Morality in the Market*

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Abstract

Being honest can be a competitive disadvantage. In markets with opportunities to violate laws and regulations, producers who are willing to cheat may crowd out more efficient producers who are honest, and buyers who are willing to cheat may crowd out honest buyers with higher willingness to pay. This mechanism makes morals (honesty) a bad substitute for sanctions in markets. Honesty reduces cheating, but the output may be less efficiently produced and less efficiently allocated between buyers. While it does not matter who pays a sanction, buyers or sellers, the effect of honesty depends crucially on whether it is buyers or sellers who are honest.

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JEL classifications: D41 (Perfect competition), L51 (Economics of regulation), K42 (Illegal behaviour and the enforcement of the law), D64 (Altruism and Philanthropy), D61 (Allocative efficiency and CB-analysis), H26 (Tax evasion)

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1 Introduction

Can a desirable trait such as honesty become a social cost in a market economy? Good morals, such as honesty, may prevent people from cheating on laws and regulations like an intrinsic cost of breaking the rules, similar to the extrinsic cost of a sanction. As enforcing laws and regulations by sanctions alone is expensive, there is a growing interest in morality as a potential substitute for sanctions. I claim that even if morals and sanctions are substitutes in each transaction, taking prices as given, they are not substitutes in markets where prices, entry and exit are endogenous. Honesty among producers can reduce efficiency of production and honesty among buyers can reduce efficiency of exchange. Morality affects market outcomes in ways that are not easy to predict from simple analogies between moral costs and pecuniary costs.

Showing these results, I am inspired by Shleifer (2004) who argues that ethical behaviour in the market is a normal good that is easily destroyed by competition. As unethical producers save costs, they drive down prices and revenues. With lower revenues, the demand for ethical behaviour is lowered. My approach is complementary to Shleifer's. I emphasize morals such as honesty as an intrinsic cost of cheating on laws and regulations, and therefore a competitive disadvantage. For example, cheating on safety regulations by some producers drives down prices. Some of the honest producers do not survive and are replaced by producers who are less efficient, but willing to cheat. Honesty in some but not all producers distorts competition as their entry and exit is not determined by productivity alone but also by their willingness to cheat.

The example illustrates the key difference between sanctions and morals in the market: While sanctions are the same for all, morality differs between individuals. Sanctions do not change the ranking of profitability between sellers. Morality, in contrast, changes the ranking as private gains do not correspond to social gains. These differences may turn individual virtues into social vices. Honesty in some but not all sellers creates a social cost in the form of inefficient allocation of talent between markets. Although morality reduces cheating and the excessive output that cheating brings, these gains may not compensate for the cost of inefficient production.

The cost of inefficient production varies with the fraction of honest sellers. A key result is that a higher fraction of honest sellers reduce efficiency of production in a market with a low fraction of honest sellers but improves it in a market with a high fraction. In a market with few honest sellers, those who exit when they become honest is most likely replaced by dishonest ones who are less efficient. In a market where most sellers are honest, however, they are most likely replaced by honest ones who are more efficient. Thus, improving honesty among sellers has a more favourable impact the more sellers that are already honest.

As long as no buyers are honest, or they cannot distinguish between honest and dishonest sellers, they all pay the same price. Output is therefore inefficiently produced but efficiently allocated between buyers. With honesty among buyers, but not among sellers, the opposite is the case. To make sellers indifferent between the buyers, the honest buyers must pay a higher price and may therefore be crowded out by dishonest buyers with lower willingness to pay. Output is efficiently produced, but inefficiently allocated between buyers. This points to another difference between sanctions and morals: With pecuniary sanctions, it does not matter whether it is the buyers or the sellers that are sanctioned. With the intrinsic sanction from moral, it does.

Varying the fraction of honest buyers and sellers gives rise to different types of equilibriums. For example, in an equilibrium with widespread honesty among sellers but few honest buyers, more honesty among buyers has no effect, while more honesty among sellers has. Widespread honesty among buyers but few honest sellers gives the opposite result: More honesty among sellers has no effect while more honesty among buyers has. If the prevalence of honesty is more equal in the two groups, more honest buyers may improve efficiency of production but reduce the efficiency of exchange. If these complex effects of moral differences in markets are not recognized, policies to improve morality may have no effect or even be harmful.

The results imply that otherwise optimal taxes and regulations may create distortions when morals differ between people. The reason is that taxes and regulations create a competitive advantage for those who are willing to cheat. For example, taxes create a competitive advantage for those who are willing to evade. A common belief is that morality in the market improves the effect of regulations because it makes compliance higher than what can be obtained by sanctions alone. I show that the opposite may be the case: The gain from corrective regulations may be lower if some but not all market participants are honest than if everyone is willing to cheat. While honesty makes compliance higher than what is obtained by sanctions alone, it also creates inefficiencies in production and exchange. The cost of these inefficiencies may outweigh the gains from higher compliance.

Policymakers, however, have embraced the idea that people may be "nudged" to comply with inexpensive framing and appeals. For example, the UK government has established a Behavioral Insights Team (2012) to apply these ideas. The inspiration is insights from behavioural economics that morality matters for individual economic decisions. Most people are for instance willing to sacrifice some economic gains for being honest and fair.[1] Their willingness to comply with laws and regulations, for example by paying taxes, is affected by the fairness of the tax system (Barth et al., 2013), the use of tax incomes (Alm et al., 1993) and how they are treated by the tax authorities (Feld and Frey, 2001). Also, it seems possible to make people comply with non-expensive policies, such as framing, appeals and reminders (Mazar and Ariely, 2005 and Bott et al, 2014). While these studies suggest that policies to use morality as a substitute for sanctions may work on each individual, they cannot be used to infer the effects of morality in markets. I show that there is no simple relationship between the effect of morality on

[1]See for example Camerer, 2003, Fehr and Schmidt,1999, Fehr and Fischbacher, 2002, Fehr and Gächter, 2000 a and b, Cappelen et al, 2010 and Mazar and Ariely, 2005.

individuals and the effects in the market.

