

Gender, Social Value Orientation, and Tax Compliance¹

John W. D'Attoma
Clara Voluntiru
Antoine Malezieux

Abstract

This paper brings an important empirical contribution to the academic literature by examining whether gender differences in tax compliance are due to higher prosociality among women. We conducted a large cross-national tax compliance experiment carried out in different countries – Italy, UK, USA, Sweden, and Romania. We uncover that women declare a significantly higher percentage of their income than men in all five countries. While some scholars have argued that differences in honesty between men and women are mediated by prosociality, we find that women are not more prosocial than men in all countries and we do not find a mediating effect of prosocial behaviour on tax compliance. Though tax evasion is a form of dishonesty, the tax compliance experiment is quite different from an honesty experiment, which is certainly one explanation for the different results. We conclude that although differences in prosociality between men and women seem to be context dependent, differences in tax compliance are indeed much more consistent.

Introduction

Countries face a number of challenges that have consequently led to controversial budget cuts. As Sven Steinmo (1993, 1) puts it, “Governments need money. Modern governments need lots of money.” It is, thus, essential that governments can increase revenue without necessarily increasing tax rates. One way governments can increase revenue without raising taxes is through better tax compliance. Governments lose a considerable amount of money due to tax avoidance and evasion— for example, the Tax Justice Network estimates that the world economy loses approximately \$3.1 trillion from tax evasion (Werdigier 2016). It is thus useful to understand both when, why, and which people would choose to pay their taxes honestly and how to elicit voluntary compliance. In this paper, we explore tax behavior employing a large tax compliance experiment conducted in five countries. We ask the following research questions: First, are prosocial individuals more tax compliant? Secondly, are women more tax compliant than men? Finally, does Social Value Orientation (SVO) mediate the effect of gender on tax compliance?

A recent study by Grosch and Rau (2017) suggests women are not only more honest than men, *but that higher levels of prosociality among women mediate the effects of gender on honesty*. Our contribution extends upon these results by examining a specific policy domain: tax compliance.

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Social Value Orientation (SVO) can inform the decision to share or give away some of your profits. Much like tax compliance, it involves a rationalization of resources between one self and peers, or society in general. However, in the case of paying one's taxes, the choice involves risk and monetary incentives that the SVO decision does not.

Tax compliance, thus, is not necessarily the same as honesty. Tax evasion is always illegal, whereas many forms of dishonesty are not. There is also an enormous amount of moral and ethical grey area in the tax compliance decision that might not be the same as in some other forms of dishonest behavior. For example, in our experiment, the audit rate is 5%, which brings forth the risk of being caught—that is not present in a die experiment (Fischbacher and Föllmi-Heusi 2013), on top of any ethical concerns subjects might have with regards to paying taxes. Nevertheless, we know that most tax compliance experiments display larger compliance rates than what would normally be attributable to audit rates or fear of being exposed (Andreoni et al 1998, Calvet and Alm 2014). Because tax fraud is essentially a type of dishonest behaviour, we argue that gender differences with regard to tax compliance are comparable to findings related to honesty in general. As such, while prosocial attitudes may have an impact on honesty as shown by Grosch and Rau (2017), we show that this is not necessarily the case when looking at tax compliance.

Although there is a large body of experimental literature on gender, tax compliance, and Social Value Orientation, we have yet to come across a study that links these three variables. We, therefore, add a theoretical and methodological contribution to the tax compliance literature by examining whether gender differences in tax compliance are due to higher prosociality among women.

Theoretically, we suggest that individual behavior is embedded with a large set of psychological motivations informed by the set of norms and beliefs. We argue that institutions frame the tenets and the weights that individuals assign to the different motivations involved in the tax compliance decisions. Let us say, for example, that the tax compliance decision is made up of three primary motivations: self-interest, norms, and social values. Institutions help individuals assign a weight to each of these motivations. The weight assigned to social values might be different in Italy than in Sweden, for instance, where the effectiveness and efficiency of institutions varies significantly. It is thus important to test behavior in different contexts. Methodologically, we use data that we collected from five different countries, in Europe and America, and are able to control for behavioural variations that might be context-dependent, and ascertain more clearly the relationship between prosocial attitudes and honesty.

To preview our results: We find that SVO is an important aspect of the tax compliance decision, and women are also more tax compliant than men (in all countries) – supporting a large body of tax compliance literature. However, differences in SVO vary by gender only in some countries, meaning that women are not more prosocial than men in all countries. As such, we suggest that prosocial values might be context dependent, while gender differences in tax compliance are much more consistent across countries.

Literature Review

Social Value Orientation and Tax Compliance

The SVO scale has been a frequently employed metric in experimental studies. It is an expressive metric of how much people care for others' wellbeing. We used for the present study the continuous version developed by Ryan Murphy and his colleagues (Murphy et al 2011). Ryan Murphy and Kurt Ackermann regard SVO as the “predominant conceptualization of social preferences in psychology” (2014:13). As opposed to previous categorical versions of the SVO, this newer version allows us to have a more detailed assessment of individual

differences. Prosocial subjects tend to be more reactive to social norms of cooperation than self-interest maximization. As audit rates and penalties have been proven to be insufficient in deterring tax evasion (Graetz and Wilde 1985, Frey and Feld 2002), our goal in using SVO measurement is to assess the extent to which a person's social-value orientation can help explain their fiscal compliance (or lack of).

