Working Paper in Economics No. 711

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Department of Economics, November 2017

ISSN 1403-2473 (Print)
ISSN 1403-2465 (Online)

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SCHOOL OF BUSINESS, ECONOMICS AND LAW

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November 6, 2017

Abstract

This paper deals with tax morale and how norms may evolve over time. The special focus is on buying black-market services. I apply mechanisms from social psychology to explain how personal norms may evolve due to one's own past behavior through self-signaling and due to conformity based on social interactions. These changes over time result in multiple equilibria, so that the economy can develop stronger social norms and less evasion over time, or weaker norms and more evasion in the long run. An economy on a trajectory toward the "bad" equilibrium may be permanently pushed onto a trajectory toward the "good" equilibrium by means of a sufficiently strong temporary policy. Observations from a recent tax reform in Sweden strongly support the theory and suggest that other policies than enforcement may indeed be a powerful tool in influencing both behavior and attitudes.

Keywords: Social norms; Endogenous norms; Tax evasion; Self-signaling; Normative conformity.

JEL classification: D91; H26

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1 Introduction

Some economies are characterized by a high degree of tax evasion together with weak social norms for compliance. When norms are weak, the psychic cost of evasion is low, which results in increased evasion, which in turn weakens the social norm further and so on. The economy is on an inevitable path toward an equilibrium where everyone evades taxes and there is no social pressure to comply. Could this path be averted by policy means other than enforcement? This paper suggests that it could, and a temporary policy change that is strong enough is sufficient to steer the economy toward an equilibrium where no one evades and where the social norm urges one to fully comply.

Combatting tax evasion by means of deterrence works to a certain degree, but in a non totalitarian economy we do not want to audit everyone and enforcement that is too strong may even backfire.[1] Although reducing the ability to evade improves actual compliance (Kleven et al., 2011), the willingness to comply is also important to behavior. In an economy where people actually want to comply, they will do so to a large extent independently of enforcement and administrative possibilities. Tax morale refers to such willingness to comply. Hence, it is important to learn what fosters tax morale and whether policy interventions could affect it.[2] If governments can influence tax morale, they can increase voluntary, rather than enforced, compliance. This paper presents a theoretical model suggesting how policy could affect tax morale. Evidence from a recent reform in Sweden shows that the effects may be substantial.

This paper examines whether or not consumers buy a particular service, that may be bought from either the white or the black market. Buying the service without any taxes added and without a receipt allows the consumer to spend more resources on other consumer goods. However, there may be intrinsic, as well as social, norms that prevent the consumer from buying the black-market service. This trade-off between pecuniary motives

[1] See, e.g., Feld and Frey (2002) and Mendoza et al. (2017).

[2] "If a government can influence a norm, tax evasion can be reduced by policy activities" (Torgler, 2007, p. 67.)

and norms implies that the prevalence of evasion differs across the income distribution. The largest proportion of individuals buying the black-market service is found among the middle-income earners. Among those with the highest and lowest incomes, only those with a very low tax morale buy black-market services; those with low incomes choose instead to a large extent not to buy the service at all, while high-income earners can afford to buy it from the white market; i.e., they pay to avoid the disutility they would get from violating the norm of compliance. Nordblom and Žamac (2012) find that two psychological mechanisms, self-signaling and normative conformity, are able to explain how people change their tax morale over the course of their lives in a way consistent with observed differences between young and old individuals.[3] These mechanisms are also encountered in the present paper. If one complies (evades) in one period, the action becomes a signal about one's type, and one becomes more (less) reluctant to evasion in the next period. Moreover, through social interactions, one tends to conform to the views of others. Hence, policies that make more people comply may strengthen their tax morale and have spillover effects to others as well, strengthening the overall social norm of tax compliance in the economy.

The remainder of the paper is organized as follows: Section 2 discusses previous research on tax morale and Section 3 briefly presents some relevant theories of norm evolution. Section 4 introduces the model where both personal and social norms influence the decision to evade or not. The proposed norm-updating mechanisms are applied to analyze the development of tax morale on personal and social levels. What happens when a policy intervention makes compliance less costly in a pecuniary sense is analyzed in Section 5. Section 6 illustrates that the development of tax morale in Sweden following a recent Swedish tax reform is very much in line with the proposed theory. Section 7 concludes the paper.

[3]It is a common finding that older people have a stronger tax morale than do younger. (see, e.g., Orviska and Hudson, 2003; Braithwaite et al., 2010).

2 Norms and tax morale

According to the original tax-evasion theory by Allingham and Sandmo (1972), one evades if the expected utility of consumption when evading exceeds that of not evading. The only way to combat tax evasion is then to reduce the possibilities to evade or to make it less profitable. This is also the main conclusion in Kleven et al. (2011), where Danish taxpayers' high compliance rates are attributed to the third-party reporting that makes most of them unable to evade. However, voluntary compliance with tax laws has also shown to be important for raising tax revenue in nontotalitarian economies.[4]

Many studies have incorporated measures of tax morale in explaining compliance behavior and have identified, e.g., guilt and shame as important deterrents.[5] These feelings are in turn based on how the actions coincide with or deviate from norms, both personal and social. (see, e.g., Gordon, 1989; Erard and Feinstein, 1994; Myles and Naylor, 1996; Wenzel, 2004, 2005a; Fortin et al., 2007; Kirchler, 2007; Torgler, 2007). Individuals who hold an intrinsic norm of compliance may experience disutility or a feeling of guilt when evading. Moreover, in an economy with a social norm of compliance, one who is observed violating that norm may be stigmatized. Kim (2003) models such stigma associated with evasion, where the degree of stigma increases with the number of honest taxpayers. Besley et al. (2015) assume that taxpayers hold constant intrinsic norms, while the social stigma attached with tax evasion may change over time depending on the prevalence of tax evasion. Also Luttmer and Singhal (2014) argue that the social stigma of evasion and thereby the personal willingness to contribute to the common good are lower when evasion is common.

In an influential paper, Cialdini and Trost (1998) make the distinction between descriptive norms, those that explain what others do, and injunctive norms, referring to what others think one ought to do. Although the above-

[4]See, e.g., Dwenger et al. (2016) where 20% of individuals pay their church taxes owed in absence of any deterrence or even third-party reporting, and the "slippery slope" framework, introduced by Kirchler et al. (2008) where both voluntary and enforced compliance are found to be important.

[5]See, e.g., Gordon (1989) and Erard and Feinstein (1994) for early contributions and Luttmer and Singhal (2014) for a recent and comprehensive survey.

mentioned (and other) studies often have analyzed the descriptive norms in models of tax evasion, Jacobson et al. (2011) find that injunctive norms are the ones that mainly invoke social obligations. Bobek et al. (2007) study tax compliance and explore the various norm concepts in Cialdini and Trost (1998). They find that the personal norm is the most important, followed by the injunctive, while descriptive norms did not explain tax compliance at all. These kinds of injunctive social norms in combination with personal intrinsic norms explain compliance and noncompliance behavior in the present paper.

3 Theories of norm evolution

Norms concerning, e.g., tax morale may not be constant, but may evolve over time. Theories concerning such norm evolution have mainly been proposed within social psychology (for a comprehensive overview, see Turner, 1991). Personal norms may change due to one's own past behavior, others' behavior, others' attitudes, or some combination of these.

Nordblom and Žamac (2012) present some theories in more detail and their results indicate that self-signaling (or cognitive dissonance) and normative conformity may be important in explaining how personal attitudes toward buying black-market services evolve over time.

According to the self-signaling theory (Bénabou and Tirole, 2004, 2006, 2011a), individuals are unaware of their personal norms before they act. Once they act, their action reveals what type they are, e.g., evader or non-evader, and personal norms are updated accordingly. Hence, behavior in one period affects the intrinsic norm in the next.

In an experimental taxation setting, Wenzel (2005b) finds evidence, not only of tax morale influencing compliance, but also that tax compliance has a causal effect on personal tax morale, such that evasion in one period reduces tax morale in the next. Although, not in a tax related situation, Lieberman et al. (2001) find behavior to cause an automatic change in personal attitudes.