The literature on morals and sanctions in the market has focused on how sanctions may crowd out moral motivation in individuals by reducing its value.[2] The opposite problem of how lack of sanctions may crowd out productive but morally constrained agents, has received less attention. The novelty in my framework is a change of focus by exploring how sellers and buyers reduce their private costs of holding their moral standards by changing markets or occupations, an how these changes creates inefficiencies for society.

Sections 2 and 3 presents the model and derive the effects of honesty in the market. I start with the case where only sellers face the moral choice of whether to cheat or not. The buyers do not know or do not care. Section 3 demonstrates that some honest buyers in a market with dishonest sellers provides a different result from some honest sellers in a market with dishonest buyers. Section 4 explores the effects of honesty among both buyers and sellers. Section 5 concludes the paper.

2 A market with honest and dishonest sellers

The market mechanism that may turn a desirable individual trait such as honesty into a social cost rests on three key assumptions: First, individuals differ in their morals, i.e. their intrinsic cost of violating laws and regulations. Second, the opportunity for violating laws and regulations differ across markets. Third, suppliers differ in their relative productivity across these markets, and buyers differ in their willingness to pay. I present a framework that captures these assumptions in the simplest possible way, and to have a clear case, I use tax evasion as the main example of cheating.

[2] See Gneezy and Rustichini, 2000, Brekke et al., 2003, Fehr and Rockenbach, 2003, Tirole and Benabou 2006, Ellingsen and Johannesson, 2008. In addition, Tirole and Benabou ,2011, show how sanctions can be used to avoid such crowding out.

Differences in morality

The moral choice is whether or not to cheat on taxes when it pays to do so. I model this choice as a dichotomous one, between being "honest" or "dishonest": An honest individual pays all taxes regardless of the level of sanctions, while the dishonest one cheat on taxes if the gain exceeds the expected penalty. Thus, an honest individual is constrained by morals, a dishonest one only by the threat of sanctions. If an honest and a dishonest individual trades, the honest one demands that all taxes are paid, but the price must be such that the dishonest one is not better off with another trading partner.

Modelling honesty as an exogenous individual trait is clearly a strong simplification. Honesty may be a trade-off between a moral cost and the gain from cheating. There is some evidence that people are insensitive to gains from cheating below a "moral threshold" (Mazar and Ariely, 2005), but as this threshold varies between individuals, the fraction of honest individuals varies with the gain from cheating. It can be shown, however, that the main results hold also in the case where the fraction of honest individuals varies with the gain from cheating.

Differences in opportunities for cheating

I discuss the choice between being self-employed, with opportunities to cheat on taxes, or employed, with no such opportunities. The fact that a self-employed person reports his own income gives him more opportunities to evade taxes than an employee, who has his income reported by the employer. In line with this, empirical studies find that tax evasion is extremely low among employees, but substantial among self-employed (Kleven et al., 2011). Since only the self-employed have the opportunity to cheat, morality is only costly for those who become self-employed. This affects the choice between self-employment and employment.

Differences in relative productivity

Individuals have the same productivity as employees, but differ in their productivity as self-employed. Thus, while all employees earn the same wage rate w, the pre-tax revenues of the self-employed differ because their entrepreneurial productivities differ. Let a_i be output produced by a self-employed individual, distributed on the interval $[0, \bar{a}]$ with cumulative probability $F(a)$, increasing in a.

Incorporating these assumptions, I model how morality affects the individual's choice between employment and self-employment. I start with the case where some sellers are honest and thus unwilling to evade taxes, but where all buyers are dishonest. The interpretation of a dishonest buyer may also be that he cannot distinguish between honest and dishonest sellers. This is typically the case in markets with small transactions, such as in taxis and restaurants. With no honest buyers, the output price must be the same for all buyers, and so honest sellers must bear the entire cost of their tax compliance. Let q denote the price of the output from self-employment, determined by demand equal to supply.

With a tax rate t on all reported incomes, an honest self-employed person earns a net income $(1-t)qa_i$. A dishonest self-employed person can earn more since he is willing to cheat on taxes. He saves taxes on the fraction of income evaded, λ, but if the evasion is detected, he pays a penalty tax τ per dollar evaded, where $\tau > t$. Let $p(\lambda)$ be the probability of detection, an increasing, convex function of λ.[3] His net expected revenue is then $qa_i[(1-t) + \lambda(t - p(\lambda)\tau)]$. To have an interesting problem, assume that some tax evasion is profitable, i.e. $t - p(0)\tau - p'(0)\tau > 0$. If $t - p(1)\tau - p'(1)\tau \geq 0$, it is profitable to evade the entire income. If not, the optimal fraction evaded, λ^*, is determined by the first order condition $t - p(\lambda)\tau - \lambda p'(\lambda)\tau = 0$. Clearly, λ^*, is independent of the individual's productivity, increasing in t and decreasing in the penalty tax rate τ.

[3] Typically, the probability of detection depends on how visible the evasion is, which may depend on both the fraction and the amount evaded. For my purpose, what matters is that the expected sanctions do not change the ranking of expected private revenues.

Each individual supplies one unit of labour and chooses the occupation that gives him the highest net income, given his morals. He compares the net income as employed, $(1-t)w$, with his net revenue as self-employed, $(1-t)qa_i$ if he is honest and $qa_i[(1-t)+\lambda^*(t-p(\lambda^*)\tau)]$ if he is willing to evade. An honest individual becomes self-employed if and only if $qa_i \geq w$, and a dishonest one if and only if $qa_i/\alpha \geq w$, where α is given by

$$\alpha = \frac{1-t}{1-t+\lambda^*[t-p(\lambda^*)\tau]} \tag{1}$$

Since $\alpha < 1$, an honest individual needs higher productivity than a dishonest one to survive as self-employed, implying that honesty is a competitive disadvantage.

