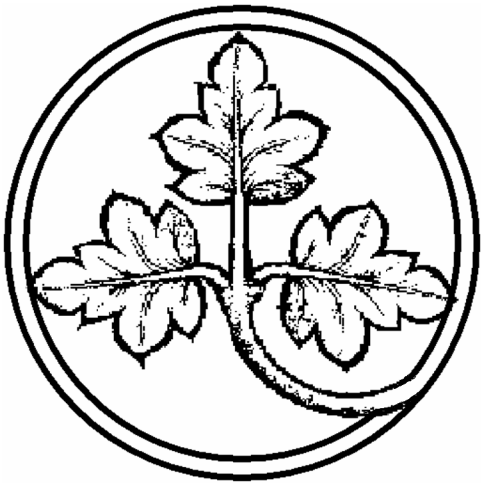

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Morality and Conflict

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Abstract

In recent debates, morality or social norms have been proposed as an instrument to reduce conflict behavior. As the argument goes, moral people will not engage in socially not-tolerated behavior or, less so than amoral people. Analyzing this question in the framework of contest theory, we find that if morality can discriminate between appropriation and defense, it is an effective instrument to lower socially unwanted behavior and support the enforcement of property rights. If it cannot discriminate between these different conflict efforts, strategic effects due to a one-sided increase in morality might actually lead to total increased conflict effort in the economy.

Keywords: Contests, property right enforcement, morality, education.
JEL classification: D72, D74, I20, K42, Z13

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1 Introduction

In most societies one can observe major investments into the morality and social values of its members. Schools, churches, individuals and sometimes governmental institutions spend a considerable fraction of their resources to instill and sustain a common morality. Among the most central guidelines are the commandments found in the three big monotheistic religions "thou shalt not steal" and "thou shalt not kill". These, among other norms reflecting an underlying morality, have the purpose to suppress harmful and destructive actions. From an economist's perspective the question arises why societies care or should care about maintaining a common morality. These kind of investments do not make sense, if one perceives decision-makers to be pure *homines oeconomici*. If human beings had stable preferences there would be no point in spending resources on generating common values which amounts to influence people's preferences. Furthermore, they do not make sense in an economy where property rights are costlessly enforced. And they do not make sense in situations that are devoid of conflict. Noting this, can these investments be explained from an economist's point of view?

One objective that comes to mind when considering the function of norms and values, is to make society's individuals less prone to engage in activities that encompass stealing, socially destructive, undesirable or wasteful behavior. If we take a broader perspective, namely, that the enforcement of property rights is costly and that many social interactions have the potential for conflict, the benefit of these investments may lie in the fact that they support the enforcement of property rights and reduce socially harmful activities. For example, Grossman (2001) and Grossman and Kim (1995) have argued repeatedly that property rights only have substance insofar as they can be defended against the appropriative activities of other individuals. Instruments with which property rights are enforced, encompass private enforcement and/or institutional enforcement. Whereas formal institutional enforcement takes the form of police and other institutions of a law enforcement system, private enforcement of property rights usually takes the form of a contest: one individual invests resources to protect her property whereas the other will spend effort to appropriate it. Sometimes, institutional barriers may deter individuals to engage in such a contest.[1] However, there are many situations in which the use of an institutional form of law enforcement system is too expensive or ineffective. Examples include situations in which the prizes are of little value or where serious verification problems of contracts or actions exist. In such situations, the result of such a contest and therefore the security of property rights in the absence of other institutional enforcement is determined by the respective contest technology. If we give up the strict assumption of *homo oeconomicus*, these forms of private enforcement could be supported by informal institutions such as social and moral norms which regulate and reduce conflict behavior.

Following up on this line of thought, we find that many situations that are regulated by social and moral norms turn out to involve situations of conflict (Posner, 1997; Shavell, 2002;

[1] See Kolmar (2003b) for a more careful discussion on the issue of the efficiency of property rights if these have to be produced endogenously.

Elster, 1985). The basic tenet is that part of a society's potential welfare is wasted by the attempt to possess it. As the resources spent on these kind of rent-seeking activities could have been put to other more beneficial uses, conflict behavior may be inefficient. The use of social norms and moral values that sanction these kind of undesirable behavior has been proposed as a possible solution to the problem (see e.g. Shavell, 2002). Whereas social norms regulate a wide array of social interactions, "moral norms are marked out by their subject matter (interpersonal interaction where significant benefits and harms are at stake), their weight (they typically override other considerations), and the sanctions, both internal (guilt) and external (blame), attached to their violation"(Hausman and McPherson, 1997, p. 54). Rules and commandments like the ones mentioned above work in this way. They work because they intrinsically punish a moral individual for engaging in "amoral" behavior even if there is no one else present to observe or punish her for it (see e.g. Elster, 1989a). These rules do not eliminate the incentive to engage in such behavior. However, by inflicting feelings like guilt or shame, they do increase the personal cost of conflict borne by the individual and therefore influence her behavior.

A channel to instill these values in people is eduction. For example, Usher has argued that there exists a civic externality to schooling, namely the reduction of crime. In his words: "Education does more than teach skills to enhance one's capacity to earn income. It perpetuates the values of society, ... and promotes the virtues of hard work and honesty"(Usher, 1997, p. 368). While, the first category of virtues has the benefit of reducing the personal disutility of work the latter reduces the benefits received from dishonest or criminal behavior. He examines in his paper in which circumstances targeted or general education measures are more useful to reduce criminal behavior. Guttman et al. (1992), for example, examine in detail how education in the form of taste change can lead to Pareto improvement in a situation involving rent-seeking behavior.[2] This leads to the suggestion that a society should care about investing into social and moral norms of its members by using appropriate education measures. Two questions follow from this: first, is there something like a "production technology" for something like morality in the first place? Second, does morality really constitute a useful instrument for the reduction of conflict behavior? While the success of religions to deeply shape the preferences of the believers of their communities on the one hand, as well as sociological theories of moral development (Piaget, 1965; Damon, 1977; Power et al., 1989) on the other hand, seem to allow a tentative *yes* regarding the first question, we will not inquire in the following, how this technology could look like. Taking the existence of such a technology as given, instead we will focus on the second question.