Norms may also change through social interaction and the influence of others' attitudes. According to the theory of normative conformity, one conforms to what others view as right (Deutch and Gerard, 1955). Hence, indi-

viduals' intrinsic norms may over time conform to injunctive group norms. In his seminal paper, Bernheim (1994) finds that when status is sufficiently valued one may conform to the social norm although it may go against one's own intrinsic motivation. According to Michaeli and Spiro (2015), the inner discomfort due to cognitive dissonance and social pressure could be reduced by conforming to the average stance. In liberal societies, the further one's own norm is from the social one, the more one is likely to compromise and change one's own view over time.

Hence, there are many indications that others' opinions, as well as one's own previous compliance or noncompliance, affect personal tax morale. Therefore policies that affect compliance behavior could also affect tax morale, which creates an even stronger long-term effect on behavior. Nordblom and Žamac (2012) argue that the two above-mentioned mechanisms are important in explaining how personal tax morale may evolve over time: First, according to normative conformity, personal and social norms are interlinked. One is influenced by what others think is the right thing and tend to conform to that view. Second, people may update their personal tax morale as a consequence of their own past behavior, due to self-signaling.[6] Besley et al. (2015) extend the model by Bénabou and Tirole (2011b) in the tax-evasion context and use both intrinsic motivation and concern with one's own reputation based on social norms to explain behavior. They find that the increase in evasion due to the UK poll tax of 1990 prevailed even after the tax was abolished because of a weakened social norm of compliance. Kim (2003) models tax evasion in a dynamic setting with social interactions and concludes that a tax reform may shift social norms significantly. Also Traxler (2010) studies a tax reform and how it affects evasion behavior and thereby the overall social norm of evasion. In his example, a tax increase implies more evaders both due to the substitution effect and to the norm effect. Most recently, Lamantia and Pezzino (2017) study social interactions and the long-run evolution of tax-compliance norms. Common in all these papers is that social norms evolve over time and multiple equilibria may exist depending on initial conditions.

[6] In Nordblom and Žamac (2012), both these mechanisms are supported by Swedish data comparing different generations' tax morale.

The premise in the present paper is similar: The way in which norms evolve gives rise to multiple equilibria. Moreover, a policy change will alter compliance both directly and via a second-order effect on the social norm, which amplifies the effect.

4 A theory of buying black-market services

This section shows how choices and social norms concerning black-market services evolve over time. We will first look at the individual's atemporal choice in 4.1 and aggregate it to the population consisting of heterogenous individuals in 4.2 before turning to how norms evolve over time in 4.3 and 4.4.

4.1 The individual's choice

In a simple partial equilibrium model, at any point in time, individual i has a certain income, Y_i, which is spent on goods consumption, c_i, and possibly on a household service, S, of a fixed amount. The service could be bought on the white market, S_W, or on the black market, S_B, and the two are perfect substitutes in terms of result. $p_W > p_B > 0$ are the prices of white- and black-market services, respectively.[7]

Buying from the black-market sector thus leaves more resources for goods consumption than buying in the white-market sector due to the tax wedge.[8] Let us assume that saving is not possible. This means that the choice in any point in time can be analyzed independently from previous and following

[7]It is a simplification to assume that there is just one price when buying the black-market service. We could think of p_B as not only reflecting the actual price paid, but also incorporating fines and the risk of detection. The risky aspects of black-market services are not the issue of this paper, so this simplification is innocuous. Moreover, Blaufus et al. (2016) find that the mere legality may be important to people's actions also when there are no penalties for evasion. For this type of crime, penalties are usually quite low. For example, in a folder from Swedish Economic Crime Authority trying to persuade people not to buy black-market services, no reference at all is made to penalties, just to the illegality and the consequences for society. See https://www.ekobrottsmyndigheten.se/PageFiles/195/EBM_infofolder_hushallsnara_tjanster.pdf

[8]We abstain from any supply-side effects, but assume that both black and white markets are characterized by perfect competition, so that buyers are price takers.

periods. Hence, although the individual lives for a large number of periods, she only has one discrete choice in every period in time, $k \in K$, where $K = \{N, B, W\}$, meaning the individual chooses not to buy S (N), to buy S from the black market (B) or to buy S from the white market (W).[9]

Utility from goods and service consumption, $u(c, S)$ is a positive function, where marginal utility of $c \in (0, Y_i]$ is decreasing.

$$u(c_k, S_k) = \{u(Y_i, 0); u(Y_i - p_B, S); u(Y_i - p_W, S)\}, \quad k = N, B, W \tag{1}$$

Hence, if nothing but pecuniary interests are taken into account, the individual would not choose W. However, there may be a psychological disutility from buying a black-market service. People have an intrinsic moral attitude toward buying black-market services, $\gamma_i \in [0, 1]$. If $\gamma_i = 0$, one has no moral doubts about buying black-market services. If $\gamma_i = 1$, one is extremely reluctant to do so.

Individuals are part of social networks and are concerned with the attitudes of their peers. If people talk freely, the average moral attitude, $\bar{\gamma}$, i.e., the social norm, is known to the individual and may affect disutility from noncompliance. If one buys the black-market service, one experiences disutility if peers disapprove, and the more unacceptable it is (the higher $\bar{\gamma}$) the larger the disutility.[10] The individual is concerned with conforming to what others think is the right thing to do, not necessarily how they act.

Thus both an intrinsic personal norm and a social norm affect the utility of buying the service from the black market. These two effects are joined in the positive and convex function $\varphi(.)$ reflecting the degree of disutility or guilt that the individual experiences if she buys the black-market service:

$$\varphi_i^B = \varphi\big(\gamma_i,\ \bar{\gamma},\big), \tag{2}$$

where $\{\gamma_i, \bar{\gamma}\} \in [0, 1] \rightarrow \varphi \in [0, \infty)$. $\varphi_i^k = 0\ \forall\ k \neq B$.

Hence, the total utility of the individual could be written

[9]Since S_W and S_B are perfect substitutes, no one would buy both kinds of services.

[10]c.f., the injunctive norm that was discussed in Section 2.

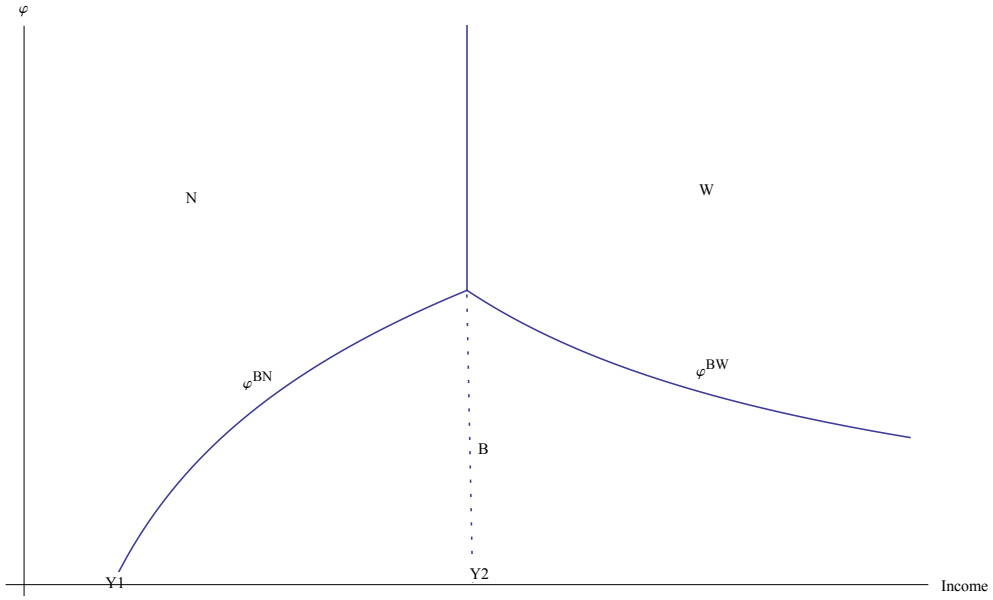
$$U_i^* = \max_{k \in K} U(c_k, S_k, \varphi^k) \tag{3}$$

where $K = \{N, B, W\}$. Hence,

$$U_i^* = \max \left\{ u(Y_i, 0);\ u(Y_i - p_B, S) - \varphi(\gamma_i,\ \bar{\gamma});\ u(Y_i - p_W, S) \right\}. \tag{4}$$

Depending on Y_i and γ_i, the individual will choose $k \in K$ and end up in one of the three domains in Figure 1 according to (5).