With minor modifications, the framework can be used to explore other types of cheating, such as violating environmental standards or financial regulations, as is evident from my discussion of the welfare effects of morals. The purpose of using tax evasion as the main example of cheating is to have a clear case. This is why the effect on tax incomes is only briefly discussed.

2.1 Market equilibrium with honest and dishonest sellers

There is a fixed number of individuals who either sells their services as employees or as self-employed, referred to as sellers. A fraction h of the sellers are honest, but no buyers are honest. The market for employment is simply modelled as an exogenous wage offer with no opportunities for cheating. All interesting changes take place in the market for self-employment and so all terms refer to this market. For example, the total supply from the self-employed, denoted x, is referred to as output or supply. Similarly, demand refers to the demand for self-employed services.

At a given output price q, an honest seller becomes self-employed if his productivity is above w/q, and a dishonest one if his productivity is above $\alpha w/q$. If everyone is honest $(h = 1)$, the supply is

$$S(q) = \int_{w/q}^{\bar{a}} a dF(a) \tag{2}$$

If no one is honest ($h = 0$), the supply is

$$S(q/\alpha) = \int_{\alpha w/q}^{\bar{a}} a dF(a) \tag{3}$$

Total supply then depends on both the output price and the fraction of honest sellers:

$$x(q,h) = hS(q) + (1-h)S(q/\alpha) \tag{4}$$

Supply is increasing in q since $S'(.) > 0$, and decreasing in h since $S(q/\alpha) > S(q)$, i.e. $x_q(q,h) > 0$ and $x_h(q,h) < 0$.

The equilibrium price and output is determined by demand equal to supply. With a demand curve $D(q)$, decreasing in the price, the equilibrium price $\tilde{q}$ is determined by

$$x(\tilde{q};h) = D(\tilde{q}) \tag{5}$$

The equilibrium price $\tilde{q}$ is a function of the fraction of honest suppliers, i.e. $\tilde{q} = \tilde{q}(h)$. Since $x_h(q;h) < 0$ and $D'(q) < 0$, the price is increasing in h, i.e. $\tilde{q}'(h) > 0$. The equilibrium output is determined by $x(\tilde{q}(h);h) = D(\tilde{q}(h)) \equiv \tilde{x}(h)$. Since $D'(q) < 0$ and $\tilde{q}'(h) > 0$, output is decreasing in h, i.e. $\tilde{x}'(h) < 0$. Thus, a higher fraction of honest sellers reduces the total output from self-employment.

If everyone is honest, the social revenue of the marginal self-employed equals his opportunity value. The number of self-employed is optimal and it is the right people who become self-employed. Cheating on taxes works as a subsidy to dishonest sellers, inducing too many of them to become self-employed. The implicit subsidy from cheating drives down the price and thereby the revenue of the honest self-employed, such that some of them leave the market. In equilibrium, the productivity of the marginal dishonest self-employed is lower than the productivity of the marginal honest one who left. Thus, when some sellers are dishonest, too many become self-employed and it is not the right ones. Paradoxically, increasing the fraction of honest sellers may not improve the allocation. In the next section, I demonstrate that while honesty in the market reduce the output towards its optimal level, it may increase the cost of producing it.

2.2 The social cost of honesty in a dishonest marketplace

To derive the cost of morality in the market, I investigate how the cost of producing a given output varies with the fraction of honest sellers. The social cost of producing x is the alternative value of the number of self-employed who produce x, i.e. the number of honest suppliers, $h[1 - F(w/q(x,h)]$, plus the number of dishonest ones, $(1-h)[1 - F(\alpha w/q(x,h)$. Since each self-employed has an opportunity cost equal to the wage as employed, the social cost of producing x is

$$c(x;h) = wh\big[1 - F(w/q(x,h)\big] + w(1-h)\big[1 - F\left(\alpha w/q(x,h)\right)\big] \tag{6}$$

, where $q(x,h)$ is the price that induces output x when a fraction h is honest. From (4), $q(x,h)$ is determined by $x = hS(q) + (1-h)S(q/\alpha)$.

In Appendix A I show that the cost of producing a given output x is minimized for $h = 0$ and $h = 1$. It is increasing in h at $h = 0$ and decreasing at $h = 1$. When costs are single peaked in h, we have the following proposition:[4]

Proposition 1 *There is a critical level, $\bar{h}$, such that a higher fraction of honest sellers increases total production costs if $h < \bar{h}$ and reduces total production costs if $h > \bar{h}$. A given output is efficiently produced if and only if everyone or no one is honest.*

The proof is in Appendix A.

A rephrasing of the first part of the proposition is that honesty among some but not all sellers makes production less efficient than if all of them were willing to cheat. In this sense, morals in the market is costly unless followed by everyone. The reason why output is efficiently produced only if everyone or no one is honest is that only in these cases is the ranking of private and social opportunity cost the same. If everyone is honest, social and private opportunity costs per unit produced are the same and equal to

[4] A sufficient condition for a single peaked cost function is that the elasticity of supply is constant. As demonstrated by Houthakker, 1955, Pareto-distributed labor use per unit output gives a production function of Cobb-Douglas-type, i.e. with constant elasticity of supply.

w/a_i. If no one is honest, the private opportunity cost, $\alpha w/a_i$, is lower than the social opportunity cost, w/a_i, but self-employed with the same social opportunity cost also have the same private opportunity cost. This means that output is produced by those who are most productive as self-employed. When some are honest and some are not, however, the ranking of private and social opportunity costs differ. Among self-employed with the same private opportunity cost, the dishonest ones have lower social opportunity cost than the honest ones. The marginal honest self-employed who exits may then be replaced by a cheating self-employed with lower productivity.

