Documents de Travail du
Centre d'Economie de la Sorbonne

CES Working Papers

The Relevance of Social Norms for Economic Efficiency: Theory and its Empirical Test

Anil ALPMAN

2013.38R

Version révisée

Maison des Sciences Économiques, 106-112 boulevard de L'Hôpital, 75647 Paris Cedex 13
http://centredeconomiesorbonne.univ-paris1.fr/bandeau-haut/documents-de-travail/
ISSN : 1955-611X

The Relevance of Social Norms for Economic Efficiency: Theory and its Empirical Test

Anil Alpman[1]

Revised version: August 08, 2013; First version: May, 2013

Abstract

This paper proposes a new theory of social norms that explores the relation between individuals' income, time allocation decisions, and consumption choices on the one hand, and the determinants of individuals' decision to conform or not to social norms on the other. It is shown that rational consumers may obey inefficient social norms, which in turn would slow economic development. An empirical test of the model is performed for different categories of countries using the World Values Survey, a voluminous cross-country micro dataset. The results yield the gain and the cost of disobeying inefficient social norms, the latter of which can be used as an indicator of social pressure regarding conformity.

Keywords: Social Norms, Social Interactions, Consumer Behavior, Household Production, Economic Development, Social Pressure Indicator
JEL Classification: D11, D12, O43, Z13.

1. Introduction

As an informal institution, social norms determine "the rules of the game" as much, if not more, as formal institutions (North, 1990, 2005, p. 48-52), especially in developing countries where formal institutions are often inoperative. Socially accepted and expected behaviors are the rules defined by social norms which can shape, together with formal institutions, various aspects of everyday life such as consumption decisions, property-rights regimes, species of crops grown by farmers, and whether making profits is acceptable (Ray, 1998, p. 155).

Yet, social norms "can become retrogressive" (Arrow, 1971), they can be "inimical to development" (Ray, 1998, p. 155), and many social norms "do not benefit anyone" (Elster, 1989). In addition, social norms often "go against narrow self-interest" and many "are not socially beneficial" (Bicchieri, 2006, p. 2

[1]Paris School of Economics and Université Paris 1 Panthéon-Sorbonne (Centre d'Economie de la Sorbonne)
E-mail address: anil.alpman@univ-paris1.fr
I thank François Gardes, Elisabeth Cudeville, the participants at the Annual Congress of the "Société Canadienne de Sciences Economiques", and the participants at the "Journées de Microéconomie Appliquée" for their helpful comments.

and 7). This paper refers to such social norms as *inefficient*, in the sense that disobeying them could lead to a higher income (see Akerlof, 1980).

The economic approach rationalizes the persistence of inefficient social norms by arguing that there is a tradeoff between the material well-being of the consumer and its desire to avoid social disapproval (see for example Burke and Young, 2011; and Akerlof, 1980). However, the challenging and debated points consist in specifying how the mechanisms through which social norms operate affect the consumer's utility, and what are the *gain* and the *cost* of disobeying inefficient social norms that ultimately determine the consumer's disobedience level to social norms.[2]

Following the definition of social norms given by Bicchieri (2006) and Elster (1996), social norms, unlike moral norms, have not to be internalized: moral norms are followed because disobeying them triggers the emotion of guilt that leads to a negative sense of self regardless of whether the disobedience is observed (Elster, 1996). Indeed, "moral norms demand ... an unconditional commitment" (Bicchieri, 2006, p. 20).

"The operation of social norms", on the other hand, "depends crucially on the agent *being observed by others*" (Elster, 2009, p. 196). Dana et al. (2006), and Haley and Fessler (2005) provide some evidence that the obedience of individuals to social norms is conditional on whether they are observed: when individuals are unobserved, they tend to disobey the social norms that they would have obeyed otherwise. As Elster (2007) says, "the shame that sustains social norms is triggered by the perceived contempt of others". Therefore, disobedience *per se* does not induce a poor sense of self.[3]

Nevertheless, "the action tendency of contempt is avoidance" (Elster, 2009, p. 199): if an individual is observed disobeying social norms, the society would have a negative opinion about that individual who would be excluded by the society as a response. To avoid exclusion, individuals can conform their behaviors to the expectations of the society without changing, however, their internal values. For instance, if the social norm of wearing black at funerals (Elster, 1996) were to change to, say, wear white, would I have a poor sense of myself by complying to this new norm? Probably not. Most likely, people would even provide the necessary effort to conform to the new norm in order to avoid negative judgements and, eventually, to avoid social exclusion.

Ultimately, the *origin* of the disutility caused by disobedience to social norms is to be found in the deterioration of social interactions (as opposed to social isolation) rather than in an "identity loss" (i.e., a negative sense of self) as in Akerlof and Kranton (2000), or "a loss of reputation" as in Akerlof (1980). A good reputation is a *mean* for fruitful social interactions and thus reputation *in itself* does not affect *directly* utility: isolate a man, and his reputation would have no effect on his utility while the absence of social

[2] Because integrating social norms into economic models is challenging, models concerned with social norms "have little or no predictive power" according to Postlewaite (2011).

[3] "What makes something a social or a moral norm is our attitude toward it" (Bicchieri, 2006). Therefore, if disobeying a norm leads a person to have a poor sense of himself, it is because this person considers that specific norm as a moral norm rather than a social norm.

interactions would torment his soul. Unlike the reputation, social interactions are a direct source of utility.

Therefore, this paper considers social interactions as a commodity produced by the consumer that generates utility. It is assumed moreover that disobeying inefficient social norms affects negatively the production of social interactions while it increases the consumer's income. The theoretical model, which is developed in Section 2, shows that, under these assumptions, there is a unique level of disobedience that maximizes utility. This approach enables partial levels of disobedience and incremental evolution of social norms.

The model predicts that the optimal disobedience level depends on individual-specific parameters (the market wage rate, the output elasticities of inputs, and the individual's preferences) and on country-specific parameters (the quality of the economic environment and the tolerance of the society). Within a population, country-specific parameters induce similar disobedience levels while individual-specific parameters allow for some variances. On the other hand, the values of the parameters determine whether inefficient social norms are more likely to persist or to vanish: as long as the cost of disobedience is high compared to its gain, that is, the incentives to disobey inefficient social norms are weak, the average disobedience level in a country would be low and thus inefficient social norms would persist for longer periods, impeding thereby economic development. Hence, social norms are an additional factor that can account for income differences across countries. Moreover, the theoretical results indicate that the optimal level of disobedience affects the level of income, the time allocation, and the consumption choices of the consumer.

The empirical framework is presented in Section 3. That section begins by describing the variables of the World Values Survey which are used in the empirical test, followed by the empirical specification. This paper's approach enables the analysis of the incentives that determine an individual's behavior regarding social norms without necessarily defining any specific norms. The empirical test yields the estimates of the gain and the cost of disobedience to inefficient social norms for rich, emerging, developing, and Arab Spring countries. The estimates of the cost of disobedience provide a valuable indicator: the social pressure put on an individual to not disobey the society's social norms.

The results are presented in Section 4. The level of disobedience as well as the gain and the cost of disobedience for each category of countries are compared and discussed in length in Section 5.

2. The Model

2.1. Assumptions

2.1.1. Utility and Household Production Functions

In addition to the arguments mentioned above, studies in psychology and in behavioral medicine provide further evidence about the importance of social interactions for physical and mental health.[4] Therefore, let

[4]See Cacioppo et al. (2010), Hawkley and Cacioppo (2010), and Hawkley et al. (2010).

the utility be a function of the level of social interactions, denoted Z_s, and of the consumption quantity of a composite commodity, denoted Z_c. Human nature is assumed to be such that, for a given level of utility, it can exchange social interactions for non-social commodities only to some extend, implying that Z_s and Z_c are imperfect substitutes. Moreover, it is assumed that each additional unit of Z_s satisfies a lower psychical and socioeconomical need. Hence, the utility could be represented by a Cobb-Douglas function:

$$U = Z_s^{\theta}\ Z_c^{1-\theta} \tag{1}$$

Z_i, with $i = \{c, s\}$, is a final good produced by the consumer who combines market goods, C_i, with his time, t_i.[5] Assuming that inputs are imperfect substitutes with decreasing marginal productivity, the production functions of Z_c and Z_s can take the Cobb-Douglas form:[6]

$$Z_c = C_c^{\beta}\ t_c^{1-\beta} \tag{2}$$

and

$$Z_s = \mu(x, \delta)\ C_s^{\alpha}\ t_s^{1-\alpha} \tag{3}$$

where μ is the total factor productivity of C_s and t_s as a function of the disobedience level to norms, x (the higher is x, the greater is the disobedience level, with $x \geq 0$), and the intolerance of the society to disobedience, δ (the higher is δ, the more severely the society punishes disobedience, with $\delta > 0$).