Figure 1: Combinations of Y and φ that make individuals end up in different domains



$$k = \begin{cases} N & \text{if } N \succ W \text{ and } N \succeq B \\ B & \text{if } B \succ W \text{ and } B \succ N \\ W & \text{if } W \succeq N \text{ and } W \succeq B \end{cases} \tag{5}$$

The threshold incomes in Figure 1 are $Y_1 : u(Y_1, 0) = u(Y_1 - p_B, S)$, i.e., the income below which no service is bought and $Y_2 : u(Y_2, 0) = u(Y_2 - p_W, S)$,

i.e., the income above which a service is bought, either on the black or on the white market.

The individual's choice thus depends on Y_i and φ_i as illustrated in Figure 1, in a way which can be described as

$$\begin{aligned} Y_i \leq Y_1 \ &\Rightarrow k = N \\ Y_i \in (Y_1, Y_2) \ &\Rightarrow k = \begin{cases} N & \text{if } \varphi_i \geq \varphi^{BN}(Y_i) \\ B & \text{if } \varphi_i < \varphi^{BN}(Y_i) \end{cases} \\ Y_i \geq Y_2 \ &\Rightarrow k = \begin{cases} W & \text{if } \varphi_i \geq \varphi^{BW}(Y_i) \\ B & \text{if } \varphi_i < \varphi^{BW}(Y_i) \end{cases} \end{aligned} \tag{6}$$

where the threshold values of φ as a function of Y, φ^{BN} and φ^{BW} are defined in equations (9) and (10) below.

4.1.1 Describing the thresholds

In order to end up in region B in Figure 1, i must strictly prefer B to both N and W:

$$B \succ N \Leftrightarrow \ \varphi_i < u(Y_i - p_B, S) - u(Y_i, 0) \tag{7}$$

$$B \succ W \Leftrightarrow \ \varphi_i < u(Y_i - p_B, S) - u(Y_i - p_W, S) \tag{8}$$

The threshold values of φ below which an individual chooses $k = B$ thus become functions of Y_i. $\varphi^{BN}(Y_i) : B \succ N$ for $\varphi_i < \varphi^{BN}(Y_i)$ from (7) is increasing and concave in Y_i:

$$\varphi^{BN}(Y_i) = u(Y_i - p_B, S) - u(Y_i, 0). \tag{9}$$

For given prices a unique φ^{BN} exists for every Y so that those with lower φ choose B and those with weakly higher φ choose N. When income increases, the constraint on φ_i required for preferring B to N is loosened. $\varphi^{BW}(Y_i) : B \succ W$ for $\varphi_i < \varphi^{BW}(Y_i)$ is instead decreasing and convex in Y_i:

$$\varphi^{BW}(Y_i) = u(Y_i - p_B, S) - u(Y_i - p_W, S). \tag{10}$$

For given prices a unique φ^{BW} exists for every Y so that those with lower φ choose B and those with weakly higher φ choose W. The higher Y_i is, the lower φ_i an individual requires to prefer B to W.

The choice between W and N is independent of φ_i, but with an income above Y_2, $W \succeq N$:

$$W \succeq N \Leftrightarrow \; u(Y_i, 0) \leq u(Y_i - p_W, S) \tag{11}$$

The individual's choice thus depends on Y_i and φ_i as described above and summarized in Figure 1 and (6). In the model by Gordon (1989) (and many others to follow[11]), there is a threshold value of the psychic cost which divides people into evaders and non-evaders. In the present model, there is instead a threshold function of income.

4.2 From individual to population

The population has unit mass and consists of individuals who all have the same utility function (as described above), but differ in terms of income and moral attitudes. When both Y_i and γ_i follow some distributions, different people make different choices according to (6). $F(\varphi) = \int_{\varphi=0}^{\infty} f(\varphi)d\varphi$ is the cumulative distribution function of combinations of individual and social norms.[12] $F(Y) = \int_{Y=0}^{\infty} f(Y)dY$ is the cumulative distribution function of incomes.

The shares choosing each of the options at any point in time could be defined as follows. The share β who chooses $k = B$ can be expressed as

[11] See e.g., Kim (2003) and Besley et al. (2015),

[12] Note that $\varphi_i = \varphi(\gamma_i, \bar{\gamma}) = \varphi(\gamma_i, \bar{\gamma}(F(\gamma)))$. Hence $F(\varphi) = \zeta(F(\gamma))$ where $\zeta(.)$ is a positive monotone transformation. The distribution of γ thus translates into the distribution of φ.

$$\beta = \int_{Y=Y_1}^{Y_2} \left(\int_{\varphi=0}^{\varphi^{BN}(Y)} f(\varphi)d\varphi \right) f(Y)dY + \int_{Y=Y_2}^{\infty} \left(\int_{\varphi=0}^{\varphi^{BW}(Y)} f(\varphi)d\varphi \right) f(Y)dY \tag{12}$$

and the share δ who chooses $k = W$ as

$$\delta = \int_{Y=Y_2}^{\infty} \left(\int_{\varphi=\varphi^{BW}(Y)}^{\infty} f(\varphi)d\varphi \right) f(Y)dY. \tag{13}$$

The share who chooses $k = N$ is $\eta = 1 - \beta - \delta$, which could be expressed as

$$\eta = \int_{Y=0}^{Y_1} f(Y)dY + \int_{Y=Y_1}^{Y_2} \left(\int_{\varphi=\varphi^{BN}(Y)}^{\infty} f(\varphi)d\varphi \right) f(Y)dY. \tag{14}$$

Hence, the distributions $F(Y)$ and $F(\varphi)$ determine the three shares. For a given $F(Y)$, the lower the distribution of γ_i (and $\bar{\gamma}$), the larger the share β and the smaller δ. The share choosing B is larger among middle-income earners than among those with very high or low incomes. Low-income earners cannot afford any service at all, and among high-income earners a larger part buy S from the white market.

4.3 Updating norms

Above, we saw that the individuals' choices at any point in time depend on income as well as on intrinsic and social norms. In the intertemporal perspective, Y_i and $F(Y)$ are assumed to be constant over time, whereas $F(\varphi)$ may change if γ_i and/or $\bar{\gamma}$ is altered.

According to the updating mechanism of self-signaling, proposed by Bénabou and Tirole (2004, 2006, 2011a), behavior indicates (even to oneself) whether one is an evader or a non-evader. Hence, if one bought a black-market service in period $t-1$, one wants to justify that behavior[13] and becomes less reluctant to buying black-market services in t (γ_i is reduced in accordance with some parameter $\alpha_b > 0$). Likewise, if one bought on the white market, one signals that one is not an evader and one's reluctance toward buying on

[13] Just as in the theory of cognitive dissonance.

the black market increases (γ_i increases in accordance with some $\alpha_w > 0$). Hence, behavior in one period affects the value of γ_i in the next.

Also normative conformity with social norms may induce updated norms. An individual with a $\gamma_i < (>)\bar{\gamma}$ would increase (decrease) their γ_i to conform to the views of their peers.

When updating the personal norm, both self-signaling and normative conformity play a role.[14] However, if the individual does not buy any services at all, only the conformity mechanism matters.