In this paper, we will analyze the role morality plays for the reduction of efforts involved into conflict. Often enough the assumption is made that moral people will not steal or violate

[2]There are other approaches which explain why education in the form of human capital could lead to reduced conflict behavior, too. For example, Grossman and Kim (2004) have raised the argument that education in the form of investment into human capital could fulfill the purpose of deterring people from conflict. Still, their line of argument – namely that increased human capital increases the opportunity costs of conflict of the involved individuals – only holds in environments with endogenous production. As we want to focus on the effect morality can play, we abstract from these kind of considerations and focus on environments without production.

their norms. Accordingly, in most papers addressing the issue, morality is is modelled in a way that the immoral steal, the moral (or rather more moral) do not (see e.g. Grossman and Kim (2000, 2004); Usher (1997)). Nevertheless, the existence of morality does not remove the temptation of stealing or engaging in otherwise personally profitable but socially undesirable behavior. To capture this conflict, we take a different approach to the problem as even moral people might give in to temptation now and then. In this paper, being moral means that the act of pursuing an aggressive action leads to decreased utility. Being more moral than others implies a higher disutility from aggression than the one that less moral people face.[3] We will then examine how a change in the morality of the people involved changes the conflict behavior of the individuals. We will furthermore address the issue how the results depend on whether the change in morality is unilateral or bilateral. The first could, for example, be due to targeted educational policies in which only one party is made subject to a morality increasing policy. The second could be due to the fact that the educational measures reach all parties equally.

To understand how morality affects different environments with different conflict technologies we build a stylized model of morality and conflict that compares two situations which differ in one fundamental aspect: namely, whether property rights to a resource exist or are non-existent. This will have implications for whether it is possible to differentiate between purely aggressive or defensive behavior. We derive several results. First, we show that morality is an effective instrument to reduce the conflict effort of the individual whose morality has increased. Second, we show that the strategic impact of the given conflict technology operative at the equilibrium is crucial for the effectiveness of morality as a means to reduce total conflict. We will then take the perspective of a policy-maker who is interested in reducing the total level of aggression or appropriation. If she has access to an education technology which allows for targeted or general education measures which lead to either a unilateral or a bilateral increases in morality, the question is addressed what is the best policy to achieve this goal. If the conflict technology does not allow for differentiation of the conflict efforts into appropriation and defense, we show that a one-sided increase in morality can lead to *increased* total conflict. We examine two ways to avoid this outcome such that both individuals reduce their efforts. Using a unilateral education policy requires to target the individual which was "weaker" to begin with and implies unpleasant distributional consequences. Using a bilateral education policy implies that maximal conflict reduction will not be achieved. Last but not least, we show that if the conflict technology allows for separation of conflict efforts into appropriation and defense, a one-sided increase in morality is enough to reduce appropriation in the economy. In such a context, it is a useful instrument to support the enforcement of property rights.

Our analysis will proceed along the following lines: in Section 2 we will analyze a situation in which no previous property rights are in existence and therefore conflict technologies cannot

[3]The author is aware that this use of the term "morality" is rather narrow. For a different approach which sheds light on a different treatment of morality or social norms see e.g. Guttman et al. (1992), Kolmar (2003a) Fehr and Fischbacher (2004) or Traxler (2005). For a short but concise treatment of possible underlying problems of the social norms which reflect a society's morality see Posner (1997); Elster (1989a,b). For the possible consequence of the absence of any kind of morality see Hillman (2003).

be differentiated with respect to defense and appropriation. We will first look at the effects in an abstract theoretical model and will then apply the results to the concrete example of a Tullock contest-success function. We will take the perspective of a social planner who is interested in limiting appropriative behavior and examine what she should do to achieve this goal. In Section 3 we will then proceed to look at a situation where prior property rights in the form of claims to a resource exist. This allows for a differentiation in the conflict technology in the form of conflict efforts designated at appropriation and defense. Here, we will examine whether morals are a useful instrument to support the enforcement of property rights. Finally, we will conclude in Section 4.

2 The role of morality in situations without property rights

Before turning to the model itself, a general remark is in order. When thinking about conflicts and their structural differences, among others one can envision two classifications of a situation: one in which there are no clear-cut property rights and in which involved parties contest for a share of a certain resource, the other in which property rights in the form of prior claims exist and in which one party tries to appropriate that to which the other party has a claim.[4] The structural difference of this situation plays itself out when one thinks about how morality can limit socially undesirable behavior. When thinking about morality as an instrument to reduce conflict behavior by imposing an internal (e.g. emotional) cost , to function properly this instrument needs to be able to aim at this behavior precisely. In the second type of situation, the distinction between aggressive and defensive behavior is possible. Therefore, morality can target the conflict behavior which is deemed undesirable, namely 'stealing', without punishing conflict efforts that are not seen as socially harmful. In the first type of situation, this is not possible. Hence, there is no way to distinguish between socially harmful and not harmful behavior and to target only the first. A further thing which is necessary to allow for a normative distinction between desirable and undesirable conflict efforts is the ability given by the conflict technology to commit efforts to one purpose. While some instruments can be cleanly committed to a defensive or appropriative purpose, others instruments cannot. A lock or an alarm system is clearly meant for the defense against thieves whereas prybars or lock-picks obviously are meant to engage in stealing. While such a classification is natural and straightforward in these cases, other instruments, like a gun or a knife, can be put to both purposes. Both can be used to threaten someone to hand over her possessions as well as to defend oneself against a mugging. The ability to commit your own conflict efforts is necessary for morality as a conflict regulating instrument to distinguish between socially undesirable behavior – e.g. stealing and killing – and others which are deemed legitimate – such as defense or self-defense.[5] Keeping this in mind, we will see why this distinction influences the usefulness of morality as regulating conflict behavior.

[4]By prior claim we mean a claim to a resource which may rest on a formally and legally backed property right but which might be backed by custom or other reasons as well.

[5]It should be noted that in these examples the idea of property rights or the form of the given contest technology has been employed to demonstrate the classification of the two environments. Still, the underlying principle which is needed to make this distinction is the ability to cleanly distinguish whether behavior is seen

2.1 The model

In this section we will analyze the influence of morality on conflict in an environment where property rights are not specified or the commitment of conflict efforts to just one purpose is not possible. We will take the perspective of an external party (e.g. a state or social planner) that is interested in limiting the conflict behavior of the involved parties because of the harmful consequences and the waste of valuable resources which results as a consequence of engaging in conflict. This party has one instrument to punish the behavior it deems socially undesirable, namely increasing the morality of one or both of the parties via educational measures. We will understand morality as some internal cost, that punishes the individual for a certain type of aggressive behavior.[6] One way to imagine this is to think of the amount of guilt the individual feels when engaging in behavior that is not tolerated by its values. As there is only one type of conflict effort, morality cannot discriminate between different purposes and only punish general engagement in conflict. The individuals can only decide how much effort to spend on conflict. This will determine the share of a certain resource which they will be able to appropriate and which is a source of utility. Let the model be as follows: there are two risk-neutral individuals i, j contesting for a resource R, with $u^\iota = \pi^\iota R - \mu^\iota a^\iota$ as the utility function of individual $\iota \in \{i, j\}$. $\pi^\iota = \pi^\iota(a^\iota, a^\kappa)$ is the share individual ι can secure for herself by the exerted conflict effort and is a function of her own conflict effort a^ι and the other's effort a^κ and therefore reflects the conflict technology. We assume that π^ι is at least twice continuously differentiable in $\mathbb{R}^2_{++}$ and that $\pi^\iota(a^\iota, 0) = 1$ for all $a^\iota > 0$ and $\pi^\iota(0, 0) < 1$. Both are completely informed about the other individual's strength as well as her morality and are able to observe the other's conflict effort. μ^ι is the morality parameter that measures the internal cost of the individual's act of conflict. It will be assumed, that $\mu^\iota > 0$ for convenience.[7] Denote $\frac{\partial \pi^\iota}{\partial a^k} = \pi^\iota_k$ and $\frac{\partial^2 \pi^\iota}{\partial a^k \partial a^\kappa} = \pi^\iota_{k\kappa}$, with $\iota, k, \kappa \in \{i, j\}$ and assume the following regularities for the conflict technology:

Assumption 1
$\pi^i + \pi^j = 1$, $\pi^\iota_\iota > 0$, $\pi^\iota_\kappa < 0$, $\pi^\iota_{\iota\iota} < 0$ *and* $\pi^\iota_{\kappa\kappa} > 0$, *with* $\iota, \kappa \in \{i, j\}$.[8]

This means the appropriated share of each individual increases with her own contest effort, decreases with the other's contest effort and exhibits decreasing returns to scale in the own contest effort. $\pi^\iota_{\iota\kappa}$ measures the change an increase in κ's conflict effort has on ι's marginal return on conflict. We will call this the strategic effect. If no strategic effect is present,

as *bad*, and needs to be punished, or as *legitimate* and therefore socially acceptable. Still, in the following we will stick to the example of the (non-)existence of property rights to classify these two kinds of situations.

[6] In this model we therefore take a slightly different and narrower perspective on what constitutes morality than others do. Consequentialists view morality in the acts and not as reflected by the underlying moral dispositions which cause feelings of guilt when violating against moral standards. We will measure the morality of individuals by the strength of their moral dispositions and use both terms equivalently. For a wider but more sophisticated look at advantages and problems that come with morality or social norms see Posner (1997); Posner and Rasmusen (1999); Elster (1989a).

[7] One can imagine the total cost of conflict $\tilde{\mu}^\iota$ to be a combination of some general cost of conflict, say $\nu > 0$, and the psychic cost due to morality $\mu^\iota \geq 0$. If ν is assumed to be constant, the total cost of conflict $\tilde{\mu}^\iota = \nu + \mu^\iota$ only varies if μ^ι, that is, the cost inflicted by morality, varies. We will therefore use the above shortcut for convenience.

[8] Note, that the sign of last derivative follows automatically from the fact, that the two shares add to one.

then $\pi^{\iota}_{\iota\kappa} = 0$. If $\pi^{\iota}_{\iota\kappa} \neq 0$ an abstract way to label this strategic effect is by characterizing whether the conflict efforts at the point of equilibrium are *strategic substitutes* or *strategic complements*.[9] If the conflict efforts are strategic substitutes, a more aggressive strategy of the other individual lowers the first individual's *marginal* return of conflict. Equivalently, if the conflict efforts are strategic complements, a more aggressive strategy of j raises the other's *marginal* return on conflict. Note one important point: this property is individual specific. If conflict efforts at the point of equilibrium are strategic substitutes from one individual's point of view, they are strategic complements from her opponent's point of view, as $\pi^{i}_{ij} = -\pi^{j}_{ij}$. For this reason, without loss of generality will will define i as the individual from whose point of view the conflict efforts are strategic substitutes and j as the individual from whose point of view conflict efforts are strategic complements:

Assumption 2
$\pi^{i}_{ij} < 0$ *and* $\pi^{j}_{ij} > 0$.

Both individuals maximize their utility with respect to their contest efforts. Assuming an interior solution, we get[10]

$$\pi^{\iota}_{\iota}\, R \,=\, \mu^{\iota}\,, \tag{1}$$

as the optimality condition for each individual $\iota \in \{i, j\}$: the marginal utility of conflict has to equal its marginal cost, which is given by ι's morality and gives way to the individual's reaction function with respect to the other individual's effort. From these optimality conditions the Nash equilibrium $a^* = (a^{i*}, a^{j*})$ can be computed. How do these equilibrium efforts react to changes of each individual's morality? We derive the following results:

Proposition 1 *The effect of increasing the morality of individual i, μ^i, on the equilibrium conflict efforts is as follows:*

(i) her own conflict effort a^{i*} will decrease.

(ii) If no strategic effect is present, a^{j*} will not change. If a strategic effect is present, the other's conflict effort a^{j*} will decrease.

(iii) Therefore, total conflict effort $a^{i*} + a^{j*}$ will decrease.

Proof. Assuming an interior solution, using the Implicit Function Theorem and using the fact that $\pi^i + \pi^j = 1$, one can derive the following effects from the system of first-order conditions determining the Nash equilibrium of both individual's efforts:

(i) The effect of increasing own morality on one's own conflict effort is

$$\frac{\partial a^{i*}}{\partial \mu^i} \,=\, -\frac{\pi^{i}_{jj}}{R\,((\pi^{i}_{ij})^2 \,-\, \pi^{i}_{ii}\,\pi^{i}_{jj})} \,<\, 0\,, \tag{2}$$

[9] These terms are due to Bulow, Geanakoplos and Klemperer (1985).

[10] The second order conditions for the individuals hold, as can be easily verified.

because of assumption 1 taken with respect to the conflict technology.

(ii) The effect of ones own morality on the other individual is given by

$$\frac{\partial a^{j*}}{\partial \mu^i} = \frac{\pi^i_{ij}}{R\left((\pi^i_{ij})^2 - \pi^i_{ii}\,\pi^i_{jj}\right)} 0\,. \tag{3}$$

The denominator is positive by assumption 1. If no strategic effect is present, this corresponds to the case in which $\pi^i_{ij} = 0$ and the whole effect is zero. If a strategic effect is present due to assumption 2 the whole effect will be negative.

(iii) The effect on total conflict effort of a one-sided increase of morality is

$$\frac{\partial a^{i*}}{\partial \mu^i} + \frac{\partial a^{j*}}{\partial \mu^i} = \frac{\pi^i_{ij} - \pi^i_{jj}}{R\left((\pi^i_{ij})^2 - \pi^i_{ii}\,\pi^i_{jj}\right)} < 0 \tag{4}$$

which is negative by assumptions 1 and 2. ■

Equivalently, we get:

Proposition 2 *The effect of increasing the morality of individual j, μ^j, on conflict effort is as follows:*

(i) her own conflict effort a^{j*} will decrease.

(ii) In the absence of strategic effects a^{i*} will not change. If a strategic effect is present the other's conflict effort a^{i*} will increase.

(iii) Total conflict effort can $a^{i*} + a^{j*}$ decrease as well as increase.

