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The Economic Value of Ideology

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Abstract

Specialization and trade rest on institutions that protect property rights and enforce agreements. Frequently, in economic analysis institutions are just assumed to exist, or it is implicitly supposed that the political game can establish them. Once this assumption is done, the invisible hand does its work properly. It doesn't matter if humans beings are benevolent or selfish for the gains from specialization and trade be realized. However, it is not easy to build institutions, neither are they a free lunch. The paper shows that ideology, understood as a self-imposed code of conduct, contributes to reduce the cost of instituting an industrious society, inducing people to assign their time and effort to productive activities rather than to theft.

JEL Classification: K42, Z13.

Keywords: ideology, self-imposed codes of conduct, crime, enforcement of property rights.

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'*Society ... cannot subsist among those who are at all times ready to hurt and injure one another ...*' (Adam Smith, Theory of Moral Sentiment)[1]

1 Introduction

Adam Smith [14] emphasizes in the first chapters of book I of The Wealth of Nations the gains from specialization and trade. He also claims that individuals have a natural propensity to trade. However, in book V of The Wealth of Nations he asserts that a government is necessary to enforce property rights, agreements and contracts, because otherwise individuals could have an incentive to appropriate others' goods and resources instead of working and trading. The dilemma is clear: although individuals could benefit from specialization and trade getting the goods that others produce from voluntary exchange, they have also an incentive to get other people's goods by violence and coercion, do not respect agreements, cheat and deceive whenever possible.

However, this dilemma was not integrated in the core of economic analysis. As Grossman [6] states:

> Traditionally, general-equilibrium models have taken effective property rights to be given and have been concerned only with analyzing the allocation of resources among productive uses and the distribution of the resulting product. However, this formulation of the economic problem is incomplete, because it neglects the fact that the appropriative activities by which agents create the effective property rights that inform allocation and distribution are themselves an alternative use of scarce resources.

Recently, this has began to change. The field of the economics of conflict has been using economic analytical's tools to model environments where property rights are not effective[2], agreements are not credible and agents can assign their resources to productive as well as appropriative activities. For example, Hirshleifer [8] presents a model of an anarchic social order[3] in which agents have a technology of production and a technology of appropriation or conflict. In this model resources are not immediately secure; on the contrary each agent can use his resources to productive effort or fighting effort in order to acquire more resources from other agents and defend himself from others' appropriative activities. Grossman and King [7] analyze a similar model, emphasizing the difference between defensive and offensive weapons and studying the possibility of an equilibrium where agents assign their resources only to productive and defensive activities, but nothing to offensive (predation) ones. Konrad and Skaperdas [9] compare different types of governance to provide security in a setting where individuals can use their effort to produce or to fight for the appropriation of others' resources. Garfinkel and Skaperdas [5] review the literature of economics of conflict. They present many modification and extensions of the basic model in Hirshleifer [8] or Grossman and King [7].

One common feature of this literature is that it supposes self-interested agents completely lacking any standard of honesty and integrity, who do not care about others' welfare. The problem is that it is very difficult to build a political system capable of enforcing property rights and contracts in a world populated by individuals absolutely indifferent about norms. North [10] states this in a clear manner:

> How effectively agreements are enforced is the single most important determinant of economic performance. The ability to enforce agreements across time and space is the central underpinning of efficient markets. On the surface such enforcement would appear to be an easy requirement to fulfill. All one needs is an effective, impartial system of laws and courts for the enforcement of formal rules, for the 'correct' societal sanctions to enforce norms of behavior, and for strong normative personal standards of honesty and integrity to undergird self-imposed standards of behavior. The creation and enforcement of efficient property rights depend on polity. However, it is difficult if not impossible to derive a model of polity that produces such results *as long as one retains the standard wealth maximization postulate* and accepts the time horizons that characterized political decisions.[Italics added.]

North [10] also stresses that in a world where measuring performance and enforcing contracts is not costless it would be too costly to enforce rules only based on the dissuasive power of controls. Individuals' sense of fairness and internalized moral rules could provide a limit to people's behavior as effective as external coercion. It follows that in environments characterized by imperfectly specified and imperfectly enforced

[1] Quoted in Coase [4].

[2] Grossman [6] defines effective property rights as follows: 'To say that a agent has an effective property right means that this agent control the allocation of some valuable resources and the distribution of the fruits of this allocation.'

[3] Hirshliefer [8] defines anarchy as: '... a social arrangement in which contenders struggle to conquer and defend durable resources, without effective regulation by either higher authorities or social pressures'. He also adds that 'since regulation can vary from total to zero effectiveness anarchy is typically a matter of degree'.

property rights and agreements people's ideology can play a significant role in the determination of economic outcomes.

Ideology, often a fuzzy expression, has multiple meanings, although most of them agree in considering that it is a set of beliefs sustained by an individual or group of individuals. Usually it refers to a set of value judgments about the results of a social order, *i.e.*, a social justice criterion or a sense of fairness, but it can also be a set of representations about the way a social order works. While the former meaning suggests a normative connotation (sense of fairness, social justice criterion, standards of honesty), the latter focus on a positive feature: social perceptions, system of beliefs concerning social affairs[4].

Many authors has employed the latter meaning for underlining the effects of ideology on people's behavior and economic outcomes. Piketty [12] presents a model where individuals who believe that the probabilities of social mobility are mainly generated by predetermined factors rather than effort prefer more redistribute policies, and at the same time make less effort. Alesina and Angeletos [2] show that if people believe that the wealth of individuals is more a question of luck and destiny than of effort they prefer higher tax rates. Di Tella and MacCulloch [15] show that people's perceptions of corruption affect their disposition to favor public regulations. These papers view ideology as a set of representation about the way a social order works. In this sense they suppose that people share the same values regarding social justice but they differ in their perceptions about how the world works (for example, people disagree about the impacts of government policies, politicians' debate intensively about the best ways to reduce unemployment and economists dispute about the determinants of economic growth. At the same time there is more or less a consensus about the objectives -citizens desire high-quality public policies, politicians want to reduce unemployment, economists pursue a high growth rate- but people involved have conflicting views concerning the way the world works.) Furthermore, many differences in representations do not seem to disappear as time runs. For example in Piketty's model agents learn about the parameters that determine social mobility in a way that even in the long run differences in perceptions across individuals persist.

On the other hand, Akerlof and Yelen [1] develop a model of the labor market where firms do not adjust wage because it offends employees' sense of fairness. This corresponds more closely to the first meaning of ideology. In the same direction North [10] treats ideology as a component of informal rules[5]. According to him informal rules include: '(a) conventions that evolve as solutions to coordination problems and that all parties are interested in having maintained, (b) norms of behavior that are recognized standards of conduct, and (c) self-imposed codes of conduct such as standards of honesty or integrity.' The difference between conventions and norms, on one hand, and self-imposed codes of conduct, on the other, is that while conventions are self-enforcing and norms of behavior are enforced by the fear to retaliation or by social ostracism, self-imposed codes of conduct '... do not obviously entail wealth maximization behavior but rather entail the sacrifice of wealth or income for other values'. Thus, pursuing this line of reasoning ideology can be identify with self-imposed codes of conduct. For example, an ideology that favors the respect for others' rights could facilitate the enforcement of property rights and agreements; on other hand, an ideology that supports and legitimate the breach of contracts could be an impenetrable barrier to economic development.

Recapitulating, for the purposes of the present paper ideology is considered a system of social belief that induces self-imposed codes of conduct on individual behavior. The value of ideology as an alternative and complementary method to enforce property rights and agreements, or at least to reduce the social costs of enforcing them, is explored. A model is presented in which an ideology of respect for other people's goods contributes to discourage theft, decreasing the resources society must distract from other uses to deter robberies. The paper is organized as follows. In section 2 the model with no ideology regarding others' rights is introduced. In subsection 2.1 the basic assumptions are performed, in subsection 2.2 the agent optimization problem is solved, and finally in subsection 2.3 the equilibrium is found. Section 3 incorporates into the model an ideology of respect for others' rights. In subsection 3.1 the optimization problem of agents who are concerned about their behavior toward others is solved, and in subsection 3.2 the equilibrium of the model is derived. Section 4 compares both equilibria and the maximum aggregate consumption achievable in each case. Finally, section 5 summarizes the results and interprets them.