The second part of the proposition claims that the effect of more honest sellers depends on how widespread honesty is to begin with. A higher fraction of honest sellers reduces cost if most sellers are already honest, but increases cost if few are. The reason is that the fraction of honest sellers determines who replaces those who do not survive as self-employed when they become honest. The negative shift in supply as honest sellers exit leads to a higher price, which in turn induces entry. If few sellers are honest, few of those who enter have lower social opportunity costs than the ones they replace, they are just more willing to cheat. As a result, the cost of producing a given output goes up. If most sellers are honest, most of those who enter have lower opportunity costs than the ones they replace and so the cost of producing a given output goes down.

In contrast to a higher fraction of honest sellers, higher sanctions unambiguously improve allocation. Higher expected penalties reduces the optimal cheating for each self-employed, and with a lower gain from cheating, supply is reduced as some of the self-employed become employed. Sanctions do not make the ranking of private revenues different from the social ones. Those who exit when sanctions are increased are those who are least productive as self-employed. The average productivity among the self-employed goes up, and so the cost of producing goes down. Formally, a positive shift in the expected penalties, for example because τ is increased, reduces the optimal λ, which in turn increases α. The cost of producing an output x, given by (6), depends on α both directly and via the output price q. Including α in the cost function, it is easily verified that $c_\alpha(x,h;\alpha) < 0$. Although the fraction of honest people in the population is the same, the fraction of honest among the self-employed goes up as more honest individuals are now able to survive as self-employed. In this sense, sanctions improve morality in the market.

2.3 Welfare effects of honesty in the marketplace

A higher fraction of honest sellers has three effects on welfare: The direct effect of reduced law violation, the cost effect established in proposition 1, and the effect of a lower output. With laws and regulations that correct market failures, less violation is clearly welfare increasing. A lower output also increases welfare, since output is too high in markets with cheating.[5] If the fraction of honest sellers is above a threshold, increasing it further lowers the cost of producing - a welfare gain. However, increasing the fraction if it is below the threshold increases the cost of producing - a welfare loss. If the cost effect of more honest sellers is not recognized, the predicted effects of moral improvements are skewed: The welfare gain from an increase in h is underestimated for h above the threshold, and overestimated for h below the threshold.

In the case of tax evasion, the direct harm from law violations is the increased cost of collecting tax revenues. A larger fraction of honest sellers reduces these costs if it increases the tax revenue. This may not be the case, however. Since more honest sellers leads to less efficient production for $h < \bar{h}$, it may reduce the total taxable incomes. If the effect of lower tax base exceeds the effect of more self-employed paying taxes, tax revenue may go down.

I have not included the direct effects of morality on welfare. Morality may impose

[5]For given h, the effect of lower output on the market surplus, i.e. the willingness to pay for output minus the cost of producing, is $\tilde{q}(h) - c_x(\tilde{x};h)]\tilde{x}'(h)$. By differentiating (6) and (4), it is easily verified that $\tilde{q}(h) < c_x(\tilde{x};h)$ for all $h < 1$, i.e. the marginal willingness to pay is below the marginal cost of production. Since $\tilde{x}'(h) < 0$, the market surplus goes up when output goes down.

guilt in those who are dishonest and feelings of virtue in those who are honest. This raises difficult questions on how such changes in moral sentiments should be treated in welfare evaluations. For example, should imposing guilt in law violators be treated as a welfare loss?[6] Since the direct welfare effects of moral sentiments does not add insight to the question of how morality changes the efficiency of production and exchange, I leave them out of the analysis.

2.4 Regulating a market with morality

A common belief seems to be that if sanctions do not induce full compliance, morality in the market always helps as it induces additional law compliance.[7] Proposition 1 implies that morality in the market does not always improve upon the effects of sanctions. On the contrary, in a market with a low fraction of honest sellers, increasing the fraction marginally may do more harm than good. The flip side of this argument is that corrective regulation may do more harm than good in markets with a low fraction of honest sellers. The gains from reduced harm and more optimal output may be outweighed by higher cost of producing. I illustrate this in figure 1 below.

[6]Also, whether people are honest because honesty increases their wellbeing or because dishonesty decreases it may have different implications on welfare, even if both alternatives may give the same choices on the margin. For a discussion of the related problem of "hedonistic" versus "obligatory" altruism, see Ray, 2013.

[7]For example, Slemrod,1992, argues that ".. it is extraordinarily expensive to arrange an enforcement regime so that, from a strict cost-benefit calculus, noncompliance does not appear attractive to many citizens. It follows that methods that reinforce and encourage taxpayers 'devotion to their responsibilities as citizens play an important role in the tax collection process".