SVO has also been analyzed in relation to trust and reciprocity (Kanagaretnam et al 2009), cooperation (see meta-analysis from Balliet et al 2009), and expectations (Pletzer et al 2018). This entices us to look for the effects of prosociality on cooperative behavior in a fiscal setting. A series of studies have applied a similar methodological framework in contextualising fiscal behaviour in cross-cultural circumstances (Alm and Torgler, 2006, Kogler et al 2015, Alm et al 2017). Large comparative studies are not the norm in experimental studies, and yet the insights they provide are very valuable indeed.

Moreover, location matters when we look at the drivers of tax compliance. While economic incentives account for a certain level of compliance, Richardson (2006, 2008) also points out the role of non-economic factors (e.g. tax morale, institutional complexity) in the decision to evade taxes. Similarly, Kogler et al (2013) test the role of the slippery slope argument (i.e. cumulative effect of trust in authorities and power of authorities in tax compliance) in a cross-cultural design in Austria, Hungary, Romania and Russia, and find a strong association between evasion and low trust/low power. Such studies suggest that there is a notable cross-country variation in fiscal behaviour that is driven by individuals' expectations, not just incentives.

We focused our present assessment on countries in Europe and North America that share many similarities in terms of the structure of their economies and the institutional context (e.g. taxation system, enforcement capacity). Yet even within this sample of cases, we can still see significant variation in their actual collection levels. Despite member states' efforts to achieve better fiscal and institutional alignment, in the European Union tax gaps vary from 7.98% in Luxembourg to 29.51% in Romania (Murphy 2019). This points to persistent differences in behaviour that are harder to change through (relatively) recent institutional reforms. Previous studies revealed cross-national variation in tax compliance behaviour driven by (perceived) legitimacy of the state and quality of government, or individuals' expectations and obligations towards society (Alm and Torgler 2006, Cummings et al 2009, Kogler et al 2013, D'Attoma 2017, 2018, Zhang et al 2016, Andrighetto et al 2017, Pampel et al 2018, D'Attoma et al 2018). Building on these findings, we also expect differences in SVO and compliance (and their interaction) across countries.

While there are notable studies on the effects of tax morale on tax compliance (Alm and Torgler 2006, Torgler 2007), much fewer have concerned the impact of SVO. Brizi et al (2015), however, suggest that SVO is a strong predictor of tax compliance. If SVO influences cooperation and public goods contributions, we would also expect SVO to impact an individual's willingness to pay taxes.

Gender

There is quite a large catalogue of literature that examines the effects of gender on honesty. Studies are at odds, however, on this issue. The majority of honesty games suggest that women are more prone to honest behavior (Erat and Gneezy 2012, Capraro 2018). Still, there are also those that challenge gender differences. Biziou-van-Pol et al (2015) have questioned this assumption, suggesting that the debate on gender differences in lying is not settled. Most recently, however, Grosh and Rau (2017) have confirmed gender differences, as they find men are less honest than women in a deception game (i.e. cheat significantly more), and they link these gender differences to SVO (i.e. consideration of others).

According to Byrnes et al (1999) risk taking means accepting the possibility of a negative outcome as a result of the option made. Women seem less inclined to accept such negative outcome despite the upside of

potentially higher returns. Several studies indicate that women are more risk-averse than men (Byrnes et al 1999, Croson and Gneezy 2009, Charness and Gneezy 2012). Charness and Gneezy (2012) show through a cross-country investment experiment that women make less financially risky decisions. Furthermore, much more visible gender differences are recorded in affluent countries (Falk and Hermle 2018), and the relationship between gender and tax compliance is strongest in Europe and North America (Hofmann et al 2017). That said, a recent large meta-analysis emphasizes that an overwhelming majority of published papers – more than 90%, do not find any gender differences (Filippin and Crosetto 2014, 12).

Tax compliance experiments overwhelmingly demonstrate gender differences (Hasseldine and Hite 2003, Chung and Trivedi 2003, Gërzhani 2007, Gylfason, Arnardottir, and Kristinsson 2013, Bruner, D'Attoma, and Steinmo 2017, D'Attoma, Volintiru, and Steinmo 2017). These studies all find that women are more tax compliant than men in most countries in laboratory environments, as did a meta-analysis on this topic by Alm and Malézieux (2019). For example, D'Attoma et al (2017) examining differences between men and women in the US, Sweden, UK, and Italy, assert that women are less likely than men to cheat on taxes, across countries and across cultures. However, in another study using the same data, Bruner et al. (2017) uncover that although women are more compliant than men, men are more responsive to an increase in the pay-off from a public good.

Hypotheses

Tax compliance is a decision that is embedded with a host of personal and psychological motivations as well as consideration for institutional constraints and context, such as the pay-off from the public good, risk, or tax rates. More than a calculation of perceived risks, tax compliance is an inherently prosocial decision (Alm et al 2012, Brizi et al 2015, Drus 2016): when paying taxes, taxpayers contribute some of their earnings to a government, who then takes that money to provide public goods. Being prosocial and acting prosocial (i.e. paying one's taxes) adds to perceived individual benefit. Therefore, people who derive higher utility by making others better off, should also be more likely to contribute their earnings in the form of tax payments (Erard and Feinstein 1994, Dunn et al 2014). Similarly, a more individualistic person who is more concerned with maximizing their own payoff will more likely evade their fiscal obligations.

If participants acted purely rational in our experiments, proportional to the stated audited risk, the optimal decision would always be to report zero income. We therefore posit the following hypothesis:

Hyp1: Individuals with higher SVOs will report significantly more of their earnings in all countries.

Carol Gilligan (1982) suggests that men's and women's divergent behavior can be compartmentalized into two theoretical constructs. Masculine behavior is more instrumental as it stresses the role of hierarchical relationships, individual rights, competition, and equates morality with justice. Females behave in a manner that is more reactive to context, by emphasizing communal relationships, cooperation, and avoidance of harm to others.