The properties of the total factor productivity are defined by the following assumptions: first, increasing disobedience to norms deteriorates the reputation (Akerlof, 1980) that in turn decreases the production level of social interactions for a given level of inputs. Thus, increasing disobedience to norms decreases μ: $\partial\mu/\partial x < 0$ and $\mu(0, \delta) = q > 0$ where q is the highest value of μ . Then, it is assumed that people ignore low levels of disobedience and punish each additional level of disobedience more than proportionally. Indeed, ignoring disobedience, avoiding, gossiping, and openly ostracizing are more than proportional punishments. As a consequence, $\lim_{x\to 0}\left(\partial\mu/\partial x\right) = 0$ and μ decreases more than proportionally with increasing x: $\partial^2\mu/\partial x^2 < 0$. Thirdly, an increase in the intolerance of the society decreases μ for each level of disobedience (except if the individual does not disobey norms): $\partial\mu/\partial\delta < 0$ and $\partial^2\mu/(\partial x\partial\delta) < 0$. For $\delta = \overline{\delta}$, let x_{excl} denote the level of disobedience for which $\mu(x_{excl}, \overline{\delta}) = 0$. It is assumed that $\forall x > x_{excl}$, $\mu(x, \overline{\delta}) = 0$, which implies that the

[5] It is assumed that there is no joint production: an input used in the production of Z_s cannot be simultaneously used in the production of Z_c.

[6] For example, for housecleaning, an individual can substitute time input by hiring someone through the market to do it for him (note that the hiring process still requires, even though very little, some time). Similarly, an individual who spends little time with his friends may maintain his level of social interactions by offering them many gifts.

individual is socially excluded (i.e., $Z_s = 0$).[7]

2.1.2. The Income

Disobeying inefficient social norms may nevertheless be "of pecuniary advantage to the person who disobeys" (Akerlof, 1980). Consider the following examples: obeying *social gender norms* may lower the wage rate by inducing inefficient allocation of labor (see Udry, 1996; and Zwarteveen, 1996). *Social norms of working places*, which forbid *pulling strings* or *rate-busting*, may also lower the wage rate for someone who obeys them. *Agricultural social norms* may prescribe the cropping of a traditional plant even if farmers are not competitive in its production (Ray, 1998, p. 155–156). The social norm of *anti-achievement* (Elster, 2009, p. 196) or the social norm *proscribing profits* (Ray, 1998, p. 155) "can discourage the gifted from using his talents" (Elster, 1989), resulting potentially on a lower wage rate as well.

Therefore, let the wage rate of the consumer be given by the function w:

$$w(x, W, E, \delta) = W + \gamma(x, E, \delta) \tag{5}$$

where W is the *market wage rate* prevailing in the profession of the consumer regardless of his behavior vis-à-vis social norms; γ is the monetary gain of disobedience as a function of x, E and δ; and $E \geq 0$ is the quality of the economic environment (e.g., the efficiency of formal institutions).

The relation between γ and x is the outcome of an *efficiency effect* and a *punishment effect*. The former concerns the increase of the wage rate induced by the efficiency gain that arises from disobeying inefficient social norms. The efficiency effect is assumed to define a decreasing and always positive relation between the marginal gain of disobedience and the level of disobedience; more specifically, let the marginal gain of disobedience tend to infinity around complete obedience and to zero around complete disobedience. The intuition behind this assumption is that each additional level of disobedience reduces the scope of further efficiency gain.

The punishment effect, on the other hand, affects negatively the gain of disobedience (γ) because of sanctions imposed by the society against individuals who disobey social norms. Besides direct material sanctions, emotional sanctions such as avoidance and gossip can also generate material loss for non-conformists by deteriorating their reputation and their desirability on the labor market. As it has been assumed in Section 2.1.1, the society ignores low levels of disobedience, and each additional level of disobedience is punished more than proportionally.

[7] An example of a functional form satisfying the expected properties of μ is (in equation [4], $q = 1$)

$$\begin{cases} \mu(x, \delta) = 1 - \delta x^2 & \text{if} \quad x \leq \left(\frac{1}{\delta}\right)^{\frac{1}{2}} \\ \mu(x, \delta) = 0 & \text{if} \quad x > \left(\frac{1}{\delta}\right)^{\frac{1}{2}} \end{cases} \tag{4}$$

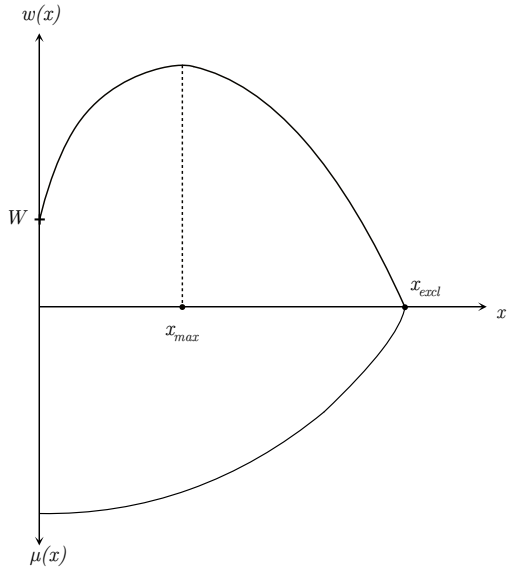

Figure 1: The total factor productivity and the wage rate functions

Therefore, when both effects are combined, the marginal gain of disobedience is decreasing and it becomes negative above a level of disobedience denoted x_{max} because the punishment effect outweighs the efficiency effect. Utility maximizing behavior suggests however that the disobedience level will not be higher than x_{max}, which restricts the possible range of disobedience to $x \in [0, x_{max}]$.[8] As a consequence, in-between this range, $\partial\gamma/\partial x > 0$; $\partial^2\gamma/\partial x^2 < 0$; $\gamma(0, E, \delta) = 0$ and $\lim_{x\to 0}\left(\partial\gamma/\partial x\right) = +\infty$ (see Figure 1).

Furthermore, the gain of disobedience (γ) depends on the economic (E) and the social (δ) environment because these are assumed to determine the magnitude of the efficiency and punishment effects. For instance, if the labor market is missing or private property is not properly enforced, that is, if E is low, disobeying social norms mentioned above is likely to have only a minor impact on the wage rate: $\partial\gamma/\partial E > 0$ and $\partial^2\gamma/(\partial x\partial E) > 0$. On the other hand, if the society becomes less tolerant, it will punish each level of disobedience more severely, reducing thereby the gain of disobedience: $\partial\gamma/\partial\delta < 0$ and $\partial^2\gamma/(\partial x\partial\delta) < 0$.[9]

Finally, a person would be excluded from the labor market when his behavior becomes socially unacceptable, which would also imply social exclusion. It is therefore assumed that w and μ tend to zero in similar values of x as in Figure 1.

[8] If $x > x_{max}$, disobedience would decrease both, w and μ. Thus, a rational individual will never disobey social norms more than x_{max}.

[9] A possible functional form of the gain of disobedience is

$$\gamma = Ex^{\tau} - \delta x^2 \quad \text{with} \quad 0 < \tau < 1 \tag{6}$$

2.1.3. Summary

In this paper, the consumer produces a composite commodity (Z_c) and social interactions (Z_s) by combining his time (t_i) with market goods (C_i). Social interactions is a particular final good: as disobedience to social norms increases, the total factor productivity (μ) associated with social interactions decreases more than proportionally. On the other hand, disobeying social norms increases the wage rate (w) at a decreasing rate. It follows that the disobedience level of a rational individual would never be higher than x_{max} as mentioned above. Hence, in the remainder of this paper, $x \in [0, x_{max}]$. Note that if all social norms were efficient, individuals would have no incentives to disobey them. This model is therefore concerned with inefficient social norms. The choice variables are Z_i, C_i, t_i and x, and, until Section 2.3, W, E, and δ are omitted in the functions notation for easier readability.

2.2. The Consumer's Choices

The consumer's income constraint is

$$p_c C_c + p_s C_s = w(x) t_w \tag{7}$$

and his time constraint is given by

$$t_w + t_c + t_s = T \tag{8}$$

where t_w is the time spent working on the market, p_i is the price of C_i, and T is the total available time. Combine equations (7) and (8) to obtain the full income constraint:

$$p_c C_c + w(x) t_c + p_s C_s + w(x) t_s = w(x) T \tag{9}$$

The optimal levels of t_i, C_i and Z_i are such that they maximize the consumer's utility (1) subject to the production constraints (2) and (3), and to the full income constraint (9). The first order condition giving the optimal combination of the factors used in the production of Z_i is (see Michael and Becker, 1973)

$$\left(\frac{\partial U}{\partial Z_i}\frac{\partial Z_i}{\partial C_i}\right) \Big/ \left(\frac{\partial U}{\partial Z_i}\frac{\partial Z_i}{\partial t_i}\right) = \frac{\partial Z_i / \partial C_i}{\partial Z_i / \partial t_i} = \frac{p_i}{w(x)} \tag{10}$$

Combining the first order condition (10) with (2) and (3) yields the optimal level of inputs:

$$t_s^* = t_s(Z_s, x) = \frac{Z_s}{\mu(x)} \left(\frac{p_s\ (1-\alpha)}{w(x)\alpha}\right)^{\alpha} \tag{11}$$

$$C_s^* = C_s(Z_s, x) = \frac{Z_s}{\mu(x)} \left(\frac{w(x)\alpha}{p_s\ (1-\alpha)}\right)^{1-\alpha} \tag{12}$$

$$t_c^* = t_c(Z_c, x) = Z_c \left(\frac{p_c\ (1-\beta)}{w(x)\beta}\right)^{\beta} \tag{13}$$

$$C_c^* = C_c(Z_c, x) = Z_c \left(\frac{w(x)\beta}{p_c\ (1-\beta)}\right)^{1-\beta} \tag{14}$$

