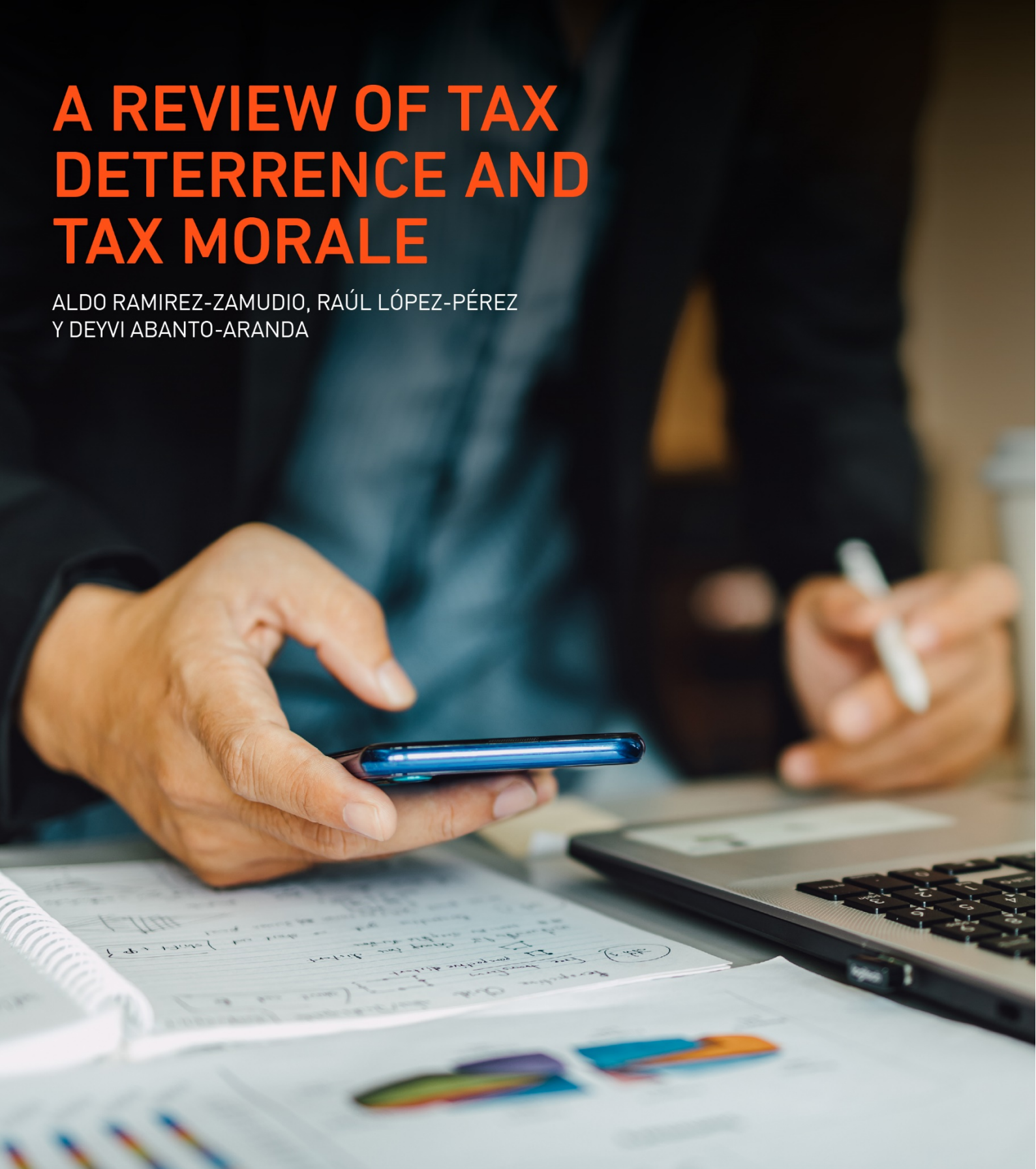# A REVIEW OF TAX DETERRENCE AND TAX MORALE

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A review of tax deterrence and tax morale [*]

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ABSTRACT: This work reviews theory and empirical evidence, first of the seminal neoclassical model of taxation from Allingham and Sandmo (1972) and then of "Tax Morale" which is the broad concept that groups taxpayer's non-pecuniary nor legally enforced reasons to pay taxes.

Keywords: Taxation, deterrence, Social Norms, Tax Morale.

JEL classification codes: D91, H21, H26, H30.

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1. Introduction

People often contribute money to their governments, e.g., by paying taxes. Since enforcement cannot reach all taxpayers in any country, the question of why people voluntarily pay their taxes is a crucial one for economic research and public policy because taxes support most of public investment and expenditures (Andreoni, Erard and Feinstein, 1998). Indeed, tax evasion has been an important research topic for many years, starting from the seminal paper by Allingham and Sandmo (1972), who adapted the Becker (1968) model of crime deterrence to study tax evasion. Their model assumes that taxpayers are standard economic agents adverse to risk and focused on their own material interest. Therefore, people pay taxes if the expected punishment for evasion is large enough, that is, if the probability of detection and the ensuing material sanctions are sufficiently high.

While the model by Allingham and Sandmo (1972) is remarkable for its parsimony, its empirical validity has been often contested (Alm, McClelland and Schulze, 1992; Andreoni et al., 1998; Frey, 2003; Luttmer and Singhal, 2014). In effect, since prevailing sanctions and detection probabilities around the world are arguably low, the model seems to be inconsistent with the relatively low levels of tax evasion observed in most developed economies (Alm et al, 1992; Torgler, 2002). In short, dissuasion cannot explain by itself the actual levels of voluntary tax compliance. This has caused the birth of an abundant literature that analyzes the importance of psychological and cultural elements to explain taxpayers' behavior (Scholz and Witte, 1989; Pommerehne and Weck-Hannemann, 1996; Feld and Frey, 2002; Torgler, 2002; Luttmer and Singhal, 2014; Mascagni, 2018; Alm, 2019).

These not-related-to-the-dissuasion arguments have been grouped under the concept of "Tax Morale", which includes varied non-standard motivations like loss aversion, peer effects, reciprocity, and social norms, to name a few, but also cognitive aspects like biased perceptions, bounded rationality, and the application of mental heuristics. One of the appeals of a better understanding of these elements is that they might suggest ways to reduce tax evasion at a relatively low cost for the tax administration (for examples, see Del Carpio, 2014; Hallsworth, List, Metclafe and Vlaev, 2017; López-Pérez and Ramirez-Zamudio, 2020).