There is an extensive body of experimental literature addressing behavioral differences between men and women in altruistic preferences and willingness to contribute to the public good. Catherine C. Eckel and Phillip J. Grossman for example have consistently demonstrated that women are the fairer sex and more altruistic. In an ultimatum game, Eckel and Grossman (2001) demonstrate that women are not only more cooperative, but in addition, offers from women are significantly more likely to be accepted. Because women are more cooperative, they were more willing to accept unequal splits. In a similar line of research in which one partner is the sender and the other is the receiver, men tend to send more money, especially when women are on the

receiving end of the partnership, but women return more money to the sender (Buchan et al 2008). This again speaks to the contextual/instrumental behaviors of men and women. According to Buchan et al (2008, 7), “the only possible motivation to be trustworthy is a communal one (an empathetic response, perhaps the need to live up to expectations)”.

Building on our comparative research design, our expectation is that on average women are more prosocial than men in all countries (H2a). Since prosociality relates to a higher preoccupation with the well-being of others and a number of studies have demonstrated that women are more cooperative, we assume that on average women will report more income than men (H2b).

Hyp2: (a) On average women are more prosocial than men in all countries.

(b) On average women will report more income than men.

Extending upon Grosch and Rau (2017), we suggest that this relationship between SVO, gender, and honesty should be applicable to tax compliance as well. If it is the case that women are more prosocial than men, this prosocial preference could be a mediating variable between gender and tax compliance.

Hyp3: The individual SVO mediates the effect of gender on dishonest behavior.

Experimental Design

Our experiments were conducted over the course of two years (2015-2017) in different sites across Europe and America.² We chose experimental location to best represent regional variation within countries, and the significant variation in tax compliance between Western democratic countries. One of the researchers working on “Willing to Pay” project was always present during the experiments for quality assurance and to make sure the experiments were conducted in the same way in all locations. Our *within* subject experimental design follows the basic elements of most tax compliance experiments. First, subjects earn money and we ask them to report their income for tax purposes. We specifically framed our experiment as a tax to make the experiment resemble a real-world tax paying scenario. Only at the end of the experiment does the computer reveal the results of taxpayers selected for an independent audit and the fine subjects pay for underreporting. For our experiments, there was a five-percent audit probability and a fine equal to twice the taxes owed. Throughout the experiment there was a thirty-percent tax rate.

On the day of the experiment, we invited subjects to a computer lab; most sessions had between twenty and twenty-eight subjects with a minimum of eight and a mean of eighteen. We asked the participants (mostly students) to take a seat and we began to read them the instructions, which they could also read on their screens. We first asked subjects to perform a simple clerical task for which they copied a row of fictitious names from a sheet of paper to the computer (see Figure 1). For each row copied correctly they received ten currency units,

² The experimental sites included Bologna Laboratory for Experiments in Social Sciences, Centro d'Economia Sperimentale A Roma Est, and Experimental Economics Lab of the University of Milano Bicocca in Italy, Oxford Experimental Laboratory, Experimental Economics Laboratory-Royal Holloway in London, Finance and Economics Experimental Laboratory at Exeter, and ESSEXLab at Essex in Britain, Learning & Experimental Economics Projects at University of California-Santa Cruz, Social Science Experiments Lab at the University of Colorado-Boulder, Appalachian Experimental Economics Laboratory in Boone, North Carolina, Center for Behavioral Political Economy in Stony Brook, New York, and University of Hawaii Laboratory for Computer-Mediated Experiments and the Study of Culture in Honolulu, Hawaii, in the US, and the Behavioural lab in Stockholm and Behavioural and Experimental Economics in Gothenburg in Sweden, Bucharest University of Economic Studies (ASE) and National School of Political Science and Public Administration (SNSPA) in Bucharest, and Babes-Bolyai University in Cluj, Romania.

which would be exchanged at the rate of 0.01 for real money. We then show participants their earnings for the round and asked them to declare their income for tax purposes. They could declare any amount that they wanted, but if they declared less than what they earned, there was a five-percent probability of being caught, and if caught, there was a penalty of twice the taxes owed for underreporting. Final income was equal to the earned income plus the redistributed revenues from collective choices of contribution, less taxes levied and fines.³

Figure 1: Screen Capture of the Clerical Task

Row number	ID number	Last name	First name	Vote
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Remaining Time [sec]: 29

The experimental design consisted of a total of six reporting rounds separated in two stages.⁴ In the first stage of the experiment we manipulate the payoff to the public good, while in the second round we vary the public institution to which subjects contribute. Before each round they were given examples of the payoff mechanism.

In stage one, we investigate how redistribution affects willingness to pay taxes. Therefore, after one five-minute clerical task, we gave subjects the parameters, and we asked subjects to report their income. Figure 2 is a screen capture of the reporting screen. That rationale behind the six rounds, instead of using only the last three rounds, was that we wanted to test how participants behave when given an abstract public good that we could hold constant in all countries compared to using their real-world institutions which vary significantly by country.

Figure 2: Screen Capture of the Reporting Screen

³ Another paper from this study using the same design can be found in D’Attoma (2018).

⁴ For this article we have chosen to only study the effects of gender and SVO on tax compliance overall, instead of looking at the individual treatment effects. We, therefore, limit our discussion of each individual treatment. For more details, see (D’Attoma 2018).

REPORT YOUR EARNINGS

Please report your earnings for tax purposes.

The relevant rules in this round are summarized in the box below.

- Based on the number of rows you copied during the clerical task, your earnings are 0 currency units.
- The tax rate is 30%
- The audit probability is 5%
- If audited you will pay a fine equal to 2 times any taxes avoided.