[4]Frequently, but not always, dictionary definitions captures these dual meaning of ideology. For example, The Compact Oxford English Dictionary defines ideology as: '1 a system of *ideas* and *ideals* forming the basis of an economic or political theory. 2 the set of beliefs characteristic of a social group or individual', and The Longman Dictionary defines it as: '1. a set of *ideas* on which a political or economic system is based, and 2. a set of *ideas* and *attitudes* that strongly influence the way people behave.'[Italics added.]

[5]In the same paper North [10] also considers ideology as a set of representations about the way a social order works and he argues that how people perceive reality significantly affects the evolution of institutions.

2 The model with no respect for others' rights

2.1 Basic Assumptions

The economy is populated by n individuals. Each of them has an utility function that depends on consumption (c^i) of the form $u^i(c^i) = (c^i)^\alpha$. Individuals can assign their time $(\bar{l})$ to work in a productive job (e^i), or to rob (r^i). Every person has a constant coefficient production and robbery function: $(a_r^i r^i)$ and $(a_e^i e^i)$ respectively, and an endowment (w^i) of consumption goods. Some people are relatively more skilful at working than others. People who work pay an income tax at rate $t \in [0, 1)$. The revenue of this tax is used to finance a police system that, although it is not able to catch the thieves, it can dissuade robberies by making them more difficult. The protection of goods from theft (p) is an increasing function of the resources assigned to the police system (the revenue), a decreasing function of the quantity of goods that need protection, and the efficacy of the police system. The logic underneath this technology of protection is that, if more resources are devoted to protect goods from theft, it is possible to avoid a greater proportion of the existing goods from being stolen. However, if more goods can be stolen, the same amount of resources assigned to the police system can offer less protection. All this suggest that the protection function must be homogeneous of degree zero in revenue and aggregate income. A simple way to model this police device is to consider a protection function of the form:

$$p = (\frac{R}{Y})^\varepsilon \ , \tag{1}$$

where R is revenue, Y aggregate income, and $\varepsilon \in (0, 1)$ is a parameter that measures the efficacy of the police system[6]. Considering the budget constraint $(R = tY)$, then the protection function (1) adopts the following simple form:

$$p = (t)^\varepsilon. \tag{2}$$

Notice that, since $t \in [0, 1)$ and $\varepsilon \in (0, 1)$ then $p \geq t$, and as ε is smaller protection is greater for the same tax rate.[7]

After taking into account the impact of the income tax, one hour allocated to a legal job reports $(1-t)a_e^i$ units of consumptions goods to individual i. Alternatively, one hour assigned to robbery pays back $(1-t^\varepsilon)a_r^i$, because the police system acts as a deterring device making robberies more complicated[8]. An individual decides how much time to assign to work and robbery in view of his comparative advantage and the dissuasive power of the police system. A person can rob others' goods, but he can also be the victim of others' criminal activities. To model this in a simple way it is supposed that each individual suffers the same amount of robberies that other individuals do. Thus, individual i losses $\frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)}$ consumption goods due to robberies.

2.2 Robbery and work in a world without respect for others' rights

The problem of individual i is to decide c^i, r^i, e^i to maximize its utility, *i.e.*:

$$\underset{c^i, r^i, e^i}{Max} \quad \{u^i(c^i) = (c^i)^\alpha\} \tag{3a}$$

$$s.t.: \quad \bar{l} - e^i - r^i \geq 0 \ , \tag{3b}$$

$$(1-t)a_e^i e^i + (1-t^\varepsilon)a_r^i r^i - \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} + w^i - c^i \geq 0 \ , \tag{3c}$$

$$c^i \geq 0 \ , \tag{3d}$$

$$e^i \geq 0 \ , \tag{3e}$$

$$r^i \geq 0 \ . \tag{3f}$$

It is easy to see that restrictions (3b) and (3c) will be binding in the optimum, otherwise the agent could increase his consumption and utility without violating his restrictions. It is also clear that restriction (3d),

[6] ε can also be interpreted as a parameter that captures the efficacy of formal institutions to avoid theft.

[7] As mentioned earlier, ε measures the efficacy of the police systems and it is restricted to be less than one. A value of ε greater than one can be interpreted as a so ineffective police system that it encourages theft rather than deters it.

[8] It is supposed, perhaps not realistically, that protection has the effect of reducing the goods that thieves get from robberies following a linear relation; *i.e.* if an agent uses x hours to rob, and a police system does not exist, he gets $a_r^i x$, but if it exists he gets only $(1-t^\varepsilon)a_r^i x$. This, implicitly assumes that there are enough goods in society; otherwise the agents could not get $(1-t^\varepsilon)a_r^i x$ from other people. Later on, a condition on the amount of individuals' endowments is introduced, which guarantees that thieves obtain $(1-t^\varepsilon)a_r^i$ per hour they assign to theft.

assuming that $w^i > \frac{\sum_{j\neq i}(1-t^{\varepsilon})a_r^j r^j}{(n-1)}$, will not be binding in the optimum, or else the individual could increase his utility choosing a strictly positive consumption[9]. Finally, notice that the objective function (3a) is concave and the restrictions (3b-3f) form a convex set, so the following Kuhn-Tucker conditions are necessary and sufficient to find a solution:

$$\alpha(c^i)^{\alpha-1} - \lambda_2 = 0 \ , \tag{4a}$$
$$-\lambda_1 + \lambda_2(1-t)a_e^i + \lambda_4 = 0 \ , \tag{4b}$$
$$-\lambda_1 + \lambda_2(1-t^{\varepsilon})a_r^i + \lambda_5 = 0 \ , \tag{4c}$$
$$(\bar{l} - e^i - r^i) = 0 \ ,$$
$$(1-t)a_e^i e^i + (1-t^{\varepsilon})a_r^i r^i - \frac{\sum_{j\neq i}(1-t^{\varepsilon})a_r^j r^j}{(n-1)} + w^i - c^i = 0 \ , \tag{4d}$$
$$(e^i)\lambda_4 = 0 \ , \quad \lambda_4 \geq 0 \ , \quad e^i \geq 0 \ , \tag{4e}$$
$$(r^i)\lambda_5 = 0 \ , \quad \lambda_5 \geq 0 \ , \quad r^i \geq 0 \ . \tag{4f}$$

In order to solve the Kuhn-Tucker system it is necessary to distinguish two possible cases. First, consider an agent that, after the joint impact of tax and the dissuasive effect of the police controls, has a comparative advantage in theft. Mathematically,

$$(1-t^{\varepsilon})a_r^i > (1-t)a_e^i \ , \tag{5}$$

i.e., for this individual one hour assigned to robbery produces more goods than one hour assigned to work in a productive job. This person will completely specialize in criminal activities, assigning no time to work and employing all his time in robbery ($r^i = \bar{l}$ and $e^i = 0$.) On the other hand, if individual i is relatively more skillful at work rather than at criminal activities he completely specializes in work and he does not use his time to steal. Mathematically, if individual i satisfies the following condition:

$$(1-t^{\varepsilon})a_r^i \leq (1-t)a_e^i \ , \tag{6}$$

then his solution is $r^i = 0$ and $e^i = \bar{l}$. Summarizing[10]:

Summary 1 *The solution of individual i's problem is (i's best response function):*

$$c^i = \begin{cases} (1-t^{\varepsilon})a_r^i\bar{l} + w^i - \frac{\sum_{j\neq i}(1-t^{\varepsilon})a_r^j r^j}{(n-1)} & if \quad (1-t^{\varepsilon})a_r^i > (1-t)a_e^i \\ (1-t^{\varepsilon})a_e^i\bar{l} + w^i - \frac{\sum_{j\neq i}(1-t^{\varepsilon})a_r^j r^j}{(n-1)} & if \quad (1-t^{\varepsilon})a_r^i \leq (1-t)a_e^i \end{cases} \tag{7a}$$

$$r^i = \begin{cases} \bar{l} & if \quad (1-t^{\varepsilon})a_r^i > (1-t)a_e^i \\ 0 & if \quad (1-t^{\varepsilon})a_r^i \leq (1-t)a_e^i \end{cases} \tag{7b}$$

$$e^i = \begin{cases} 0 & if \quad (1-t^{\varepsilon})a_r^i > (1-t)a_e^i \\ \bar{l} & if \quad (1-t^{\varepsilon})a_r^i \leq (1-t)a_e^i \end{cases} \tag{7c}$$