2. Tax compliance and deterrence

The modern economic literature on tax compliance starts with the paper by Allingham and Sandmo (1972, A-S henceforth). For years after, much of the literature explored the A-S model and provided interesting extensions, although keeping its neoclassical spirit[3].

The Allingham-Sandmo Model: Basics

In the A-S model, W is the taxpayer's exogenous income, known by the taxpayer but not by the government, θ is the tax rate on reported income, X the income reported to

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[3] A Von Neumann-Morgenstern utility function (linear, concave or quasi-concave) with consumption as the main argument (other variations include leisure but the results are very similar) and dissuasive policies (like audits and fines) as factors affecting (mostly reducing) utility.

the government (the taxpayer's decision variable), and hence $\theta \cdot X$ the amount of tax to pay. If the taxpayer chooses to fully report then $W = X$. However, she may choose to report $X < W$ evading an amount equal to W-X. The tax authority does not know the true income and sets an enforcement system described by a probability p to audit the taxpayer ($0 \leq p \leq 1$) and a penalty or fine μ[4] for each dollar evaded, which is supposedly higher than θ. If the tax authority catches an evader, it fully detects the true income, hence imposes a fine of $\mu \cdot (W-X)$ dollars in addition to the evaded tax. The taxpayer chooses X to maximize

$$E[U] = (1-p)U(W - \theta X) + pU\big(W - \theta X - \mu(W - X)\big) \tag{1}$$

If we introduce:

$$Y = W - \theta X$$

$$Z = W - \theta X - \mu(W - X) \tag{2}$$

The first order condition for an interior maximum of $E[U]$ is:

$$-\theta(1-p)U'(Y) - (\theta - \mu)pU'(Z) = 0 \tag{3}$$

In turn, the second order derivative of (1) is called D, such:

$$D = \theta^2(1-p)U''(Y) + (\theta - \mu)^2 pU''(Z) \tag{4}$$

Note that the sign of D is negative if U is concave, as it is assumed afterwards. For an interior solution, the marginal expected utility at $X = 0$ and $X = W$ is evaluated. Given how Y and Z are defined, it requires that

$$\frac{\partial E[U]}{\partial X}\bigg|_{X=0} = -\theta(1-p)U'(W) - (\theta - \mu)pU'\big(W(1 - \mu)\big) > 0$$

and

$$\frac{\partial E[U]}{\partial X}\bigg|_{X=W} = -\theta(1-p)U'\big(W(1 - \theta)\big) - (\theta - \mu)pU'\big(W(1 - \theta)\big) < 0$$

And these two conditions can be respectively rewritten as

$$p\mu > \theta\left[p + (1-p)\frac{U'(W)}{U'\big(W(1 - \theta)\big)}\right] \tag{5}$$

$$p\mu < \theta \tag{6}$$

Both (5) and (6) guarantee an interior solution. Condition (6) leads to the first, straightforward

Prediction 1: Ceteris paribus, a rational agent will choose to evade at least some part of her income (W-X > 0) if the expected fine per unit of undeclared income ($p\mu$) is less than the tax rate θ.

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[4] The penalty rate μ (the punishment for evading) is usually a percentage of the undeclared income (W-X) and tax agencies usually collect the fine $\mu \cdot (W-X)$ separately to the evaded tax $\theta.(W-X)$, but each one also includes interests from the due time of the obligation to the final payment date.

A-S also explores the comparative statics of their model in terms of its main parameters. For this, they use the Arrow-Pratt Absolute (A) and Relative (R) risk aversion measures:

$$R_A(Y) = -\frac{U''(Y)}{U'(Y)}; \; R_R(Y) = -\frac{U''(Y) \cdot Y}{U'(Y)} \tag{7}$$

Then, they differentiate the first order condition (3) with respect to income W:

$$\frac{\partial X}{\partial W} = \frac{1}{D}[\theta(1-p)U''(Y) + (\theta - \mu)(1 - \mu)pU''(Z)] \tag{8}$$

Then, they substitute (3) into (8) to get the following expression

$$\frac{\partial X}{\partial W} = -\frac{1}{D}\theta(1-p)\,U'(Y)\left[-\frac{U''(Y)}{U'(Y)} + (1-\mu)\frac{U''(Z)}{U'(Z)}\right] \tag{9}$$

And simplifying with the definition of absolute risk aversion measure in (7),

$$\frac{\partial X}{\partial W} = -\frac{1}{D}\theta(1-p)U'(Y)[R_A(Y) - (1-\mu)R_A(Z)] \tag{10}$$

If absolute risk aversion is decreasing, then $R_A(Y) < R_A(Z)$. Hence, the sign of expression (10) is positive only if the penalty rate is greater than one ($\mu > 1$). Since this is a rather restrictive condition, A-S consider the sign of the derivative as well of the *fraction of real income* reported when income changes, to obtain

$$\frac{\partial(X/W)}{\partial W} = \frac{1}{W^2}\left(\frac{\partial X}{\partial W}W - X\right) \tag{11}$$

Then they substitute (8) and (4) into (11) to obtain

$$\frac{\partial(X/W)}{\partial W} = \frac{1}{W^2}\frac{1}{D}[\theta(1-p)U''(Y)W + (\theta - \mu)(1 - \mu)pU''(Z)W \\ - \theta^2(1-p)U''(Y)X - (\theta - \mu)^2 pU''(Z)X] \tag{12}$$

A-S simplify this expression using the definitions of Z and Y in (2) and get:

$$\frac{\partial(X/W)}{\partial W} = \frac{1}{W^2}\frac{1}{D}[\theta(1-p)U''(Y)Y + (\theta - \mu)pU''(Z)Z] \tag{13}$$

Finally, they substitute the first-order condition (3) to have

$$\frac{\partial\left(\frac{X}{W}\right)}{\partial W} = -\frac{1}{W^2}\frac{1}{D}\theta(1-p)U'(Y)[R_R(Y) - R_R(Z)] \tag{14}$$

Here it turns clear that when actual income varies, the fraction reported increases, stays constant or decreases depending respectively on whether relative risk aversion is an increasing, constant, or decreasing function of income. This means that

Prediction 2: If the agent's utility function exhibits a decreasing relative risk aversion to income, she will report a smaller fraction of her income (W) as it grows, thus increasing the amount evaded W-X.