Report your earnings here: 1|

You cannot report more than your earnings.

When you are finished reporting your earnings, please press "Continue."

In round 1 (our baseline), there was no payoff from the public good. Essentially the money was burned. In round 2, we collected their money, summed, and put it into a general fund which was then redistributed equally to all participants. Here there was no multiplier, and thus, the utility maximizing strategy would be to always report 0. Finally, in round 3, the money was collected into a general fund divided into two portions: one part (80%) was allocated to portion A, and a second part (20%) was allocated to portion B. All of the money in portion A was distributed in equal parts to all of the participants, regardless of how much each participant earned, and how much they put into the fund. The money in portion B was distributed in equal parts to the lowest 20% of income earners, regardless of how much each person in this group put into the fund.

In stage two, we examine how perceptions of participants' real-world institutions influence tax compliance. In this stage, we asked subjects to perform a four-minute clerical task before each reporting round, for which they would earn money and pay taxes directly to their real-world institutions (national government, pension fund, and fire department). Therefore, there was not an abstract public good, but instead, there was an actual public good attached to this stage, since we did send all revenues to the specified public institutions of the country in which they live at the end of the experiment. We randomized the rounds in stage two.

Table 1: Description of Experimental Treatments

Task	Description
Clerical 1: 5 minutes	Earn Income that is reported in Rounds 1-3.
Round 1: No Pot	Flat 30% tax rate on all reported income; No redistribution.
Round 2: Redistribution	Flat 30% tax rate on all reported income; Tax revenues are put into a general fund and redistributed equally to all subjects.
Round 3: Progressive Redistribution	Flat 30% tax rate on all reported income; General fund is portioned into two funds; One part (80%) will be allocated to portion A, and a second part (20%) will be allocated to portion B. All of the money in portion A will be distributed in equal parts to all of the participants, regardless of how

	much each participant earned, and how much he or she put into the fund. The money in portion B will be distributed in equal parts to the lowest 20% of income earners, regardless of how much each person in this group put into the fund.
Clerical 2: 4 minutes	Earn Income that is reported in Rounds 4
Round 4: Public Institution (Nat'l Gov, randomized)	Flat tax rate of 30% on all reported income Tax revenues are collected and sent to the National Government (Department of Treasury)
Clerical 3: 4 minutes	Earn Income that is reported in Rounds 5
Round 5: Public Institution (Pension Fund, randomized)	Flat tax rate of 30% on all reported income Tax revenues are collected and sent to the National Pension Scheme.
Clerical 4: 4 minutes	Earn Income that is reported in Rounds 6
Round 6: Public Institution (Fire Department, randomized)	Flat tax rate of 30% on all reported income Tax revenues are collected and sent to the Fire and Rescue Department.

After the income reporting rounds, subjects were tasked with 6 allocation decisions to elicit their ‘social value orientation’ (Murphy et. al., 2011). The decision was a simple allocation task. Individuals were required to choose a proportion of coins to be shared between them and a randomly chosen anonymous partner (see appendix for an example of the first six decisions). These decisions are created to gauge how much subjects cares about other subjects earnings relative to their own.⁵

Murphy et al (2011, 772) argue that this approach of measuring social preferences is superior to other methods, such as a SVO index or a categorical variable representing prosocials and individualists, because other measures do not provide consistent results, lack sensitivity to individual differences, and require a great deal of time from participants.

At the end of the experimental rounds, subjects were asked to take a short 10-minute survey that collected demographic information, as well as information regarding trust attitudes towards taxation, and levels of risk tolerance.

⁵ We construct the SVO angle as such: First, we calculate the average number of tokens a participant keeps to their self, y_1 , and the average number of tokens they give to the other participant, y_2 . Then we subtracted 50 from each in order to shift the coordinates. Finally, we take the arctangent of the ratio of the corrected allocation to the other participant relative to oneself to calculate the SVO angle, $SVO^\circ = \arctan \frac{(y_2-50)}{(y_1-50)}$.

Subjects were recruited through a common recruitment system called Online Recruitment System for Experimental Economics (ORSEE) (Greiner 2015), and the experiments were programmed in Behavory. Sessions lasted approximately 60 minutes. Payment structure was based on 1.5 times the country's minimum wage. In total we had 1,124 subjects of which 55% were men and 45% were women. Session size varied between 8 and 28 participants. The average age was 22, and 61% of our sample had previously partaken in behavioral experiments. Finally, the average earnings were approximately \$13 dollars with a \$5 (or equivalent) show up fee.

To maximize the extent of our study, including the number of participants, the number of countries and locations in which we conducted the experiment, and the consistency of our experiment, we did make some methodological sacrifices. For example, we did not reorder treatments. We did randomize the last three rounds, but we did not reorder the treatments to control for order effects. However, in our previous experiment, with a similar design, we did control for ordering in the tax compliance experiment and the order did not affect the overall results (Bruner et al 2017). Another limitation of our study is that there could be post-treatment bias in our Social Value Orientation task and survey instrument since they were conducted after the tax experiment. Our primary concern was running a large tax compliance experiment, and we thus, chose to run the SVO and survey after the tax compliance experiment as to not affect subject's behavior in the tax experiment. It would have been too costly to reorder, randomize treatments, and run the SVO task before and after the tax treatment in all countries and locations. Table 2 displays our descriptive statistics and how they vary by gender.