Proof. Proceeding as in the proof for Proposition 1 we get:

(i) The effect of increasing own morality on one's own conflict effort is

$$\frac{\partial a^{j*}}{\partial \mu^j} = -\frac{\pi^j_{ii}}{R\left((\pi^j_{ij})^2 - \pi^j_{ii}\,\pi^j_{jj}\right)} < 0\,, \tag{5}$$

because of assumption 1.

(ii) The effect on the other individual is given by

$$\frac{\partial a^{i*}}{\partial \mu^j} = \frac{\pi^j_{ij}}{R\left((\pi^j_{ij})^2 - \pi^j_{ii}\,\pi^j_{jj}\right)} > 0\,. \tag{6}$$

as the denominator is positive due to assumption 1, the sign depends on the numerator. In the absence of a strategic effect $\pi^j_{ij} = 0$ which implies that the whole effect is zero. If $\pi^j_{ij} \neq 0$

then numerator is positive due to assumption 2 which implies that a^{i*} will increase.

(iii) The effect on total conflict effort is

$$\frac{\partial a^{i*}}{\partial \mu^j} + \frac{\partial a^{j*}}{\partial \mu^j} = \frac{\pi^j_{ij} - \pi^j_{ii}}{R\left((\pi^j_{ij})^2 - \pi^j_{ii}\,\pi^j_{jj}\right)} \tag{7}$$

As can be seen the sign of the numerator is not determined. But if $\pi^j_{ij} > \pi^j_{ii}$ total conflict effort will increase. ■

What is the intuition of these results? If j's morality increases the individual j will reduce her effort. As conflict efforts are strategic complements from her point of view (because $\pi^j_{ij} > 0$), at the same time, this *increases* the marginal utility of conflict for individual j (because $\pi^i_{ij} < 0$) giving her an incentive to increase her effort. As a consequence, this individual will increase the effort she spends on conflict even if her own morality has not changed. The argument for the other case holds analogously. We can therefore observe a discrepancy between the moral disposition reflected by her morality parameter μ^i and her behavior. Behavior may not necessarily reflect the individual's underlying morality. The fact that one individual has become more moral and and adapted her behavior accordingly will have a feed-back effect on the other individual. Depending on whose morality has changed this might tempt the other to become more aggressive. As a consequence, this individual might appear less moral although her underlying morality has *not* changed. The implication for total conflict efforts is the following: depending on whose morality is changed it can decrease as well as increase. The latter may only happen, if j's morality is increased and if the strategic effect for individual i is stronger than the conflict-reducing effect for j. But if this happens total conflict effort increases, even though the morality in the economy (as measured by the sum of both individuals' morality) has increased.

The following examples of two parties (countries) that want to appropriate a resource (e.g. the neighboring strip of land) shall highlight the idea: The conflict technology is given by the two armies, that is soldiers, their weapons and their logistic technology. Their fighting effort will be determined by the value of the land, their costs and the respective contest technology. Now, if some change of the situation induces one party, say the "attacker", to increase one aspect of her appropriative effort, say, soldiers, the strategic effect which is generated by the relative strength of the defender against her opponent will determine the defender's optimal reaction. If the defender's soldiers are only poorly armed, this party's optimal reaction might be to withdraw to a point where she is still able to defend themselves. That is, this party will lower her effort. But if the defender is armed with automatic guns or equipped with a better communication technology that allows her to control a larger fraction of the contested land, the change of the other's conflict effort could lead to the opposite behavior by the second party. Now, the optimal reaction might be to buy more guns and hire more soldiers as a response to the other's increased conflict effort. The relative strength of the available conflict technologies determines whether conflict efforts are perceived as *strategic complements* or *strategic substitutes* by a party. Note, that already the Romans seem to have

been aware of this effect as can be seen from their saying "Si vis pacem, para bellum" (If you want peace, prepare for war). As the romans were the stronger party in most of their conflicts for centuries, making use of their dominant position this strategic effect may well have worked to their advantage.

The subsequent question is for what kind of situations we actually face strategic substitutes or complements and whether a policy-maker could make use of this information. In the literature the effects of the contest technologies and the involved relative strengths are summarized by a function called the contest-success function. Different classes of contest-success functions have been studied in the literature (Skaperdas, 1996; Hirshleifer, 2001; Clarke and Riis, 1998). One prominent type of contest-success function which is widely used in the literature encompasses different versions of the "Tullock contest-success function" (Tullock CSF in the following).[11] The CSF summarizes the outcome of the conflict efforts used by the involved parties. These efforts could be time and money spent on conflict, armies equipped with the a certain technology – weapons, logistics, and so on. But the conflict could also be interpreted on a wider scale. One such example fitting our model is a situation where both parties contest for the exploitation of a resource. In such a case, the corresponding contest efforts could be interpreted as any effort suitable to exploit the resource. One example one could imagine is the contest for the spoils from a fishery. Here, the conflict technology takes the form of the ships or the fishing technology available, with which they try to appropriate their shares. Varying contest efforts could then take the form of a different number of ships of a fishing fleet, or the instruments of a more advanced technological level, that tell the fishing crew where their prey are. If one party would enjoy a relative advantage with respect to her opponent just because of the technology involved, this might have effects on both parties' conflict efforts. In this context, morality could take the form of norms whose underlying morals punish overfishing or employing destructive fishing methods (drift nets, dynamite) that harm and threaten to destroy the resource. Other examples for which the model is applicable include the search for oilfields, exploitation of other common pool resources or lobbying for some kind of benefit in a rent-seeking context. Keeping this kind of examples in mind, we will now turn to the results of our model if the contest technology is represented by the Tullock CSF.

One form with which the Tullock CSF is used specifies the share an individual is able to secure for herself as follows::

$$\pi^i \;=\; \frac{\theta^i\, a^i}{\theta^i\, a^i \;+\; \theta^j\, a^j}\,. \tag{8}$$

The parameter $\theta = \frac{\theta^j}{\theta^i}$ reflects the two parties' relative technological strength. Obviously, if $\theta = 1$ this corresponds to equal strengths of both contestants. If $\theta > 1$, party j has a relative advantage over i. If it is less than 1, j is the disadvantaged party.

[11] The name of this function in which the ratio of the conflict efforts determines the relative success is due to Tullock's contribution to the analysis of rent-seeking contests (Tullock, 1980). Different versions of the Tullock CSF allow for asymmetries in the effectiveness of the individuals contest technology while others are symmetric with respect to the opponents' strengths. Some versions differ with regards to a scale parameter. For a detailed treatment of ratio against logistic contest-success functions see Skaperdas (1996); Clarke and Riis (1998) and Hirshleifer (2001).