To explore the effect on reported income X of the other parameters of the model, A-S differentiates (3) with respect to the tax rate θ, and use the definitions of risk aversion in (7) to obtain:

$$\frac{\partial X}{\partial \theta} = \frac{1}{D} X\theta(1-p)U'(Y)[R_A(Y) - R_A(Z)] + \frac{1}{D}[(1-p)U'(Y) + pU'(Z)] \tag{15}$$

The first term on the right side of (15) is a positive income effect: In effect, an increased tax rate θ makes the taxpayer less wealthy (Y and Z decrease for any level of X), and if relative risk aversion is decreasing, it would reduce evasion (W-X). The second term is a negative substitution effect because an increase in the tax rate θ makes it more profitable to evade taxes on the margin. Then we have.

Prediction 3: The effect of an increase in the tax rate θ on evasion is ambiguous and ultimately depends on the predominance of the income or the substitution effect it produces.

Similarly, differentiating as well the F.O.C. (3) with respect to the penalty rate μ, they obtain:

$$\frac{\partial X}{\partial \mu} = -\frac{1}{D}(W-X)(\theta-\mu)pU''(Z) - \frac{1}{D}pU'(Z) \tag{16}$$

Both terms in the expression are positive which implies

Prediction 4: An increase in the penalty rate μ will always increase the fraction of actual income declared X, thus reducing evasion.

Finally, A-S explore if audits increase compliance or not by deriving F.O.C. (3) with respect to p:

$$\frac{\partial X}{\partial p} = \frac{1}{D}[-\theta U'(Y) + (\theta - \mu)U'(Z)] \tag{17}$$

The derivative is positive, then the following result is direct

Prediction 5: An increase in the probability of detection p will always lead to a larger income being declared, reducing evasion.

Therefore, unambiguous results can be derived for the two parameters of the model (the penalty rate μ and the probability of detection p) which are of particular interest for policy purposes.

Evidence

In the early 1980s, an abundant data set was prepared and released to the public by the United States Tax Authority (IRS). This information was obtained from the 1969 Taxpayer Compliance Measurement Program (TCMP) and included estimates of the voluntary compliance rate by audit class[5] and aggregate data on numerous taxpayer characteristics. In this program, taxpayers were randomly selected for thorough audits and this information, together with similar data coming from other countries, allowed researchers to test economic theories of noncompliance.

Please notice that most empirical works testing the A-S model refer to the personal income tax as it is the focus of the model.

Prediction 1: Tax evasion is expected if the expected tax payment on undeclared income or expected penalty ($p\mu$) is smaller than the tax rate θ.

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[5] Audit classes (seven) were determined by a combination of the amount and source of income.

For some *preliminary* **discussion** on this point, Table 1 depicts average values for some parameters of the A-S model in some OECD and Latin American countries. Note that this table refers to personal income tax and all calculations were made with the information available at the tax agencies of each country.[6]

Country	1 Number of taxpayers registered (income tax)	2 Number of audits made on income tax	3 Probability of being audited (p) (2/1)	4 Penalty (μ) % of undeclared income	5 Expected penalty (p. μ) (3*4) %	6 Tax rate (θ) %	7 Income tax evasion (% of potential)
EEUU	142'000,000	933,785	0.0066	5%	0.03%	18.40%	10.1%
France	37'900,000	343,000	0.0091	10%	0.09%	14.80%	12%
Japan	42'000,000	200,000	0.0048	100%	0.48%	7.90%	8%
Canada	27'090,400	585,361	0.0216	50%	1.08%	26%	3.5%
Sweden	5'600,000	43,174	0.0077	20%	0.15%	56.78%	0.39%
Mexico	38'500,000	60,000	0.0016	45%	0.07%	21.36%	11.5%
Colombia	2'902,256	300,000	0.1034	20%	2.07%	20%	34.4%
Peru	6'900,000	43,000	0.0062	50%	0.31%	17.8%	15.7%

Note: Personal income data (2018) obtained from the tax services of each country, IRS (EEUU), IMPOTS (France), NTA (Japan), CRA (Canada), SKATTEVERKET (Sweden), SAT (Mexico), DIAN (Colombia) and SUNAT (Peru). However, some countries (e.g. Spain) do not inform on audits in their web sites neither to OECD: https://read.oecd-ilibrary.org/taxation/tax-administration-2017-table-a-15-verification-audit-activity-per-active-taxpayers-by-tax-type_tax_admin-2017-table73-en#page1 The methodology to calculate income tax evasion is obtained from Lahura (2016) and made in two steps. First, the potential collection of labor income is generated using the number of people of working age and the expansion factor of each socioeconomic level that pays taxes. Second, Potential Collection (PC) and Effective collection (EC) are substracted (TN = PC-EC) and the result is Tax Noncompliance (TN). Finally, Tax Evasion (TE) is TN as a percentage of Potential Collection, this is shown in column 7.

Columns 4 to 7 are in percentages. Column 3 is column 2 divided by column 1. Column 4 is a penalty that applies as a percentage of undeclared income as it is used in most countries and appears in tax agencies web sites (see also footnote 8 in 1.1). Column 5 is column 3 multiplied by column 4 (to replicate A-S prediction 1). Column 6 is the average tax rate on income as appears in tax agencies' web sites.

Table 1: Estimated parameters of the A-S Model

As we see, the A-S model would predict full (or positive) evasion for all these countries but the actual estimated rates of evasion in column 7 contradict that. Moreover, some of the data appears also to contradict the A-S model. For instance,

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[6] A particular remark concerns the data in column 3 about the probability of being audited (p). Since p is an unconditional estimation, it is very likely to be an under-estimation of the actual one for many taxpayers, but also an over-estimation for those others subject to third party reports (by their employers), which are in many countries out of the scope of regular audits. In Peru, for instance, the tax agency audits only taxpayers who are partially subjected to third party reports or those who have other sources of income besides this one.

Colombia shows approximately the same tax rate than Peru, but Peru has a tax evasion rate far lower than that of Colombia even though Colombia has a far higher expected penalty. More substantially, the estimated rates of tax evasion look too low, particularly considering that the estimated expected penalty is also rather low in all countries. Then penalty rates would not be crucial to deter evasion as predicted by the A-S model.[7]

Certainly, a more accurate discussion of this point would require considering the taxpayers' degree of risk aversion. However, in one of the best attempts to test the A-S model's predictions, Alm et. al. (1992), assuming a standard concave utility function and data from the United States, find that a mid-range estimate of the coefficient of relative risk aversion ($R_R(Y) = 3$) implies a rate of compliance of only 13 percent, well below any audit-based estimates of compliance. In fact, their calibration suggests that the coefficient of relative risk aversion must be quite high ($R_R(Y) = 5$) to achieve 44 percent compliance and extraordinarily high ($R_R(Y) = 10$) to achieve 71 percent compliance. In this line, Alm (2019) discusses some field evidence on the coefficient of relative risk aversion pointing out that there are a variety of estimation approaches, but most of them range between 1 and 2 and may even be as low as 0 (Friend and Blume, 1975; Hansen and Singleton, 1983; Hall, 1988; Chetty, 2006; Gandelman and Hernandez-Murillo, 2015).