Table 2: Descriptive Statistics

	WOMEN (N=3,720)		MEN (N=3,024)		SIGN. DIFF.	FULL SAMPLE (N=6,744)	
	Mean	STD. DEV.	Mean	STD. DEV.		T-test	Mean
<i>Average compliance rate</i>	0.73	0.38	0.48	0.45	***	0.62	0.43
<i>Compliance rate Round 1</i>	0.68	0.40	0.38	0.43	***	0.55	0.44
<i>Compliance rate Round 2</i>	0.74	0.36	0.50	0.44	***	0.63	0.42
<i>Compliance rate Round 3</i>	0.73	0.37	0.55	0.44	***	0.65	0.41
<i>Compliance rate Round 4</i>	0.70	0.38	0.43	0.45	***	0.58	0.43
<i>Compliance rate Round 5</i>	0.74	0.37	0.48	0.45	***	0.62	0.43
<i>Compliance rate Round 6</i>	0.79	0.34	0.53	0.46	***	0.68	0.42
<i>Risk</i>	5.79	2.31	6.38	2.34	***	6.06	2.34
<i>Econ major (%)</i>	0.28	0.45	0.40	0.49	***	0.33	0.47
<i>Trust in Government</i>	-0.03	0.61	-0.03	0.64	***	0	0.61

<i>Past participation</i>	0.61	0.49	0.61	0.49	n.s.	0.61	0.49
<i>SVO</i>	21.02	14.60	18.08	15.76	***	19.70	15.20
<i>Age</i>	21.85	5.57	22.27	5.54	***	22.04	5.56
<i># observations: Italy</i>	714	--	906	--	--	1,620	--
<i># observations: UK</i>	504	--	336	--	--	960	--
<i># observations: US</i>	1,464	--	1,080	--	--	2,544	--
<i># observations: Sweden</i>	282	--	366	--	--	648	--
<i># observations: Romania</i>	756	--	336	--	--	1,092	--

Notes. n.s. not significant

* $p < 0.1$

** $p < 0.05$

*** $p < 0.01$

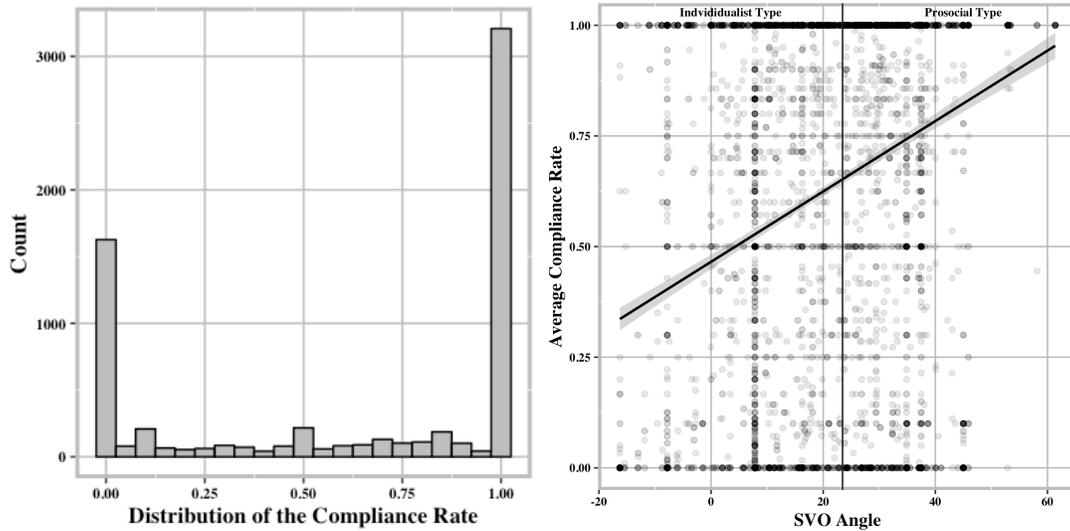
Results

Result 1: SVO is positively correlated with the average compliance rate overall.

Here we test the effects of Social Value Orientation on tax compliance. From Figure 1, we can observe a bimodal distribution, which is typical of a tax compliance experiment and provides some validation to the experimental design. This means that we get a large number of respondents either reporting 0 income or all income. Interestingly, the number of people who report 100% of their income far surpasses the number of individuals who report 0, although reporting 0 is the optimal decision in each round.

Now we move on to examine the relationship between SVO and reporting behavior. We do this first by using our pooled data set, followed by investigating the relationship in each individual country. The scatter plot in Figure 2 demonstrates that there is weak but significant and positive correlation between SVO angle and the average compliance rate. A Spearman's Rho of $\rho=0.30$ ($p < 0.001$) demonstrates a statistically significant relationship between the two variables. Specifically, individuals with higher SVO angles report a significantly higher proportion of their income than individuals with lower SVOs.

Figure 3: Distribution of Tax Compliance (left); Effects of SVO on Tax Compliance (right)



This supports previous literature on the effects of SVO on honest behavior. However, we are also interested in whether this relationship holds up when testing it in a number of countries.

To do this, we run Spearman’s correlation coefficient in each individual country. We confirm that SVO is significantly and positively correlated with tax compliance in each country.⁶

