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Samuel Bowles

*University of Massachusetts - Amherst*

Arjun Jayadev

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# DEPARTMENT OF ECONOMICS

## Working Paper

**Guard Labor: An Essay in Honor of  
Pranab Bardhan**

by

Samuel Bowles and Arjun Jayadev

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**UNIVERSITY OF MASSACHUSETTS  
AMHERST**

# Guard Labor: An Essay in Honor of Pranab Bardhan

Samuel Bowles\* and Arjun Jayadev†

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\*Santa Fe Institute and University of Siena

†Department of Economics and Political Economy Research Institute, University of Massachusetts at Amherst

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*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)[5])

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)[3], Bardhan (1989)[4]). We here explore the economic importance of the exercise of power and the resources devoted to this end.

In the next section we give empirical examples of the economic importance of power and offer a definition of this elusive term. We then investigate the role of power in an abstract modern capitalist economy, borrowing ideas 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 will see that a significant portion of an economy’s productive potential may be devoted to the exercise of power and to the perpetuation of social relationships of domination and subordination. We then measure these resources in labor units using the concept of guard labor, finding it to be a significant fraction of the U.S. labor force. Turning to evidence from other economies, we document substantial country-differences in the extent of guard labor and a strong statistical association between the extent of income inequality and the fraction of the labor force that is constituted by guard labor. We close with some observations on the role of guard labor in the process of economic development, and some speculations concerning how economies might function better with more carrot and less stick.

## §

*[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)[35]

Historians have never doubted the economic importance of power. Indeed, the entire content of the PhD oral exam in economic history set by Alexander Gerschenkron

for one of the authors of this paper required an extemporaneous half hour lecture on the role of power in economic development! Whatever may be said of the quality of that performance years ago, historical material for such a presentation is now abundant.

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)[42]:166 ) According to Pomeranz, by contrast to the resource-constrained Yangzi delta, England's military prowess had been honed in centuries of continental warfare, a benefit of which was cheap access to the raw materials of the New World. The Yangzi delta did not have the political or military wherewithal to break out of the Ricardian constraints and escape the profit squeeze associated with the resource demands of rapid growth ( for a skeptical view, see Brenner and Isset(2002)).

Similar themes appear in studies by Frederic Lane (1973)[34] 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)[33]: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)[47]. 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)[18] 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. The result, according to Ransom and Sutch (1977)[43]: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)[13])—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 predictors 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)[46], Bowles, Gordon, and Weisskopf (1983)[15] and the essays in Bowles and Weisskopf (1998)[17].) 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)[10]).

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))[2]. 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.

Thus both historical and contemporary evidence suggests the economic relevance of power. But at least until recently, the economics of power has been pursued only by modern day mercantilists, Marxists and other mavericks, the latter including not only Bardhan, but also Jack Hirshleifer (2001)[31], Phillip Aghion and Jean Tirole(1997)[1], Kaushik Basu (2000)[7], Shelly Lundberg and Robert Pollak (1994)[37], Oliver Hart (1995)[30]. With no disrespect intended to that illustrious list and others who have worked on it, power has not made into the economic mainstream. Why has power remained a boutique item rather than being available at the mall?

Bardhan's warning of "descriptions taking the place of explanation" may provide a partial explanation. In the same spirit, a distinguished line of economists, from Eu-

gen 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 concerns<sup>1</sup> 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*<sup>2</sup>. 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 sufficient that, by imposing or threatening to impose sanctions on A, B is capable of affecting A's actions in ways that further A's interests, while A lacks this capacity with respect to B (Bowles and Gintis (1992)[14]

## §

*[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)[40]:341)

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<sup>1</sup>Dahl's definition (1957)[20]:202-203: "A has power over B to the extent that he can get B to do something that B would not otherwise do."

<sup>2</sup>Many political theorists regard sanctions as the defining characteristic of power. Lasswell and Kaplan (1950)[36]: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.)