Hence, personal norms are updated according to

$$\gamma_{it} = \begin{cases} \gamma_{it-1} + \gamma_{it-1}(1-\gamma_{it-1})\big[\mu f(\bar{\gamma}_{t-1} - \gamma_{it-1}) + (1-\mu)\alpha_w\big] & \text{if } k_{it-1} = W \\ \gamma_{it-1} + \gamma_{it-1}(1-\gamma_{it-1})\big[\mu f(\bar{\gamma}_{t-1} - \gamma_{it-1}) - (1-\mu)\alpha_b\big] & \text{if } k_{it-1} = B \\ \gamma_{it-1} + \gamma_{it-1}(1-\gamma_{it-1})\mu f(\bar{\gamma}_{t-1} - \gamma_{it-1}) & \text{if } k_{it-1} = N \end{cases} \tag{15}$$

where $\mu \in (0,1)$ determines the importance of conformity for the updating process, relative to one's own behavior, which affects the personal norm by $\alpha_w \in (0,1)$ or $\alpha_b \in (0,1)$. f is the continuous and strictly positive function, with $f(0) = 0$ and $f(1) = 1$ associated with conformity. The updating terms are multiplied by $\gamma_{it-1}(1-\gamma_{it-1})$, which is the propensity to adjust. The closer γ_{it-1} is to the extreme values, the less likely one is to alter one's norm, and once $\gamma_i = \{0,1\}$, one does not change the norm at all. The formulations in (15) assure that $\gamma_i \in [0,1]$.

In period t, all individuals in the economy update their norms according to (15), depending on their actions and on the social norm in $t-1$. The social norm $\bar{\gamma} \in [0,1]$, which is the average of individual norms, will be updated then too:

$$\bar{\gamma}_t = \bar{\gamma}_{t-1} + \sum_i (\gamma_{it} - \gamma_{it-1}), \tag{16}$$

where the differences $(\gamma_{it} - \gamma_{it-1})$ are given by (15), depending on the actions

[14] See Nordblom and Žamac (2012) for a more comprehensive description of the two updating mechanisms.

of the individuals.

In each period t, a fraction ρ enters the economy and a share κ leaves it. Those who leave have on average $\gamma_i = \bar{\gamma}_{t-1}$ and those who enter get a $\gamma_{it} \in (0, 1)$ drawn from a Poisson distribution, where on average $\bar{\gamma}_{\rho t} = \bar{\gamma}_{t-1}$.[15] In the following we therefore do not have to explicitly take changed population composition into account.

When γ_i is updated according to (15) $\forall$ i, and thereby $\bar{\gamma}$ according to (16), the distribution $F(\varphi)$ will change. This may cause some individuals to alter their behavior depending on the inequalities in (7) and (8). Hence, the shares δ, β and η may evolve over time.

Individual norms, as well as the social norm, may thus evolve over time due to both behavior and social interactions, resulting in both altered behavior and norms over time.

4.4 Multiple equilibria

In equilibrium $\gamma_{it} = \gamma_{it-1}$ $\forall i \Rightarrow \bar{\gamma}_t = \bar{\gamma}_{t-1}$ must hold. Also $\delta_t = \delta_{t-1}$, $\beta_t = \beta_{t-1}$ and $\eta_t = \eta_{t-1}$ in equilibrium. According to (15) and (16), $\gamma_{it} \in [0, 1]$ and $\bar{\gamma}_t \in [0, 1]$ are continuous functions of $\gamma_{it-1} \in [0, 1]$ and $\bar{\gamma}_{t-1} \in [0, 1]$, respectively. Hence, regarding both each individual and the social norm, there exists at least one fixed point in the interval, indicating equilibrium. The present model will actually generate two stable potential equilibria and one unstable equilibrium in between.[16] The equilibria are sketched in Figure

[15] As long as $\bar{\gamma} \in (0, 1)$, the initial γ's for individuals entering the model follow a Poisson distribution with $\lambda = \min\{\bar{\gamma}_{t-1}, 1 - \bar{\gamma}_{t-1}\}$ such that

$$f(\gamma) = \begin{cases} \frac{e^{\lambda}\lambda^{\gamma}}{\gamma!} & \text{if } \bar{\gamma}_{t-1} \leq 1/2 \\ 1 - \frac{e^{\lambda}\lambda^{\gamma}}{\gamma!} & \text{if } \bar{\gamma}_{t-1} > 1/2. \end{cases} \tag{17}$$

This assures that the updating of $\bar{\gamma}_t$ is unaffected by individuals leaving and entering the economy. The closer to the extremes (0 and 1) the social norm $\bar{\gamma}_{t-1}$ is, the more concentrated around this norm the new entrants will be. If $\bar{\gamma} = \{0, 1\}$, the economy will be in a stable equilibrium, and all new entrants will get $\gamma_i = \bar{\gamma}$.

[16] The existence of multiple equilibria is similar to what previous literature on endogenous norm formation has pointed out. Lindbeck et al. (2003) state that "endogenous norms may generate multiple equilibria in economic decisions" and Kim (2003) shows that in his model there are (at least) three equilibria, of which two are stable. In Myles and Naylor

2, which shows that the two stable equilibria imply extreme-value preferences. Let us now analyze what constitutes these equilibria by studying the different groups in the economy separately.

For an individual who chooses $k = W$, the following must hold in equilibrium:

$$\gamma_{it}^{W} = \gamma_{it-1}^{W} + \gamma_{it-1}^{W}(1-\gamma_{it-1}^{W})\Big[\mu f(\bar{\gamma}_{t-1} - \gamma_{it-1}^{W}) + (1-\mu)\alpha_w\Big] = \gamma_{it-1}^{W} = \gamma_{i}^{W}. \quad (18)$$

There are three options that solve (18): Either $\gamma_i^W \in \{0, 1\}$, or $\gamma_i^W \in (0, 1]$ such that

$$\gamma_i^W = \bar{\gamma} + g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] \quad (19)$$

where $g[\cdot] = f^{-1}(\cdot)$, i.e., a continuous, positive and increasing function. As the right-hand side of (19) consists of constants that everyone in the economy shares, $\gamma_i^W = \gamma^{W*}\ \forall\ \{i : k_i = W\}$ must hold in equilibrium.

Obviously, $\gamma^{W*} \geq \bar{\gamma}$. Because both γ^{W*} and $\bar{\gamma}$ are bounded above $\gamma^{W*} = \bar{\gamma} \Leftrightarrow \bar{\gamma} = 1$.

Hence, the share δ has two possibilities in equilibrium: Either $\gamma^{W*} = 1$ or $\gamma^{W*} \in (0, 1)$, determined in (19) $\forall\ \{i : k_i = W\}$.[17] In the interior equilibrium, those who choose $k = W$ have a higher than average γ, so they tend to conform their γ_i, but this reduction is exactly offset by the increase due to buying the white-market service.

For those individuals where $k = B$, the equilibrium norm (common to everyone in β) is determined by

$$\gamma_{it}^{B} = \gamma_{it-1}^{B} + \big(\gamma_{t-1}^{B}(1-\gamma_{t-1}^{B})\big)\Big[\mu f(\bar{\gamma}_{t-1} - \gamma_{it-1}^{B}) - (1-\mu)\alpha_b\Big] = \gamma_{it-1}^{B} = \gamma^{B*} \quad (20)$$

(1996), one equilibrium where everyone evades and another one where no one evades are both possible. Also in Traxler (2010), there are two stable equilibria (with almost no-one and almost everyone evading, respectively) and one unstable in between.

[17] Footnote 20 shows that $\gamma^{W*} = 0$ is not possible in equilibrium if $\delta > 0$.

One possible solution is the corner solution $\gamma^{B*} = 0$.[18] However, if $\gamma^{B*} \in (0,1) \; \forall \; \{i : k_i = B\}$, the bracketed expression has to be zero, i.e.:

$$\gamma^{B*} = \bar{\gamma} - g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]. \tag{21}$$

Hence, $\gamma^{B*} \leq \bar{\gamma}$ and $\bar{\gamma} = 0 \Leftrightarrow \bar{\gamma} = \gamma^{B*}$.

