890	1929	1948	1966	1979	1989	2002
Supervisors	0.8	1.4	9.8	9.9	11.7	13.2	15.7
Guards	0.3	0.7	0.8	0.9	1.7	1.8	2.2
Military	0.3	0.8	3.3	5.4	3.0	3.1	1.8
Prisoners	0.4	0.2	0.2	0.3	0.3	0.5	1.5
Unemployed	4.2	3.8	4.7	4.5	6.7	6.3	4.8
Total	6.0	6.9	18.9	20.9	23.4	24.9	26.1

Source: See text and Jayadev, 2005[39]

Table 2: Guard Labor and its Components as a Percentage of the Labor Force,2002: 18
Advanced Economies

Country	Supervisors	Unemployed(a)	Military(b)	Prisoners(c)	Total
Switzerland	5.8	2.7	1.0	0.1	9.7
Iceland	7.9	2.6	0.0	0.1	10.6
Sweden	4.4	5.3	1.1	0.1	10.9
Denmark	6.9	3.6	0.9	0.1	11.5
Norway	7.3	3.6	1.4	0.1	12.4
Austria	6.8	4.3	1.3	0.2	12.6
Portugal	6.7	4.4	1.4	0.3	12.7
Italy	2.9	9.7	1.5	0.2	14.3
Netherlands	11.6	3.0	0.8	0.2	15.7
Ireland	10.6	4.1	0.9	0.2	15.8
Canada	8.5	7.2	0.4	0.2	16.3
Belgium	10.3	6.6	1.0	0.2	18.1
Australia	11.1	6.3	0.5	0.2	18.2
New Zealand	11.9	5.5	0.5	0.3	18.3
Spain	6.7	11.9	0.9	0.3	19.8
United Kingdom	13.4	5.5	0.7	0.2	19.9
United States	14.9	4.8	1.0	1.4	22.2
Greece	9.1	10.3	4.50	0.2	24.0

(a) Average of 2001-2003

(b) Data does not include civilian employees of the military

(c) Prisoners data are from Walmsley (2003) and are for the latest year available between 1998 and 2001

Source: See text and Jayadev, 2005[39]

Table 3: Supervisors as a Percentage of Total Employment in 27 Low and Middle Income Countries

Namibia	1.8
Bolivia	2.1
Romania	2.2
Mexico	2.3
Ecuador	2.8
Botswana	3.0
Oman	3.2
Moldova	3.3
Georgia	4.9
Mongolia	4.9
Costa Rica	5.7
South Africa	5.8
Bulgaria	5.8
Poland	6.1
Czech Republic	6.1
Uruguay	6.2
Slovakia	6.3
Argentina	6.7
Croatia	6.7
Hungary	6.9
Ukraine	7.1
Trinidad and Tobago	7.2
Barbados	7.5
Lithuania	8.3
Egypt	9.7
Latvia	10.3
Estonia	12.6

Source: See text and Jayadev, 2005[39] based on ILO Segregat database

Table 4: Supervisors as a Percentage of Employees: 5 African Economies

Country	Predicted*	Wood and Furniture	Textile and Garments	Metal and Machinery	Food Processing
Ghana	2.03	2.52	3.63	3.14	1.79
Kenya	3.09	3.54	4.50	4.75	2.70
Zimbabwe	4.33	5.40	4.43	5.10	4.40
Cameroon	4.42	3.28	5.82	6.72	4.18
Zambia	5.30	4.85	4.93	4.57	9.54

* predicted value of supervisors to employees conditioned on industry dummies

Source: Calculations from Center for the Study of African Economies Database available at <http://www.csae.ox.ac.uk/datasets/cfd-edcc/cfd-main.html>