Equilibrium efforts: Calculating the equilibrium values yields

$$a^{i*} = \frac{R\,\theta\,\mu^j}{(\theta\,\mu^i + \mu^j)^2} \tag{9}$$

$$a^{j*} = \frac{R\,\theta\,\mu^i}{(\theta\,\mu^i + \mu^j)^2}\,. \tag{10}$$

As one can see, both parties' conflict efforts are decreasing in their own morality.[12] The impact of θ is ambiguous. Still, one can see that it will move the individuals' efforts in the same direction. That is, either both will increase their efforts, or both will decrease their efforts with an increase in the parameter. Now, if we take the perspective of a policy-maker who has the opportunity to educate one party with the effect that her morality will increase, which party should be subjected to this education measure to guarantee that not only this party's but also overall conflict efforts decrease?

The effect of morality: We know from our theoretical analysis that the effects of an increase of the morality of i crucially depend on π_{ij}^i. In equilibrium this term takes the following form:[13]

$$\pi_{ij}^{i*} = \frac{(\mu^j + \theta\,\mu^i)(\mu^j - \theta\,\mu^i)}{R^2\,\theta}\,. \tag{11}$$

If, from an ex-ante perspective, a prospective policy-maker anticipating the conflict is interested in achieving maximal conflict reduction, she should target the morality-increasing educational policy in a way that both individuals decrease their efforts. From Proposition 1 we know that this is the case if individual i is targeted. So, for which parameter combination will (11) actually be negative? One can see from equation (11) that this is the case if $\theta\,\mu^i > \mu^j$. That is, j will decrease her effort in a response to i's increased morality if the impact of j's comparative technological advantage is larger than the impact of the individuals' relative moral dispositions, that is $\theta = \frac{\theta^j}{\theta^i} > \frac{\mu^j}{\mu^i}$. If j has a relative technological advantage ($\theta > 1$) but is less moral than i we know for sure, that her conflict effort will decrease if i's morality is increased as then $\theta > 1 \geq \frac{\mu^j}{\mu^i}$.

Note that if $\theta = 1$, this implies that i needs to be more moral than j for contest efforts to be strategic *substitutes*. Therefore, to guarantee that both individual's reduce their conflict efforts, the individual who needs to be subjected to the educational policy is the one, who was more moral in the first place. This is a rather surprising result. Instead of educating the less moral and therefore more aggressive individual, which might have been expected, the less aggressive one should be made even more moral than before.

The reason for this is that increasing the morality of the less moral individual j will insure her reduced conflict activity, but the strategic effect might actually tempt the more moral

[12] Note that, even in a model in which the resource is produced endogenously these qualitative considerations still hold. Equilibrium efforts would look slightly different, but the implications with regards to the sign of the comparative statics are identical.

[13] The asterisk denotes the fact that the cross derivative is evaluated at the point of equilibrium.

individual i to engage in more conflict. Beforehand, the less moral individual previously engaged in higher conflict activity thereby guaranteing her a larger share of the resource. As she reduces her efforts this weakens her dominant position and opens the opportunity to the other party to "close the gap". The larger the former difference in morality the stronger will be the effect on the formerly weaker individual. On the other hand, increasing the more moral individual's morality decreases this individual's effort. In addition, this makes the "immoral" individual's position more dominant and allows her to relax her conflict effort without having to fear a reduction in her share of the resource.

The implication of such a policy is that the final resource allocation is shifted, favoring the less moral individual and thereby strengthening the immoral party. The distributional effects that come along are quite unpleasant from a normative point of view that cares for the "weak". To guarantee a low level of conflict in an economy, one party has to be sufficiently weakened. In short, that person's moral values must inducer her not to properly defend her own interest. This guarantees little conflict but comes at the price that more moral individuals are disadvantaged with regards to consumption. Morality – if used unilaterally – is an instrument to strengthen the position of the immoral and punish the moral – an implication which makes it an instrument of questionable desirablity from a distributional and ethical point of view.

This basic message extends to the case when $\theta \neq 1$. As we know from above, if j is at a technological advantage and less moral, conflict efforts will definitely be strategic substitutes from i's point of view. In this constellation i will be the ideal policy target to guarantee decreased efforts from both parties because j will decrease her efforts along with i. The drawback of this constellation is that j (being less moral and the stronger party) already had a dominant position before the policy measure could take an effect. Increasing i's moral disposition will strengthen j's position even more with all the unpleasant distributive implications already considered in the case of $\theta = 1$. What happens if the situation is such that j faces a technological advantage but is more moral, that is either $\theta^j > \theta^i$ and $\mu^j > \mu^i$ but the condition $\theta\,\mu^i > \mu^j$ is fulfilled? Does this allow for a policy that does not require the weaker party to be weakened even further to achieve maximal conflict reduction? If me measure a party's effective strength by the share of the resource she is able to secure for herself, the answer is no. From the theoretical analysis of Dixit (1987), we know that one individual perceives the conflict efforts to be strategic substitutes ($\pi^i_{ij} < 0$), if the share she is able to secure was less than $\frac{1}{2}$. Therefore, the qualitative conclusion that the formerly "weaker" party needs to be the target of the educational policy does not change.

Total conflict effort Given that the distributional consequences might not be accepted, the question then is whether the policy-maker should settle for a less ambitious goal. Instead of striving for maximal conflict reduction, the goal could just be to achieve total conflict reduction. Targeting the stronger party – that is j[14] – with an educational policy might still

[14]This follows the fact that we know from Dixit, that $\pi^j_{ij} > 0$ iff $\pi^j > \frac{1}{2}$.

be worth-while if total conflict can be reduced. From our previous analysis, we know that this holds if $\pi_{ij}^{j} - \pi_{ii}^{j} < 0$. Evaluating $\pi_{ij}^{j} - \pi_{ii}^{j}$ at the point of equilibrium, we find that:

$$\pi_{ij}^{j*} - \pi_{ii}^{j*} = \frac{(\theta\,\mu^i + \mu^j)(\theta\mu^i - (2\,\mu^i + \mu^j))}{\theta\,R^2}\,. \tag{12}$$

As one can see, this expression can be negative as well as positive. If neither of the two contestants has a technological advantage, that is $\theta = 1$, one can show that this expression will always be negative. In this case, total conflict effort will always be reduced, regardless of which party is made more moral. But if $\theta \neq 1$, total conflict effort could actually be increasing when one party's morality is increased. Taking a look at (12), we can see that this will happen if $\theta > \theta^* = \frac{2\mu^i + \mu^j}{\mu^i}$. So there is a critical θ^* – which is increasing in μ^j and decreasing in μ^i – that describes the frontier which marks whether a one-sided increase in j's morality will lead to increased total conflict effort or not. $\theta^* > 2$, that is, this critical θ^* implies that an increase in total conflict effort will only happen, if individual i is considerably weaker than individual j who constitutes the target of the educational policy – sufficiently weak so that the strategic effect induced by the change in morality dominates the direct one. This weakness beforehand guaranteed that both engaged in relatively little conflict. Making the stronger more moral and therefore lowering her conflict effort increases the weaker individual's incentives to engage in the conflict so much as to overcompensate the positive effect gained by i's reduced aggression.