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. 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. 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:

$$u_e = t_e(e,m)(v-z) \quad (1)$$

Thus the worker will choose the level of effort that equates the marginal cost of effort ( $u_e$  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)[11], chapter 8). The before-tax profit rate ( $\pi$ ) 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)[16] and Bowles, Edwards, and Roosevelt (2005)[12]). 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)[28], Fougere, Kramarz, and Pouget (2003)[25], Raphael and Winter-Ember (2001[44]), Edmark (2003)[21]) 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  $\tau$ , 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,  $\delta$ . Making explicit the relationships of the above variables to the level of employment ( $h$ ) and the tax rate ( $\tau$ ) we have

$$k(h,\tau) = (1-\tau)\pi(h) - \delta(h,\tau) \tag{3}$$

Where  $\delta$  is decreasing in both of its arguments. The government determines both  $\tau$  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:

$$\pi(h) = -\delta_\tau \tag{4}$$

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

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 (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  $\tau$  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 role in sustaining the status quo distribution of property rights and claims, we call all but the employed workers *guard labor*<sup>3</sup>. 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.

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<sup>3</sup>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, its is unclear which transactions their costs underwrite.

*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)[38]: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. Jayadev (2004)[32] gives the details of our calculations.

While most of the measurements are straightforward, estimating the number of supervisors in the relevant sense is not. however. Following Gordon (1994)[27], we use the codes in the Dictionary of Occupational Titles 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)[50] and Wright (1990)[49], 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 labor force report that they exercise task supervision. 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.

Figure 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.

*[Figure 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 extent of supervision, 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.

## §

*..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)[29]: )

In a world described by the model in the third section, we would not expect any particular relationship between the extent of guard labor and the rate of accumulation or any other measure of economic performance. The reason is that the entity has determined the level of guard labor in order to maximize the rate of growth of the capital stock, so that small differences in the use of guard labor should have second order effects on the rate of accumulation. Differences in the extent of guard labor would be expected to reflect nation-specific levels of legitimacy of economic institutions, work ethic, and other aspects of adherence to social norms. Countries whose institutions were less costly to maintain would be advantaged, of course, because a larger fraction of the labor force could be devoted to productive labor.

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 (see <http://laborsta.ilo.org/>). 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 a percentage of all employees as our

measure of supervisory labor. Further details of the methods are described in Jayadev (2004)[32].

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 seventeen advanced economies (for details see Jayadev (2004)[32])<sup>4</sup>. The results appear in Figure 2.

*[Figure 2 about here]*

Certain aspects of the data are striking. 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 unusually high unemployment rates and thus, large amounts of guard labor.

Second, differences in the extent of supervisory labor are especially striking ranging from a low of 4.4 percent in Sweden to the U.S. with 3 times that number. According to the Wright data set 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 as 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,

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



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.

Figure 3 shows that the extent of guard labor varies with the degree of post tax and transfer income inequality and the measure of income polarization in 1995 due to Duclos, Esteban and Ray (2003)<sup>5</sup>. 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 one's neighbors are from others more distant in the income distribution. The close statistical association between the extent of guard labor on the one hand and income inequality and polarization on the other ( $r=0.91$   $r=0.94$ , respectively) is due almost entirely to the covariation of the intensity of supervision with income inequality and polarization ( $r = 0.71$  and  $r = .70$  respectively).

*[Figure 3 about here]*

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. Figure 4 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 Denmark, Sweden and Switzerland, 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.

*[Figure 4 about here]*

Some of the diversity of supervisory intensity across countries may reflect differences in the composition of output. One check on this possibility in the context of low income countries is afforded by analyzing occupational data from the World Bank's survey of manufacturing firms that it conducted as part of its Regional Program

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<sup>5</sup>The figure shows only those countries for which we have data on both inequality and income polarization. Adding all the advanced economies to either scatter plot, however, does not change the basic result

on Enterprise Development (RPED) in Africa. The data on supervision intensity by manufacturing sector in five sub-Saharan African countries shown in Figure 5 suggests large country effect 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.