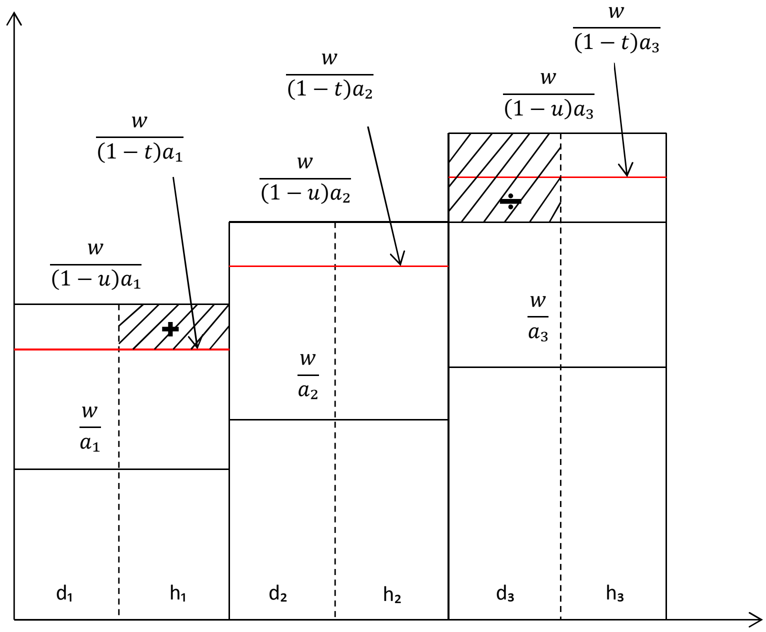

Figure 1 shows the trade-off between reduced harm from law violation and increased cost of producing for a given output, $\bar{x}$. Consider the case where the output from self-employment causes an external harm u per unit if regulations are not followed. The cost of following regulation is t per unit, where $t < u$. Employment causes no external harm. The three types of producers, have productivities a_1, a_2 and a_3, from highest to lowest. The red line is the social unit cost of production if firms comply with the regulations, $w/(1-t)a_i$. If they do not comply, the social unit cost of production is higher, $w/(1-u)a_i$, while the private unit cost is lower, w/a_i. When no one is honest, the output is produced by types 1 and 2, with productivities a_1 and a_2. If a fraction h of all producers become honest, the ones of type 2 no longer survive and are replaced by the dishonest ones of type 3. The gain is the reduced harm from honest producers of type 1, $u - t$ per unit. The cost is the increased cost of producing the output $\bar{x}$, since the dishonest producers of type 3 have lower productivity than those of type 2. In the example shown in the figure, the cost of more honest producers is clearly larger than the gain from reduced harm and so the improved morality gives a net welfare loss.

The example also illustrates how the desirability of corrective regulations depends on morals in the market: In markets with a low fraction of honest producers, corrective regulations may not improve allocation although they reduce harm from the external effects. In figure 1, there is a net loss from the regulation. If it is not feasible to increase sanctions, it is better not to introduce the regulation at all. For a sufficiently high fraction of honest producers, however, morality improves upon sanctions and the regulation is optimal even if sanctions are not strong enough to ensure full compliance.

3 Honesty among buyers reduces the value of output

While the effects of an expected penalty is the same whether it is the buyers or the sellers who are sanctioned, it matters whether it is buyers or sellers that are honest. As shown in section 2, if a fraction of the sellers are honest while no buyers are, output is inefficiently produced but efficiently allocated between buyers. In this section, I demonstrate that if a fraction of the buyers are honest, while no sellers are, output is efficiently produced but inefficiently allocated between buyers. Thus, the effect of a fraction h of honest sellers is qualitatively different from the effect of the same fraction of honest buyers.[8]

Consider the case where a fraction m of buyers are honest, but no sellers are ($h = 0$). To makes the analysis parallel to the one in section 2, where all buyers are dishonest, I assume that sanctions are too low to induce any law compliance ($\lambda = 1$). An honest buyer

[8]Whether or not buyers can control that the seller does not cheat depends on the the size and type of the transaction. One the one extreme, buyers have little control over small transactions paid in cash. On the other extreme, large customers such as government agencies, large organizations and firms are often honest by design, in the sense that they have staff and formalized procedures to check that laws and regulations are followed.

can demand full compliance, but as no sellers want to comply, an honest buyer must pay a price that compensates the seller for the cost of complying. Since honest buyers face a higher price than the dishonest ones, output is inefficiently allocated between them: The marginal discouraged honest buyer has higher valuation of output than the marginal dishonest buyer.

The social value of an output can be defined as the total willingness to pay among those who end up buying. To characterize the loss from inefficient allocation between buyers, I derive the social value of output as a function of the fraction of honest buyers, m. With a single-peaked social value function, we get a result that is parallel to the result of proposition 1:

Proposition 2 *There is a critical level, $\bar{m}$, such that a higher fraction of tax compliant individuals decreases the social value of output if $m < \bar{m}$ and increases it if $m > \bar{m}$. A given output is efficiently allocated between buyers if and only if everyone or no one is honest.*

The proof is in Appendix C. Since the intuition is similar to that of proposition 1, it is not repeated here.

Assume that it was possible, through moral appeals, to make a certain fraction of buyers or suppliers honest in the market for house-painting, where tax cheating is common. The results above show that the effect of making a fraction of the sellers honest differs from the effects of making the same fraction of buyers honest: If a third of all painters are honest, but no house-owners, it will not be the best painters who do the job, but it will be the house-owners with the highest willingness to pay who get their houses painted. If a third of the house-owners are honest, but no painters, it is no longer those with the highest willingness to pay who get their houses painted, but the job will be done by the best painters.

4 A market with honest buyers and sellers

If a dishonest seller trades with a dishonest buyer or vice versa, the honest partner determines whether or not to comply, but the price must be such that the dishonest one is equally well off as with a dishonest trading partner. In appendix C, I demonstrate that this provides three types of equilibrium, depending on the fraction of honest buyers and sellers: (A) Honest and dishonest buyers pay the same price but the revenues differ between honest and dishonest sellers, (B) Honest and dishonest sellers get the same revenue but honest and dishonest buyers pay different prices and (C) The price differs for honest and dishonest buyers and net revenue differs for honest and dishonest sellers.

The intuition is simple and illustrates the general idea that markets allocate moral to where it is least costly for the individuals. To simplify the exposition, I continue with the example of tax evasion and refer to the output that buyers want to report for taxation as "demand for reported output" and the output that sellers want to report as "supply of reported output". Consider an intitial equilibrium of type (A), where some sellers are honest but no buyers are, such that prices are the same for reported and unreported output. Assume that half the supply is reported output, which means that the sellers together wants to report half of their incomes. By varying the fraction of honest buyers, and thereby also the demand for reported output, I show how the type of equilibrium changes.

Since the sellers voluntarily report half of their incomes, honest buyers makes no difference as long as their demand is below half of the output. The sellers satisfy the demand for reported output by reporting payments that would be reported in any case. Trading with honest buyers creates no extra cost to the sellers, who therefore charge the same price to honest and dishonest buyers. As long as the demand for reported output is below the supply of reported output, a marginal increase in the fraction of honest buyers has no real effect: The price does not change and so neither does the allocation of production between sellers or the output between buyers. The average tax moral in the population has improved, but with no effect on tax evasion or allocation. The market neutralizes morality by allocating honest buyers to where their morality is least costly for them, which is when they are matched with sellers that would report their payments in any case.[9]

As the fraction of honest buyers goes up, the demand for reported output eventually exceeds the supply of reported output at an equal price for honest and dishonest buyers. Honesty now matters, as it is costly on the margin. To make demand for reported output equal to supply, the honest buyers must pay a price that compensates the dishonest sellers for the extra tax payments, i.e. there is an "honesty mark-up". In equilibrium, which is of type C, the price differs for honest and dishonest buyers and net revenue differs for honest and dishonest sellers. The higher the fraction of honest buyers, the higher the relative price of reported output that makes demand for reported output equal to supply. Since an increased "honesty mark-up" favours honest sellers and dishonest buyers, more honest buyers makes production more efficient, but allocation of output less efficient between buyers.