The optimal consumption levels of Z_c and Z_s are obtained by equalizing the ratio of their marginal utility to the ratio of their marginal cost:

$$\frac{\partial U/\partial Z_s}{\partial U/\partial Z_c} = \frac{w(x)(\partial t_s/\partial Z_s) + p_s(\partial C_s/\partial Z_s)}{w(x)(\partial t_c/\partial Z_c) + p_c(\partial C_c/\partial Z_c)} = \frac{\left[p_s^{\alpha}\ w(x)^{1-\alpha}\ a\right]/\mu(x)}{p_c^{\beta}\ w(x)^{1-\beta}\ b} \equiv \frac{\pi_s}{\pi_c} \tag{15}$$

where $b \equiv [\beta/(1-\beta)]^{(1-\beta)} + [(1-\beta)/\beta]^{\beta}$; $a \equiv [\alpha/(1-\alpha)]^{(1-\alpha)} + [(1-\alpha)/\alpha]^{\alpha}$; and π_i is the shadow price of Z_i. The full income constraint can be written in terms of final goods:

$$Z_c\pi_c + Z_s\pi_s = w(x)T \tag{16}$$

Combine the first order condition (15) with equation (16) to obtain the optimal consumption level of Z_s and Z_c:

$$Z_s^* = Z_s(x) = \frac{\theta T}{a}\left(\frac{w(x)}{p_s}\right)^{\alpha}\mu(x) \tag{17}$$

$$Z_c^* = Z_c(x) = \frac{(1-\theta)T}{b}\left(\frac{w(x)}{p_c}\right)^{\beta} \tag{18}$$

Equations (11) to (14) suggest that the level of disobedience to inefficient norms affects the optimal level and combination of inputs: for example, an increase in the level of disobedience, by increasing the opportunity cost of time (w), leads time input to be substituted by market goods. Furthermore, Z_c^* is strictly increasing with the level of disobedience whereas the optimal level of social interactions initially increases with x, and, as disobedience increases further, Z_s^* starts to decrease because the income effect (i.e., an increase of Z_s resulting from an increase of w) is outweighed by the *reputation effect*, that is, a decrease of Z_s resulting from a decrease of μ (see Appendix A).

2.3. Optimal Disobedience Level to Inefficient Social Norms

Let V denote the indirect utility as a function of x:

$$V(x) = T\left(\frac{\theta}{p_s^{\alpha}\ a}\right)^{\theta}\left(\frac{1-\theta}{p_c^{\beta}\ b}\right)^{1-\theta} w(x)^{\alpha\theta+\beta(1-\theta)}\ \mu(x)^{\theta} \tag{19}$$

The optimal disobedience level is the one that maximizes the indirect utility. This methodology is possible because the choice of the disobedience level to norms is unconstrained, and it does not affect the definition of the first order conditions (10) and (15). Therefore, maximize V with respect to x (see Appendix B for the second order condition):

$$\frac{\partial V(x)}{\partial x} = T \left(\frac{\theta}{a\ p_s^{\alpha}}\right)^{\theta} \left(\frac{1-\theta}{b\ p_c^{\beta}}\right)^{1-\theta} w(x)^{\alpha\theta+\beta(1-\theta)}\ \mu(x)^{\theta} \left[\frac{\partial w(x)}{\partial x}\ \left[\alpha\theta+\beta(1-\theta)\right]\ w(x)^{-1}+\theta\frac{\partial \mu(x)}{\partial x}\mu(x)^{-1}\right] = 0 \tag{20}$$

Using equation (5) and including W, E, and δ in the notation of functions, equation (20) holds if

$$-\frac{\partial \gamma(x,E,\delta)/\partial x}{\partial \mu(x,\delta)/\partial x} = \frac{W+\gamma(x,E,\delta)}{\mu(x,\delta)\ \left[\alpha+\beta(1-\theta)/\theta\right]} \tag{21}$$

Given the properties of γ and μ, there is a unique value of x (as a function of the exogenous variables), denoted x^*, that verifies equation (21) (see Appendix C):

$$x^* = x(\theta,\alpha,\beta,\delta,E,W) \tag{22}$$

x^* is the optimal disobedience level to social norms or, said differently, the optimal social behavior. The optimal social behavior, which shapes economic decisions, is itself determined by economic and social factors. The relation of x^* with respect to θ, α, β, δ, E, and W discussed here below is found by comparative statics analysis (see Appendix D for mathematical details).

An increase in individuals' preferences for social interactions will lead them to obey more inefficient social norms: $\partial x^*/\partial\theta < 0$. It is also straightforward to understand why the optimal disobedience level will decrease as the society gets more intolerant to disobedience: $\partial x^*/\partial\delta < 0$.

The relation between the economic environment and the optimal social behavior is also quite intuitive: as the economic environment improves, the gain of disobeying inefficient norms increases. As mentioned in Section 2.1.2, better institutions—or technological innovations—create an environment where the increase of the wage rate induced by disobedience is likely to be higher than in an environment with inoperative institutions: $\partial x^*/\partial E > 0$. This relation is consistent with the economic literature: better institutions and greater tolerance are expected to have a positive impact for economic development.

As the output elasticities of market goods (i.e., α and β) increases, the shadow prices of Z_s and Z_c become less sensitive to an increase of the wage rate (see equation [15]). As a consequence, the optimal level of disobedience increases: $\partial x^*/\partial\beta > 0$ and $\partial x^*/\partial\alpha > 0$.

Lastly, equation (19) suggests that the marginal indirect utility of the wage rate is decreasing because $\alpha\theta+\beta(1-\theta) < 1$. Therefore, as the market wage rate increases, the marginal utility of the wage rate that was

induced by disobedience becomes lower than the marginal disutility of disobedience (see equation [21]).[10] In other words, when the market wage rate increases, obeying more to norms generates greater utility by increasing Z_s (through an increase in μ) than it generates disutility by decreasing both commodities (through a decrease in γ): $\partial x^*/\partial W < 0$.

Substitute x with x^* in equations (5), (11) to (14), (17), and (18) to find the *effective* wage rate, the *effective* level of inputs, the *effective* level of social interactions, and the *effective* consumption quantity of the composite commodity. Unless the gain of disobedience is much higher than its cost, or that there is a significant exogenous shock on parameters affecting the optimal disobedience level, individuals will rather obey inefficient social norms, and, as a consequence, inefficient social norms will last for a longer period of time, impeding thereby economic development.[11] This is especially true when the society is more intolerant to disobedience (high δ); the output elasticities of time inputs are important (low α and β); the preference for social interactions is high (high θ); the quality of the economic environment is low (low E); and the market wage rate is high (high W).

The model accounts for the four characteristic features of social norms pointed out by Burke and Young (2011): first, the existence of one commodity that is positively associated with obedience to inefficient social norms is enough to induce choices that individuals would not have made if they had not to conform. This is the *conformity warp* effect. The traditional household production model—and the mainstream consumer theory generally speaking—is a special case where social issues arising from non-conformity are supposed to not affect individuals. Then, when the society attaches a high importance to a social norm, its disobedience would be severely punished, that is, δ would be high, and people would not disobey this particular norm. This captures the *long-run stability* effect. Thirdly, the social behaviors will converge within a population but not necessarily between populations since the differences in the exogenous variables will lead societies to diverge. This corresponds to the *local conformity/global diversity* effect. Finally, the existence of a subsistence level of income under which the utility is zero would yield the *punctuated equilibrium* effect. This effect suggests that the accumulation of small changes may eventually reach a tipping point where a social norm would suddenly shift. The model predicts that the consumer adjusts its disobedience level at the margin when the market wage rate (W) decreases marginally. In this context, social norms evolve at a constant pace. However, the tipping point would be reached when the marginal decrease in the market wage rate would induce an income below the subsistence level. In this case, the consumer's disobedience level would have to *shift* (rather than increasing marginally) to restore the subsistence level of income (provided that the consumer can achieve this income level before the marginal gain of disobedience becomes negative).

[10] The value of x that verifies equation (21) implies necessarily that the marginal indirect utility of disobedience induced by the increase of w is equal to its marginal disutility induced by the decrease of μ so that the marginal indirect utility of disobedience is zero ($\partial V/\partial x = 0$).

[11] Since there is a wide range of social behavior between complete obedience to inefficient social norms (i.e. $x = 0$) and complete disobedience to them (i.e., the disobedience level associated with the most efficient social behavior), it is considered that an individual "rather obeys social norms" if his behavior is closer to complete obedience.

3. Empirical Framework

3.1. The Database

The 2005 wave of the World Values Survey (WVS) provides a voluminous micro database for many countries on issues such as people's values, beliefs, representations, work motivations, and social capital.[12] Only this wave contains the relevant variables for the empirical investigation conducted in this paper.

The *disobedience* variable is the answer to the following question: "would you please indicate whether the person for whom it is important to always behave properly and to avoid doing anything people would say is wrong is very much like you, like you, somewhat like you, a little like you, not like you, or not at all like you?"

A social norm concerning the same matter in two different societies may induce, prescribe, or proscribe opposite behaviors. The *disobedience* variable takes into account such differences. Moreover, this variable encompasses what different societies consider as disobedience.

The *Social interactions* variable is the "mean" membership level to the following five categories of social activities: membership of church; membership of sport or recreation; membership of art, music, educational; membership of labour unions; and membership of professional organization. For each activity, the interviewee says whether he is not a member (in which case the value of the variable is zero), an inactive member (the value of the variable is one), or an active member (the value of the variable is two). These variables have been summed and divided by five to get the mean membership level. *Social interactions* is therefore on a scale of eleven: $0, 0.2, 0.4, \ldots, 1.8, 2$.