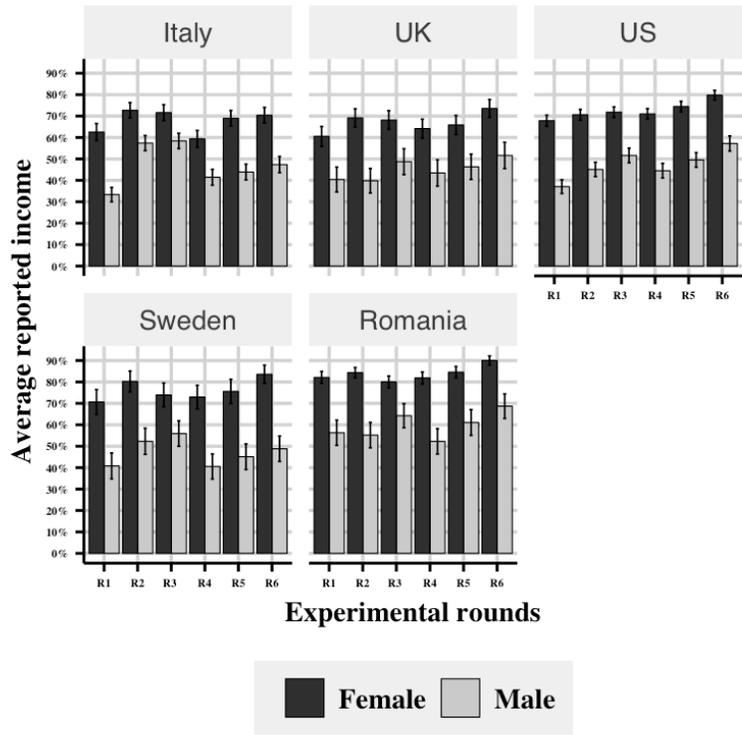
Result 2: Women are significantly more tax compliant than men overall and in each individual country; however, whether women are more prosocial depends on the country in which the experiment was conducted.

In this section, we test whether women are more tax compliant and prosocial than men. From the bar graph in Figure 3, we can clearly see that women are more tax compliant than men in each country. Women on average, across countries report an astounding 73% of their income, while men report approximately 48% of their income. We also perform a Mann-Whitney test for our pooled sample and within countries. Our test confirms the figure demonstrating that women are significantly more compliant than men across (Mann-Whitney test: $p < 0.001$) and within countries.⁷

Figure 4: Bar Chart of Tax Compliance by Gender and Country

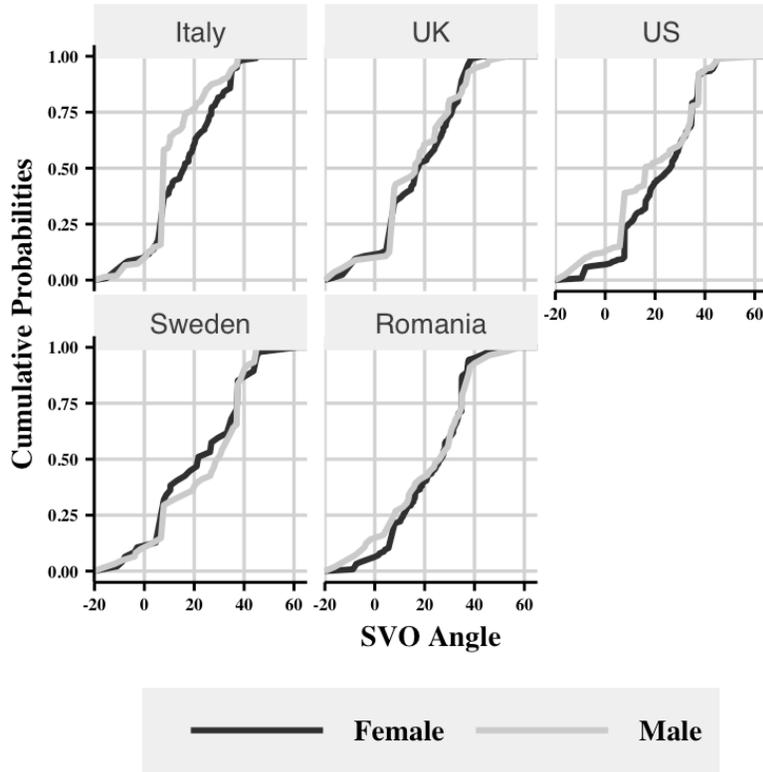
⁶ Italy: $\rho = 0.24$ ($p < 0.001$), the UK: $\rho = 0.26$ ($p < 0.001$), the US: $\rho = 0.33$ ($p < 0.001$), Sweden: $\rho = 0.25$ ($p < 0.001$), and Romania: $\rho = 0.15$ ($p < 0.001$).

⁷ Mann-Whitney test: Italy: ($p < 0.001$), the UK: ($p < 0.001$), the US: ($p < 0.001$), Sweden: ($p < 0.001$), and Romania: ($p < 0.001$).



We also explore the relationship between gender, SVO, and tax compliance. As such, we examine differences in the SVO angle between men in women overall and within countries. Figure 4 are Cumulative Distribution Functions (CDF) for men and women for each individual country.

Figure 5: Cumulative Distributions for the SVO Angle



We find that overall there are significant differences between men and women regarding SVO (Mann-Whitney: $p < 0.001$). Women have an average SVO angle of 21, whereas men have an average SVO angle of 18. However, somewhat surprisingly, our data suggest that women are only more prosocial than men in Italy and the United States, as the Mann-Whitney test shows (Italy: $p < 0.001$, UK: $p = 0.20$, US: $p < 0.001$, Sweden: $p = 0.19$, and Romania: $p = 0.71$).

Though we cannot begin to speculate as to why women are more prosocial in some countries but not others, this result would suggest that differences between men in women with regard to prosociality are largely context dependent.

Individual Level Models

In this section, we test our individual level models. In the first model (seen in column 1 of Table 3), we examine the effects of gender on the average tax compliance rate across all six rounds and each individual decision, controlling for a number of variables, with standard errors clustered at the subject level. Female is a dummy variable with 0 representing men and 1 representing women. We measure risk attitudes from a question in our post-experimental survey in which we asked participants how willing they are to take risks – 0 meaning completely unwilling to take risks and 10 meaning completely willing to take risk. Age is a continuous measure of age; Economics majors represents those who study economics; Past-participation measures whether participants have participated in laboratory experiments before. Trust in government is a factor index of four variables: trust in national government, trust in the pension system, trust in the fire department, and trust in

city (see the appendix for the post-experimental survey and exact wording of the questions). Finally, we control for country and round fixed effects.