For a sufficiently high fraction of honest buyers, the honesty mark-up is high enough to make sellers indifferent between reported and unreported output in equilibrium. This gives an equilibrium of type B, where selling to honest buyers at a high price and paying the taxes yields the same net revenue as selling to dishonest buyers at a lower price but evading taxes. Since dishonest sellers are indifferent between reporting and not, honest and dishonest sellers face the same net revenue, implying that production is efficiently allocated between them. Honest and dishonest buyers face different prices, implying that output is efficiently allocated between them. A further increase in the fraction of honest sellers has no real effect, i.e. it does not change the allocation.

[9] I have assumed that honest buyers and sellers find each other at no cost. With market frictions, i.e. if it is costly for honest buyers and sellers to find each other, honest buyers may have an effect even if their demand is lower than supply from honest sellers. A market with tax evasion and frictions, but without tax morale among agents, is discussed in Strand, 2005.

To summarize, if fraction h of the sellers are honest, there are thresholds for m, $m^A(h)$ and $m^B(h)$, that divides between the following three types of equilibriums :

Proposition 3 *(A) If the fraction of honest buyers is equal to or below the threshold $m^A(h)$, the equilibrium is the same as if no buyers are honest ($m = 0$). Output is efficiently allocated between buyers but inefficiently produced. (B) If the fraction of honest buyers is equal to or above a threshold $m^B(h)$, the equilibrium is the same as if no sellers are honest ($h = 0$). Output is efficiently produced but inefficiently allocated between buyers. (C) If the fraction of honest buyers is between the thresholds m^A and m^B, both production and the allocation of output between buyers is inefficient. Increasing m makes production more efficient but allocation of output between buyers less efficient. Both thresholds, $m^A(h)$ and $m^B(h)$, are increasing in h.*

The proof is in appendix D.

Proposition 3 shows that there is no simple relationship between the fraction of honest market participants and the efficiency of the market. Increasing the fraction of honest participants may increase or decrease efficiency or have no effect at all, depending on whether honesty increases among buyers or sellers and depending on the initial fraction of honest sellers and buyers. Also, more honest participants may increase efficiency of production but reduce efficiency of exchange, or vice versa. This implies that improving the market by improving moraityl requires targeting. Undirected campaigns to improve morality among market participants may be a waste or even harmful.

As a rule of thumb, increased honesty has the best effect where it is already widespread. For example, it is better to increase the fraction of honest sellers in a market where most sellers are already honest than in one where few are. In a market with widespread honesty among sellers but not among buyers, honesty should be increased among sellers, not buyers. A few honest sellers or buyers in a market with mostly dishonest participants is at best without effect and may even reduce efficiency.

5 Conclusions

Cheating on laws and regulations leads to inefficiencies in the markets, but improving morality among buyers or sellers may not help. Even if morality works like an intrinsic sanction for individuals, making them comply, it may not be a good substitute for sanctions in markets. The reason is that morality differ between people and therefore creates differences in private costs and gains between people with the same social costs and gains. Thus, even if the increased compliance brings output closer to its optimal level, it may not be produced by those with the lowest alternative cost or not allocated to those with the highest willingness to pay. In contrast, sanctions that are the same for all and therefore brings output closer to its optimal level and makes it more efficiently produced and allocated.

The effects of morality depend on how widespread the moral sentiments are. For example, an increase in the fraction of tax compliant sellers may improve the allocation if most sellers are tax compliant, but worsen the allocation if most sellers evade. In markets where most sellers are cheating, it may therefore be better to do nothing than to improve the tax morale of a small group. The effect also depends on the distribution of compliance among buyers or sellers. For example, if most sellers comply while most buyers do not, an increase in the fraction of compliant buyers may have no effect at all as their payments would be reported by the sellers in any case.

The result that moral may lead to inefficient production and exchange have implications for the effects of taxes and regulations: It is common to assume that morality in the population always improves the effect of laws and regulations, since it makes compliance higher than what is obtained by sanctions alone. This reasoning is too simplistic as differences in morality creates inefficiencies in production and allocation of output, and the cost of these inefficiencies may outweigh the gain from higher compliance. Paradoxically, a regulation that increases welfare if no one is honest, may reduce it if some but not all market participants are honest. The policy message is not that morality in the market should be discouraged, but that sanctions and morals are complements rather than substitutes. Morals works best as a complement to sanctions strong enough to make most people comply.

The model also speaks to how we should measure morality and its effects. Empirical studies such as Kleven et al (2011) find substantial tax evasion among self-employed and conclude that tax compliance is high because most people are unable to cheat on taxes, not because they are unwilling to. This conclusion about peoples tax moral may be too pessimistic if the opportunity to evade affects the choice between self-employment and employment. If those who are willing to evade taxes self-select into self-employment, the observed tax moral among self-employed underestimates the tax moral among citizens. Similarly, experiments and survey studies may overestimate the role of tax moral in the market, as many morally constrained individuals self-select into employment where their tax moral does not mattter because they are unable to evade.