The wage rate is proxied by the *income* variable that is on a scale of ten with one being the lowest and ten being the highest income decile specific to the country. *Income* encompasses all wages, salaries, pensions, and other incomes that come in.

The market wage rate is proxied by the *profession* of individuals, and it is on a scale of eleven with the following order: agricultural worker; farmer with own farm; unskilled worker; semi skilled worker; skilled worker; foreman and supervisor; non-manual - office worker (non-supervisory); office worker (supervises others); professional worker such as lawyer, accountant, or teacher; employer/manager of establishment with less than ten employees; employer/manager of establishment with more than ten employees. As the profession requires more skills and responsibilities, the market wage rate is expected to increase.

The control variables are age (restricted to individuals between twenty and seventy-five[13]); whether the person is unemployed; sex; the highest educational level attained; the number of child; the marital status;

[12] Data source: World Values Survey 2005 Official Data File v.20090901, 2009. World Values Survey Association (www.worldvaluessurvey.org)

[13] Such a restriction is made because it is considered that an important fraction of teenagers go to school and have different social norms than adults on the one hand, and that some time is required for the efficiency effect to become noticeable on the other hand.

the size of town; and the religiosity degree. Table E.3 in the Appendix E gives the descriptive statistics of all the variables. The empirical analysis includes forty-eight countries that were classified by whether they are rich, emerging, developing (according to Word Economic Outlook Update, July 16, 2012), or if they have experienced the Arab Spring (see Table E.4 in the Appendix E).

3.2. Empirical Specifications

In order to estimate the gain and the cost of disobedience, the empirical test is performed on the effective wage rate and the effective level of social interactions. Since the proxies for these variables are both ordered outcomes, I use an ordered logit procedure: the income decile to which individual k belongs, which is observed, is assumed to be determined by his effective wage rate. Similarly, the mean membership level to various activities of individual k is assumed to be determined by his effective level of social interactions. As the effective wage rate (the effective level of social interactions) crosses higher thresholds, the income decile (the mean membership level to various activities) to which individual k belongs increases.

Recall that the wage rate is given by $w(x, E, \delta) = W + \gamma(x, E, \delta)$. Replacing x by x^* gives the effective wage rate denoted w^{**}:

$$w^{**}\big(W, x^*\big) = W + \gamma(x^*) \tag{23}$$

In equation (23), the optimal disobedience level accounts for variations in the economic and social environment. Thus, the empirical specification of w^{**} is given by

$$w_k^{**} = \eta_0 + \eta_1 W_k + \sum_{j=2}^{6} \eta_j D_{j,k} + \eta_6 H_k + \epsilon_k \tag{24}$$

where D_j is a dummy that takes the value 1 if individual k's disobedience level is j (D_1 has been dropped to avoid perfect multicollinearity); η_0, η_1, and η_j are coefficients to be estimated; η_6 is a vector of coefficients to be estimated; H is a vector of control variables and $\epsilon \sim \text{Logistic}(0, \pi^2/3)$ is the error term.

Let Z_s^{**} denote the effective level of social interactions which is given by

$$Z_s^{**} = \frac{\theta T}{a} \left(\frac{w^{**}(W, x^*)}{p_s} \right)^{\alpha} \mu(x^*) \tag{25}$$

As previously, in equation (25), the level of x^* accounts for variations in the economic and social environment. The data do not contain information about the prices of market goods entering the production of social interactions. Therefore, it has to be assumed that all individuals from different countries face the same prices. Hence, let the empirical specification of the effective level of social interactions be:

$$Z_{s,\,k}^{**} = \phi_0 + \phi_1 w_k + \sum_{j=2}^{6} \phi_j D_{j,k} + \phi_7 M_k + u_k \tag{26}$$

where ϕ_0, ϕ_1, and ϕ_j are coefficients to be estimated; ϕ_7 is a vector of coefficients to be estimated; M is a vector of control variables and $u \sim \text{Logistic}(0, \pi^2/3)$ is the error term.

4. Results

Table 1 shows that each additional level of disobedience is positively related to a higher income up to disobedience levels 5, 4, and 3 in rich, emerging, and developing countries, respectively (since Arab Spring countries went through exceptional events, their results are discussed at the end of this section). As the disobedience level increases further, its coefficients decreases. For example, in emerging countries, disobedience level 6 has a negative and significant coefficient.

High levels of disobedience having statistically insignificant coefficients indicate that these levels are not significantly associated with a different income level than the highest level of obedience. Therefore, disobedience initially increases income and, as disobedience increases further, the income level decreases to its initial level. These results confirm that above a level of disobedience the punishment effect outweighs the efficiency effect.

Table 1: Income

Variables	**Dependent variable: income**			
sample restricted by country category:	Rich	Emerging	Developing	Arab Spring
• disobedience level:				
1.		*Reference level*		
2.	0.012	0.148**	0.133**	0.033
	(0.056)	(0.059)	(0.055)	(0.118)
3.	0.070	0.294***	0.244***	-0.234
	(0.060)	(0.063)	(0.066)	(0.154)
4.	0.157**	0.556***	0.157*	0.043
	(0.069)	(0.076)	(0.083)	(0.192)
5.	0.229***	0.030	0.153	0.368*
	(0.076)	(0.084)	(0.106)	(0.204)
6.	0.035	-0.232*	0.026	0.056
	(0.120)	(0.133)	(0.176)	(0.348)
• profession:				
agricultural worker		*Reference level*		
famer with own farm	0.019	0.241*	-0.115	1.038***
	(0.377)	(0.124)	(0.095)	(0.267)
unskilled manual worker	-0.383	0.222*	-0.139*	0.232
	(0.353)	(0.127)	(0.078)	(0.205)
semi-skilled manual worker	-0.259	0.337***	0.054	0.982***
	(0.349)	(0.124)	(0.091)	(0.221)
skilled manual worker	0.101	0.763***	0.191***	1.398***
	(0.345)	(0.119)	(0.072)	(0.286)
foreman and supervisor	0.389	1.057***	0.472**	2.016***
	(0.361)	(0.179)	(0.221)	(0.709)
non-manual - office worker: non-supervisory	0.318	0.852***	0.381***	1.738***
	(0.345)	(0.127)	(0.103)	(0.270)
supervisory - office worker: supervises others	0.673*	0.638***	1.233***	1.638***
	(0.348)	(0.137)	(0.132)	(0.455)
professional worker (e.g. lawyer, accountant, teacher)	1.123***	1.126***	0.849***	1.596***
	(0.350)	(0.134)	(0.094)	(0.279)

Table 1: (continued)

employer/manager of establishment (less than 10 employees)	0.692**	0.717***	1.077***	2.008***
	(0.352)	(0.140)	(0.138)	(0.246)
employer/ manager of establishment (10 or more employees)	1.543***	1.292***	1.172***	2.215***
	(0.361)	(0.212)	(0.280)	(0.566)
• highest educational level attained:				
no formal education		*Reference level*		
incomplete primary school	0.501**	0.496***	0.420***	-0.445***
	(0.232)	(0.150)	(0.116)	(0.159)
complete primary school	0.602***	1.165***	0.851***	-0.550**
	(0.219)	(0.142)	(0.104)	(0.241)
incomplete secondary school: technical/vocational type	0.471**	0.682***	1.245***	-0.092
	(0.225)	(0.156)	(0.106)	(0.343)
complete secondary school: technical/vocational type	0.983***	1.335***	1.077***	0.007
	(0.218)	(0.145)	(0.103)	(0.240)
incomplete secondary school: university-preparatory type	1.291***	0.916***	1.065***	-0.237
	(0.229)	(0.161)	(0.124)	(0.217)
complete secondary school: university-preparatory type	1.330***	1.735***	0.933***	-0.415**
	(0.222)	(0.148)	(0.118)	(0.178)
some university-level education, without degree	1.296***	1.630***	1.363***	0.529
	(0.225)	(0.165)	(0.146)	(0.559)
university - level education, with degree	1.678***	2.074***	0.952***	0.429*
	(0.223)	(0.156)	(0.130)	(0.239)
• unemployed	-1.372***	-0.765***	-0.932***	1.058
	(0.108)	(0.111)	(0.100)	(0.678)
• age	0.090***	0.002	-0.002	-0.060*
	(0.010)	(0.011)	(0.011)	(0.031)
age^2	-0.001***	0.000	-0.000	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)
• maried	1.184***	0.150***	0.192***	0.250*
	(0.050)	(0.056)	(0.055)	(0.144)
• number of children	-0.065***	-0.046***	0.002	-0.056
	(0.018)	(0.017)	(0.016)	(0.037)
• size of town:				.
2 000 and less		*Reference level*		
2000-5000	0.242***	0.131*	0.435***	0.730***
	(0.076)	(0.079)	(0.082)	(0.258)
5000-10000	0.319***	0.145	0.671***	0.334
	(0.080)	(0.096)	(0.089)	(0.247)
10000-20000	0.316***	-0.110	0.652***	0.464*
	(0.075)	(0.099)	(0.097)	(0.246)
20000-50000	0.393***	0.302***	0.482***	0.103
	(0.066)	(0.101)	(0.105)	(0.269)
50000-100000	0.307***	0.103	0.223**	0.559*
	(0.084)	(0.087)	(0.095)	(0.296)
100000-500000	0.378***	0.190***	0.286***	0.229
	(0.071)	(0.067)	(0.096)	(0.250)
500000 and more	0.347***	0.348***	0.565***	-0.434
	(0.073)	(0.074)	(0.090)	(0.306)
• sex (female)	-0.195***	0.083**	-0.044	0.402***
	(0.040)	(0.042)	(0.045)	(0.104)
• religious:				
a religious person		*Reference level*		
not a religious person	-0.037	0.079*	0.344***	-0.599***
	(0.042)	(0.048)	(0.060)	(0.199)
a convinced atheist	-0.261***	-0.186	0.556***	
	(0.060)	(0.127)	(0.090)	
Observations	8929	7734	6585	1500

Notes: The coefficients reported in this table are the log odds ratios. Robust standard errors are in brackets. *, **, *** indicate significance different than zero respectively at 90%, 95% and 99% confidence.