For the share $\eta = 1 - \delta - \beta$ where $k = N$

$$\gamma_{it}^N = \gamma_{it-1}^N + \gamma_{it-1}^N(1 - \gamma_{it-1}^N)\mu f(\bar{\gamma}_{t-1} - \gamma_{it-1}^N) = \gamma_{it-1}^N. \tag{22}$$

This requires that $\gamma_{it}^N = \bar{\gamma} = \gamma^{N*}$.[19]

For the total social norm, thus

$$\bar{\gamma^*} = \delta\gamma^{W*} + \beta\gamma^{B*} + \eta\gamma^{N*} = \frac{\delta\gamma^{W*} + \beta\gamma^{B*}}{\delta + \beta}. \tag{23}$$

Proposition 1. *There are three potential equilibria for the social norm – two are stable where $\bar{\gamma^*} \in \{0,1\}$. There is also an unstable equilibrium where $\bar{\gamma^*} \in (0,1)$. The potential equilibria are sketched in Figure 2 and characterized by*

$$\begin{array}{llll} \bar{\gamma}^* = 0 & \delta = 0 & \beta > 0 & \textit{Stable} \\ \bar{\gamma}^* = 1 & \delta > 0 & \beta = 0 & \textit{Stable} \\ \bar{\gamma}^* \in (0,1) & \delta > 0 & \beta > 0 & \textit{Unstable.} \end{array} \tag{24}$$

Proof. If no one buys from the white market, i.e., $\delta = 0$, then (23) implies that $\bar{\gamma^*} = \gamma^{B*}$. Above we concluded that this is equivalent to $\bar{\gamma^*} = 0$. Hence, iff $\delta = 0$ in equilibrium, $\bar{\gamma^*} = 0$. Since no one will then alter their γ_i, the equilibrium is stable. Likewise, iff $\beta = 0$, there is a stable equilibrium where $\bar{\gamma^*} = 1$. An unstable equilibrium $\bar{\gamma^*} \in (0,1)$ exists where both $\delta > 0$ and

[18] It can be shown that $\gamma^{B*} = 1$ is not an attainable equilibrium when $\beta > 0$

[19] For $\gamma_{it}^N \in (0,1)$, this is self-evident. (22) would be fulfilled also for $\gamma^N \in \{0,1\}$. However, since initial γ's follow a distribution with mean $\bar{\gamma}$ and the group η update their γ's only with respect to $\bar{\gamma}$, the group would not reach the equilibria $\gamma^N \in \{0,1\}$ unless $\bar{\gamma} \in \{0,1\}$.

$\beta > 0$. The share δ hold $\gamma_i = \gamma^{W*} \in (0, 1]$, as determined in (19).[20] The share β hold $\gamma_i = \gamma^{B*} \in [0, 1)$, as determined in (21). There is also a fraction η who choose $k = N$ and who have $\gamma_i = \bar{\gamma^*} \in (\gamma^{B*}, \gamma^{W*})$ in equilibrium. Substituting (19) and (21) into (23), we get

$$\bar{\gamma^*} = \bar{\gamma^*} + \delta g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] - \beta g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]. \tag{25}$$

For (25) to hold, thus $\delta g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] = \beta g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$ is required. This unstable equilibrium also marks the boundary for the paths toward the two stable equilibria.[21] [22]

□

Figure 2 sketches the three potential equilibria and the trajectories toward them.

Corollary 1. *At the outset, an economy where people differ in their attitudes,*[23] *could be characterized as either of the three:*

1. *Constant $\bar{\gamma}$ in an unstable equilibrium where $\delta g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] = \beta g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$.*
2. *A positive trajectory $\bar{\gamma} \to 1$, $\beta \to 0$; $\delta g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] > \beta g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$.*
3. *A negative trajectory $\bar{\gamma} \to 0$, $\delta \to 0$; $\delta g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] < \beta g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$.*

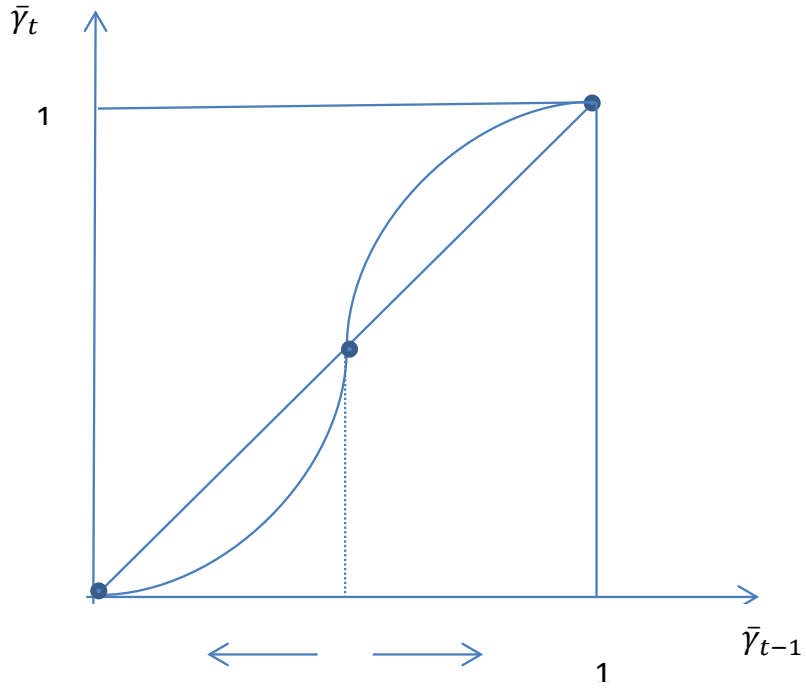
[20] Assume $\delta > 0$ and $\gamma^{W*} = 0$. Then the total, $\bar{\gamma}^* = \delta 0 + \beta\gamma^{B*} + (1 - \beta - \delta)\bar{\gamma}^* \Rightarrow \bar{\gamma}^*(\beta + \delta) = \beta\gamma^{B*} \Rightarrow \gamma^{B*} > \bar{\gamma^*}$. According to (21) this requires that $\bar{\gamma^*} < 0$, which is not attainable.

[21] The mechanisms are the same also in the equilibria where at least one of the groups is in a corner solution, i.e., when $\gamma^{W*} = 1$ and/or $\gamma^{B*} = 0$. Also these equilibria are unstable in the sense that $\bar{\gamma}$ will change if the system is shocked, since $\gamma^{N*} = \bar{\gamma} \in (0, 1)$.

[22] As soon as $\delta g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] > \beta g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$, $\bar{\gamma}$ begins to increase over time, and this will continue until the stable equilibrium $\gamma_i^* = \bar{\gamma}^* = 1 \ \forall \ i \quad \Rightarrow \varphi_i = \infty \ \forall \ i$ is reached. In such equilibrium, $\beta = 0$, since $u(Y_i - p_B, S) - u(Y_i - p_W, S) < \infty \ \forall \ Y_i$ according to (10). On the other hand, if $g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] < g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$, $\bar{\gamma}$ will instead decrease over time until $\gamma_i^* = \bar{\gamma}^* = 0 \ \forall i \ \Rightarrow \varphi_i = 0 \ \forall i$, which is the second stable equilibrium. In such equilibrium, $\delta = 0$, since $u(Y_i - p_B, S) - u(Y_i - p_W, S) > 0 \ \forall \ Y_i$ according to (10).

[23] This rules out having reached either of the two stable equilibria.