2.3 Equilibrium in a world without respect for others' rights

Now let's define a family of simultaneous-static games (one for each possible $t \in [0,1)$), where the players are the n individuals and, for each individual, the set of actions is formed by non-negative values of c^i, r^i, e^i, and the pay-off function is given by the value function of the individual optimization problem (3). Formally:

Definition 2 *Let's $\Lambda(t)$ be the following family of simultaneous games:*

$$\Lambda(t) = \left\langle \begin{array}{c} \{i\}_{i=1}^n ; \left\{(c^i, r^i, e^i) \in [0, \max\left\{a_e^i\bar{l}, a_r^i\bar{l}\right\}] \times [0, \bar{l}]^2\right\}_{i=1}^n ; \\ \left\{V^i\left[(c^i, r^i, e^i); (c^{-i}, r^{-i}, e^{-i})\right]\right\}_{i=1}^n \end{array} \right\rangle \ ,$$

[9] A condition that is sufficient in for $w^i > \frac{\sum_{j\neq i}(1-t^{\varepsilon})a_r^j r^j}{(n-1)}$ be fulfilled is that each agent has an endowment of consumption good greater than the maximum quantity of goods other people can steal from him, namely, $\frac{\sum_{j\neq i}(1-t^{\varepsilon})a_r^j\bar{l}}{(n-1)}$. This condition also guarantees that one hour assign to theft pays back $(1-t^{\varepsilon})a_r^j$. See footnote 8.

[10] Condition (6) implicitly assumes that when the agent is indifferent he chooses to work. Substantive results do not depend on this borderline case.

where:

$$V^i\left[(c^i,r^i,e^i);(c^{-i},r^{-i},e^{-i})\right] = \underset{c^i,r^i,e^i}{Max}\left\{u^i(c^i)=(c^i)^\alpha\right\}$$

$$s.t.: \quad \bar{l}-e^i-r^i \geq 0 \ ,$$

$$(1-t)a_e^ie^i+(1-t^\varepsilon)a_r^ir^i+\left[w^i-\frac{\sum_{j\neq i}(1-t^\varepsilon)a_r^jr^j}{(n-1)}\right]-c^i \geq 0 \ ,$$

$$c^i \geq 0 \ , \quad r^i \geq 0 \ , \quad e^i \geq 0 \ .$$

Notice that, since the utility function is concave and the restrictions generate a convex set the value function $V^i[.]$ is concave. Furthermore, the set of actions of each player is a compact and convex set, so the conditions of Glicksberg's theorem are satisfied and each game $\Lambda(t)$ has a Nash equilibrium in pure strategies[11]. In the rest of the section this Nash equilibrium is found and characterized.

Suppose that $a_r^i > a_e^i$ for all individuals, which reflects that it is easier to get consumption goods by stealing than by working. Let's order individuals according to their $\frac{a_r^i}{a_e^i}$, so that individual 1 is the one who has the most relative skills at theft, individual 2 is the next one and so on. Let N be the set of individuals ordered in this way and F be the set of all the possible values of $\frac{a_r^i}{a_e^i}$. Suppose also that all individuals have different relative productivities, *i.e.*, $\nexists j,k\in N:\frac{a_r^j}{a_e^j}=\frac{a_r^k}{a_e^k}$. Now define a function $f:N\rightarrow F$ that represents this ordering, *i.e*: $f(i)=\frac{a_r^i}{a_e^i}$. Notice that, with the assumptions introduced on production and theft coefficients f is strictly decreasing[12].

Lemma 3 *For every income tax rate $t\in[0,1)$ there exists a unique $N_t\subseteq N$ such that: for every $i\in N_t$ $r^i=0$ and $e^i=\bar{l}$, and for every $i\in N_t^C$ $r^i=\bar{l}$ and $e^i=0$.*

Proof. Consider a particular value of t. For this rate, either there exists an individual $i^*\in N$ for which condition (6) holds, and for i^*-1 condition (5) holds, or not. If so, because f is strictly decreasing: $f(i)=\frac{a_r^i}{a_e^i}>\frac{a_r^{i^*}}{a_e^{i^*}}=f(i^*)$ for all $i<i^*$ and $f(i)=\frac{a_r^i}{a_e^i}<\frac{a_r^{i^*}}{a_e^{i^*}}=f(i^*)$ for all $i>i^*$. So $f(i)>\frac{(1-t)}{(1-t^\varepsilon)}$ for all $i<i^*$ and $f(i)<\frac{(1-t)}{(1-t^\varepsilon)}$ for all $i>i^*$. Now define the set $N_t=\left\{i\in N:f(i)\leq\frac{(1-t)}{(1-t^\varepsilon)}\right\}$. Then for every $i\in N_t$ $r^i=0$ and $e^i=\bar{l}$, and for every $i\in N_t^C$ $r^i=\bar{l}$ and $e^i=0$. If not, there are two possibilities. For every $i\in N$ $f(i)>\frac{(1-t)}{(1-t^\varepsilon)}$, so $N_t=\varnothing$ and for every i $r^i=\bar{l}$ and $e^i=0$. Or, for $f(1)\leq\frac{(1-t)}{(1-t^\varepsilon)}$, so $N_t=N$ and for every i $r^i=0$ and $e^i=\bar{l}$. ■

Lemma 3 simply states that if individuals can be order according to their comparative advantage in theft, then for every tax rate there exist a group of individuals who completely specialize in theft and the others completely specialize in work. It also provides a separation result, because if some agent prefers to steal then every agent with relative more skilful at theft also prefer to steal. Conversely, if there is an agent that prefers to work, then everybody with less relative productivity in theft also prefer to work.

Using the notation of definition 2 expression (7) is the best response function of player i in game $\Lambda(t)$. After incorporating the results of lemma 3 into the best response functions of every player the Nash equilibrium can be obtained.

Proposition 4 *Suppose that the conditions of lemma 3 hold. Then, for every $t\in[0,1)$ there exists a unique Nash equilibrium for game $\Lambda(t)$, given by:*

$$c^i=(1-t^\varepsilon)a_r^i\bar{l}+w^i-\frac{\sum_{j\in N_t^C,j\neq i}(1-t^\varepsilon)a_r^j\bar{l}}{(n-1)} \ , \tag{9a}$$

$$r^i=\bar{l} \ , \tag{9b}$$

$$e^i=0 \ , \tag{9c}$$

[11] For existence of a Nash Equilibrium the reader is referred to Osborne and Rubinstein [11] (chapter 2) and Mas-Colell, Whiston and Green [3] (chapter 9).

[12] It is possible to alow that individuals have the same relative skill at work and theft, in which case f is decreasing, but it can not be assured that it is strictly decreasing. Since generalizing to a decreasing f complicates mathematics without any conceptual gain, the more strict case is analyzed.

for all $i \in N_t^C$, *and:*

$$c^i = (1-t)a_e^i\bar{l} + w^i - \frac{\sum_{j\in N_t^C}(1-t^{\varepsilon})a_r^j\bar{l}}{(n-1)} \; , \tag{10a}$$

$$r^i = 0 \; , \tag{10b}$$

$$e^i = \bar{l} \; , \tag{10c}$$

for all $i \in N_t$.

Proof. Notice that lemma 3 establishes that every agent has a dominant strategy, so the unique Nash equilibrium is just the profile of strategies formed by the dominant strategy of each player. Furthermore, from lemma 3 there exist a unique set N_t such that for every $i \in N_t$ $r^i = 0$, $e^i = \bar{l}$ and for every $i \in N_t^C$ $r^i = \bar{l}$, $e^i = 0$. Incorporating this result in expressions (7) the consumption of every agent can be calculated, getting (9) and (10). ■

Figures 1 and 2 show an example of an f function and illustrates proposition 4 for two different values of the tax rate: $t = 0$, so the police system to deter criminals can not be financed (without state), and $t > 0$ when there is a police system paid by the income tax (with state).