The implication from this is that the target of an educational policy needs to be well chosen. Fairness considerations, together with ignoring such issues as strategic aspects, could imply that the opposite from what was intended, namely less conflict, might actually be achieved. Not paying attention to which of the conflicting parties to target can have the disastrous effect that total conflict effort increases, although morality in the economy has increased. This will particularly happen if the individual who is targeted by the educational policy has a considerable technological advantage over her adversary. The more moral j, the stronger the necessary advantage to cause this perverse effect, and the more moral i, the less pronounced this effect needs to be. A way to guarantee that total conflict effort decreases is to insure that both individuals will decrease their conflict efforts after the policy takes effect. We know that if one individual is weaker with respect to technology *and* morality, increasing this individual's morality will guarantee decreased total conflict. Still, this implies distributive consequences that are unpleasant from a point of view which takes fairness and ethical considerations into account.

2.2 Universal Education

The results so far have been rather unsettling. They imply that without further knowledge about which individual actually faces a certain kind of strategic effect, increasing morality unilaterally can either actually lead to total increased conflict effort – that is, the opposite of what has been intended by the educational measure – or it can have the consequences that the more moral individual looses out from a distributional perspective. Can these unpleasant results be changed if all the individuals in the economy are subjected to moral-education, and their morality increases equally? The corresponding analysis leads to the following result:

Proposition 3 *The effect of increasing both individuals' morality by the same amount μ is as follows:*

(i) If there are no strategic effects between the contest efforts of the involved individuals, that is $\pi_{ij}^i = 0$, their and total conflict efforts will decrease.

(ii) If there are strategic effects, that is $\pi_{ij}^i \neq 0$, at j will reduce her conflict effort. Whether i will increase or decrease her effort will depend on the balance of the strategic effect against the diminishing marginal utility of conflict.

(iii) Total conflict activity will decrease with an increasing economic-wide morality.

Proof. Define $\mu^i = \kappa^i + \mu$ and $\mu^j = \kappa^j + \mu$.[15] A symmetric and equal increase of both individuals' morality, that is, a change in μ, has the following effects:

$$\frac{\partial a^i}{\partial \mu} = -\frac{\pi_{ij}^i + \pi_{jj}^i}{R\left((\pi_{ij}^i)^2 - \pi_{ii}^i \pi_{jj}^i\right)}, \tag{13}$$

and

$$\frac{\partial a^j}{\partial \mu} = \frac{\pi_{ii}^i + \pi_{ij}^i}{R\left((\pi_{ij}^i)^2 - \pi_{ii}^i \pi_{jj}^i\right)}. \tag{14}$$

(i) If there are no strategic effects on contest effort, $\pi_{ij}^i = 0$, and these expressions reduce to

$$\frac{\partial a^i}{\partial \mu} = -\frac{\pi_{jj}^i}{R\left((\pi_{ij}^i)^2 - \pi_{ii}^i \pi_{jj}^i\right)} < 0, \tag{15}$$

and

$$\frac{\partial a^j}{\partial \mu} = \frac{\pi_{ii}^i}{R\left((\pi_{ij}^i)^2 - \pi_{ii}^i \pi_{jj}^i\right)} < 0, \tag{16}$$

as the denominator is positive, $\pi_{ii}^i < 0$ and $\pi_{jj}^i > 0$ due to the assumption 1.

(ii) If strategic effects are present, $\frac{\partial a^j}{\partial \mu}$ is unambiguously negative because the denominator in (14) is positive by Assumption 1 and the numerator is negative by Assumptions 1 and 2. Whether individual i will increase or decrease her effort will again depend on the relative strength of the strategic effect with respect to the diminishing marginal returns on conflict effort. The numerator in (13) is positive. Therefore, if $-\pi_{ij}^i \leq \pi_{jj}^i$ then the effort i spends on conflict will decrease (or at least not increase). Else, it will increase.
(iii) Adding up the above expressions to get the effect on total conflict effort shows the following:

$$\frac{\partial a^i}{\partial \mu} + \frac{\partial a^j}{\partial \mu} = \frac{\pi_{ii}^i - \pi_{jj}^i}{R\left((\pi_{ij}^i)^2 - \pi_{ii}^i \pi_{jj}^i\right)} < 0, \tag{17}$$

due to the fact, that the denominator is positive and the numerator is negative. ■

[15] The author is indebted to Johannes Münster for a hint how to generalize a previous result.

As one can see from (13) and (14), the reaction of both individuals will not necessarily move in the same direction. j will decrease her conflict effort for sure. But whether i does so, too, will depend on the balance of the "strategic effect" and the "diminishing marginal returns effect". As j decreases her conflict effort i faces an increased incentive to invest into conflict. This is partly offset, by the fact, that the decreasing marginal returns of the other individual loose their impact due to her reduced conflict effort. If the strategic effect is stronger, she will increase her conflict effort in spite of the increased morality. Still, total conflict effort will decrease, regardless of the shape and strength of the strategic effect because taken together the strategic effects on both individuals cancel out.

In some of the literature it has been suggested that to limit conflict behavior or if a resource is threatened by over-exploitation or may even be destroyed by the competing behavior of the involved parties, instilling appropriate social and moral norms to limit such behavior might be a solution to the problem. Our results show that this might actually be the case. But to guarantee the decrease of total conflict without precise knowledge of the parties' relative strengths, either all parties need to be subjected to the necessary education or the increasing of morality needs to be limited to the one from whose perspective the contest efforts are strategic substitutes. If the latter alternative is chosen, this implies that the weaker party has to be weakened even more to achieve the desired result. The choice of universal education seems to be desirable if distributional considerations and not only the limiting of the waste of resources due to conflicts play a role in the policy-maker's calculus. The distributional point may be one reason why many societies adopt relatively homogenous moral norms

3 Morality and Property Rights

Up to now, we have only considered the case that many conflict efforts are not specific and can be used either for attack or defense. Nevertheless, there exist conflict 'technologies', that are fairly specific: for example, thick walls and strong locks are usually used to defend your possessions against appropriation. Lock picks, on the other hand, are designed for appropriation. These technologies only make sense in a surrounding in which the claim one has on one's possessions is clear-cut. That is, only if a prior property right exists does something like 'defensive action' have a clear meaning, namely to protect what is yours. And only in such a context will it be possible to discriminate between purely defensive and aggressive behavior and to punish the latter by investment in morality. In this context, we will talk about property rights as a *claim to a good* (or resource), which nevertheless still needs to be enforced. We will speak of the effective enforcement of property rights if the share an individual is able to defend is high. We will abstract from the institutional enforcement of property rights and focus on how morality supports the private enforcement of property rights. This leads to an important question: How will the results gained above change if norms conveying moral judgements about behavior discriminate between aggressive and defensive efforts?