Prediction 2: There is a positive relation between income and the evasion rate, provided that the agent's utility function exhibits decreasing relative risk aversion.

Discussion: Clotfelters (1983) also uses the TCMP data to analyze the empirical relationships among income, the marginal tax rate and evasion. He estimates a Tobit model in which the endogenous variable is evasion, and the exogenous variables are the after-tax-income and the combined state and federal marginal tax rate (among other variables). In line with prediction 2, the author reports a positive and significant coefficient for the two variables.

However, a test of this prediction using field data presents some issues. One of them is that in the A-S model income is exogenous and therefore it is theoretically possible to obtain an effect of its variation in the amount reported, but in the real world, tax authorities regularly use combined policy mechanisms to fight evasion which makes income endogenous and the analysis of pure income effects impossible to observe. In this line, Andreoni et. al. (1998) remind some interesting attempts of making income endogenous by adding labor supply (see Pencavel, 1979; Cowell, 1981; Sandmo 2005b). However, the effects of the enforcement tools simultaneously used turned to be all ambiguous. The authors suggest a possible explanation in which an increase in enforcement may reduce the effective wage rate that in turn may decrease labor supply and then income but if the labor supply curve is backward bending, more enforcement may increase the labor supply and decrease the amount reported (increasing evasion). In this same line, however, other studies found that individuals work more to increase earnings to cover probable audit's losses causing

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[7] Indeed, Sandmo (2005a) points out that penalty rates are lower than tax rates in most places all around the world (Table 1 above) and nevertheless we do not see full evasion. He even offers an example in which the penalty rate μ, ceteris paribus, is twice the regular tax rate θ and finds that only a probability of detection p greater than 0.5 would be able to deter full evasion but that p is far higher than that observed all around the world (see also table 1 above).

in turn to also increase evasion (see Weiss, 1976). Moreover, they also find that other utility functions gave also ambiguous results when manipulating parameters and thus think that evasion appears to be better explained instead by the strategic interaction between the tax authority and taxpayers.

Prediction 3: The effects of an increase in the tax rate θ on evasion are ambiguous depending ultimately on the income and substitution effects.

Discussion: Sandmo (2005a) tries to solve the ambiguity between the income and substitution effects by including black labor market and leisure, but his model cannot predict how the tax rate affects reported income. In contrast, Yitzhaki (1974) notes that this ambiguity is a consequence of the assumption that the taxpayer should pay a penalty rate μ on the undeclared income $(W - X)$. Instead, he proposes a penalty or fine (F) to be imposed on the evaded tax $\theta(W - x)$ and not income, as in EEUU or Israel. In this case there is no substitution effect. Assuming decreasing relative risk aversion he proves that evasion decreases as the tax rate increases –see expression (15) above.

However, some empirical studies find that marginal tax rates do not have a significant effect on tax evasion. For example, Kleven, Knudsen, Kreiner, Pedersen and Saez (2011) run a tax enforcement field experiment in Denmark for a representative sample of 40,000 taxpayers. In the base year, half of them were randomly selected to be thoroughly audited, while the rest not and used as control. In the following year, threat-of-audit letters were randomly assigned and sent to taxpayers in both groups. The authors define that pre-audit measurement includes the combined effect of tax avoidance and tax evasion, post-audit involves the tax avoidance only, and the difference between them refers to the effect of tax evasion only. They find that the marginal tax rate has only a small positive substitution effect on tax evasion for taxpayers with mostly self-reported income, and third-party reporting turns to be much more important than low marginal tax rates to improve compliance (see also Porcano 1988).

In contrast, Pommerehne and Weck-Hannemann (1996) present data from Switzerland, an interesting country for testing the A-S model because, according to the authors, its strong fiscal decentralization adds considerable variance in the potential determinants of tax evasion. They estimate a simultaneous equation system and find a significant positive impact of the marginal tax rate on evasion (see also Clotfelter, 1983; Witte and Woodbury, 1985).

Prediction 4: There is a negative relationship between evasion and the penalty rate μ (a higher penalty rate produces a decrease in evasion)

Discussion: According to this, if most taxpayers were risk-averse the tax authority would easily fight against evasion by raising μ sufficiently. Precisely, Sandmo (2005b) shows that the effects of changes in the penalty rate μ and the probability of detection p have the same signs as they have in the A–S model, in line with Prediction 4.

In this point, Park and Hyun (2003) use an asymmetric-information variation of the A-S model in which income is exogenously endowed and therefore, is known only by the individual taxpayer. They set a lab experiment with graduate students in different sessions, each with different combinations of tax rates, audit rates, fine rates,

absence/presence of public goods, and education on the importance of voluntary and honest tax payments. They set a compliance rate (actual income/reported income) as a dependent variable, run a Tobit model and find that raising 1% the penalty rate produces an increase in 1.0467%, in the compliance rate but raising 1% the probability of audit increases compliance in only 0.4212%. They conclude that the penalty rate has a bigger effect.

However, Andreoni et. al. (1998) remind that the penalty rate has never been so high in any country (see column 4 in Table 1 above), mostly because a very high penalty would produce bankruptcy making this prediction impossible to prove empirically in the field. Indeed, penalties are not as high in any country (mostly) for political reasons, and those works that have tested their effects have been made only theoretically or in laboratory and not having real taxpayers as subjects.

Prediction 5: An increase in the probability of detection p will reduce evasion.

Discussion: Witte and Woodbury (1985) conducted one of the first regression modeling studies on the topic published in the literature. They used the TCMP data cited above, made a random audit assumption, and found that higher probabilities of audits were associated with higher levels of compliance. This result however presents some problems. To start, the effects were lagged probably due to the consistency between changes in objective and perceived audit probabilities, even more, Dubin and Wilde (1988) suggest that Witte and Woodbury's model was wrongly specified since many of the tax agency variables are indeed endogenous including the audits that are not random but determined instead by taxpayer characteristics and agency's resources. Using the same TCMP data, they reported inconsistent results with respect to the deterrent effects of audits. Also, Beron, Tauchen and Witte (1988) use data from different sources in the mid 1970's and even though they find that audits appear to stimulate compliance, the effect was not large nor statistically significant.