However, since the different levels of disobedience do not have equal intervals, it cannot be deduced from Table 1 whether the marginal gain of disobeying inefficient social norms is decreasing between two levels of disobedience. In Figure 2, the different disobedience levels are arbitrarily considered as equally distant. Using the results of Table 1, the figure plots the *centered* probability ratios, that is, the probabilities of belonging to higher income deciles as disobedience increases from 1 to 2, 1 to 3, 1 to 4, 1 to 5, and 1 to 6 (the reference disobedience level is 1), everything else held constant.[14] For example, in emerging countries, an individual whose disobedience level is 4 is 1.32 times more likely to belong to a higher income decile than an individual whose disobedience level is 1, everything else equal. Moreover, a second order polynomial curve is fitted for the different groups of countries by using the nonlinear least square method. The higher is the curve, the greater is the probability to belong to a higher income decile. Thus, the curve approximates the *expected* gain of disobedience (which will be simply referred to as the gain of disobedience).

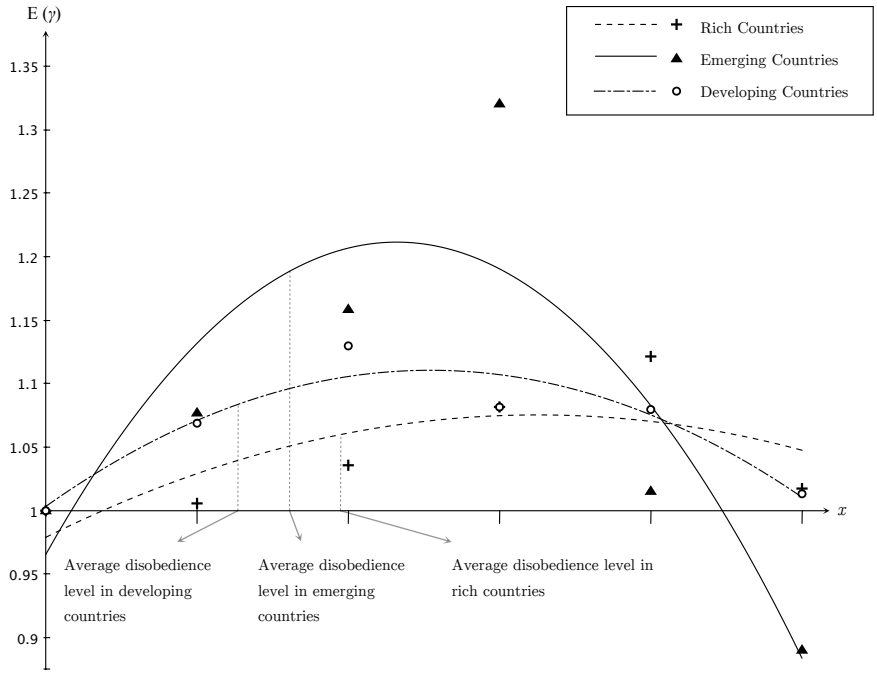

Figure 2: The expected gain of disobedience derived from Table 1. The interval between the disobedience levels are arbitrarily considered as equally spaced. The circles, triangles, and squares represents the probability of belonging to a higher income decile for each disobedience level over the probability of that of disobedience level 1. Note that the significancy of these points are as in Table 1. A second order polynomial curve is fitted for the different groups of countries by using the nonlinear least square method.

[14]The centered probability ratios are obtained by exponentiating the log odds ratios in Table 1, and then by taking their square roots. The probability ratio (i.e., the risk ratio or the relative risk) has a more intuitive interpretation than the odds ratio, and interpreting odds ratios as probability ratios inflates effect sizes in probability terms (Liberman, 2005). Liberman shows that the square root of an odds ratio yields the centered probability ratio (because it centers the probability pair around 0.5), which "provides a sort of average of all possible probability ratios for a given odds ratio". According to Liberman, the centered probability ratio is useful for making "general statement across the probability range" and "when one lacks a strong basis for choosing representative probabilities to explore".

Although the marginal gain of disobedience may locally increase between two levels of disobedience in Figure 2, overall, the marginal gain of disobedience appears to be decreasing: the fitted curve, which has a strictly decreasing marginal gain, explains 89%, 75%, and 55% of the variance for developing, emerging and rich countries, respectively. Furthermore, the distance between different disobedience levels can be adjusted to obtain a strictly decreasing marginal gain. Therefore, the assumption of decreasing marginal gain of disobedience made in Section 2.1.2 seems plausible.

The Figure 2 shows in addition that the average disobedience levels are below x_{max} as predicted by the model. Overall, the gain of disobedience is the highest in emerging countries followed by developing countries. However, for high levels of disobedience, the gain is the greatest in rich countries.

Table 1 shows furthermore that professions requiring higher qualifications and responsibilities increase income, suggesting that the market wage rate (W) is positively related to the effective wage rate (w^{**}). However, since professions are classified into broad groups, significant differences appear especially between very distinct groups. For instance, a professional worker (e.g., a lawyer) has a higher income than manual workers in each group of countries whereas the income difference between a professional worker and an employer/manager of an establishment with less than 10 employees depends on the country group.

The relation between the level of disobedience and the level of social interactions is given by the Table 2. In developing countries, each additional level of disobedience (except level 4) deteriorates increasingly social interactions. In emerging countries disobedience is negatively related to social interactions until disobedience level 4. Disobedience levels 5 and 6 are associated with more social interactions than levels 3 and 4, but less than level 1. This result may arise because the proxy for the effective level of social interactions is not sufficiently precise. Another explanation could be that people belonging to disobedience levels 4 or 5 form a group within themselves and thus their level of social interactions remains relatively high.

Table 2: Social Interactions

Variables	**Dependent variable: social interactions**			
sample restricted by country category:	Rich	Emerging	Developing	Arab Spring
• disobedience level:				
1.		*Reference level*		
2.	0.165***	-0.267***	-0.351***	0.241***
	(0.048)	(0.035)	(0.043)	(0.071)
3.	0.221***	-0.562***	-0.399***	0.239***
	(0.050)	(0.040)	(0.053)	(0.091)
4.	0.330***	-0.601***	-0.214***	0.209
	(0.054)	(0.049)	(0.065)	(0.140)
5.	0.437***	-0.330***	-0.448***	0.451***
	(0.056)	(0.056)	(0.081)	(0.175)
6.	0.324***	-0.165**	-0.531***	-0.201
	(0.090)	(0.080)	(0.152)	(0.244)
• incomes decile				
1.		*Reference level*		

Table 2: (continued)

2.	-0.006	-0.039	-0.130*	0.004
	(0.077)	(0.058)	(0.070)	(0.162)
3.	0.066	0.072	-0.084	0.140
	(0.074)	(0.056)	(0.069)	(0.153)
4.	0.090	0.168***	0.143**	0.382***
	(0.073)	(0.055)	(0.071)	(0.145)
5.	0.143**	0.295***	0.096	0.386***
	(0.071)	(0.052)	(0.067)	(0.141)
6.	0.345***	0.276***	0.323***	0.851***
	(0.074)	(0.057)	(0.074)	(0.151)
7.	0.493***	0.354***	0.412***	0.858***
	(0.076)	(0.059)	(0.081)	(0.159)
8.	0.558***	0.293***	0.685***	1.263***
	(0.086)	(0.067)	(0.095)	(0.176)
9.	1.041***	0.030	0.965***	0.782***
	(0.097)	(0.094)	(0.147)	(0.268)
10.	1.083***	0.245**	1.325***	0.753*
	(0.093)	(0.096)	(0.212)	(0.444)
• highest educational level attained:				
no formal education		*Reference level*		
incomplete primary school	0.347*	0.075	0.139**	0.854***
	(0.186)	(0.074)	(0.064)	(0.143)
complete primary school	0.650***	-0.445***	0.210***	1.314***
	(0.173)	(0.074)	(0.060)	(0.123)
incomplete secondary school: technical/vocational type	1.104***	-0.437***	-0.240***	2.310***
	(0.179)	(0.085)	(0.071)	(0.181)
complete secondary school: technical/vocational type	1.281***	-0.308***	0.025	1.424***
	(0.173)	(0.073)	(0.065)	(0.150)
incomplete secondary school: university-preparatory type	1.316***	0.344***	-0.288***	1.403***
	(0.183)	(0.080)	(0.090)	(0.151)
complete secondary school: university-preparatory type	1.204***	-0.060	-0.574***	1.043***
	(0.175)	(0.074)	(0.082)	(0.114)
some university-level education, without degree	1.667***	0.304***	0.232**	2.703***
	(0.177)	(0.091)	(0.101)	(0.196)
university - level education, with degree	1.800***	0.481***	-0.414***	2.136***
	(0.174)	(0.078)	(0.092)	(0.115)
• unemployed	-0.538***	-0.050	-0.345***	0.275**
	(0.069)	(0.042)	(0.047)	(0.117)
• age	0.023***	0.014**	-0.019**	0.038**
	(0.007)	(0.006)	(0.008)	(0.017)
• age^2	-0.000***	-0.000***	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
• maried	-0.067*	-0.268***	-0.492***	-0.155*
	(0.039)	(0.033)	(0.043)	(0.083)
• number of children	0.019	0.135***	0.111***	-0.045*
	(0.013)	(0.010)	(0.011)	(0.024)
• sex (female)	-0.224***	-0.243***	-0.354***	-0.729***
	(0.030)	(0.026)	(0.035)	(0.063)
• religious:				
a religious person		*Reference level*		
not a religious person	-0.703***	-0.463***	-0.809***	-0.028
	(0.033)	(0.035)	(0.057)	(0.100)
a convinced atheist	-1.018***	-0.623***	-1.282***	1.118**
	(0.049)	(0.083)	(0.130)	(0.484)
Observations	15250	20052	10743	5944

Notes: The coefficients reported in this table are the log odds ratios. Robust standard errors are in brackets. *, **, *** indicate significance different than zero respectively at 90%, 95% and 99% confidence.