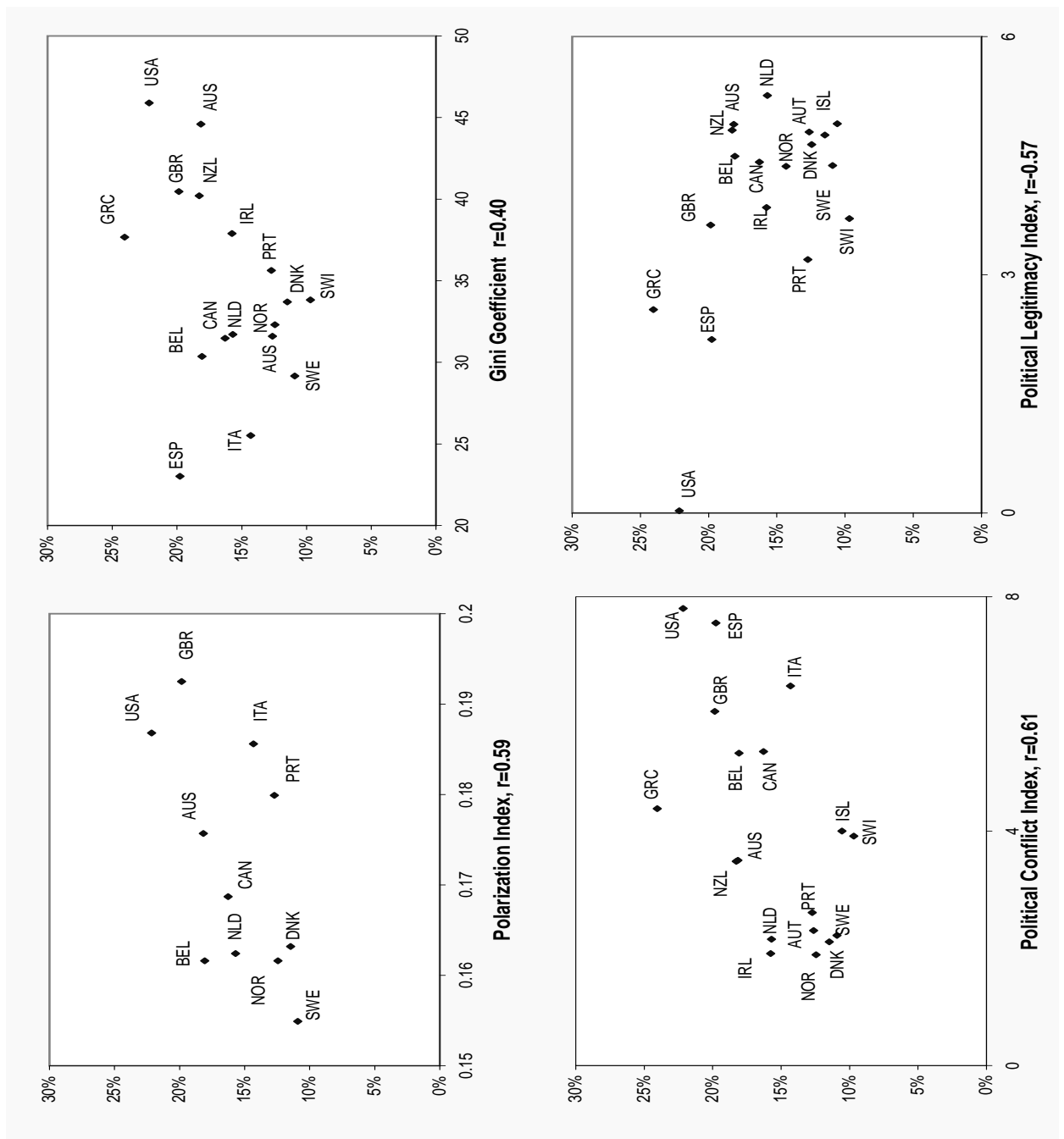


Figure 1: Guard Labor and its Correlates. For methods and sources see text and Jayadev (2005)[39]

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Appendix

Guard Labor in the cross country sample comprises supervisory labor, the unemployed, military personnel and the prison population. Supervisory labor is obtained from the International Labor Organization's LABORSTA Segregat dataset. This dataset classifies respondents according to International Standard Classification of Occupations(1988) categories. Within these categories, the subgroup consisting of "Legislators, Senior Officials and Managers" are taken to be supervisory labor. For the United States the data are not available, and instead for the value for the cross country figure for 2002 we use the estimate of the same category from the International Social Survey Program (ISSP) dataset. This nationally representative dataset classifies respondents according to International Standard Classification of Occupations (1988) categories as well. The unemployment rate was obtained from the world development indicators. Although unemployment measures vary across countries, a comparison between the BLS's series of a consistently defined unemployment rate and the series showed that there is little significant differences in the measures, and the former provided us with a larger dataset. The data on military personnel as a percentage of the labor force were obtained from the World Bank's World Development Indicators CD ROM (2003). Finally, data on the prison population was obtained from Walmsley, Roy(2003)[65] "A World Prison Population List" Research, Development and Statistics Directorate, Home Office, UK. The data vary in terms of the year for which the data was collected. For the most part, however, the prison population is for the years between 1998 and 2001.

Gini coefficients were obtained from the high quality Deininger and Squire database. The measure of polarization is obtained from Duclos, Esteban and Ray (2004)[24] "Polarization: Concepts, Measurement, Estimation"