*[Figure 5 about here]*

Returning to the economy-wide supervisory intensity measure of from the ILO SEGREGAT database, Figure 6 shows that 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 as unemployed. Moreover, as Figure 6 shows, 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.

*[Figure 6 about here]*

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 workers 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.

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.

## §

*...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)

Why do economies exhibit such different levels of guard labor? Could its reallocation to productive employment promote economic development and enhance the livelihoods of the least well off? We cannot answer these questions 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 conflicts of interest over things that cannot specified in complete contracts 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 (Bardhan, Bowles, and Gintis (2000)[6]).

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 (1986)[9]).

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)[24], Falk, Fehr, and Fischbacher (2003)[23] )

We conclude with two observations on the relationship between guard labor and the process of economic development.

First, 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 people’s territory and one’s 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[8]). 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. Peer monitoring and informal sanctioning may play a larger role in Switzerland. The extent of the difference between the two countries may reflect the fact, at least in part, that in the U.S. when one’s neighbor’s boisterous party is disturbing the sleep of the neighborhood one is more likely to call the police than to call the neighbor.

Second, when accounting for the depreciation of capital goods we typically define net income as the maximum one could consume in a given time period without reducing the value of one’s assets. If restoring capital assets to a status quo value through depreciation expenditures motivates a deduction from gross income, should not the same principle apply to the costs of sustaining the institutional structure of society? In light of the national differences in the extent of guard labor (even taking account

of the caution immediately above), a positive answer would suggest a considerable downward revision in net income in many countries, and a reordering of per capita guard-labor-adjusted net incomes. This is especially true of the U.S. where roughly one in five employees (that is not counting the prisoners and the unemployed) are performing guard labor, while roughly one tenth of gross domestic product is accounted for by capital consumption.

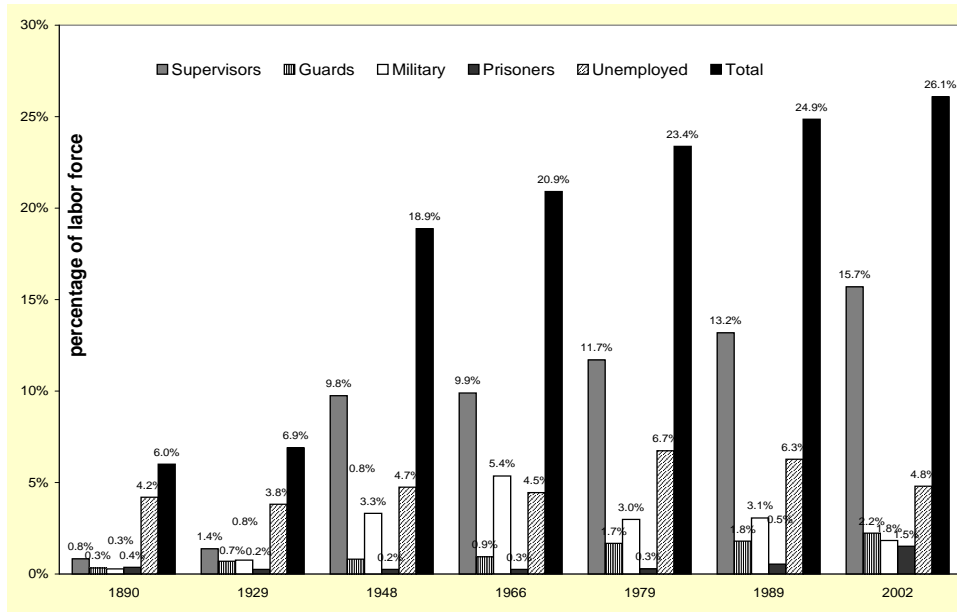


Figure 1: Guard Labor in the United States, 1890-2002. For methods and sources see Jayadev (2004)[32]