In turn, Luttmer and Singhal (2014) remind that most tax authorities intentionally avoid disclosing information making taxpayers to have incomplete information about true audit rates. For example, Scholz and Pinney (1995) use matched IRS-survey data from the United States and find that individuals report a subjective probability of being detected (conditional on underreporting income) far higher than the actual IRS' probability of audit. In contrast, Del Carpio (2014) finds that Peruvian taxpayers apparently underestimate the probability of audit and disclosing its actual numbers would improve tax collection. She claims that a combination of a payment reminder and information about enforcement of property tax both increases perceived probability of audit and this results in increased tax compliance. However, the effects appear to be caused mainly by the payment reminder[8]. In this point, Luttmer and Singhal (2014) think that this finding instead suggests a failure of individual optimization due to bounded rationality rather than wrong perceptions about the probability of audit. They say that this is consistent with Hallsworth, List, Metcalfe, and Vlaev (2014), who also find a direct effect of payment reminders on UK taxpayers for similar reasons.

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[8] Indeed, it is worth noting that municipalities do not audit, but just collect the property tax (which is of a far simpler calculation than the income tax). Hence the message could act more as a payment reminder than as an audit warning.

Sandmo (2005b) also points out that p is indeed the taxpayer's subjective probability, surely different from the statistical frequency with which peoples' tax returns are checked. He even mentions some empirical studies in which people tend to overestimate the probability of detection (See Andreoni et. al. 1998 and Scholz and Pinney, 1995), then he claims that this overestimation would increase p above observable audits/taxpayer ratios to high enough levels to make the A-S model's predictions sound.

Even though, if we assume that the probability of audit p is indeed the perceived one, its real impact on tax compliance appears to be rather weak according to more recent experimental evidence. For example, Blumenthal, Christian and Slemrod, (2001) run a field experiment in 1995 in which they randomly selected a 'treatment group' of 1724 Minnesota taxpayers and send the treatment group's subjects a letter saying that the returns they were about to fill would be 'closely examined'. The authors used two years of data to make comparisons of changes in reported income, deductions, and tax liability between the treatment and the control group (those who did not receive this letter).

As a result, both treatment and control increased their reported liabilities. However, the difference in differences[9] was not statistically significant for the treatment group. As a result, the authors conclude that a threat of examination (increasing the perceived probability of audit) appears to increase the reported income and tax liability only of low- and middle-income taxpayers, especially those that have greater opportunities to evade taxes. However, they represent only less than 2% of total tax liability.

Additional evidence comes from Park and Hyun (2003), described above. In effect, when subjects know the parameters (e.g. the probability of audit/detection) the authors find a positive, significant, however modest effect of the probability of audit on compliance (elasticity is only 0.4212%, being that of the penalty rate far higher). On the same topic, Tan and Yim (2014) run a computerized experiment with two treatments: the first in which they introduce uncertainty by informing subjects of the maximum number of audits to be carried out (bounded rule), and the second in which, resembling what the A-S model implies, they inform the subjects about the exact audit probability (Flat rule). The authors claim that the bounded rule describes the actual auditing practice more realistically and implies a game theoretic environment since the probability of being audited depends on the other taxpayers' evasion decisions. Their results show that compliance improve significantly for the bounded rule.

Kleven et al (2011), whose study for 40,000 taxpayers in Denmark was mentioned above for prediction 3, find a positive effect of the threat-of-audit letters on the amounts and probabilities of self-reported adjustments to income and tax liability. Nevertheless, the effects are modest compared to those of actual previous-year audits, which suggests that audit-threat letters create less variation in the perceived probability of detection than actual audit experiences.

Many first-generation laboratory experiments varying audit probabilities found expected but low positive effects of audit rates on compliance (Spicer and Thomas, 1982; Mason and Calvin, 1978; Song and Yarbrough, 1978; Spicer and

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[9] The difference in the percentages' variation of both groups

Lundstedt, 1976; Warneryd and Walerud, 1982). However, Fischer, Wartick and Mark (1992) claim that these experiments seem biased because instructions appeared to direct subjects to maximize income and ignore nonpecuniary factors that may encourage compliance in the real world, while those run afterwards and designed to better mask the purpose of the study found no consistent results (see e.g., Robben, Webley, Elffers and Hessing, 1990; Weigel, 1991). The authors point out that survey studies may be also biased towards a positive correlation between p and compliance because it is highly possible that individuals who evade tax are less likely to participate in the studies and on the contrary, compliance behavior of those who do participate surely causes a greater perceived probability of detection.

On the other hand, some may think that the regression studies are more valid to analyze evasion because they are based on actual taxpayer compliance data. Nevertheless, these authors say that of the four regression studies they reviewed, two of them, contrary to what it is expected, provide evidence of a negative correlation between audit probability and compliance (Dubin, Graetz and Wilde, 1987; Dubin and Wilde, 1988), a third failed to detect a statistically significant relationship between these variables for half of the cases examined (Beron, Tauchen and Witte, 1992) and only the pioneer work of Witte and Woodbury (1985) appears to demonstrate a positive relationship between p and compliance (however, criticized by later works like those mentioned). It appears then that there is no firm evidence that increasing detection probability affects compliance (see also Roth et al. 1989, p. 105).

More recently, Ariel (2012) reports a field experiment with 4,395 firms in Israel in which two groups received different tax letters, one letter conveying a deterrent message (implying an increase of the probability of audit) and the other a moral persuasion one. His results indicate that both treatments do not produce statistically significant greater compliance compared with control conditions. Even more, the persuasion letter produced a backfiring effect in terms of deductions. Gangl, Torgler, Kirchler and Hoffman (2014) conduct another field experiment for newly started firms in Austria. They analyze the effect of a "friendly" supervision on timely tax payments, which may be interpreted as an audit. The authors eliminate previous experiences between taxpayers and the tax administration by focusing only on new firms, and mostly on those classified as high-risk groups for tax evasion. Their results indicate that close supervision offers no overall positive effect on tax compliance but alternatives to enforcement measurements such as service and/or trust approaches might be better to increase compliance (see also Alm and Torgler, 2011). The authors claim that supervision appears to crowd out the intrinsic motivation of taxpayers (see also Feld and Frey, 2002; Torgler, 2002).

In summary, we cannot find definite evidence on the positive effects of deterrence on compliance. Moreover, of all the A-S parameters that can be potentially used as policy rules only the probability of audit/detection appears to be available with some degrees of freedom. However, the contradictory results about its effects are probably because we do not understand yet how agents form it.