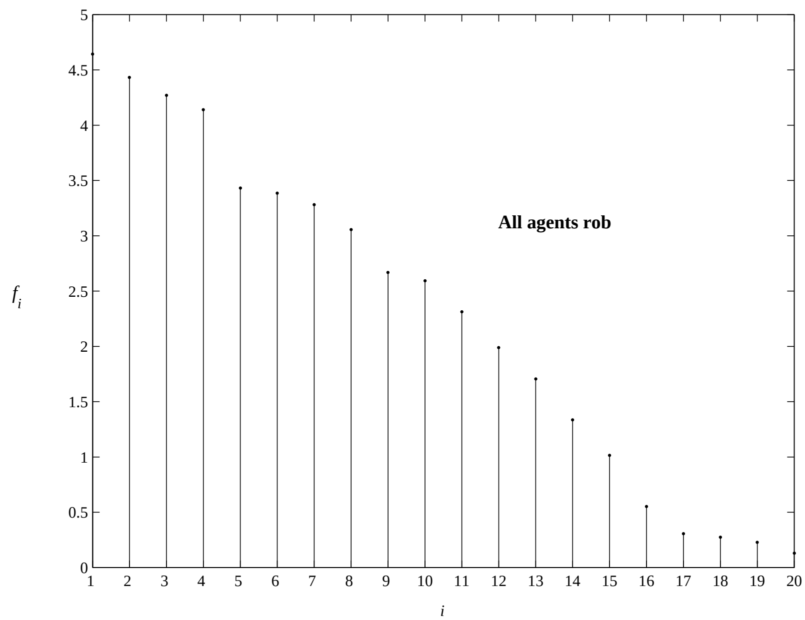

Figure 1: Robbery and work without respect for others' rights. Without State ($t = 0$)

The history that this model transmits is widely known. If there is no police device that deters people from stealing, or although it exists it is extremely ineffective, all people's efforts are devoted to theft and nobody works in a productive activity. In equilibrium, those who are more skilful thieves improve their position because they get more goods from others than what other individuals get from them. Society's efforts are dissipated in a costly redistributive game, because for each person it is better to invest time to rob rather than to work. But these decisions do not produce more goods, they just redistribute existing ones. A state that taxes individuals and uses the revenue to finance a system that, at least partially protect people's goods, can contribute to change things. In fact, if the deterrence effect is sufficiently strong all robbery can be eliminated. However, this is not free; society must use resources to finance the police system. The less effective the system is, the more resources are necessary to reach the same effect on robbery. Individuals' productivities also matter in the equation; if most people have high relative productivity in robbery it is more costly to generate the same amount of dissuasion.

3 The model with respect for others' rights

Now suppose that the economy is characterized by the same technology and preferences as in section 2, except that individuals have moral values that limit their behavior. They feel guilty when they get their

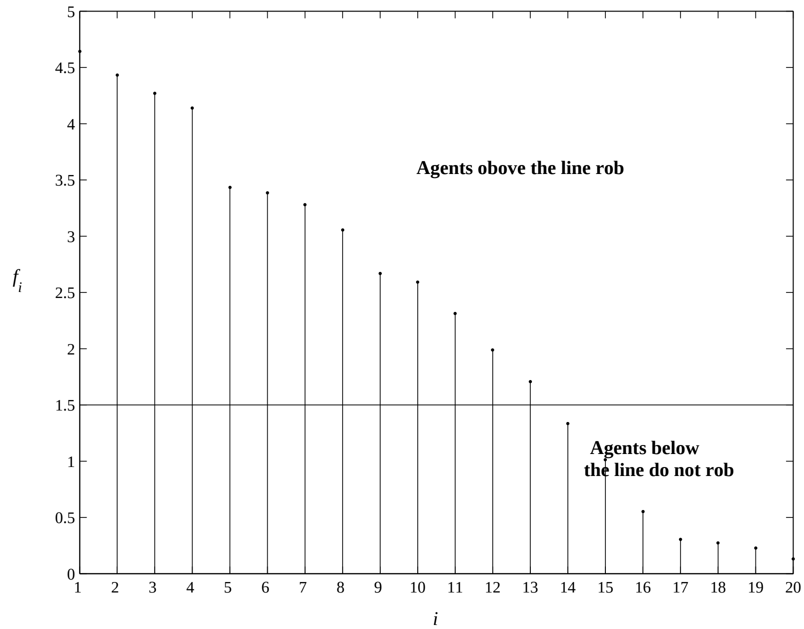

Figure 2: Robbery and work without respect for others' rights. With state $(t > 0)$

welfare from others' working effort and they can't enjoy completely their consumption.

3.1 Robbery and work in a world with respect for others' rights

Individuals now decide how much time assign to work and robbery, not only taking into account their comparative advantage and the dissuasive power of the police system, but also their sense of fairness and ideology regarding the respect of the products of others' working efforts. If, for example, people have learned in the past a moral rule that forbids stealing and they have internalized it, or if they just belief that it is not fair to rob others' goods, they would feel guilty if they engage in robbery. People who value being honest would probably experience guilt and could not completely enjoy the goods they consume if they get them by stealing from others. In order to model this moral values a multiplicative dummy variable z is introduced in the utility function, which is given by:

$$u^i(z, c^i) = z(r^i)(c^i)^\alpha \ , \tag{11}$$

where $z(r^i)$ adopts the value $\theta \in [0, 1)$ if the person steals, and adopts a value of 1 if it does not use any of its available time to steal. Mathematically, now person i solves the following problem:

$$\underset{c^i, r^i, e^i}{Max} \quad \left\{ u^i(z, c^i) = z(r^i)(c^i)^\alpha \right\} \tag{12a}$$

$$s.t. \quad \bar{l} - e^i - r^i \geq 0 \ , \tag{12b}$$

$$(1-t)a_e^i e^i + (1-t^\varepsilon)a_r^i r^i - \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} + w^i - c^i \geq 0 \ , \tag{12c}$$

$$c^i \geq 0 \ , \tag{12d}$$

$$e^i \geq 0 \ , \tag{12e}$$

$$r^i \geq 0 \ , \tag{12f}$$

$$z(r^i) = \begin{cases} \theta & if \quad r^i > 0 \\ 1 & if \quad r^i = 0 \end{cases} \tag{12g}$$

Notice that this problem can be broken into two simpler optimization problems (one with $z(r^i) = 1$, and the other with $z(r^i) = \theta$), and then the maximum value of each problem can be compared to get the solution. Suppose that $z(r^i) = \theta$, so i decides to rob. Then, the solution to his optimization problem will be the same as when there is no respect for others' rights, *i.e.* $r^i = \bar{l}$ and $e^i = 0$. The logic of this result is that if i chooses a positive amount of theft, no matter how little, he will suffer a fix proportional reduction in utility because of, say guilt and regret; so i will rob as many hours as he would have robbed if he had been an immoral agent. On the other hand, suppose that $z(r^i) = 1$. Hence, i does not use his time to theft, and he behaves as a person who does not have a productive advantage in robbery. The solution will be: $r^i = 0$ and $e^i = \bar{l}$. All this can be summarized in:

$$if \quad r^i > 0 \quad \Rightarrow \quad r^i = \bar{l},\ e^i = 0 \quad \Rightarrow$$

$$u^i(z, c^i) = \theta \left[(1 - t^\varepsilon) a_r^i \bar{l} + w^i - \frac{\sum_{j \neq i} (1 - t^\varepsilon) a_r^j r^j}{(n-1)} \right]^\alpha \tag{13a}$$

$$if \quad r^i = 0 \quad \Rightarrow \quad e^i = \bar{l} \quad \Rightarrow$$

$$u^i(z, c^i) = \left[(1 - t) a_e^i \bar{l} + w^i - \frac{\sum_{j \neq i} (1 - t^\varepsilon) a_r^j r^j}{(n-1)} \right]^\alpha \tag{14a}$$