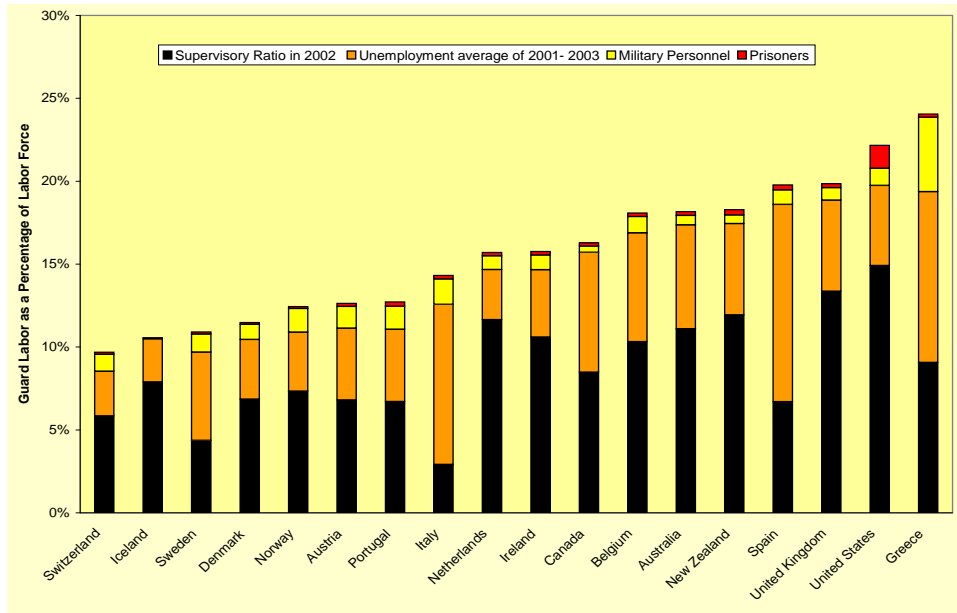


Figure 2: Guard Labor as a Percent of the Labor Force, Seventeen Advanced Economies, 2002. For methods and sources see Jayadev (2004)[32]

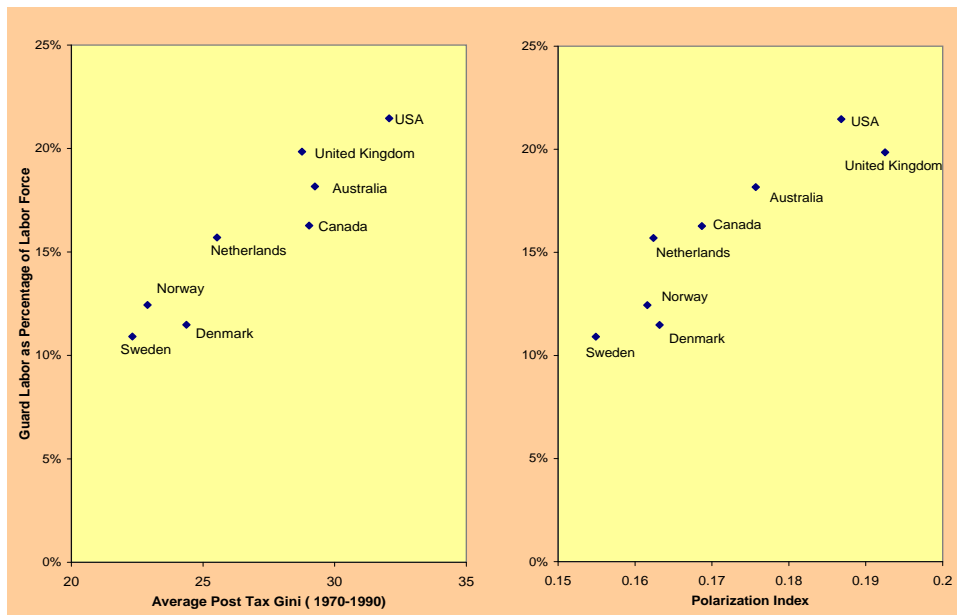


Figure 3: Guard Labor, Inequality and Polarization. The polarization measures are from Duclos, Esteban and Ray (2003) and are estimated with  $\alpha = 1$ . The post tax and transfer gini coefficients are from Rehme (2003)