Concerning rich countries, each additional level of disobedience increases social interactions until level 5, suggesting that the income effect is greater than the reputation effect. Nevertheless, the highest level of disobedience is associated with less social interactions than level 5.

Moreover, Table 2 indicates that the level of social interactions decreases with unemployment (as it is often highlighted in social sciences) and increases with the effective wage rate in rich and developing countries. These results are similar for emerging countries but the negative coefficient of unemployment is not statistically significant and the positive relation between the effective wage rate and the level of social interactions does not hold above income decile 7.

For individuals living in countries that experienced the Arab Spring five years after the WVS 2005 wave, empirical results show that disobedience increases social interactions without affecting the income. Becker and Murphy (2000, p. 144) argue that inefficient social norms, which impoverish the population eventually below the subsistence level, may be conveyed by the elite to protect its privileged position. The model predicts that a decreasing market wage rate (W) leads to disobedience that in turn slows or offsets the decrease of the wage rate (w). The empirical results of the Arab Spring countries can therefore be interpreted as a rejection of social norms (and as an example of the punctuated equilibrium): the people disobey social norms to maintain their income, and, because the values underlying the struggle are shared by the society, disobedience leads to a higher level of social interactions rather than social exclusion.

5. Discussion and Concluding Remarks

People "want to be 'rich and *famous*' " (Akerlof, 1980). The desire to be rich pushes individuals to disobey social norms whereas the will of being famous, that is, to have plenty of social interactions, may keep inefficient social norms in place. Increasing disobedience leads the consumer to a point where the increase of the wage rate (induced by disobedience) does not compensate, in utility terms, the increase of the social interactions' shadow price (also induced by disobedience). That point corresponds to the optimal disobedience level. It is therefore rational that individuals obey inefficient social norms.

The theoretical model predicts that individuals disobey inefficient social norms as (1) their preference for social interactions decreases; (2) the society gets more tolerant toward individuals who do not comply to its social norms; (3) the output elasticities of market goods increases; (4) the market wage rate, that is, the wage rate prevailing in a given profession regardless of the consumer's behavior vis-à-vis social norms, decreases; and (5) the quality of the economic environment, notably the efficiency of formal institutions (e.g., property rights), improves.

The consequences of disobedience to inefficient norms are (a) a higher income level; (b) more consumption of the composite commodity; (c) a lower level of social interactions as long as the reputation effect is greater than the income effect, otherwise the level of social interactions increases; and (d) a substitution of time

input by market goods.

When individuals have no incentives to disobey inefficient social norms, these will persist longer. As a consequence, social norms, which form an informal institution, can induce income differences across countries. Empirical results are consistent with the theory especially for emerging and developing countries, which is not surprising insofar the weight of informal institutions are likely to be more important in these countries. As predicted by the model, statistics show that the higher is the average disobedience level in a group of countries, the richer is this group (see Figure 2). The comparative analysis here below shows the connection between the theoretical model and the empirical results.

It is widely argued that rich countries have relatively the most efficient formal institutions (E is high). Moreover, the empirical results have shown that the cost of disobedience in these countries is very low, suggesting that they are relatively more tolerant toward individuals who disobey their social norms (δ is low). It is therefore observed that the average disobedience level is the highest in rich countries and, as a consequence, less inefficient social norms should persist. When social norms are rather efficient, disobedience should induce only a small increase of the wage rate because the scope of the efficiency gain arising from disobedience is limited. As expected, the estimated gain of disobedience is low in rich countries

Emerging countries are characterized by recent improvements in their formal institutions. These improvements have increased the gain of disobedience that in turn has led to a higher disobedience level. However, since the disobedience level has increased recently and that it is not as high as that of rich countries, more inefficient social norms are likely to persist in emerging countries. As a consequence, the gain of disobedience is higher in emerging countries than in rich countries because the scope of the efficiency gain is wider.

Moreover, the evolution of inefficient social norms in emerging countries seems to be induced mainly by improvements in formal institutions rather than greater tolerance because the intolerance of the society to disobedience is high. Possibly, some groups within the society have less incentives to disobey and therefore the new norms are not accepted by the whole society yet. Such broad range of social behaviors within a society reflects a social evolution which is to be linked with social tensions and inequalities; indeed, the *behavioral gap* between rich and poor, urban and rural, or educated and non-educated is likely to be rather wide in emerging countries.

The gain of disobedience is lower in developing countries than in emerging countries because the former do not have the economic environment which would allow individuals to fully take advantage of their disobedience to inefficient social norms. Additionally, the level of intolerance to disobedience in developing countries is similar to that of emerging countries. As a result, the incentives to disobey the society's social norms in developing countries are relatively low and thus most people obey them.

The model could be applied to specific norms or to broader issues. For instance, the model suggests that a higher wage rate, induced by disobeying inefficient social norms, results in social interactions to be market

goods intensive. This implies that individuals in rich countries maintain their level of social interactions by relying more on, say, trendy cloths, gifts, items reflecting membership to various groups, rather than the time spent for social interactions. As a result, disobedience to social norms affects consumption decisions by increasing the share of the budget allocated to the market goods mentioned above. Furthermore, I have briefly discussed in Section 4 how the model's predictions may offer a complementary explanation about an individual's decision to uprise against the existing institutions.

The theory developed in this paper raises new questions. The long term dynamics of the model and the way the society's tolerance is determined appear to be particularly important. The specificity of the long term is that the disobedience level to social norms of an individual can affect the disobedience level of others.

Appendix A. The variation of Z_s^* and Z_c^* induced by a change in x

Derive equation (17) with respect to (w.r.t. hereafter) x:

$$\frac{\partial Z_s^*}{\partial x} = \frac{\theta T}{p_s^\alpha a}\left(\alpha \frac{\partial w(x)}{\partial x}\frac{\mu(x)}{w(x)^{1-\alpha}} + \frac{\partial \mu(x)}{\partial x} w(x)^\alpha\right) \tag{A.1}$$

Given that $\big[\partial f(x)/\partial x\big]/f(x) = \partial\big[\log f(x)\big]/\partial x$, $\partial Z_s^*/\partial x > 0$ if

$$\alpha \frac{\partial \log w(x)}{\partial x} > -\frac{\partial \log \mu(x)}{\partial x} \tag{A.2}$$

Given the properties of w and μ, deduce that $\lim_{x\to 0}\big[\partial\big(\log w\big)/\partial x\big] = +\infty$ and $\lim_{x\to 0}\big[\partial\big(\log \mu\big)/\partial x\big] = 0$. As a result, when $x \to 0$, inequality (A.2) holds. On the other hand, $\lim_{x\to x_{max}}\big[\partial\big(\log w\big)/\partial x\big] = 0$ and $\lim_{x\to x_{max}}\big[\partial\big(\log \mu\big)/\partial x\big] = y$ with $y < 0$. Thus, when $x \to x_{max}$, inequality (A.2) does not hold.

Recall that $x \in [0, x_{max}]$. In between this range, $\partial\big(\log w\big)/\partial x$ is decreasing and $-\partial\big(\log \mu\big)/\partial x$ is increasing with x. Let x' denote the highest value of x for which inequality (A.2) holds. As long as $x < x'$, Z_s^* increases with x (income effect), otherwise Z_s^* decreases with increasing x (reputation effect).

Derive equation (18) w.r.t. x:

$$\frac{\partial Z_c^*}{\partial x} = \frac{\partial w(x)}{\partial x}\frac{\beta}{w(x)^{1-\beta}}\frac{(1-\theta)T}{p_c^\beta b} \tag{A.3}$$

The right hand side (RHS hereafter) of equation (A.3) is always positive: Z_c^* is strictly increasing with x.