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A Proof of proposition 1

Let $q(x,h)$ be the price that induces supply x when a fraction h of potential suppliers is honest, determined by (4), i.e. by $hS(q)+(1-h)S(q/\alpha)=x$. The partial derivative of q with respect to h is

$$q_h(x;h)=\frac{S(q/\alpha)-S(q)}{hS'(q)+(1-h)S'(q/\alpha)/\alpha} \tag{A.1}$$

To find how a higher fraction of honest people affect the cost of producing a given output x, take the partial derivative of $c(x;h)$, given by (6), with respect to h. This gives

$$c_h(x;h)=F\big(\alpha w/q\big)-F\big(w/q\big)+\frac{w}{q^2}\big[hf(w/q)+(1-h)f(\alpha w/q)\alpha\big]q_h(x,h) \tag{A.2}$$

Using $q_h(x;h)$ from (A.1) and rearranging yields

$$sign\, c_h(x;h)=sgn\Big[\Big(S(q/\alpha)-S(q)\Big)-\frac{1}{K}\frac{w}{q}[F\big(w/q\big)-F\big(\alpha w/q\big)]\Big] \tag{A.3}$$

where

$$K=\frac{hf(w/q)+(1-h)f(\alpha w/q)\alpha}{hf(w/q)+(1-h)f(\alpha w/q)\alpha^2} \tag{A.4}$$

(A.3) can be rewritten as

$$sign\ c_h(x;h)=sgn\Big[\int_{\alpha w/q}^{w/q}[a-\frac{1}{K}\frac{w}{q}]f(a)da\Big] \tag{A.5}$$

From (A.4), $K=1$ for $h=1$ and $K=1/\alpha$ for $h=0$. It then follows from (A.5) that $c_h(x;h)>0$ for $h=0$ and $c_h(x;h)<0$ for $h=1$.

Let $\bar{h}$ be the value of h that makes $c_h(x,h)=0$. If $c_{hh}(x,\bar{h})<0$, the cost function is single-peaked, i.e. it has a maximum for $\bar{h}$, $c_h(x,h)>0$ for all $h<\bar{h}$ and $c_h(x,h)<0$ for all $h > \bar{h}$. A sufficient condition is that the elasticity of supply is constant. A reasonable distribution for labour use per unit of output ($1/a_i$) is the Pareto-distribution. As shown by Houtakker (1955), Pareto distributed labour use per unit of output, $1/a_i$, gives a production function of Cobb-Douglas-type, which in turn gives constant elasticity of supply.

B Proof of proposition 2

Consider the case where a fraction m of the potential buyers are honest, but no sellers. Each individual either buys one unit of the output or nothing, and the willingness to pay for a unit differs between them. I assume that honest buyers can ensure that their payments are reported. As in section 2, the sellers are responsible for paying the taxes, and face the probability of being detected and penalized for evasion. I only model the simple case where sanctions are so low that dishonest sellers report nothing, i.e. $\lambda^* = 1$. It is easy to show that the results are qualitatively the same if sanctions induce dishonest sellers to report a fraction of their income.

To evaluate the allocation of output between the buyers, I derive the social value of output as a function of the fraction of honest buyers. The social value is defined as the total willingness to pay for the output in those who end up buying. Let z_i be the value of a unit to customer i, distributed on the interval $[0, \bar{z}]$, and $G(z_i)$ the cumulative distribution function. Let q be the price paid by an honest buyer, i.e. the "official price", and q^d the price paid by a dishonest buyer. To make sellers indifferent between honest and dishonest buyers, $q^d = \alpha q$. The demand is then $m[1-G(q)]$ from honest buyers and $(1-m)[1-G(\alpha q)]$ from dishonest buyers. The social value of output x is

$$v(x,m) = m\int_{q}^{\bar{z}} z dG(z) + (1-m)\int_{\alpha q}^{\bar{z}} z dG(z) \tag{B.1}$$

where $q = q(x,m)$ is determined by $x = m[1-G(q)] + (1-m)[1-G(\alpha q)]$, i.e. it is the price that induces demand x when a fraction m of consumers are honest. Since total demand is decreasing in q and m, $q(x,m)$ is decreasing in x and m.

To find how the social value of a given output x varies with m, take the partial derivative of $v(x;m)$ with respect to m. Using $q_m(x;m)$ and rearranging gives us

$$v_m(x;m) = -\int_{\alpha q}^{q} (qH - z)dG(z) \tag{B.2}$$

where

$$H = \frac{mg(q) + (1-m)g(\alpha q)\alpha^2}{mg(q) + (1-m)g(\alpha q)\alpha} \tag{B.3}$$

Since $H = \alpha$ for $m = 0$ and $H = 1$ for $m = 1$ it follows from (B.2) that $v_m(x,m) < 0$ for $m = 0$ and $v_m(x,m) > 0$ for $m = 1$. Let $\bar{m}$ be the value of m that makes $v_m(x,m) = 0$. If the value function is single peaked, i.e. has only one minimum, $v_m(x,m) < 0$ for all $m < \bar{m}$ and $v_m(x,m) > 0$ for all $m > \bar{m}$. A sufficient condition is that the elasticity of demand is constant.

C Proof of proposition 3

As in Appendix B, I model the case where sanctions are so low that dishonest sellers report nothing, i.e. $\lambda^* = 1$. The results are qualitatively the same if sanctions induce dishonest sellers to report a fraction of their income.

Let r denote the ratio between the price of reported and unreported output, i.e. $r = q/q^d$. Since no one cheats on taxes if there is no gain, $1 \leq r \leq 1/\alpha$. The the combinations of r and q that makes total demand equal to total supply is

$$mD(q) + (1-m)D(q/r) = hS(q) + (1-h)S(q/\alpha r) \tag{C.1}$$

Let q^* denote the price of reported output that makes demand for reported output equal to supply of reported output, i.e q^* is determined by

$$mD(q^*) = hS(q^*) \tag{C.2}$$

Let q^A denote the price that gives equality between total demand and supply for $r = q/q^d = 1$. From (C.1), q^A is determined by

$$D(q^A) = hS(q^A) + (1-h)S(q^A/\alpha) \tag{C.3}$$

Since q^A is independent of m, (C.3) also holds for $m = 0$, i.e. the case with no honest buyers. This means q^A is equal to the equilibrium price derived in equation (5).