Figure 2: The three potential equilibria



5 Policy intervention

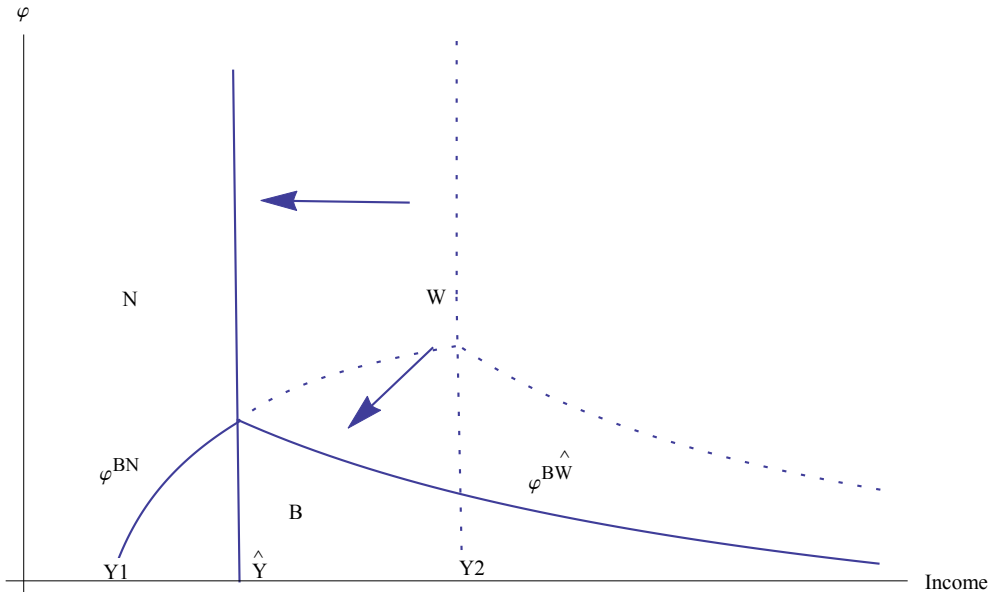
Kim (2003) points out that the existence of multiple equilibria is important for the effects from policy intervention, since an economy stuck in a "bad" equilibrium could actually be put on a path toward a "good" equilibrium with the right policy tools. If people's choices affect their moral attitudes and those of others, policy interventions that affect choices should also influence the development of attitudes. Let us analyze how a policy that subsidizes white-market services affects behavior and norms.

Consider an economy outside equilibrium or in the unstable equilibrium. By increasing the share δ, also the social norm can be strengthened. Assume that the government introduces a subsidy for white-market services in period $t = 1$, so that the new price $\hat{p_W} \in [p_B, p_W)$. Then more people will choose

W and fewer will choose B than in $t = 0$ *c.p.*[24]

How many will change behavior depends on the size of the subsidy and the distribution of the γ's at the time of the policy implementation. Figure 3 shows how the domains change when $p_{\hat{W}} \in (p_B, p_W)$. The threshold income above which the service certainly will be bought is lowered from Y_2 to $\hat{Y}$. Above this income, the threshold norm above which W is chosen is reduced from φ^{BW} to $\varphi^{B\hat{W}}$. Appendix A shows exactly how the shares δ, β and η change.

Figure 3: How the different domains change when p_W is reduced



5.1 Norm development after reform

We cannot generally say how $\bar{\gamma}_1$ and $\bar{\gamma}_0$ relate to each other, although we know that $\delta_1 > \delta_0$ and $\beta_1 < \beta_0$. We know, though, that

Proposition 2. *Outside the stable extreme-value equilibria, $\bar{\gamma}$ will grow steadily $\forall\ t > 1$ if the subsidy is sufficiently large:*

[24]Incomes and prices remain constant. Hence, we disregard any supply-side effects.

Proof. i) If the social norm at the outset was either at the unstable equilibrium or on a positive trajectory (i.e., $\delta_0 g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] \geq \beta_0 g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$), it follows directly from Corollary 1 that the social norm will be on a positive trajectory toward $\gamma = 1$, irrespective of the size of the subsidy.

ii) If $\bar{\gamma}$ from the outset was on a negative trajectory (i.e., $\delta_0 g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] < \beta_0 g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$), it will, after the reform, be on a positive trajectory iff $p_{\hat{W}}$ is low enough to give sufficiently low $\hat{Y}$ and $\varphi^{B\hat{W}}$ so that $\delta_1 g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] \geq \beta_1 g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$. Then $\bar{\gamma}_2 > \bar{\gamma}_1$ although $\bar{\gamma}_1 < \bar{\gamma_0}$, and onward $\bar{\gamma}$ will continue to increase, as will δ, while β diminishes as the social norm against black-market services approaches $\bar{\gamma} = 1$.

□

Corollary 2. *According to Proposition 2, the social norm will steadily increase after introducing the sufficiently large subsidy. This, in turn, implies that the distribution of φ is continuously pushed upwards, i.e,*

$$\int_{\varphi=0}^{X} f(\varphi_t)d\varphi < \int_{\varphi=0}^{X} f(\varphi_{t-1})d\varphi \tag{26}$$

$$\int_{\varphi=X}^{\infty} f(\varphi_t)d\varphi > \int_{\varphi=X}^{\infty} f(\varphi_{t-1})d\varphi \tag{27}$$

$\forall\ t > 1$ *where X is an arbitrary number, $X \in (0, \infty)$.*

After the introduction of the subsidy, the social norm will thus be on a positive trajectory: a larger and larger share will choose $k = W$ and a smaller and smaller share will choose $k = B$. The longer the subsidy is at work, the closer the economy will come to the good equilibrium where $\bar{\gamma} = 1$ and $\beta = 0$.

5.2 Abolished subsidy

The subsidy is costly, but under some circumstances it can actually be abolished after a while without the risk of returning to a large black market, although the abolition implies an immediate drop in δ, which corresponds to increases in β and η.[25] If the subsidy has been in place for a sufficient time so that the social norm has moved sufficiently far along the positive trajectory, abolishing the subsidy will imply that $\bar{\gamma}$ will continue to increase, although at a slower pace. If, on the other hand, the subsidy has not been in place for a sufficiently long time, the social norm will return to the negative trajectory.

Assume that the economy is on a negative trajectory before the subsidy is introduced, i.e., $\delta_0 g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] < \beta_0 g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$. According to Proposition 2 ii), $\bar{\gamma}$ is put on a positive trajectory after a sufficiently large subsidy is introduced in $t = 1$. According to Corollary 2, the distribution $F(\varphi)$ is then continuously pushed upward $\forall\ t > 1$. Hence, δ will steadily increase and β will steadily decrease as long as the subsidy is in place, i.e., until $t = T - 1$. Iff $\delta_T g\left[\frac{(1-\mu)\alpha_w}{\mu}\right] \geq \beta_T g\left[\frac{(1-\mu)\alpha_b}{\mu}\right]$, $\bar{\gamma}$ will continue to increase even after the subsidy is abolished in T.[26]

Since Corollary 2 gives us that $F(\varphi)_t$ is continuously pushed upward also for $t > T$, (12) implies that the share β will continue to decrease even after the subsidy is abolished. Hence, in line with the reasoning of Kim (2003), the multiplicity of equilibria of the model brings us to the following proposition.

Proposition 3. *If the subsidy has been in place sufficiently long and has been sufficiently large, the social norm $\bar{\gamma}$ remains on a positive trajectory and the share choosing B continues to decrease even after the subsidy has been abolished.*

[25] See Appendix B for the calculations.
[26] See Corollary 1.

5.3 Comparing two policies that eliminate the black market

Subsidizing the white-market services has been done in several countries during the last decades,[27] but it comes at a cost. An alternative, which may seem more cost-effective, is to strengthen enforcement. Let us compare the two policies in terms of what they do to the long-run social norm, given that both have the immediate effect of completely eliminating the black market.

Consider a subsidy from period $t = 1$, which is sufficiently large to yield $\hat{p_W} = p_B$, so that everyone who buys the service chooses W and none B, i.e., $\hat{Y} = Y_1 \Rightarrow \beta_t = 0 \ \forall \ t > 0$. Hence, the share for whom $W \succeq N$ is $\hat{\delta} = \int_{Y_1}^{\infty} f(Y)dY$.

An alternative to decreasing p_W would be to increase p_B to $\tilde{p_B}$, by e.g., higher fines or more frequent audits. If $\tilde{p_B} = p_W$ from period $t = 1$ and onward, no one would buy S from the black market anymore. The share for whom $W \succeq N$ would be $\tilde{\delta} = \int_{Y_2}^{\infty} f(Y)dY$.