Individual i now compares (13a) with (14a) to make his decision. Working algebraically with this two expressions it is possible to obtain a condition regarding the tax rate, the relative productivity in robbery and work and the magnitude of the guilt coefficient that parallels conditions (5) and (6). In fact if

$$\theta^{\frac{1}{\alpha}} (1 - t^\varepsilon)(a_r^i)\bar{l} - (1 - t)(a_e^i)\bar{l} > (1 - \theta^{\frac{1}{\alpha}}) \left[w^i - \frac{\sum_{j \neq i} (1 - t^\varepsilon) a_r^j r^j}{(n-1)} \right] \tag{15}$$

holds, individual i will prefer to rob and his solution will be $r^i = \bar{l}$ and $e^i = 0$. On the other hand if

$$\theta^{\frac{1}{\alpha}} (1 - t^\varepsilon)(a_r^i)\bar{l} - (1 - t)(a_e^i)\bar{l} \leq (1 - \theta^{\frac{1}{\alpha}}) \left[w^i - \frac{\sum_{j \neq i} (1 - t^\varepsilon) a_r^j r^j}{(n-1)} \right] \tag{16}$$

holds individual i will prefer to work and his solution will be $r^i = 0$ and $e^i = \bar{l}$ [13]. Notice that since the right side of both inequalities is positive (recall that $w^i > \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)}$, see footnote 8), if $\theta^{\frac{1}{\alpha}}(1 - t^\varepsilon)(a_r^i) \leq (1-t)(a_e^i)$ holds individual i will not use his time to rob. On the other hand if $\theta^{\frac{1}{\alpha}}(1-t^\varepsilon)(a_r^i) > (1-t)(a_e^i)$ holds then individual i could become a thief or not depending on which side of the inequality is greater: $\theta^{\frac{1}{\alpha}}(1 - t^\varepsilon)(a_r^i) - (1 - t)(a_e^i)$ or $(1 - \theta^{\frac{1}{\alpha}}) \left[w^i - \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} \right]$. Particulary, observe that if other people rob more this increase the chance that a person for which $\theta^{\frac{1}{\alpha}}(1 - t^\varepsilon)(a_r^i) > (1 - t)(a_e^i)$ holds decides to rob.

Let's express the solution of individual i's problem in a more convenient way. Denote by β_t^i the value of other individuals' robbery to person i that transforms inequality (16) into an equality. Mathematically, β_t^i is the value that solves the following equation:

$$\theta^{\frac{1}{\alpha}} (1 - t^\varepsilon)(a_r^i) - (1 - t)(a_e^i) = (1 - \theta^{\frac{1}{\alpha}}) \left[w^i - \beta_t^i \right] \tag{17}$$

Note that β_t^i is a function of $\theta,\ t,\ a_r^i,\ a_e^i,\ w^i$ and it can be positive, negative or zero. Notice also that if $\beta_t^i < \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)}$ i's solution will be given by $r^i = \bar{l}$ and $e^i = 0$, and if $\beta_t^i \geq \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)}$ then individual i's solution will be given by $r^i = 0$ and $e^i = \bar{l}$. All this can be summarized as follows:

Summary 5 *Let's β_t^i be the value that solve equation (17). Then the solution of individual i's problem is (i's best response function):*

$$c^i = \begin{cases} (1 - t^\varepsilon) a_r^i \bar{l} + w^i - \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} & if \quad \beta_t^i < \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} \\ (1 - t^\varepsilon) a_e^i \bar{l} + w^i - \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} & if \quad \beta_t^i \geq \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} \end{cases} \tag{18a}$$

$$r^i = \begin{cases} \bar{l} & if \quad \beta_t^i < \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} \\ 0 & if \quad \beta_t^i \geq \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} \end{cases} \tag{18b}$$

$$e^i = \begin{cases} 0 & if \quad \beta_t^i < \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} \\ \bar{l} & if \quad \beta_t^i \geq \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)} \end{cases} \tag{18c}$$

[13] Again the indifference is solved assuming that the individual works, see footnote 9.

3.2 Equilibrium in a world with respect for others' rights

Let's define again a family of simultaneous-static game (one for each possible $t \in [0,1)$), where the players are the n individuals and, for each individual, the set of actions is formed by non-negative values of c^i, r^i, e^i, and the pay-off function is now given by the value function of the individual optimization problem (12). Formally,

Definition 6 *Let's $\Gamma(t)$ be the following family of simultaneous games:*

$$\Gamma(t) = \left\langle \begin{array}{c} \{i\}_{i=1}^n ; \left\{(c^i, r^i, e^i) \in [0, \max\left\{a_e^i \bar{l}, a_r^i \bar{l}\right\}] \times [0, \bar{l}]^2\right\}_{i=1}^n ; \\ \left\{W^i\left[(c^i, r^i, e^i);(c^{-i}, r^{-i}, e^{-i})\right]\right\}_{i=1}^n \end{array} \right\rangle ,$$

where:

$$W^i\left[(c^i, r^i, e^i);(c^{-i}, r^{-i}, e^{-i})\right] = \underset{c^i, r^i, e^i}{Max} \left\{u^i(z, c^i) = z(r^i)(c^i)^\alpha\right\}$$

$$s.t.: \quad \bar{l} - e^i - r^i \geq 0 ,$$

$$(1-t)a_e^i e^i + (1-t^\varepsilon)a_r^i r^i + \left[w^i - \frac{\sum_{j \neq i}(1-t^\varepsilon)a_r^j r^j}{(n-1)}\right] - c^i \geq 0 ,$$

$$c^i \geq 0 , \quad r^i \geq 0 , \quad e^i \geq 0 ,$$

$$z(r^i) = \left\{ \begin{array}{lll} \theta & if & r^i > 0 \\ 1 & if & r^i = 0 \end{array} \right.$$

To obtain the equilibrium of the model is convenient to follow similar steps as in subsection 2.3. The significant differences are two. First, now it is necessary to employ conditions (15) and (16) instead of conditions (5) and (6) respectively. Secondly, since conditions (15) and (16) depend on the amount others steal now it is a little more difficult to find the equilibrium.

Lemma 7 *For every income tax rate $t \in [0,1)$ there exists a unique $Z_t \subseteq N$ such that: for every $i \in Z_t$ the solution is $r^i = 0$ and $e^i = \bar{l}$.*

Proof. Use the proof of lemma 3. Define $Z_t = \left\{ i \in N : f(i) \leq \frac{(1-t)}{(1-t^\varepsilon)\theta^{(\frac{1}{\alpha})}} \right\}$ and use it in the proof in the same way as N_t in the proof of lemma (3). ■

Remark 8 *Notice that now it is not possible to assert that for every $i \in Z_t^C$ the solution is $r^i = \bar{l}$ and $e^i = 0$, because for some individuals that do not satisfy $\theta^{\frac{1}{\alpha}}(1-t^\varepsilon)(a_r^i) \leq (1-t)(a_e^i)$ maybe condition (16) holds.*

In order to find the equilibrium it is necessary to separate the individuals in Z_t^C who will turn into thieves and those who will assign their time to work. This is not an easy task because agents' decisions now are interdependent (agents that belong to Z_t^C do not have a dominant strategy). The following proposition shows that there exists a Nash equilibrium. Let's denote by X_t the subsets of Z_t^C formed by the individuals in Z_t^C who decide to work.

Proposition 9 *Suppose that the conditions of lemma (7) holds and that at least for one $h \in N$ $\beta_t^h < 0$*[14]*. Then for every $t \in [0,1)$ there exists a Nash equilibrium for game $\Gamma(t)$, given by:*

$$c^i = (1-t^\varepsilon)a_r^i \bar{l} + \left[w^i - \frac{\sum_{j \in X_t^C, , j \neq i}(1-t^\varepsilon)a_r^j \bar{l}}{(n-1)}\right] , \tag{20a}$$

$$r^i = \bar{l} , \tag{20b}$$

$$e^i = 0 , \tag{20c}$$

for all $i \in X_t^C$, and:

$$c^i = (1-t)a_e^i \bar{l} + \left[w^i - \frac{\sum_{j \in X_t^C}(1-t^\varepsilon)a_r^j \bar{l}}{(n-1)}\right] , \tag{21a}$$

$$r^i = 0 , \tag{21b}$$

$$e^i = \bar{l} , \tag{21c}$$

[14] h have to belong to Z_t^C in order to β_t^h be negative. An individual that satisfies $\theta^{\frac{1}{\alpha}}(1-t^\varepsilon)(a_r^i) \leq (1-t)(a_e^i)$ must have a positive β. This assumption assures that at least one agent that does not belong to Z_t decides to rob regardless others decision.

for all $i \in Z_t \cup X_t$*, where* $X_t = \left\{ i \in N : \beta_t^i \geq \frac{\sum_{j \in X_t^C} (1-t^e) a_r^j \bar{l}}{(n-1)} \right\}$.