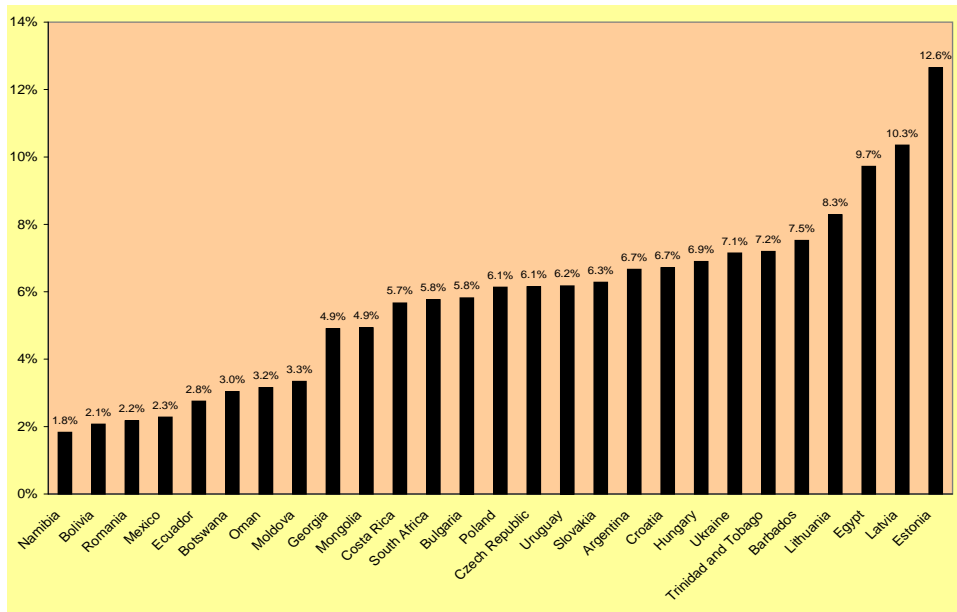


Figure 4: Supervisors as a Fraction of Employment; 27 Low- and Middle-Income Economies Source:Derived from International Labor Organization Laborsta Segregat Database ([www.laborsta.ilo.org](http://www.laborsta.ilo.org)) The data are for the year 2000.For methods and sources see Jayadev (2004)[32]