3. Non-deterrence arguments (Tax Morale)

As we have seen, A-S' deterrence approach cannot explain satisfactorily the observed tax compliance rates around the world. Alm (2019), in a broad coverage of the tax compliance literature, says that individuals are obviously heterogeneous, then some may be motivated only by financial outcomes, but others may have different preferences including non-pecuniary elements. A growing literature has grouped the latter under the ample term "Tax Morale" and this concept includes various motivations like loss aversion, peer effects, reciprocity, and social norms, etc. but also cognitive aspects like biased perceptions, bounded rationality, and the application of mental heuristics. Let now us review some of these concepts in a more detailed way.

Taxpayers' satisfaction with public goods funded with their taxes

Alm (2019) reminds that the most important issue regarding public goods' contribution is how to influence the individuals' willingness to cooperate and avoid the 'free-rider' problem. In this vein, taxpayers may decide to contribute based on their evaluation of public goods and services amount and quality, for example, Alm and Gomez (2008) use data from the survey of Spanish Fiscal policies with 2,483 Spanish citizens. They set "Tax Morale" as a dependent dichotomous variable and various questions of the survey as independent variables. They run a Probit model and find that one-unit increase in the individual perceptions of the benefits to society derived from public goods increases Tax Morale by 7.4 percentage. Similar results are provided by Cummings, Martínez-Vázquez and Torgler (2005), who found evidence of a substantial improvement in Tax Morale in Spain from 1981 to 2000, years coincident with democracy and institutional improvement.

Also, Mascagni et al. (2017) run a large (9 thousand subjects) field experiment in Rwanda in which they sent a combination of three message contents (deterrence, information about public goods, reminder of payments) and three delivery methods (letter, email, SMS), and they compared them to a control group that received no message. Then they run a two-part Tobit model, calculate the overall revenue gain obtained by the treatments relative to the control group and find an increase in compliance in the range of 16.0 to 23.7 percent. They also find that messages including both information about public goods and gentle reminders are more effective than those including deterrence (that appears to work mainly for small taxpayers). On the same vein, Lopez-Perez and Ramirez Zamudio (2020) set a lab-in-the-field experiment in Peru, in which they ask 117 subjects to donate none or part of an endowment to public treasury, they set three groups, one treatment in which subjects were informed about two large public projects in execution (IP), other treatment on which subjects were informed that a well-known Peruvian Olympic medalist pays punctually her taxes (PF), and a control group with no information at all. They find that subjects in both treatments donate in average far more than those in the control group, that the probability of donating increases for being in any of the treatments and that it would be possible to set simple and not related to deterrence, policy rules to improve compliance.

Institutions, trust in government, and perceptions of corruption

Alm (2019) claims that the social and institutional environments in which individuals live affects compliance and this has been consistently demonstrated by empirical findings of differences in compliance behavior in countries with similar fiscal systems but different social and institutional environments (Alm, Sanchez and De Juan, 1995; Cummings, Martinez-Vazquez, McKee and Torgler, 2009; Andrighetto, Zhang, Ottone, Ponzano, D'Attoma and Steinmo, 2016). It has also been found that individuals who have a negative attitude towards government tend to comply less, both in the laboratory (Webley et al., 1991) and in the real world (Pommerehne and Weck-Hannemann, 1996). Further, 'trust' in institutions affects the viability of government policies: when individual trust in government is greater, enforcement tends to be more effective in deterring non-compliance.

In one of the pioneer empirical works on this view, Smith (1992) uses the Taxpayer Opinion Survey (TOS)[10] to perform a multivariate analysis showing the effectiveness of alternative policies over those based on deterrence. He claims that taxpayers will improve their compliance if they consider that government services are worth the paid tax. He also finds that trust in the president, the belief that other individuals obey the law and a pro democratic attitude have significant positive effects on tax morale.

Also, Feld and Frey (2002) use data of Swiss cantons for five different years during the period from 1970 to 1995 and find that a respectful treatment from authorities to taxpayers, decreases in 5.726% the ratio of income evaded as a percentage of true income. In contrast, when tax officials consider taxpayers purely as 'subjects' who have to be forced to pay, taxpayers tend to respond by actively trying to avoid taxation (similar results in Kastlunger, Dressler, Kirchler, Mittone and Voracek, 2010).

More empirical evidence is provided by Cummings et. al. (2009), who run a lab-experiment with university students in Botswana (99 subjects) and South Africa (88 subjects), and whose setting imitates a real annual tax process (including deterrence). The experiment controls all other factors not related to the institutional environment. Authors use a Tobit estimation and show that participants in South Africa exhibit lower compliance (statistically significant at the 0.05 level). Thus, they claim that low quality governance causes a negative effect on compliance.

Torgler (2003) uses the World Values Survey and the TOS to check determinants of tax morale in 17 European countries and the US, and finds that an increase of trust by one unit increases the share of people stating that tax evasion is never justifiable between 3.3 and 4.1 percentage points. He also claims that trust in the president is even more important for tax morale in developing countries because taxes can be even seen as a price paid for government's positive actions to face greater problems.

Indeed, some other authors have paid exclusive attention to the determinants of trust (e.g., Scholz and Lubell 1998; Wintrobe 2001; Torgler, 2002 2004). For example, in a recent empirical work, Jimenez and Iyer (2016) also study the effect of

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[10] A survey collected in the United States in 1987 that provides a wide source of taxpayers' opinions and evaluations of the tax system, the Internal Revenue Service, tax evasion, etc.

trust in government on tax compliance. They use a sample of 217 US taxpayers and claim that people may judge actions of an entity as fair or unfair depending upon how much that entity is trusted. In summary, it appears to be that trust in public authorities might tend to increase commitment to the tax system and compliance.

Social norms, intrinsic motivations, and cultural characteristics

Alm (2019) thinks that much of the individual behavior can be viewed as a 'psychological contract' between individuals (and between individuals and governments) and a central item of this contract is the concept of 'social norm' (Elster, 1989). The author says that "a social norm represents a pattern of behavior that is judged in a similar way by others and that is sustained in part by social approval or disapproval". Therefore, individuals usually follow social norms for different reasons than just the fear of legal punishment.