Proof. The proposition can be proved carrying out the next steps to build a Nash equilibrium:

1. By using lemma 7 find out Z_t. Then for all $i \in Z_t$ $r^i = 0$ and $e^i = \bar{l}$.
2. Build $X_t \subseteq Z_t^C$, a set formed by the individuals in Z_t^C who decide to work. To construct X_t begin with Z_t^C and exclude h, the individual with a negative β_t^h, because his decision will be $r^h = \bar{l}$ and $e^h = 0$ no matter how much other people choose to rob. Then, suppose that this person is the only one who rob and seek the agents whose β_t^i's are less than $\frac{(1-t^e)a_r^h \bar{l}}{(n-1)}$. If there is not anyone then $X_t = \left\{ i \in Z_t^C : i \neq h \right\}$. Otherwise exclude these agents from Z_t^C as well and denote X_t^1 the set that remains. Next, look for the agents whose β_t^i's are less than $\frac{\sum_{j \in C(X_t^1)} (1-t^e) a_r^j \bar{l}}{(n-1)}$. If there is not anyone then $X_t = X_t^1$. In other case exclude these individuals from X_t^1, denote X_t^2 the set that remains. Go on with this procedure as many times as necessary to get X_t. Notice that X_t could be just $\left\{ i \in Z_t^C : i \neq h \right\}$ in one extreme, or the empty set on the other depending on the values of the parameters.

To finish the proof note that once X_t is found it is easy to see that the equilibrium is given by (20) and (21). ■

Figures 3 and 4 show the same f function of figures 1 and 2; except that they incorporate the combined effects of the dissuasive controls and moral values.

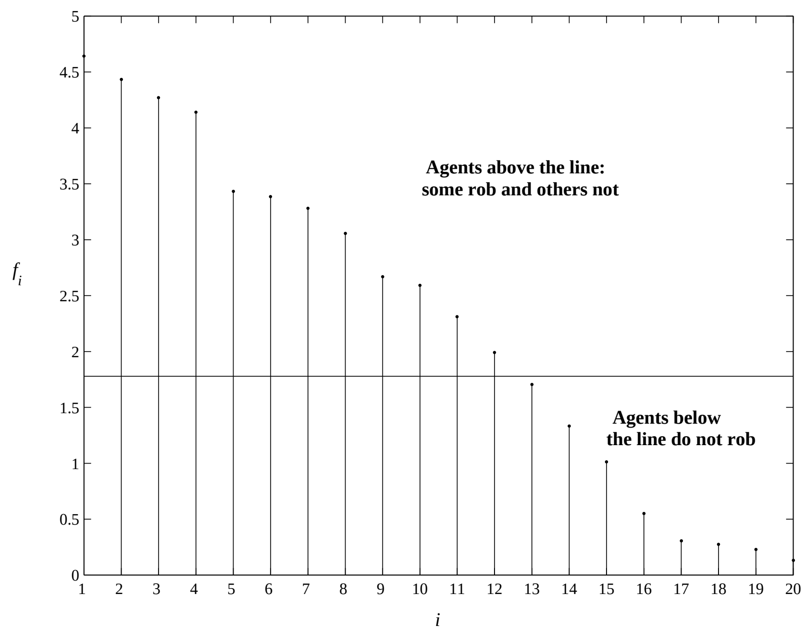

Figure 3: Robbery and work with respect for others' rights. Without sate ($t = 0$)

The history that this model transmits is different from the one of the previous section, and it is not as commonly recognized. An ideology that favors the respect for others' goods, and it is pervasive embodied in individuals' mentality makes a great contribution to institute an industrious society. Although there is no external coercion power that dissuades people from theft ($t = 0$), it is likely that all people's efforts would no longer be devoted to theft, and at least some work in a productive activity. Ideology, like the police system, changes the relative cost between robbery and work, imposing an extra penalty to theft. The differences reside in the mechanism through which ideology and the police system generates this effect, and the costs involved. While the police system is an external coercion device, ideology comprises an internal and subjective instrument, a self-imposed restriction on individual behavior. Moreover, while the coercive system costs resources to society ideology is costless[15].

[15] In the present model the ideology of respect for others' rights is assumed as a given. However, it is possible to argue that society must invest resources (education?) to 'build' individuals that respect norms by self conviction, beyond the penalties imposed to violators.

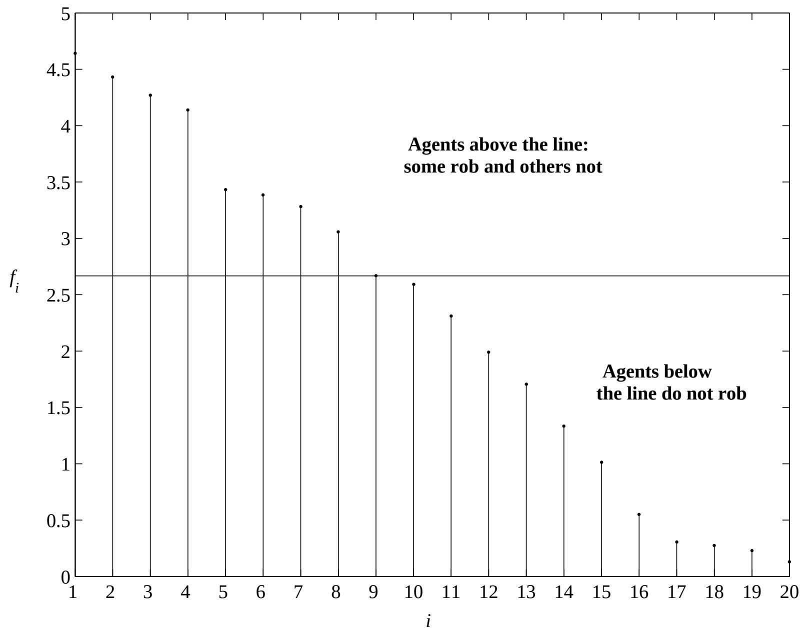

Figure 4: Robbery and work with respect for others' rights. With state $(t > 0)$

4 Comparisons

Section 2 and 3 develop basically the same model, the only difference is that in section 3 an ideology of respect for others' right is introduced. The change in results, however, is great. While people do not care if they obtain the goods they consume by working or stealing it is not possible to support an industrious society, unless a state can dissuade people from theft making criminal activities less attractive. The costs of this arrangement are the taxes necessary to finance it. However, when people have a belief system that calls for the respect for others's goods, at least to some degree, they self-imposed on themselves a code of conduct that commands them to earn what they consume by working. This ideology helps to enforce property rights and to institute an industrious society where individuals use their time to work rather than to steal from others. Propositions 4 and 9 establish this conclusion formally. Notice that, whenever people have an ideology that favors the respect for others' goods $(\theta < 1)$, the number of individuals who in equilibrium work (the cardinality of set $Z_t \cup X_t$) is equal or greater than the number who work when they are indifferent about other's welfare (the cardinality of the set N_t). In fact, those who steal in a world with respect for others' rights no matter what other people do (Z_t) also steal when there is no respect, *i.e.* $Z_t \subset N_t$; but it is likely that some agents who prefer to steal when there is no ideology change their mind and choose to work when ideology is present. Figures 5 and 6 show an example based on the same f function of figures 1, 2, 3 and 4, and the following values for the parameters: $\theta = \frac{3}{4},\ \alpha = \frac{1}{2}$. Observe that with the same tax rate ideology allows a greater deterrence effect.

4.1 Maximum Aggregate Consumption

It is interesting to compare the maximum possible aggregate consumption under different settings as regards ideology. Let's consider three possible cases: first suppose that there is no respect for others' rights $(\theta = 1)$, secondly that to some extent people respect others' goods $(\left(\frac{1}{f(1)}\right)^{\alpha} < \theta < 1)$, and finally that all individuals are good samaritans that feel so bad when they rob that they do not steal even if there is no penalty to do it $(0 \leq \theta \leq \left(\frac{1}{f(1)}\right)^{\alpha})$.