First, the coefficient on the Female variable is highly significant with a very large substantive effect. Being female increases compliance by 21 percentage points all else being equal. SVO angle is also highly significant and positive. These first two results confirm our results above. Moreover, as individuals become more risk tolerant compliance decreases. We expected this since there is some amount of risk in the compliance decision, although the chance of being caught cheating in our experiment is quite small. Importantly, the coefficient on the female variable is very large even controlling for the fact that women are significantly more risk averse. Studying economics and participating in previous experiments also significantly reduces tax compliance, *ceteris paribus*. Finally, trust in government is positive and has a significant influence on tax compliance.⁸

In column 2, we examine the extensive margins of tax compliance. There are two steps in the tax compliance decision. First, participants make the decision to evade, then among those who make the decision to evade, the second decision is how much they evade. The extensive margins estimate the effects of the independent variables on the decision to evade; we code those who decide to evade as 1 and those who comply as 0. Each cell represents marginal effects with standard errors in parentheses. Again, we observe that being female reduces the probability of being an evader by 16% compared to men. Consistent with the other results, SVO angle, risk, economics majors, past-participation, and trust in government are all statistically significant and in the expected direction.

In column 3, we report the second part of the compliance decision: the intensive margin. Here the intensive margin is continuous as the dependent variable represents the amount of evasion engaged in by evaders. We detect that among the subsample of evaders, women report more income. Overall, this result tells us that being a woman both decreases the probability of being an evader, and women who evade report more income than men who evade. SVO angle, risk, trust in government, and past participation are all significant and in the expected direction. However, among the subsample of evaders, compliance behavior between economics majors and non-economics majors is no longer significantly different. In the following sections, we further examine the role of gender on tax compliance. Specifically, we look at whether SVO might be a mediator between gender and tax compliance.

Interestingly, we find that Americans and Swedes are significantly more likely to make the decision to evade than Italians, but among those who evade, the Swedes evade less than Italians. There is not a significant difference between Italians and Americans on the intensive margin. Romanians are less likely to evade than Italians, but there is no difference between those who evade. Finally, the Brits do not demonstrate any differences when compared to Italians. Though this is an experiment on university students, these results do challenge the culturalist argument that Italians and Romanians are more dishonest than other Western countries (see e.g. Guerra and Harrington, 2018 on this topic).

⁸ These results come from an OLS model. Substituting a Tobit regression for the OLS does not change any of the conclusion on the significance of being a female on compliance – see Table 2 in Appendix (column 1).

Table 3: Individual Level Models and Mediation Analysis

	<i>Compliance</i>	<i>Compliance</i>	<i>Compliance</i>	<i>Compliance</i>	<i>SVO</i>	<i>Compliance</i>	<i>SVO</i>
	OLS (1)	Extensive Margin (2)	Intensive Margin (3)	SEM (4)	SEM (5)	SEM (6)	SEM (7)
<i>Female</i>	0.208*** (0.023)	-0.156*** (0.023)	0.173*** (0.024)	0.208*** (-0.023)	1.746* (-1.043)	0.229*** (-0.019)	3.004*** (-0.916)
<i>SVO</i>	0.007*** (0.001)	-0.007*** (0.001)	0.003*** (0.001)	0.007*** (-0.001)		0.007*** (-0.001)	
<i>Risk</i>	-0.021*** (0.005)	0.021*** (0.005)	-0.011** (0.005)	-0.021*** (-0.005)	-0.786*** (-0.238)		
<i>Age</i>	0.002 (0.003)	-0.004 (0.003)	-0.002 (0.003)	0.002 (-0.003)	0.177 (-0.132)		
<i>Econ major</i>	-0.059** (0.025)	0.074*** (0.027)	-0.006 (0.025)	-0.059** (-0.025)	-4.243*** (-1.114)		
<i>Trust in Gov.</i>	0.051** (0.02)	-0.048** (0.022)	0.035* (0.021)	0.051** (-0.02)	2.629*** (-0.994)		
<i>Past participation</i>	-0.114*** (0.024)	0.124*** (0.026)	-0.063** (0.026)	-0.114*** (-0.024)	-3.099*** (-1.135)		
<i>UK</i>	-0.047 (0.047)	0.001 (0.052)	-0.075* (0.041)	-0.047 (-0.047)	0.371 (-2.024)		
<i>US</i>	-0.073** (0.030)	0.070** (0.033)	-0.040 (0.028)	-0.073** (-0.030)	4.861*** (-1.334)		
<i>Sweden</i>	-0.167*** (0.048)	0.155*** (0.049)	-0.088** (0.043)	-0.167*** (-0.048)	2.579 (-2.291)		
<i>Romania</i>	0.062 (0.041)	-0.112** (0.049)	-0.019 (0.052)	0.062 (-0.041)	6.761*** (-2.041)		
<i>Constant</i>	0.531*** (0.084)		0.344*** (0.078)	0.531*** (-0.084)	19.063*** (-3.679)	0.354*** (-0.019)	18.021*** (-0.702)
<i>Var(Compliance)</i>				0.153***		0.159***	
<i>R²</i>	0.2		0.128				
<i>Obs.</i>	5005	5034	2645	5,005	5,005	6,712	6,712
<i>Round Fixed Effect</i>	YES	YES	YES	YES	YES	NO	NO

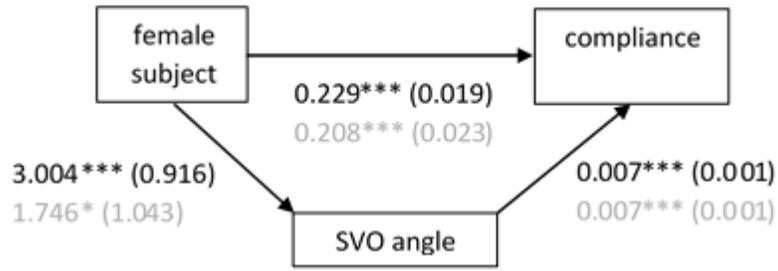
Notes. Robust standard errors between parentheses. Standard errors are clustered at the individual level. Italy has been omitted to avoid multicollinearity bias.