Appendix B. Maximization of V: second order condition

Let

$$\zeta \equiv T\left(\frac{\theta}{a\ p_s^\alpha}\right)^\theta \left(\frac{1-\theta}{b\ p_c^\beta}\right)^{1-\theta} \tag{B.1}$$

and

$$\Psi \equiv \alpha\theta + \beta(1-\theta) \tag{B.2}$$

Hence, $\partial V(x)/\partial x$ (equation [20]) can be written as

$$\frac{\partial V(x)}{\partial x} = \zeta\ w(x)^{\Psi}\mu(x)^{\theta}\frac{\partial \log w(x)}{\partial x}\Psi + \zeta\ w(x)^{\Psi}\mu(x)^{\theta}\theta\frac{\partial \log \mu(x)}{\partial x} \tag{B.3}$$

$\partial V(x)/\partial x = 0$ corresponds to a maximum if $\partial^2 V(x)/\partial x^2 < 0$, which implies

$$\zeta\Psi\left[\Psi\frac{\partial w(x)}{\partial x}w(x)^{\Psi-1}\mu(x)^{\theta}\frac{\partial \log w(x)}{\partial x} + w(x)^{\Psi}\theta\frac{\partial \mu(x)}{\partial x}\mu(x)^{\theta-1}\frac{\partial \log w(x)}{\partial x} + w(x)^{\Psi}\mu(x)^{\theta}\frac{\partial^2 \log w(x)}{\partial x^2}\right]$$

$$+\zeta\theta\left[\Psi\frac{\partial w(x)}{\partial x}w(x)^{\Psi-1}\mu(x)^{\theta}\frac{\partial \log \mu(x)}{\partial x} + w(x)^{\Psi}\theta\frac{\partial \mu(x)}{\partial x}\mu(x)^{\theta-1}\frac{\partial \log \mu(x)}{\partial x} + w(x)^{\Psi}\mu(x)^{\theta}\frac{\partial^2 \log \mu(x)}{\partial x^2}\right] < 0 \tag{B.4}$$

Divide both side of this inequation by ζ, $w(x)^{\Psi}$ and $\mu(x)^{\theta}$, and, after rearranging it, inequation (B.4) becomes

$$\Psi^2\left(\frac{\partial \log w(x)}{\partial x}\right)^2 + \theta^2\left(\frac{\partial \log \mu(x)}{\partial x}\right)^2 + 2\Psi\theta\frac{\partial \log w(x)}{\partial x}\frac{\partial \log \mu(x)}{\partial x} + \left(\Psi\frac{\partial^2 \log w(x)}{\partial x^2} + \theta\frac{\partial^2 \log \mu(x)}{\partial x^2}\right) < 0 \tag{B.5}$$

Note that $2\Psi\theta\left[\partial \log w(x)/\partial x\right]\left[\partial \log \mu(x)/\partial x\right] < 0$ and $\Psi\left[\partial^2 \log w(x)/\partial x^2\right] + \theta\left[\partial^2 \log \mu(x)/\partial x^2\right] < 0$. Moreover, the first order condition for maximizing $V(x)$ requires that (see equation [20]):

$$\left(\alpha + \frac{\beta(1-\theta)}{\theta}\right)\frac{\partial \log w(x)}{\partial x} + \frac{\partial \log \mu(x)}{\partial x} = 0 \tag{B.6}$$

which is equivalent to

$$\left(\alpha + \frac{\beta(1-\theta)}{\theta}\right)\frac{\partial \log w(x)}{\partial x} = -\frac{\partial \log \mu(x)}{\partial x} \tag{B.7}$$

Multiply both side of equation (B.7) by θ and then square it. Using equation (B.2), equation (B.7) becomes

$$\Psi^2\left(\frac{\partial \log w(x)}{\partial x}\right)^2 = \theta^2\left(\frac{\partial \log \mu(x)}{\partial x}\right)^2 \tag{B.8}$$

Therefore, inequation (B.5) is true and $\partial^2 V(x)/\partial x^2 < 0$ for x^*.

Appendix C. Uniqueness of the optimal disobedience level

$\partial V(x)/\partial x = 0$ if (see equation[20])

$$\frac{\partial w(x)}{\partial x}\ \big[\alpha\theta + \beta(1-\theta)\big]\ w(x)^{-1} + \theta\frac{\partial \mu(x)}{\partial x}\mu(x)^{-1} = 0 \tag{C.1}$$

Recall equation (5): $w(x, E, \delta) = W + \gamma(x, E, \delta)$, hence $\big(\partial w/\partial x\big) = \big(\partial \gamma/\partial x\big)$. Thus, dividing both sides of equation (C.1) by θ and rearranging it yields

$$-\frac{\partial \gamma(x, E, \delta)/\partial x}{\partial \mu(x, \delta)/\partial x} = \frac{W + \gamma(x, E, \delta)}{\mu(x, \delta)\big(\alpha + \beta(1-\theta)/\theta\big)} \tag{C.2}$$

Equation (C.1) can be also written as

$$\frac{\partial \log w(x, E, \delta)}{\partial x}\ \left(\alpha + \frac{\beta(1-\theta)}{\theta}\right) = -\frac{\partial \log \mu(x, \delta)}{\partial x} \tag{C.3}$$

When $x \to 0$, the left hand side (LHS hereafter) is greater than the RHS. Moreover, $\partial\big(\log w\big)/\partial x$ is strictly decreasing and $-\partial\big(\log \mu\big)/\partial x$ is strictly increasing. Thus, there is a unique value of x as a function of the exogenous variables, denoted x^*, that verifies (C.3): $x^* = x(\theta, \alpha, \beta, \delta, E, W)$

Appendix D. Comparative statics: optimal level of disobedience

Let the function F be given by

$$F(x, E, \delta, \alpha, \beta, \theta, W) = \left(\alpha + \frac{\beta(1-\theta)}{\theta}\right)\frac{\partial \log w(x, E, \delta, W)}{\partial x} + \frac{\partial \log \mu(x, \delta)}{\partial x} = 0 \tag{D.1}$$

The total derivative of F is

$$\mathrm{d}F(x, E, \delta, \alpha, \beta, \theta, W) = \frac{\partial F}{\partial x}\mathrm{d}x + \frac{\partial F}{\partial E}\mathrm{d}E + \frac{\partial F}{\partial \delta}\mathrm{d}\delta + \frac{\partial F}{\partial \alpha}\mathrm{d}\alpha + \frac{\partial F}{\partial \beta}\mathrm{d}\beta + \frac{\partial F}{\partial \theta}\mathrm{d}\theta + \frac{\partial F}{\partial W}\mathrm{d}W = 0 \tag{D.2}$$

- Suppose $\mathrm{d}\delta = \mathrm{d}\alpha = \mathrm{d}\beta = \mathrm{d}\theta = \mathrm{d}W = 0$. The total derivative of F becomes

$$\mathrm{d}F(x, E, \delta) = \left[\left(\alpha + \frac{\beta(1-\theta)}{\theta}\right)\frac{\partial^2 \log w(x, E, \delta, W)}{\partial x^2} + \frac{\partial^2 \log \mu(x, \delta)}{\partial x^2}\right]\mathrm{d}x$$
$$+ \left[\left(\alpha + \frac{\beta(1-\theta)}{\theta}\right)\frac{\partial^2 \log w(x, E, \delta, W)}{\partial x \partial E}\right]\mathrm{d}E = 0 \tag{D.3}$$

Given the properties of w and μ, deduce that $\partial F/\partial x < 0$ and $\partial F/\partial E > 0$, hence

$$-\frac{\partial F/\partial E}{\partial F/\partial x} = \frac{\mathrm{d}x}{\mathrm{d}E} > 0 \tag{D.4}$$

Therefore when E increases, x^* must increase.

- Suppose that $\mathrm{d}E = \mathrm{d}\alpha = \mathrm{d}\beta = \mathrm{d}\theta = \mathrm{d}W = 0$. Repeat the same steps, and given the properties of w and μ deduce that

$$\frac{\partial F}{\partial \delta} = \left(\alpha + \frac{\beta(1-\theta)}{\theta}\right)\frac{\partial^2 \log w(x,E,\delta,W)}{\partial x \partial \delta} + \frac{\partial^2 \log \mu(x,\delta)}{\partial x \partial \delta} < 0 \tag{D.5}$$

Thus,

$$-\frac{\partial F/\partial \delta}{\partial F/\partial x} = \frac{\mathrm{d}x}{\mathrm{d}\delta} < 0 \tag{D.6}$$

Equation (D.6) indicates that when δ increases, x^* will decrease.

- $\mathrm{d}E = \mathrm{d}\delta = \mathrm{d}\beta = \mathrm{d}\theta = \mathrm{d}W = 0$. Deduce that

$$\frac{\partial F}{\partial \alpha} = \frac{\partial \log w(x,E,\delta,W)}{\partial x} > 0 \tag{D.7}$$

Therefore,

$$-\frac{\partial F/\partial \delta}{\partial F/\partial x} = \frac{\mathrm{d}x}{\mathrm{d}\alpha} > 0 \tag{D.8}$$

Equation (D.8) indicates that when α increases, x^* will increase.

- $\mathrm{d}E = \mathrm{d}\delta = \mathrm{d}\alpha = \mathrm{d}\theta = \mathrm{d}W = 0$. Deduce that

$$\frac{\partial F}{\partial \beta} = \left(\frac{1-\theta}{\theta}\right)\frac{\partial \log w(x,E,\delta,W)}{\partial x} > 0 \tag{D.9}$$

Hence,

$$-\frac{\partial F/\partial \beta}{\partial F/\partial x} = \frac{\mathrm{d}x}{\mathrm{d}\beta} > 0 \tag{D.10}$$

Therefore when β increases, x^* must increase.

- $\mathrm{d}E = \mathrm{d}\delta = \mathrm{d}\alpha = \mathrm{d}\beta = \mathrm{d}W = 0$. Deduce that

$$\frac{\partial F}{\partial \theta} = -\beta\left(\frac{\partial \log w(x,E,\delta,W)}{\partial x}\right)\theta^{-2} < 0 \tag{D.11}$$

Thus,

$$-\frac{\partial F/\partial \theta}{\partial F/\partial x} = \frac{\mathrm{d}x}{\mathrm{d}\theta} < 0 \tag{D.12}$$

Equation (D.12) indicates that when θ increases, x^* will decrease.