Using propositions 4 and 9 all agents consumption level can be summed. For instance, if there is no respect for others's rights aggregate consumption as a function of the tax rate adopts the following expression:

$$C(t, NR) = \sum_{i \in N_t} (1-t) a_e^i \bar{l} + \sum_{i \in N} w^i \ , \tag{22}$$

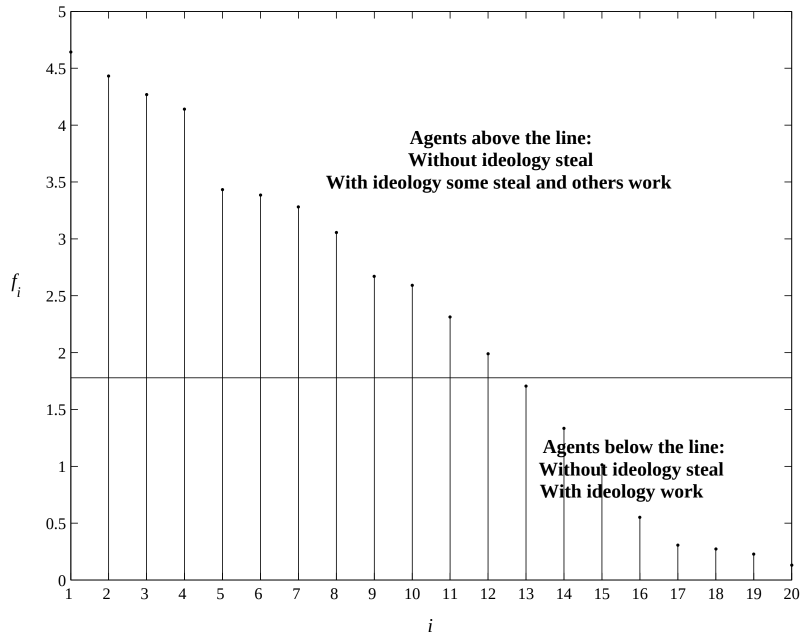

Figure 5: Robbery and Work with and without respect for others' rights. Without State ($t = 0$)

where $N_t = \left\{ i \in N : f(i) \leq \frac{(1-t)}{(1-t^{\varepsilon})} \right\}$ and NR (no respect) indicates that $\theta = 1$. To select the tax rate that maximizes (22) two effects must be considered. First, a higher t reduces aggregate consumption because there is a waste of resources employed to finance the police system (mathematically a higher t reduces the term $(1-t)a_e^i\bar{l}$). Secondly, a higher t can produce a so strong deterrence effect that same individuals change their decisions from theft to work (mathematically the cardinality of set N_t can be increased). Apparently, this makes the calculations troublesome. However, notice that if an increase in t does not change the set N_t, then the first effect dominates and the increase in the tax rate reduces aggregate consumption. Thus, it is only necessary to consider a finite number of tax rates: a zero tax rate and those that make the relative productivity of each agent equal to $\frac{(1-t)}{(1-t^{\varepsilon})}$. Moreover, notice that, since $\frac{(1-t)}{(1-t^{\varepsilon})}$ is a strictly increasing function of t for $t \in [0, 1)$, for any relative productivity there is a unique t that makes $\frac{(1-t)}{(1-t^{\varepsilon})}$ equal to $\frac{a_r^i}{a_e^i}$. So the relevant tax rates are $n+1$. The specific value of t that maximizes aggregate consumption depends on the efficacy of the police system (ε) and the values of production and robbery coefficients ($\frac{a_r^i}{a_e^i}$) of the individuals. Suppose that $t(NR)^{max}$ is the tax rate that maximizes expression (22) and let's $C(NR)^{max}$ be the maximum value of (22); mathematically:

$$t(NR)^{max} = \underset{t}{argmax} \left\{ C(t) = \sum_{i \in N_t} (1-t)a_e^i\bar{l} + \sum_{i \in N} w^i \right\} , \tag{23a}$$

$$C(NR)^{max} = \underset{t}{Max} \left\{ C(t) = \sum_{i \in N_t} (1-t)a_e^i\bar{l} + \sum_{i \in N} w^i \right\} . \tag{23b}$$

Let's consider the second case, when people are not samaritans but partially respect others' rights. Now aggregate consumption adopts the following expression:

$$C(t, SR) = \sum_{i \in Z_t \cup X_t} (1-t)a_e^i\bar{l} + \sum_{i \in N} w^i , \tag{24}$$

where $Z_t = \left\{ i \in N : f(i) \leq \frac{(1-t)}{(1-t^{\varepsilon})\theta^{(\frac{1}{\alpha})}} \right\}$, $X_t = \left\{ i \in N : \beta_t^i \geq \frac{\sum_{j \in X_t^C} (1-t^{\varepsilon})a_r^j\bar{l}}{(n-1)} \right\}$, and SR (some respect) indicates that $(\left(\frac{1}{f(1)}\right)^{\alpha} < \theta < 1)$. Suppose that $t(SR)^{max}$ is the tax rate that maximizes (24) and let's

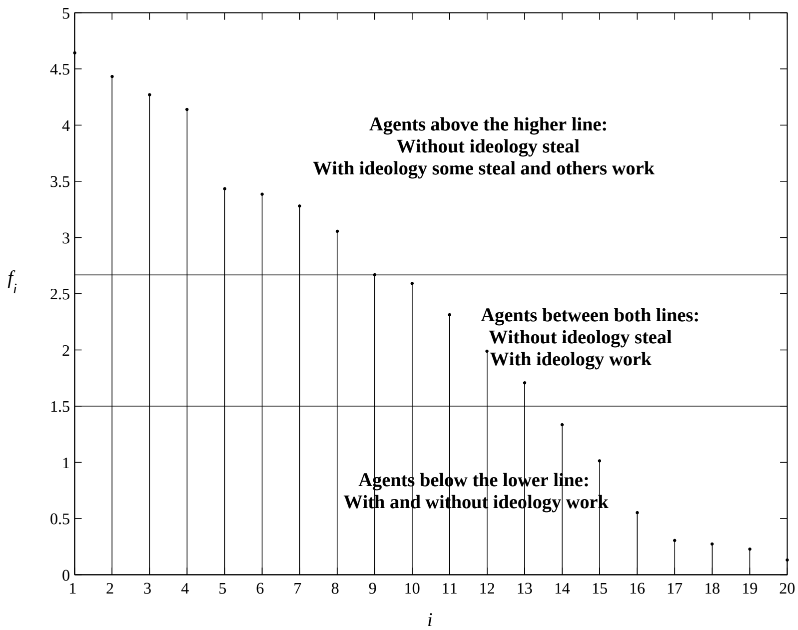

Figure 6: Robbery and Work with and without respect for others' rights. With State ($t > 0$)

$C(SR)^{max}$ be the maximum value of (24); mathematically:

$$t(SR)^{max} = \underset{t}{argmax}\left\{C(t) = \sum_{i \in Z_t \cup X_t} (1-t) a_e^i \bar{l} + \sum_{i \in N} w^i \right\} \ , \tag{25a}$$

$$C(SR)^{max} = \underset{t}{Max}\left\{C(t) = \sum_{i \in Z_t \cup X_t} (1-t) a_e^i \bar{l} + \sum_{i \in N} w^i \right\}. \tag{25b}$$

Finally, let's consider the situation where all agents are samaritans. From lemma 7, if $0 \leq \theta \leq \left(\frac{1}{f(1)}\right)^{\alpha}$, then every i work regardless the tax rate or the efficiency of the police system. Hence, aggregate consumption is maximized with a zero tax rate. Formally:

$$t(S)^{max} = 0 \ , \tag{26a}$$

$$C(S)^{max} = \sum_{i \in N} a_e^i \bar{l} + w^i. \tag{26b}$$

The next proposition compares maximum aggregate consumption under the three different settings.