3.1 The model

We will change the model from section 2.1 as follows: each individual has a claim to a certain resource R^ι and the opportunity to invest either in appropriation a^ι of the other's resource R^κ or to defend herself against the other's appropriative activities d^ι, $\iota \neq \kappa \in \{i, j\}$. π^i denotes the share of the resource each individual is able to defend of her original claim. The closer it is to 1 the better the enforcement. It reflects how well the initial property right to R^ι can actually be enforced. This share is a function of the two contest efforts $\pi^\iota = \pi(d^\iota, a^\kappa)$. Analogously to Section 2, we use the following notation $\frac{\partial \pi^\iota}{\partial d^\iota} = \pi^\iota_\iota$, $\frac{\partial \pi^\iota}{\partial a^\kappa} = \pi^\iota_\kappa$, $\frac{\partial^2 \pi^\iota}{(\partial d^\iota)^2} = \pi^\iota_{\iota\iota}$, $\frac{\partial^2 \pi^\iota}{\partial d^\iota \, \partial a^\kappa} = \pi^i_{\iota\kappa}$ and $\frac{\partial^2 \pi^\iota}{(\partial a^\kappa)^2} = \pi^\iota_{\kappa\kappa}$ and assume:

Assumption 3
$\pi^\iota_\iota > 0$, $\pi^\iota_\kappa < 0$, $\pi^\iota_{\iota\iota} < 0$, $\pi^\iota_{\kappa\kappa} > 0$.

Each individual's utility function is modified as follows. It gains utility from the consumption of the defended and stolen resource and disutility from the efforts of defense and appropriation. We will normalize the cost of defense to one and measure the morality of each individual by the disutility she gets from the act of stealing:

$$u^\iota = \pi^\iota R^\iota + (1 - \pi^\kappa) R^\kappa - \mu^\iota a^\iota - d^\iota, \qquad \text{for } \iota, \kappa \in \{i, j\}. \tag{18}$$

Each individual will then maximize her utility by choosing the efforts of appropriation and defense. Assuming an interior solution one can get the following results from the system of first-order conditions at the Nash-equilibrium:[16]

Proposition 4 *An increase in the morality of one individual has the following effects:*

(i) If i's morality μ^i is increased, her appropriative effort a^i will be reduced.

(ii) An increase in i's morality has no effect on her own defensive d^i or on the other's aggressive effort a^j.

(iii) After an increase of i's morality, j will decrease her defensive effort d^j if appropriation and defense are strategic complements and increase it if they are strategic substitutes.

(iv) If defense and appropriation are strategic substitutes, then an increase in the morality of one individual will lower the absolute amount of stealing.

Proof.
From the first-order conditions characterizing the Nash-equilibrium, we can calculate the comparative static effects. Using the results we get:

[16] Again, it can be easily verified that the second-order conditions for a maximum hold for both individuals. It can be shown that the results hold in a model in which the resource is produced endogenously.

(i) The effect of an increase of individual i's morality on her aggressive effort is given by

$$\frac{\partial a^i}{\partial \mu^i} \;=\; \frac{\pi^j_{jj}}{R^j\,((\pi^j_{ij})^2 \;-\; \pi^j_{ii}\,\pi^j_{jj})} \;<\; 0\,, \tag{19}$$

because of the assumptions in (3).

(ii) One can compute the effect of an increase in individual i's morality on her own defensive and the others effort as follows: differentiating the first-order equations which characterize our Nash-equilibrium we use Cramer's Rule to obtain our comparative static effects. It turns out that

$$\frac{\partial a^j}{\partial \mu^i} \;=\; \frac{\partial d^i}{\partial \mu^i} \;=\; 0\,. \tag{20}$$

(iii) The effect of the increase of i's morality on j's defensive effort is given by

$$\frac{\partial d^j}{\partial \mu^i} \;=\; -\,\frac{\pi^j_{ij}}{R^j\,((\pi^j_{ij})^2 \;-\; \pi^j_{ii}\,\pi^j_{jj})}\,. \tag{21}$$

This is negative if $\pi^j_{ij} \;>\; 0$, that is, defense and appropriation are strategic complements, and positive if $\pi^j_{ij} \;<\; 0$, that is, the two efforts are strategic substitutes.

(iv) Total stolen output S is $S \;=\; (1-\pi^i)\,R^i \;+\; (1-\pi^j)\,R^j$. An increase in the morality of one individual, say i, has the following effect:

$$\frac{\partial S}{\partial \mu^i} \;=\; -\,(\underbrace{\frac{\partial \pi^j}{\partial d^j}}_{>0}\,\frac{\partial d^j}{\partial \mu^i} \;+\; \underbrace{\frac{\partial \pi^j}{\partial a^i}}_{<0}\,\underbrace{\frac{\partial a^i}{\partial \mu^i}}_{<0})\,R^j\,. \tag{22}$$

So the sign of whole effect depends on $\frac{\partial d^j}{\partial \mu^i}$. We know from (iii) that this is positive if $\pi^j_{ij} \;<\; 0$, that is if the two are strategic substitutes. So, in this case the whole expression in brackets will be positive, and therefore $\frac{\partial S}{\partial \mu^i}$ is negative.[17] ■

In comparison to section 2.1 we now get a socially more desirable result. Whereas in the model with undifferentiated conflict technologies it could happen that a one-sided increase of morality could lead to an increase in total appropriative activities, the separation of the means of conflict into pure aggressive or defensive activities enables an increase in morality to punish only aggressive activities. The clean separation between defense and aggression enabled by the definition of the property rights disrupts the strategic effect between aggressive efforts. As a consequence, these activities will unambiguously be reduced if the morality of the respective individual is increased. Whether, in the end, this will lead to an absolute reduction of stealing, will depend on the strategic effects of the conflict technology involved.

[17] In the case of strategic complements, it will depend on the strength of the relative effects to determine, whether the total amount stolen is reduced or actually increases in spite of increased morality and reduced stealing.

An interesting implication of the analysis is that defensive measures and morality act as complements whenever appropriation and defense are strategic substitutes. If conflict efforts are strategic complements, we gain the insight that morality and defense act as substitutes. The theoretical consequence could be that, due to less stealing *and* less defense, the total amount that is actually stolen might increase. This might seem a bit surprising at first sight. The explanation is the following: If conflict efforts are strategic substitutes we know, that an increase in morality will lead to decreased appropriation. Due to the strategic effect, this will lead to a higher marginal return on defense. In the case of strategic complements, we know that decreased appropriation will lower the incentives for defensive measures. In a way, less appropriation leads to more carelessness from the defender's side. This effect could in theory overcompensate the reduction of stealing effort. What is the implication of this result for the security of property rights?