Proposition 4. *A subsidy of W eliminating B gives rise to a faster norm increase than increased enforcement that also eliminates B.*

Proof. At any point $t > 0$ after any of the reforms, the social norm

$$\bar{\gamma}_t = \bar{\gamma}_0 + \delta tg\left[\frac{(1-\mu)\alpha_w}{\mu}\right], \tag{28}$$

since $\beta = 0$. With a subsidy, $\hat{\delta} = \int_{Y_1}^{\infty} f(Y)dY$, and with increased enforcement, $\tilde{\delta} = \int_{Y_2}^{\infty} f(Y)dY$. Hence, $\hat{\delta} > \tilde{\delta}$ implying that $\hat{\bar{\gamma}}_t > \tilde{\bar{\gamma}}_t \ \forall t > 0$. □

Hence, the long-run social norm will grow faster if the black market is eliminated by the use of a subsidy than it will by increased enforcement. Although increased enforcement may seem superior in the short run (the same immediate effect at a lower cost), the long-run willingness to comply would be better fostered by the subsidy.

[27] E.g., France, Belgium, Finland and Sweden.

6 Evidence

A policy intervention very much in line with the one described in Section 5 has recently been introduced in Sweden and observations from there can be used to illustrate the model.

Starting in July 2007 the labor cost of household services was reduced by half for buyers, and in December 2008 the same subsidy was introduced for construction work at one's own home. In terms of the model presented in Section 5, $\hat{p_W}$ was set very low. Anecdotal evidence also suggest that almost all black-market jobs disappeared in the household service and construction sectors and many legal cleaning businesses started, which suggests that people actually changed their behavior and started to buy the services from the white market and left the black market.

As of January 2016, the subsidies have been substantially reduced. The maximum amount subsidized for household services was reduced by half, and for construction work, only 30% of the labor cost is now reimbursed.

According to the presented theory, this subsidy would have had an impact on people's attitudes, increasing γ. This increase would continue after the reduction if the subsidy was large enough.

In 2006, the Swedish tax agency conducted a survey regarding buying black-market services among a sample of the Swedish population, and 2,312 individuals responded to it. As is common, the response rate was higher among women, the elderly and people with a higher education. Therefore, the numbers presented in Table 1 and Figure **??** below are weighted values. One question was the following:

> Do you agree or not with the statement: *It is immoral to buy black-market services.*

The respondents could answer on a scale from 1 to 7, where 1 meant *Do not agree at all* and 7 meant *Agree completely.*

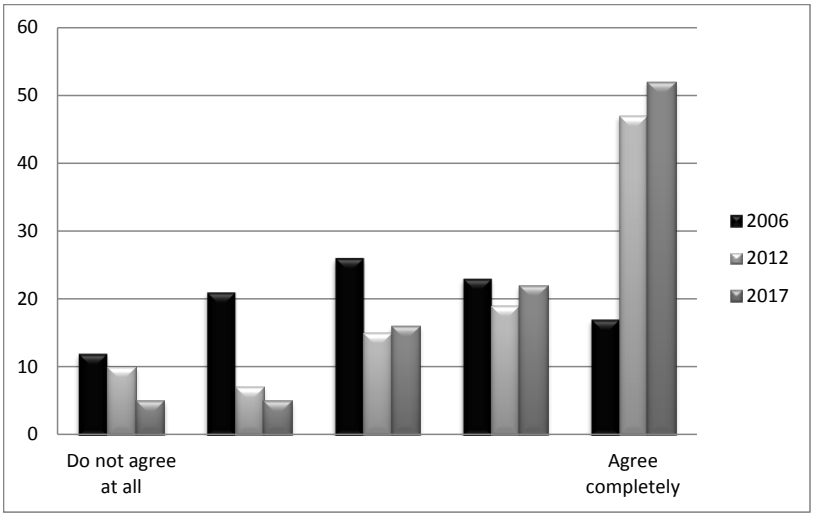
The distribution of the answers is shown by the black bars in Figure 4.[28] In October 2012, the same question was posed for a report on Swedish

[28]The scale is comprised to five steps.

taxes[29] in order to see whether the attitudes had actually changed four to five years after the introduction of the subsidy. That interview was also conducted by telephone, and the sample includes 992 usable respondents. The weighted distribution of these answers is shown by the light gray bars in Figure 4. A third wave of data was gathered during spring 2017 in order to see whether the norm continued to increase or whether it had deteriorated as a consequence of reduced subsidies from 2016. From this telephone interview of a random sample of Swedes, there are answers from 998 individuals. The weighted distribution of these answers is presented by the dark gray bars in Figure 4.

The three samples are different, i.e., I do not have a panel consisting of the same individuals at different points in time. Therefore, we cannot analyze what effects the policy reform has had on the individual tax morale. However, the samples are sufficiently large and representative that they enable a comparison of what has happened with the aggregate norm.

Figure 4: Distribution of answers to the statement "It is immoral to buy black-market services" (percent)



[29]Flood et al. (2013).

Table 1: Distribution of answers to the statement "It is immoral to buy black-market services" (percent)

	2006	2012	2017
1	12	10	5
2	20	8	5
3	27	16	16
4	24	19	22
5	17	47	52
Mean value	3.1	3.8	4.1
No. of obs.	2,153	969	998

Note. 1 means "Do not agree at all" and 5 means "Agree completely."

The figure shows a dramatic increase in the share who completely agrees with the statement "It is immoral to buy black-market services," from 17 percent in 2006 to 47 percent in late 2012. Needless to say, the two distributions are significantly different from each other according to a Kolmogorov-Smirnov test (p=0.000). Also 17 months after the reductions in the subsidies, the stronger social norm prevails. The share who completely agrees with the statement had even increased to 52 percent in 2017. However, the difference between 2012 and 2017 is not statistically significant.

According to the model in Section 5, the average norm would increase after a policy intervention that reduces $\hat{p}_W$ sufficiently. Table 1 presents also the average answers, or $\bar{\gamma}$ for the three points in time. In 2006 the average norm was not to bother at all about the question of buying black-market services, in other words neither agreeing nor disagreeing with the statement "It is immoral to buy black-market services." In 2012, however, the average norm had increased to somewhat agreeing with the statement, an increase which is significant according to a t-test (p=0.000). Also the difference in means between 2012 and 2017 is significant (p=0.003). Although the data are repeated cross section and not panel data so that one cannot prove causality, the nonparametric results are in line with the proposed theory. When the subsidy is introduced, the social norm increases and when it has increased

Table 2: The average answers to the statement "It is immoral to buy black-market services"

Group	γ
Only black	3.5
Both black and white	3.8
Only white	4.4
Never bought services	4.2
No. of obs.	975

Note. 1 means "Do not agree at all" and 5 means "Agree completely."

sufficiently, it will continue to do so even if the subsidy is substantially reduced.

In the last wave of data collection, respondents were also asked about their experience of buying services and we can see how the answers differ in light of their own experience. There are four groups: those who have only bought black-market services, those who have only bought white-market services, those who have bought from both markets and those who have not bought any services at all. Table 2 presents the average γ's in each group.

According to Wilcoxon-Mann-Whitney tests, the two groups with experience of buying black-market services are different at the 5 percent level as are the two groups without such experience. The other pairs of groups are significantly different ($p = 0.000$). Hence, also these results corroborate the proposed theory: Those with the least reluctance to buying black-market services still buy them when white-market services are heavily subsidized, and those who buy from the white market without previously having turned to the black market are the ones who are the most reluctant to buy from the black market.

7 Conclusions

This paper has shown that an inevitable path leading toward more and more tax evasion and weaker and weaker tax morale can indeed be averted by means other than increased enforcement. A model of endogenous norm for-

mation based on social interaction enables policies to affect norms as well as behavior.

The model explains how preferences may evolve over time due to one's own behavior and social interactions. When people decide whether or not to buy black-market services, both their own tax morale and the social norm influence the decision. The analysis is dynamic, hence, actions in one period may affect attitudes in the next. Someone who evades tends to justify it by becoming more tolerant of evasion. Someone who instead pays the extra cost of complying wants that action to pay off and therefore tends to become more intolerant to evasion. People also influence each other. One tends to conform somewhat to what peers think is the right thing to do. Hence, individual norms may change over time due to both one's own actions and others' opinions.