Proposition 10 *Suppose there is an individual h for who $\beta_t^h < 0 \ \forall t \in [0,1)$, and there exists an individual k that satisfies: $f(k) < \frac{1}{\varepsilon}$. Then the maximum aggregate consumption when all people are good samaritans is greater than when there is some respect for others' rights, which is as well greater than when nobody respect others's rights. Formally: $C(S)^{max} > C(SR)^{max} > C(NR)^{max}$.*

Proof. Let's consider the first inequality. When $\left(\frac{1}{f(1)}\right)^{\alpha} < \theta < 1$ at least for individual 1 $f(1) > \frac{1}{\theta^{\frac{1}{\alpha}}}$. Thus, at least one individual will steal if the tax rate is fixed in zero. This is so because of the assumption that $\forall t \in [0,1) \ \exists \beta_t^h < 0$. In fact, there are two possible cases. First, if 1 is the only individual that satisfies $f(1) > \frac{1}{\theta^{\frac{1}{\alpha}}}$, then it follows that $\beta_0^1 < 0$. Secondly, if there also exists other individual j that satisfies $f(j) > \frac{j}{\theta^{\frac{1}{\alpha}}}$, then either 1 or j must have a negative β[16]. Hence, either $t(SR)^{max}$ is zero and some agents rob, or $t(SR)^{max}$ is strictly positive. In both cases $C(S)^{max} > C(SR)^{max}$. To prove the second inequality let's first prove that $t(NR)^{max} > 0$. Note that applying the L'Hopital rule $\underset{t \to 1}{lim} \frac{(1-t)}{(1-t^{\varepsilon})} = \frac{1}{\varepsilon}$. Recall also, that $\frac{(1-t)}{(1-t^{\varepsilon})}$ is strictly increasing in $[0,1)$. Hence, since there exists an agent (k) whose relative productivity

[16] See footnote 14.

is less than $\frac{1}{\varepsilon}$, a $t \in [0,1)$ high enough must exist to deter this individual from theft. Notice also that if one agent is keep out from theft the first term of expression (22) becomes strictly positive, while it is zero if everybody steal. So, there is an agent that can be deterred from theft with a strictly positive t, and aggregate consumption is increased if an agent chooses to work no matter the tax rate necessary to change his mind. Then $t(NR)^{max}$ must be strictly positive. But if so, $t(NR)^{max}$ can be reduced in such a way that the individuals who choose to work when there is no respect for others's rights will go on working when people respect others' rights. This reduction is possible because a smaller tax rate is need to produce the same deterrence effect when ideology is present. More formally, with $t(NR)^{max} > 0$, from lemma 3 there will be an individual i^* that just prefer to work, *i.e.* whose relative productivity equal $\frac{(1-t(NR)^{max})}{(1-(t(NR)^{max})^{\varepsilon})\theta^{(\frac{1}{\alpha})}}$ (recall that the only values of t that can maximize (22) are the those that makes $\frac{(1-t)}{(1-t^{\varepsilon})}$ equal to $\frac{a_r^i}{a_e^i}$). From lemma 3 also all $i > i^*$ will prefer to work. When to some extent people respect others' rights $\left(\frac{1}{f(1)}\right)^{\alpha} < \theta < 1$, then $\theta > 0$. So, it is possible to reduce $t(NR)^{max}$ while $f(i^*)$ continues being greater or equal $\frac{(1-t)}{(1-t^{\varepsilon})\theta^{(\frac{1}{\alpha})}}$. Hence, $C(SR)^{max} > C(NR)^{max}$. ■

Table 1 summarizes the results of proposition 10.

Ideology	Maximum Aggregate Consumption
No Respect ($\theta = 1$)	$\sum_{i \in N_{t(NR)^{max}}} (1 - t(NR)^{max}) a_e^i \bar{l} + \sum_{i \in N} w^i$
Some Respect ($\left(\frac{1}{f(1)}\right)^{\alpha} < \theta < 1$)	$\sum_{i \in Z_{t(SR)^{max}} \cup X_{t(SR)^{max}}} (1 - t(SR)^{max}) a_e^i \bar{l} + \sum_{i \in N} w^i$
Samaritan People ($0 \leq \theta \leq \left(\frac{1}{f(1)}\right)^{\alpha}$)	$\sum_{i \in N} a_e^i \bar{l} + w^i$

Table 1: Maximum Aggregate Consumption

5 Conclusions

Usually it is not made explicit, but ultimately specialization and trade rest on institutional arrangements that protect property rights and enforce agreements. If these institutional requirements are fulfilled then the invisible hand does its work properly; it is not necessary a central authority that harmonized the simultaneous activities of all individuals, neither benevolent or moral human beings. Just if everybody pursue his selfish aims the gains from specialization and trade are realized. Following this line of reasoning all the burden of the social order is put in polity. In the model this feature is represented in a very simple way introducing a state that taxes individuals and provides a system that discourage theft. Hence, the social cost to support a productive society are the taxes people pay to finance the system. However, as mentioned before two related problems emerge. First, if actors in the political game are supposed completely selfish, they would not probably have the necessary incentives to impose and manage a system that protects property rights and enforces contracts. On the contrary, they would probably abuse of their power choosing a high tax rate and expropriating people. In the model the political behavior of individuals is not included, neither the political game. As normal in economic theory formal institutions comprise the 'givens' of the analysis. Thus, as regards this first problem the model is absolutely silent; however, it is important to remark that: (i) employing the standard assumptions on agents' behavior voluntary exchange is as natural as theft, violence, and coercion, (ii) a priori there is no reason why people would be a selfish sophisticated optimizer when playing the role of economic agent and a benevolent person when voting or participating in political decisions, and (iii) as North [10] claims it is difficult to maintain the standard assumptions on agents' behavior and derive a model of polity that protect property rights and enforce contracts.

Secondly, rules are not a free lunch, in the sense that society must distract resources from others uses to institute a productive society; and rules could cost too much, in the sense that it could be too expensive to sustain institutions merely based on a coercive system. All these impulse to study alternative modes to support rules. The paper explored the value of ideology as one possible answer. Table 2 summarizes the results obtained.

Ideology, understood as a self-imposed code of conduct, reinforces the effects of controls to dissuade crime and enforce property rights and agreements. It also reduces the costs necessary to establish an

Ideology/State	Without State ($t = 0$)	With State ($t > 0$)
No Respect ($\theta = 1$)	Everybody steal. All people's time is wasted in a costly redistributive game.	If t is sufficiently high some people steal and others work. A partially productive society is possible. Taxes are needed to finance the dissuasive system.
Some Respect ($\left(\frac{1}{f(1)}\right)^{\alpha} < \theta < 1$)	Some people steal and others work. A partially productive society is possible. No social cost to finance dissuasion.	Some people steal and other work. A partially productive society is possible. Taxes are needed to finance the dissuasive system.
Samaritan People ($0 \leq \theta \leq \left(\frac{1}{f(1)}\right)^{\alpha}$)	All people's time is devoted to work. No social loses to dissuade people from rob. Industrious Society.	All people's time is devoted to work. The state waste resources that are not necessary to dissuade people from theft.

Table 2: Main Results

industrious society. Indeed, the economic value of ideology is the amount of resources society does not have to divert from consumption in order to finance a deterrence system that secures property rights. Looked at in this way, ideology becomes a social mechanism that contributes to facilitate trade and induces people to assign their effort and resources to productive rather than appropriative activities.

The positive shape of ideology underlined in this paper contrasts with others views that focus on negative features, particularly those that connect it with dogmatism and conflict. For example, Sartori[13] indicates that 'ideologies are no longer ideas, in the sense that ideological doctrines no longer fall under the jurisdiction of logic and verification'. He relates ideology with people's belief system, and distinguishes two dimensions that characterize a belief system: the cognitive and the emotional. The cognitive dimension refers to closed or open belief systems. He states: 'A person's belief system is open or closed to the extent to which the person can receive, evaluate and act on relevant information ... on its own intrinsic merit'. A closed mind is just a dogmatic and rigid one. As regards the emotive dimension, Sartori [13] asserts: 'along the emotive dimension belief can be intense or feeble, passionately or weekly felt'. Using this framework he perceives ideology '...as a belief system based on (i) fixed elements, characterized by (ii) strong affect and (iii) closed cognitive structure'; and he concludes that ideology is important because it could help to understand social conflict. Viewed from this perspective ideology is opposed to pragmatism, and it would appear that it must have a bad connotation. However, as the model in this paper shows this judgment could be misleading, because it depends on the content of the belief system. In the present paper, ideology, viewed as a social belief that favors the respect for others' rights, facilitates the enforcement of property rights and agreements. On other hand, an ideology that supports and legitimates the breach of contracts could be an impenetrable barrier to economic development.

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