Also, Alm (2013) suggests a way to introduce social norms in standard theory, through a 'Reference Point' like Kahneman and Tversky (1979). He claims that the social norm may be achieved by reporting all income and paying all taxes so that an individual who underreports or pays less than her liability suffers a loss in utility. However, there is evidence that not always a social norm may induce compliance and it ultimately depends on what is accepted by most members of the social group (see for example: Myles and Naylor, 1996; Fortin, Lacroix and Villeval, 2007; Traxler, 2010). Even more, some social norms may be widely accepted but harmful for the own social group in which they are dominant, e.g., violence, misogyny, discrimination, tax evasion, etc.[11]

In one of the first empirical works on social norms and tax compliance, Torgler (2004) compares Costa Rica and Switzerland. He uses data from the Latinobarometro study of 1998 for Costa Rica and the World Values Survey (WVS) for Switzerland, he sets the compliance rate as the dependent variable and runs Tobit maximum likelihood estimations. He finds that compliance rate in Costa Rica is higher than in Switzerland and claims that internal social norms have a positive effect on tax morale.

Jimenez and Iyer (2016), mentioned in the previous section, collect information of 217 US taxpayers, through a survey, on taxpayers' political party identification, trust in government, fairness perceptions and compliance intentions. Then they run a structural equations' model in which the dependent variable is the likelihood of a taxpayer to comply with tax laws in a scenario where she may perceive an opportunity to evade taxes. Their results indicate that social norms have a positive and significant influence on taxpayers' compliance. However, social norms only influence compliance indirectly through internalization as personal norms.

Evidence on intrinsic motivations is provided by Torgler and Schneider (2005) who take data from the 1990 World Values Survey (WVS) and the 1999 European Values Survey (EVS) and analyze the attitudes of society towards paying taxes in Austria with a pooled regression model. They find that the impact of social variables on tax morale is strong, especially pride. Indeed, when pride increases by one unit, tax morale increases by 9%. Also, Dwenger, Kleven, Rasul and Rincke (2016) present a case of pure voluntary compliance in a German Protestant church where its

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[11] See the brief 'Changing cultural and social norms that support violence' elaborated by the World Health Organization: https://www.who.int/violence_injury_prevention/violence/norms.pdf

authorities set a fixed rate but completely voluntary tax, and find that even though contributions were heterogeneous, there was a sharp peak at the exact level of fixed rate which would reflect one specific form of intrinsic motivation.

Furthermore, Luttmer and Sighal (2014) claim that if we introduce intrinsic motivations like Ethics and Morality in the utility function, we may be able to better explain compliance because if a moral individual is one who considers paying taxes as the ethical norm, then if the individual behaves differently, she may suffer a psychic cost. Therefore, they suggest that every individual has two different components in her utility function. The first part is the standard expected utility, and the second part is what they called a "moral identity utility", which is the gain or loss in utility from conforming or not to an individual's ideal behavior.

Torgler (2003) outlines the importance of rules to understand tax morale and tax compliance. He thinks that focusing on rules implies analyzing the process of tax honesty and not just the outcome (see also Alm 2013). The author analyzes tax morale empirically and wonders what the reasons are why people are more co-operative than seems to be rational given the enforcement structure. He says that individuals have the tendency to follow specific rules rather than acting in the line of standard economic theory. Then, a taxpayer follows rules instead of optimizing case by case. And this interpretation matches to Herbert Simon's (1955) 'theory of satisficing' which claims that in crucial and unknown situations 'bounded rationality' turns to be of great importance. Following rules helps to minimize information costs.

Finally, the work of Cummings et al (2009), also mentioned previously, finds significant differences in compliance behavior between Botswana and South Africa, and authors claim that it is due to social or cultural factors. In fact, Transparency International's Corruption Perception Index, indicates that Botswana's score is some 20 percent higher (better) than that of South Africa. Coincidently, their results show that participants in South Africa exhibit lower compliance (statistically significant at the 0.05 level). Additionally, to reinforce the results, an alternative explanation of differences in risk attitudes is rejected by the data (for similar results see also Tsakumis, Curatola and Porcano, 2007).

Peer-effects

The concept of peer-effects is much related to social norms but appears to have a separable and identifiable influence on tax compliance since taxpayers' decisions are usually made in the context of other taxpayers' decisions, a determined environment or reference group.

Kahan (1997) assures that there is ample evidence of a general trend of individuals to adjust to other people's behavior and expectations even to commit all sorts of crimes. He says that there is a strong correlation between a person's obedience to the law and her perception about other people's obedience (Harold, Grasmick and Green, 1980; Gibbs, 1978). He goes further and claims that a person's perceptions on if other people in her situation pay taxes, play a more important role in her decision to pay than her perception about the expected punishment for evading (see also Battiston and Gamba 2016).

Further, Luttmer and Sighal (2014) claim that if individuals imperfectly perceive the enforcement environment, peers' behavior may influence their beliefs

about the consequences of tax evasion. For example, Torgler and Schneider (2005), also previously detailed, find that an increase in one point in the scale of the perceived tax evasion reduces the share of individuals who think negatively about tax evasion in 8 percentage points (a decrease in tax morale). They also claim that it appears to exist a crowding out effect when individuals notice that others are not complying. Similar evidence is provided by Torgler (2004) who, analyzing tax morale in Costa Rica and Switzerland, finds that an improvement in the perceptions that other taxpayers obey the law increases tax morale (with a 5% significance).

Nageeb and Benabou (2016) say that visibility is a powerful incentive and that many public and private entities use the esteem of individuals as an incentive, e.g. in Greece, tax authorities have published the lists of tax evaders and in Peru, those convicted for tax evasion can be shut down permanently; and some municipalities issued an honor list of families who pay promptly their taxes (Del Carpio 2014). Also, Baldry (1987) presents some experiments' results showing that the moral costs associated with public disclosure of evasion are important determinants of tax compliance, while Gächter (2007) presents experimental evidence that suggests that the probability that someone evades taxes is greater if she thinks that other people behave alike (see also Frey and Oberholzaer, 1997).

Onu and Oats (2015) say that several studies on taxpayer interaction, from large-scale surveys to field experiments, reveal that people's tax compliance attitudes change after they discuss about taxes with other taxpayers. They claim that communication may affect taxpayers' perceived risk of being caught and it may also influence the strength of social norms. Similarly, Alm and Gomez (2008) find that the perceived size of tax fraud affects the intrinsic motivation of individuals to pay taxes.

In a large field experiment, Stalans, Kinsey and Smith (1991) wonder how people form beliefs about sanctions and norms when fulfilling income tax reports. They use data from a telephone survey of 1,200 Minnesota taxpayers, run a maximum likelihood model and find that communication with co-workers lowers the perceived likelihood of IRS detections for overstating deductions (at 5% significance), the perceived severity of informal sanctions for tax cheatings (0.25%), and the likelihood of feeling guilty if under reporting income (0.17%). In contrast, communication with family members enhanced (at 10% significance) the perceived fairness of tax laws (0.08%) and the likelihood of feeling guilty if under reporting income (0.14%).