- $\mathrm{d}E = \mathrm{d}\delta = \mathrm{d}\alpha = \mathrm{d}\beta = \mathrm{d}\theta = 0$. Deduce that

$$\frac{\partial F}{\partial W} = -\left(\alpha + \frac{\beta(1-\theta)}{\theta}\right) \frac{\partial \gamma / \partial x}{\big(W + \gamma(x, E, \delta)\big)^2} < 0 \tag{D.13}$$

Hence,

$$-\frac{\partial F / \partial W}{\partial F / \partial x} = \frac{\mathrm{d}x}{\mathrm{d}W} < 0 \tag{D.14}$$

When W increases, x^* will decrease.

Appendix E. Descriptive Statistics

Table E.3: Descriptive Statistics

Variables	Observations	Mean	Min.	Max.	Standard Deviation
Rich Countries					
disobedience	18760	2.948881	1	6	1.39283
social interactions	18563	.3949146	0	2	.404127
profession	12905	5.765982	0	10	2.302006
income	17451	5.03931	1	10	2.384081
education	18844	6.109212	1	9	2.263786
age	18978	45.7173	20	75	14.98525
married	17725	.7127221	0	1	.4525051
number of children	18880	1.646981	0	8	1.383583
size of town	12564	4.888093	1	8	2.373449
female	18971	1.527437	1	2	.4992598
not religious	18306	1.625205	1	3	.687959
Emerging Countries					
disobedience	23490	2.611622	1	6	1.333263
social interactions	24064	.3320977	0	2	.4382459
profession	15504	4.283862	0	10	2.863735
income	22840	4.584851	1	10	2.339835
education	24298	5.279241	1	9	2.460791
age	24446	41.74675	20	75	14.41014
married	23661	.7124805	0	1	.4526154
number of children	24244	1.932684	0	8	1.696938
size of town	14447	4.537828	1	8	2.670091
female	24442	1.519147	1	2	.4996435
not religious	23328	1.293467	1	3	.5223567
Developing Countries					
disobedience	13071	2.270063	1	6	1.289552
social interactions	12360	.4230744	0	2	.4585426
profession	7716	3.698937	0	10	2.984766
income	12437	4.534534	1	10	2.129916
education	13225	4.308658	1	9	2.379715
age	13358	38.32071	20	75	14.23918
married	12970	.6454896	0	1	.4783831
number of children	13339	2.193118	0	8	2.087861
size of town	12208	4.811599	1	8	2.43807
female	13347	1.50206	1	2	.5000145
not religious	12981	1.203605	1	3	.4776089
Countries that Experienced the Arab Spring					
disobedience	6464	1.978342	1	6	1.170249
social interactions	6426	.1566138	0	2	.2993076
profession	2053	4.174866	0	10	2.892504
income	6479	4.341256	1	10	1.937846
education	6498	4.523546	1	9	2.94647
age	6508	37.76368	20	75	13.31946
married	6414	.7117244	0	1	.4529954
number of children	6294	2.358278	0	8	2.051192
size of town	5261	4.801749	1	8	2.457557
female	6489	1.556018	1	2	.4968904
not religious	6386	1.104291	1	3	.3071945

Table E.4: List of Countries and Number of Observations

Number	Country	Category	Observations Table 1	Observations Table 2
1	Andorra	Rich	844	876
2	Australia	Rich	1 003	1 002
3	Brazil	Emerging	1 017	1 251
4	Britain	Rich	611	628
5	Bulgaria	Emerging	316	705
6	Burkina Faso	Developing	395	859
7	Canada	Rich	806	1412
8	Chile	Emerging	661	808
9	China	Emerging	.	1424
10	Cyprus	Rich	.	919
11	Egypt	Arab Spring	715	2967
12	Ethiopia	Developing	577	1 114
13	France	Rich	683	714
14	Finland	Rich	.	703
15	Georgia	Developing	1 008	1 256
16	Germany	Rich	1 295	1 422
17	Ghana	Developing	781	1 134
18	India	Emerging	910	1 470
19	Indonesia	Emerging	949	1 423
20	Iran	Arab Spring	.	2 127
21	Japan	Rich	.	721
22	Malaysia	Emerging	708	962
23	Mali	Developing	42	649
24	Mexico	Emerging	.	1219
25	Moldova	Developing	776	867
26	Morocco	Arab Spring	785	850
27	Netherlands	Rich	.	552
28	Norway	Rich	777	823
29	Peru	Emerging	.	1 154
30	Poland	Emerging	348	765
31	Romania	Emerging	537	1 259
32	Russia	Emerging	.	1 202
33	Rwanda	Developing	764	1 114
34	Serbia	Emerging	479	878
35	Slovenia	Rich	612	765
36	South Africa	Emerging	.	2298
37	South Korea	Rich	.	1 164
38	Spain	Rich	.	911
39	Sweden	Rich	744	768
40	Switzerland	Rich	.	784
41	Taiwan	Rich	.	1 086
42	Thailand	Emerging	1 001	1 374
43	Trinidad and Tobago	Developing	447	851
44	Turkey	Emerging	.	1 148
45	Ukraine	Emerging	.	712
46	Uruguay	Developing	333	776
47	Vietnam	Developing	1125	1 305
48	Zambia	Developing	337	818

Note: Morocco and Iran are included into the Arab Spring countries group: the former country witnessed uprisings and constitutional reforms in the context of the Arab Spring. Iran, although not an Arab country in its majority, is also included in this category because the protests that stroked the country may have been influenced by the Arab Spring.

References

Akerlof, G. A., 1980. A Theory of Social Custom, of Which Unemployment May be One Consequence. The Quarterly Journal of Economics 94, 749–775.

Akerlof, G. A., Kranton, R. E., 2000. Economics and Identity. The Quarterly Journal of Economics 115, 715–753.

Arrow, K. J., 1971. Political and Economic Evaluation of Social Effects of Externalities. In Margolis, J. (Ed.). The Analysis of Public Output. New York: UMI, 1–30.

Becker, G. S., Murphy, K. M., 2000. Social Economics: Market Behavior in a Social Environment. Cambridge: Harvard University Press.

Bicchieri, C., 2006. The Grammar of Society: The Nature and Dynamics of Social Norms. New York: Cambridge University Press.

Burke, M. A., Young, P. H., 2011. Social Norms. In Benhabib, J., Bisin, A., Jackson, M. (Eds.). The Handbook of Social Economics, Vol. 1A. Amsterdam: North-Holland, 311–338.

Cacioppo, J. T., Hawkley, L. C., Thisted, R. A., 2010. Perceived Social Isolation Makes Me Sad: 5-Year Cross-Lagged Analyses of Loneliness and Depressive Symptomatology in the Chicago Health, Aging, and Social Relations Study. Psychology and Aging 25, 453–463.

Dana, J., Daylian M.C., Dawes, R.M., 2006. What you don't know won't hurt me: Costly (but quiet) exit in dictator games. Organizational Behavior and Human Decision Processes 100, 193–201.

Elster, J., 1989. Social Norms and Economic Theory. The Journal of Economic Perspectives 3, 99–117.

Elster, J., 1996. Rationality and the Emotions. The Economic Journal 106, 1386–1397.

Elster, J., 2007. Explaining Social Behavior: More Nuts and Bolts for the Social Sciences. New York: Cambridge University Press.

Elster, J., 2009. Norms. In Hedström P., Bearman, P. (Eds.), The Oxford Handbook of Analytical Sociology. Oxford: Oxford University Press, 195–217.

Hawkley L. C., Cacioppo, J. T., 2010. Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms. Annals of Behavioral Medicine 40, 218–227.

Hawkley L. C., Thisted R. A., Masi C. M., Cacioppo, J. T., 2010. Loneliness Predicts Increased Blood Pressure: 5-Year Cross-Lagged Analyses in Middle-Aged and Older Adults. Psychology and Aging 25, 132–141.

Haley K. J., Fessler D.M.T., 2005. Nobody's watching? Subtle Cues Affect Generosity in an Anonymous Economic Game. Evolution and Human Behavior 26, 245–256.

Liberman A. M., 2005. How Much More Likely? The Implications of Odds Ratios for Probabilities. American Journal of Evaluation 26, 253–266.

Michael, R. T., Becker, G.S., 1973. On the New Theory of Consumer Behavior. The Swedish Journal of Economics 75, 378–396.

North, D.C., 1990. Institutions, Institutional Change and Economic Performance. New York: Cambridge University Press.

North, D.C., 2005. Understanding The Process of Economic Change. New Jersey: Princeton University Press.

Postlewaite, A., 2011. Social Norms and Preferences. In Benhabib, J., Bisin, A., Jackson, M. (Eds.). The Handbook of Social Economics, Vol. 1A. Amsterdam: North-Holland, 31–67.

Ray, D., 1998. Development Economics. New Jersey: Princeton University Press.

Udry, C., 1996. Gender, Agricultural Production, and the Theory of the Household. The Journal of Political Economy 104, 1010–1046.

Zwarteveen, M. Z., 1996. A Plot of One's Own: Gender Relations and Irrigated Land Allocation Policies in Burkina Faso. IIMI Research Report 10, International Irrigation Management Institute (IIMI), Colombo, Sri Lanka. doi: 10.3910/2009.009.