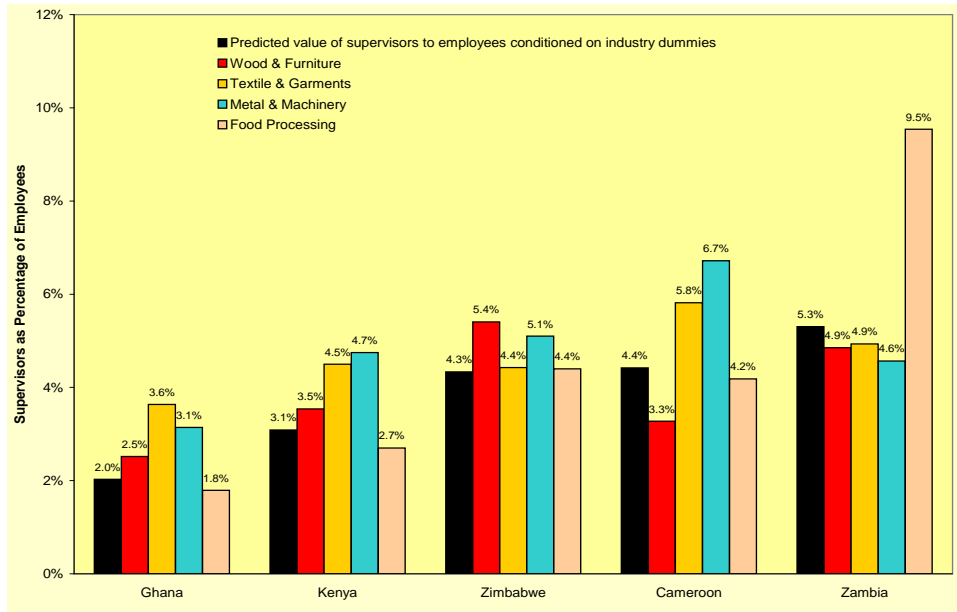


Figure 5: Supervisors as a Percentage of Employment by Manufacturing Sector in Five African Economies. Note: The first bar is the predicted country average abstracting from national differences in the structure of output. Source Center for the Study of African Economies. The data are obtained from surveys of 626 firms undertaken in three waves during the 1990s by the regional program of enterprise development project of the World Bank (RPED), and are described in detail in Fafchamps and Soderbom (2004). The data are available at <http://www.csae.ox.ac.uk/datasets/cfld-edcc/cfld-main.html>

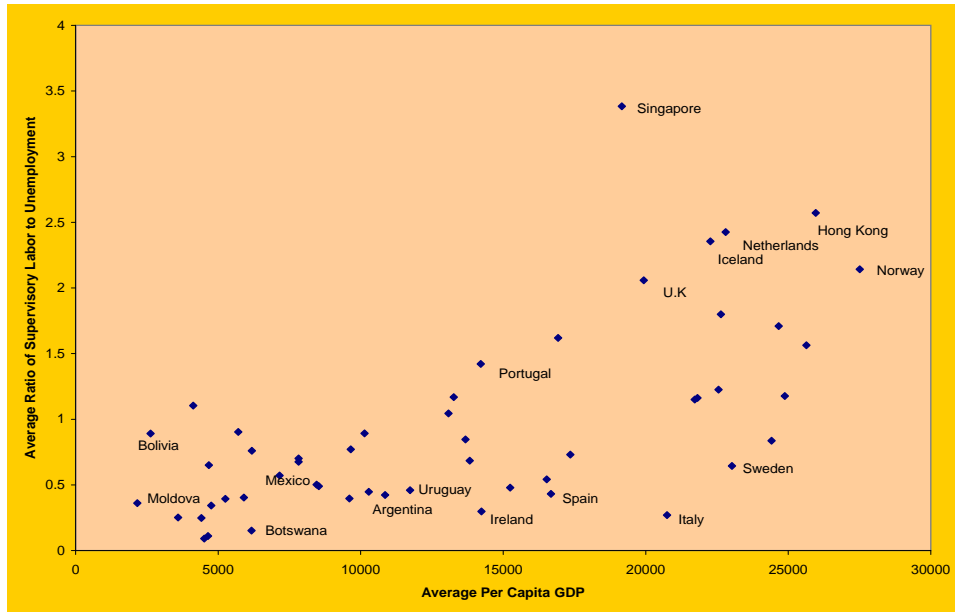


Figure 6: Supervisors Relative to the Unemployed by Per Capita Income in 2000, 55 Countries. For methods and sources see Jayadev (2004)[32]

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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) "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.

Post tax gini coefficients were obtained from Günther Rehme "(Re-) distribution of personal incomes, education and economic performance across countries" Luxembourg Income Study Working Paper No. 299 (2003),and is measured as the Average Gini coefficient for net income of households (adjusted for household size by the square root of the number of household members) for the period 1970-1990.

The measure of polarization is obtained from Duclos, Esteban and Ray (2003) "Polarization: Concepts, Measurement, Estimation"