It has been argued that in certain circumstances, in which prizes are small and verification of legal compliance is not easy, the state should invest into social norms for complying with the law (Shavell, 2002). In our context this could be interpreted as an increase in morality. What we have learned from our analysis is that this will actually lead to decreased appropriative effort. But only if appropriation and defense are strategic substitutes will this actually guarantee a decreased amount of stealing. If appropriation and defense are strategic complements, the resulting decrease of defense could actually lead to less appropriation but result in a higher actual percentage of what is actually "stolen". We will now turn to the issue regarding what kind of parameters lead to strategic substitutes and complements and whether the amount stolen actually increases or falls.

3.2 The enforcement of property rights under the Tullock CSF

If the conflict technology is be represented by the Tullock CSF, for which kind of parameters of our CSF will morality guarantee not only reduced appropriative efforts but also a reduced amount of what is actually stolen? Let our CSF be defined as follows:

$$\pi^j \;=\; \frac{d^j}{d^i \;+\; \theta\, a^j}\,. \tag{23}$$

The effect of morality From proposition 4, we know that safer property rights are guaranteed the moment appropriation and defense are strategic substitutes. When will this be the case? Our equilibrium efforts are

$$d^{j*} \;=\; \frac{\mu^i\,\theta\,R^j}{(\mu^i \;+\; \theta)^2}\,, \tag{24}$$

$$a^{i*} \;=\; \frac{\theta\,R^j}{(\mu^i \;+\; \theta)^2}\,. \tag{25}$$

Our term π_{ij}^{j}, which reflects this effect, turns out to be

$$\pi_{ij}^{j*} \;=\; \frac{\theta\,(d^{j*} \;-\; \theta\,a^{i*})}{(d^{j*} \;+\; a^{i*})^3} \;=\; \frac{(\mu^i+\theta)(\mu^i-\theta)}{R^2\,\theta}\,. \tag{26}$$

This implies that the two efforts are strategic substitutes and will guarantee safer property rights if $\mu^i < \theta$. So if the impact from the thief's morality is less than the technological advantage she enjoys, a defender will respond with more defense as a reaction to higher morality from the appropriator's side.

What happens if the efforts are strategic complements? Then defense will decrease alongside the other's appropriative actions. Fortunately enough, total stealing decreases nevertheless as the thief's morality is increased. Therefore, property rights can be successfully stabilized by endowing prospective thieves with values that punish criminal behavior. This can be seen by taking a look at the defended share at the equilibrium, which reflects the security of property rights:

$$\pi^{j*} = \frac{\mu^i}{\theta + \mu^i}. \tag{27}$$

As can be seen, this is decreasing in θ and increasing in the thief's morality. The higher her morality, the closer this share is to 1, that is the more secure property rights become.

So the good news is that a prospective policy-maker does not need to keep the relative positions of morality and the effectiveness of appropriation in mind when deciding on whether to spend efforts on morality-enhancing education. The effect will reduce stealing regardless of the parameters. In a situation with relatively low morality but a comparatively effective appropriation technology, the effect will be especially enhanced due to the resulting increased defense efforts. So in this case it is especially worthwhile to spend effort in strengthening values that limit aggressive behavior. But even in a situation in which the conflict efforts are strategic complements which will tempt a defender to become increasingly careless, increasing the thief's morality is worthwhile. As long as the conflict can be represented by a Tullock CSF, as specified above, stealing, either measured in activity or in the appropriated share, will decrease the more moral a society's individuals are.

4 Conclusions

We have analyzed the question whether and in which circumstances morality is a good instrument to reduce potentially harmful behavior in an economy. We have seen that this depends on the structure of the conflict and the technologies involved. We considered two different environments differing with respect to one central characteristic: whether clear-cut property rights existed, and therefore, whether morality could discriminate between appropriative and defense behavior or not.

In a situation in which the parties contested for the returns of a common resource to which no previous claims existed, the parties could not distinguish between aggressive and defensive behavior. As a consequence, morality could only target conflict behavior per se. The potential implications differed from the situation in which both parties had a clear claim to a resource, which they could choose to defend. This structural difference allowed for morality to target only aggressive behavior. While not affecting defensive action, morality became a precise instrument to punish only the socially undesired action. We found

that the strategic effects implied by a conflict technology are crucial to determine whether morality was useful as an instrument to lower conflict or reduce appropriation. When deciding about policy measures to reduce crime and other activities that are deemed undesirable from a social point of view, it is of utmost importance to take these effects into consideration.

In the first case, we found that increasing morality will decrease the conflict effort of the targeted individual but might lead to increased conflict effort of the individual who was not effected by the increase in morality. If the latter individual perceived conflict efforts to be strategic substitutes, this led her to increase conflict effort even though her morality had not changed. The fact that her opponent lowered her conflict level increased her marginal return of conflict, inducing her to increase her effort. When turning to the concrete example of the Tullock CSF, we saw that this happened if the "stronger" individual was the target of the educational policy. While if both individuals had access to the same conflict technology, the harm from such an effect was limited, we found that this result could not be upheld if the individuals differed in their strength with regards to the conflict technology. In this case a wrongly targeted educational policy could have a fatal effect: if one individual was sufficiently weak to begin with, making the stronger more moral could actually lead to increased *total* conflict effort. One way to guarantee that such a result will not occur is to choose the policy's target carefully. As we saw, this implied that the position of the stronger or less moral individual was actually strengthened, leading to difficult distributive considerations. The other way was to assure that both individuals were affected by the educational policy.

Introducing the concept of (a claim to) a property right, the implications changed: We found that morality was an effective and desirable instrument to support the enforcement of these very property rights. The reason for this was that the clean labelling of property rights allowed for a normative distinction between aggression in the form of *stealing* which was punished, and *defense* as an legitimate action. Accepting that this split in the normative evaluation of activities supports the enforcement of property rights this leads to a subsequent question: as defensive efforts still imply a cost, they constitute a waste of resources, which could be put to other valuable uses. Are there any economic explanations supporting this differential normative treatment of conflict efforts? This line of questioning promises to provide interesting thoughts for research on the normative foundations of property rights.

In conclusion, it can be said that morality can be a useful instrument to reduce socially undesirable behavior if the parameters characterizing the economy fulfill certain restrictions. Still, it has been proposed in the literature that education in the sense of increasing the human capital of individuals can achieve the same by increasing the opportunity cost of conflict. Compared to morality, which leads to reduced utility of the targeted individual, it has the advantage that, by increasing the productivity, the direct effect is to increase the utility of the respective individuals. The argument could also lead into an opposing direction: as the value of the resource to be appropriated increases the incentives for conflict increase, too. This again might tempt the individuals to engage in more conflict, and result in the corresponding welfare losses. It can be shown that, in the framework of the model laid out above, increasing the value of the prize leads to increased conflict effort. For the case of a Tullock CSF, this result extends to an economy in which the value of the prize is

determined endogenously by production. This supports Diamond's observation that conflict and increased productivity go hand in hand (Diamond, 1998). The issue whether education in the form of human capital or social norms is more desirable from a social point of view remains an interesting one which deserves further research.

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