The dynamic nature of the model gives rise to three potential equilibria, of which two are stable: one where no one buys black-market services and where everyone shares the strongest possible norm of compliance, and one where this norm is completely deteriorated and no one therefore buys services from the white market. If the economy is stuck on a trajectory toward the latter, this paper has shown that an adequate temporary policy change may permanently turn the economy to a trajectory toward the compliant equilibrium. If a subsidy of white-market services (like the recent Swedish reform) is introduced, more people will buy from the white market and fewer from the black market. This will first strengthen tax morale among buyers, who want to feel good about themselves, and through normative conformity this strengthens the overall social norm, which in the next period will induce even more individuals to switch from black to white services and so on. This is good news, as it is possible to break a vicious circle of increasing evasion by stimulating compliance.

Evidence from Sweden supports the theory and shows a drastically strengthened norm of reluctance to using black-market services during the last decade while a subsidy of white-market services has been in place.

The proposed model indicates that subsidizing white-market services is actually better at fostering the long-run willingness to comply than increased

enforcement is. Also previous research has questioned the effects of increased enforcement. Taxpayers may tend to reciprocate tax policy and thereby evade more instead of less if audits and fines are increased (Feld and Frey, 2002; Mendoza et al., 2017).

In this paper, any supply-side effects have been completely ignored. However, it is likely that altered social norms concerning buying black-market services also spill over to selling such services. Hence, the social norm may well affect both demand and supply in the same direction. The trajectory toward the compliant equilibrium would then move even faster.

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A Appendix: Altered behavior after the introduction of the subsidy

After the policy change, the choices in different income intervals could be summarized as follows:

$$
\begin{aligned}
&Y_i \leq Y_1 \;\Rightarrow k = N \\
&Y_i \in (Y_1, \hat{Y}) \;\Rightarrow k = \begin{cases} N & \text{if } \varphi_i \geq \varphi^{BN}(Y_i) \\ B & \text{if } \varphi_i < \varphi^{BN}(Y_i) \end{cases} \\
&Y_i \geq \hat{Y} \;\Rightarrow k = \begin{cases} W & \text{if } \varphi_i \geq \varphi^{B\hat{W}}(Y_i) \\ B & \text{if } \varphi_i < \varphi^{B\hat{W}}(Y_i). \end{cases}
\end{aligned} \tag{29}
$$

When the subsidy is introduced in $t = 1$, the share δ increases, while β and η decrease:

$$
\beta_1 = \int_{Y=Y_1}^{\hat{Y}} \left(\int_{\varphi=0}^{\varphi^{BN}(Y)} f(\varphi)d\varphi \right) f(Y)dY + \int_{Y=\hat{Y}}^{\infty} \left(\int_{\varphi=0}^{\varphi^{B\hat{W}}(Y)} f(\varphi)d\varphi \right) f(Y)dY. \tag{30}
$$

Compare this to β_0 determined in (12):

$$
\begin{aligned}
&\beta_0 - \beta_1 = \qquad (31) \\
&\int_{Y_1}^{\hat{Y}} \int_0^{\varphi^{BN}} f(\varphi)d\varphi f(Y)dY + \int_{\hat{Y}}^{Y_2} \int_0^{\varphi^{BN}} f(\varphi)d\varphi f(Y)dY + \int_{Y_2}^{\infty} \int_0^{\varphi^{BW}} f(\varphi)d\varphi f(Y)dY \\
&- \int_{Y_1}^{\hat{Y}} \int_0^{\varphi^{BN}} f(\varphi)d\varphi f(Y)dY - \int_{\hat{Y}}^{Y_2} \int_0^{\varphi^{B\hat{W}}} f(\varphi)d\varphi f(Y)dY - \int_{Y_2}^{\infty} \int_0^{\varphi^{B\hat{W}}} f(\varphi)d\varphi f(Y)dY = \\
&= \int_{\hat{Y}}^{Y_2} \left(\int_{\varphi^{B\hat{W}}}^{\varphi^{BN}} f(\varphi)d\varphi \right) f(Y)dY + \int_{Y_2}^{\infty} \left(\int_{\varphi^{B\hat{W}}}^{\varphi^{BW}} f(\varphi)d\varphi \right) f(Y)dY > 0
\end{aligned}
$$

since $\varphi^{BW} > \varphi^{B\hat{W}} \; \forall \; Y_i$ and $\varphi^{BN} - \varphi^{B\hat{W}} > 0 \; \forall \; Y_i > \hat{Y}$.

The share who chooses $k = N$ is

$$
\eta_1 = \int_{Y=0}^{Y_1} f(Y)dY + \int_{Y=Y_1}^{\hat{Y}} \left(\int_{\varphi=\varphi^{BN}(Y)}^{\infty} f(\varphi)d\varphi \right) f(Y)dY. \tag{32}
$$

The first term is the same as before the reform as specified in (14), while the second is smaller because of the reduced threshold income, $\hat{Y} < Y_2$. Hence, $\eta_0 > \eta_1$.

The share δ_1 who chooses $k = W$ in the reform period is

$$\delta_1 = \int_{Y=\hat{Y}}^{\infty} \left(\int_{\varphi=\varphi^{B\hat{W}}(Y)}^{\infty} f(\varphi) d\varphi \right) f(Y) dY > \delta_0. \tag{33}$$

Since the lower limits in both integrals have lower values after the reform ($\hat{Y} < Y_2$ and $\varphi^{B\hat{W}}(Y) < \varphi^{BW}(Y)$), a larger share than before chooses to buy from the white market, i.e., $\delta_1 > \delta_0$. These effects correspond to the reductions in β and η shown above.

B Appendix: Altered behavior after the abolition of the subsidy

If the subsidy is removed in period T, the shares making the different choices $B,\ W,\ N$ will be the following:

$$\beta_T = \int_{Y=Y_1}^{Y_2} \left(\int_{\varphi=0}^{\varphi^{BN}(Y)} f(\varphi)d\varphi \right) f(Y)dY + \int_{Y=Y_2}^{\infty} \left(\int_{\varphi=0}^{\varphi^{BW}(Y)} f(\varphi)d\varphi \right) f(Y)dY \tag{34}$$

$$> \beta_{T-1} = \int_{Y=Y_1}^{\hat{Y}} \left(\int_{\varphi=0}^{\varphi^{BN}(Y)} f(\varphi)d\varphi \right) f(Y)dY + \int_{Y=\hat{Y}}^{\infty} \left(\int_{\varphi=0}^{\varphi^{BW}(Y)} f(\varphi)d\varphi \right) f(Y)dY \tag{35}$$

since $Y_2 > \hat{Y}$. The share δ who chooses $k = W$ is

$$\begin{aligned} \delta_T &= \int_{Y=Y_2}^{\infty} \left(\int_{\varphi=\varphi^{BW}(Y)}^{\infty} f(\varphi)d\varphi \right) f(Y)dY \\ < \delta_{T-1} &= \int_{Y=\hat{Y}}^{\infty} \left(\int_{\varphi=\varphi^{BW}(Y)}^{\infty} f(\varphi)d\varphi \right) f(Y)dY. \end{aligned} \tag{36}$$

The share who chooses $k = N$ is

$$\begin{aligned} \eta_T &= \int_{Y=0}^{Y_1} f(Y)dY + \int_{Y=Y_1}^{Y_2} \left(\int_{\varphi=\varphi^{BN}(Y)}^{\infty} f(\varphi)d\varphi \right) f(Y)dY \\ > \eta_{T-1} &= \int_{Y=0}^{Y_1} f(Y)dY + \int_{Y=Y_1}^{\hat{Y}} \left(\int_{\varphi=\varphi^{BN}(Y)}^{\infty} f(\varphi)d\varphi \right) f(Y)dY. \end{aligned} \tag{37}$$

Hence, when the subsidy is abolished, there is an immediate drop in δ, which corresponds to increases in β and η.