Del Carpio (2014) runs a field experiment on property tax collection in two municipalities of Peru and finds that a treatment combining information about peer compliance and a payment reminder causes a statistically non-significant increase in compliance in comparison to a control group with only a payment reminder. Also, some other field experiments in high-compliance contexts where the act of notifying taxpayers that over 90 percent of individuals comply, have failed to find significant effects (Slemrod, Blumenthal and Christian, 2001). Indeed, Luttmer and Sighal (2014) claim that this failure may be caused by the fact that individuals already had a clear sense of overall compliance influencing their decisions instead of a mere informative number.

Some evidence on public policies to improve tax compliance

Many theoretical and empirical works are now a worth source for governments and local authorities to design and execute public policies aimed to improve tax compliance.

However, in a critical review, Luttmer and Sighal (2014) argue that if tax morale is truly important, then some simple nudges such as better presenting information or sending polite payment reminders would reduce tax evasion (Del Carpio 2014; Hallsworth, 2014; Dwenger et al. 2016). However, the evidence from field experiments to test tax morale is mixed and those successful experiments have been obtained only on "small stakes"; and simple decisions like paying taxes on time or paying relatively small taxes and fees. They think that there are some likely explanations for this. First, it could be that tax morale's channels do exist but would be small in comparison to those of the standard model. Second, it could be that tax morale is important, but inelastic, for example, in a model with honest and strategic taxpayers, intrinsic motivation may have a large effect on overall compliance (for the honest taxpayers), but moral suasion interventions may not affect behavior of either group. Also, many tax morale channels could be inelastic to the types of interventions tested in experiments, specifically, the effects of these interventions appear to be also influenced by both the context (different levels of compliance) and the personal characteristics of the taxpayer (intrinsic versus extrinsic motivation, peer effects or reciprocity strength, etc.). Therefore, identifying subjects, groups and motivations would be extremely difficult to design appropriate treatments.

Similarly, Ariel (2012) says that in large field experiments, it was very common to issue a threatening letter (deterrence), and a letter reminding the duty to pay taxes (moral suasion). So that, any relative change in reporting behavior was attributed to the content of the letter exclusively. The author says that some evidence supports the moral approach (e.g., Schwartz and Orleans, 1967; Wenzel and Taylor, 2004), but the causality appears to be weak (Slemrod et. al. 2001, p.128). And, on the contrary, other studies provided evidence to support the deterrence approach like Slemrod et. al. 2001 but only for certain groups of taxpayers, and not for others (see Paternoster and Simpson, 1996; Simpson and Koper, 1992). Even more, some other works could not find statistically significant differences between the treatments and the controls (McGraw and Scholz, 1991), and finally, some even reported a counterproductive effect (Slemrod et. al. 2001; Wenzel, 2002, 2006), it means the letters produced a decrease in compliance apparently as a sign of defiance (Bouffard and Piquero, 2010; Sherman, 1993, 2010). Also, Hasseldine, Hite, James and Toumi (2007) propose an explanation for these contradictory results, they point out that wording differences may be one of the reasons for the different outcomes.

Empirical evidence for Latin-America

The Latinobarometro Corporation[12] reports from 2009, 2013 and 2015 find a high statistical relationship between tax compliance and the citizens' perception that governments work for the well-being of all. Similarly, Ortega et al. (2016) study citizens' attitudes to tax obligations by means of surveys implemented in 17 cities of

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[12] http://www.latinobarometro.org/lat.jsp

Latin America and find a statistically significant relation between a responder's will to pay taxes and her perceived government's performance.

Also, the 4th. National Survey on Perceptions of Corruption of 2010[13] in Peru reveals interesting data on the tax voluntary compliance, for example that 82% of the people declared that they do not request invoices to avoid the payment of the Value Added Tax (VAT), even though these same people consider that the main problem in the country is corruption, and that tax evasion is one of its more frequent forms.

In one of the first empirical works in the region, Torgler (2005) analyzes tax morale in Latin America. He works with two data sets: Latinobarometro and World Values Survey, looking at individuals' perception of reasons for tax evasion and finds that the tax burden, lacking honesty, and corruption are the main factors mentioned. Furthermore, trust in the president and the officials, the belief that other individuals obey the law and a pro democratic attitude have significant positive effects on tax morale.

Castro and Scartascini (2013) report results of a large field experiment in Argentina with 23,000 taxpayers in the Municipality of Junín. Subjects were randomly divided into 4 groups, one of the groups was control and the other three were treatments that include messages in their tax bills. The treatments were: deterrence (information about the cost of noncompliance), moral suasion (information about other taxpayers' compliance), and fairness (information about public spending). Their results show that the most effective message was one based on deterrence.

Another large field experiment includes 20,000 taxpayers with unpaid tax liabilities between 2011 and 2013 in Colombia (Ortega and Scartascini, 2016). The authors test three delivery methods: letters, e-mails and personal visits and find that the personal visit by a tax inspector becomes the most effective one. Similar results are provided by Del Carpio (2014).

Finally, Ramirez and Nolazco (2020) set an experiment with 120 real taxpayers in Peru and find that people are willing to donate more to the Peruvian government than to the non-profit institution used as a control. The subjects' donations were completely voluntary and anonymous then attributable to the so-called Tax Morale.

4. Conclusions

Observed rates of tax compliance around the world are higher than those predicted by the standard model. Even though deterrence appears to be important, there exists empirical evidence that it can crowd intrinsic motivations out. Thus, moral suasion also appears to be important, however, its empirical evidence is mixed, probably due to the way it has been introduced in the experiments.

Therefore, there still exists a big concern to find concrete non-pecuniary elements that influence voluntary compliance. For example, we would like to know if, for that decision, citizens consider aspects like: the amount and quality of public

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[13] IV Encuesta Nacional sobre Percepciones de la Corrupción en el Perú, 2010.
http://www.scribd.com/doc/36168016/Sexta-Encuesta-Nacional-Sobre-Percepciones-de-la-Corrupcion-en-el-Peru-2010.

goods and services the government provides; the perceived quality of the treatment they have received from the government; their beliefs about government's truthfulness or corruption; some cultural and social aspects related with the societies they live in; their beliefs about the contribution of other people and overall those belonging to the same family or social group; and even their sympathy for the president or the authorities (see for example López-Pérez, R. and Ramirez-Zamudio, A. 2020).

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