Let $m^A(h)$ be defined by

$$m^A D(q^A) = hS(q^A) \tag{C.4}$$

Equilibrium of type A

The first part of proposition 1 claims that $q = q^A$, $r = 1$ is an equilibrium for all $m \leq m^A$. From (C.3), the price q^A that gives total demand equal to supply is independent of m. It remains to show that q^A gives reported demand equal to reported supply for all $m < m^A$. Since $q^* < q^A$ for $m < m^A$, honest demand is lower than supply at $q = q^A$, $r = 1$. However, as dishonest buyers are indifferent between reported and unreported output at $r = 1$, demand equals supply of reported output if a fraction γ^b of them buy reported output, where γ^b is determined by $mD(q^A) + \gamma^b(1m)D(q^A) = hS(q^A)$. This means that $r = 1$, $q = q^A$ gives demand equal to supply for total output as well as for reported output for all $m \leq m^A$. A marginal change in m does not affect r or q, but simply changes the fraction of dishonest buyers who buy reported output. The equilibrium is the same as with no honest buyers, i.e. $m = 0$, which means that output is efficiently allocated between buyers but inefficiently produced.

Equilibrium of type B

Let q^B denote the equilibrium price for $r = 1/\alpha$, i.e. for $q^d = \alpha q$. Inserting $r = 1/\alpha$ in (C.1), q^B is determined by

$$mD(q^B) + (1-m)D(\alpha q^B) = S(q^B) \tag{C.5}$$

It follows that q^B is independent of h, and therefore equal to the equilibrium price for the case explored in section 3, where no honest sellers are honest but a fraction $m > 0$

of buyers. Let $m^B(h)$ be defined by

$$m^B D(q^B) = hS(q^B) \tag{C.6}$$

The second part of proposition 1 says that $q = q^B$, $r = 1/\alpha$ is an equilibrium for all $m \geq m^B$. Since q^B is independent of h, it remains to show that q^B also gives reported demand equal to reported supply for all $m > m^B$. Since $q^* > q^B$ for $m > m^B$, honest demand exceeds supply at $q = q^B$, $r = 1/\alpha$. However, since dishonest sellers are indifferent between reported and unreported output at $r = 1/\alpha$, demand equals supply of reported output if a fraction γ^s of the sellers report their output, where γ^s is determined by $mD(q^B) + (1-m)D(\alpha q^B) = hS(q^B) + \gamma^s(1-h)S(q^B)$. This means that $r = 1/\alpha$, $q = q^B$ is an equilibrium for total output as well as for reported output for all $m \geq m^B$. A marginal change in m does not affect r or q but simply changes the fraction of dishonest sellers who report their output. The equilibrium is the same as with no honest sellers, i.e. $h = 0$: Output is efficiently produced but inefficiently allocated between buyers.

Equilibrium of type C

If $m^A(h) < m < m^B(h)$, it follows from (C.1) and (C.2) that $mD(q^A) > hS(q^A)$ and $mD(q^B) < hS(q^B)$. Since sellers are not indifferent at $r = 1$, and buyers not at $r = 1/\alpha$, the gap between honest demand and supply cannot be closed by indifferent buyers or sellers. Equilibrium between honest demand and supply, equation (C.2), determines the equilibrium price of reported output, q^*. For given q^*, equality between total demand and supply, given by (C.1), determines the price ratio r^*.

As m goes up, a higher fraction of a given output is purchased by honest buyers, and consequently, a higher fraction of a given output must be reported. To capture the effect of these changes, I derive the change in the value of output as m goes up, and the change in the cost of producing a given output.

Since honest buyers pay a price q and dishonest ones pay q/r, the buyers' total value of output x is

$$v(x;m,h) = m\int_{q}^{\bar{z}} zdG(z) + (1-m)\int_{q/r}^{\bar{z}} zdG(z) \tag{C.7}$$

I derive how $v(x;m,h)$ changes with m when q is determined by (C.2), i.e. by $mD(q) = hS(q)$, and r by the condition that total demand must be equal to the given output, i.e.

$$x = m[1-G(q)] + (1-m)[1-G(q/r)] \tag{C.8}$$

(C.2) gives q as an increasing function of m, $q(m)$. Inserting $q(m)$ into (C.8) and differentiating with respect to m gives us r_m as a function of q_m. Differentiating (C.7) with respect to m and inserting for r_m and q_m yields

$$v_m(x;m) = \int_{q/r}^{q} (q/r - z)dG(z) + [\frac{q}{r} - q]mg(q)q_m \tag{C.9}$$

Since $q_m > 0$ and $q/r < q$, $v_m < 0$, i.e. an increase in m reduces the total value of a given output.

The cost of producing x is

$$c(x;h,m) = \Big[h\big[1-F(w/q)\big] + (1-h)\big[1-F\left(r\alpha w/q\right)\big]\Big]w \tag{C.10}$$

I derive how $c(x;m,h)$ changes with m when q is determined by (C.2), i.e. by $mD(q) = hS(q)$, and r by the condition that total supply must be equal to the given output, i.e.

$$x = h\int_{w/q}^{\bar{a}} adF(a) + (1-h)\int_{r\alpha w/q}^{\bar{a}} adF(a) \tag{C.11}$$

(C.2) gives q as an increasing function of m, $q(m)$. Inserting $q(m)$ into (C.11) and differentiating with respect to m gives us r_m as a function of q_m. Differentiating (C.10) with respect to m and inserting for r_m and q_m yields

$$c_m(x;h,m) = [1 - 1/r\alpha]hf(w/q)d(w/q)/dm \tag{C.12}$$

Since $1 \leq \frac{1}{r\alpha} \leq \frac{1}{\alpha}$, and $q_m > 0$, $c_m(x;h,m) < 0$, i.e. an increase in m reduces the cost of producing a given output.