* $p < 0.1$

** $p < 0.05$

*** $p < 0.01$

Figure 6: Schematic Diagram of Mediation Analysis Results.



Path values are reported coefficients with standard errors in parentheses. Data in grey color represent results when covariates (risk tolerance, age, economics background, trust in government, country) are considered
Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Mediation Analysis

We now examine whether SVO mediates the effect of gender on tax compliance. First from Table 1, we can see that there are significant differences between men and women in their levels of self-reported risk aversion, along with men being much more likely to study economics.

We compute possible mediating effects of SVO in columns 4, 5, 6, and 7 of Table 3. We also include control variables such as the self-declared risk tolerance, subject's age, economics majors, trust in government, number of past participations, and the different country dummies for the countries in which the experiment was run, along with the round dummies.

Figure 6 demonstrates the Structural Equation Model. Including the potential mediator (SVO angle) in the path model (in black), we observe almost no changes to the effect of being a female on tax compliance. The coefficient on the SVO variable means that being female increases tax compliance by 23% points, all else being equal. Even so, computing the proportion of total effect mediated, we observe that SVO mediates only 8.66% of the effect of being a female on compliance. Moreover, the impact of being female on SVO disappears ($p = 0.094$) when control variables are considered (in grey).⁹

To sum up, contrary to our expectations based on Grosch and Rau (2017), we can hardly claim that SVO mediates the impact of gender on tax compliance. Instead, females are more tax compliant than men in every round and every country, even while controlling for several variables.

Result 3: SVO does not mediate the effects of gender on tax compliance. Indeed, our mediation analysis demonstrates that the effects of gender on tax compliance barely budge when introducing the mediator.

⁹ Investigating the role of subjective risk attitude, we observe in Table 2 in Appendix that risk-aversion is not a better mediator than SVO scores. Computing the proportion of total effect mediated, only 5.11% of the effect of being a female on compliance is mediated by self-perceived risk attitude.

Concluding Remarks

In this paper, we tested if SVO mediates the effect of gender on tax compliance. We provide evidence that suggests that women are more tax compliant than men across a large sample of countries and institutional contexts. Though many studies have examined the role of SVO on social dilemma games, few have examined its effect on tax compliance. Our data supports the idea that prosocial individuals are more tax compliant, and that levels of prosociality vary by gender in some countries but not all countries. Finally, we examine whether SVO mediates the effect of gender on tax compliance, and conclude that women are more tax compliant despite being more prosocial.

This paper makes three important contributions to the existing literature. First, we further explore and provide evidence which supports gender-based behavioral differences regarding tax compliance across a wide number of countries, regions, and institutional settings. Moreover, we extend previous literature by controlling for social values, determining that *despite* differences in SVO overall, there are still large gender differences in tax compliance. Secondly, we extend upon the SVO literature by demonstrating that though SVO varies by gender in some countries, it does not vary by gender in all countries. Prosociality is an important feature of most decisions that require cooperation, and thus scholars should explore what determines SVO and why it varies between genders in some countries, but not others. Finally, the extent and scope of our study make it one of the largest and most comprehensive tax compliance and SVO experiment to date.

One could also argue that social value orientation allocation and tax compliance decision are just two sides of the same phenomenon. Even though both have been found to be significantly positively correlated together here, the magnitude of this correlation remains rather weak (Spearman's $\rho=0.30$, Pearson's $r=0.28$).

To conclude, our findings make three important contributions to the literature; however, our study still does not provide a definitive answer or shut the door on this important debate with regard to gender differences in tax compliance. From our research, along with many other studies mentioned in the literature review, it seems clear that there are large gender differences in willingness to pay taxes. But, unfortunately, the literature does not seem to provide an answer to why this may be. Grosch and Rau (2017) suggest that gender differences in honesty are at least somewhat due to higher levels of prosociality in women. Though tax compliance is related to honesty, it encompasses several other motivations as well, such as cooperation, and therefore, it is not exactly the same. Indeed, we find that prosociality has very little mediating influence on the effects of gender on tax compliance. Therefore, further research should explore this interesting puzzle: Why are women so tax compliant?

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Appendix 1

Table 1: Social Value Orientation Allocation Decisions

Decision	1	2	3	4	5	6
1	(85 , 85)	(85 , 76)	(85 , 68)	(85 , 59)	(85 , 50)	(85 , 41)
2	(85 , 15)	(87 , 19)	(89 , 24)	(91 , 28)	(93 , 33)	(94 , 37)
3	(50 , 100)	(54 , 98)	(59 , 96)	(63 , 94)	(68 , 93)	(72 , 91)
4	(50 , 100)	(54 , 89)	(59 , 79)	(63 , 68)	(68 , 58)	(72 , 47)
5	(100 , 50)	(94 , 56)	(88 , 63)	(81 , 69)	(75 , 75)	(69 , 81)
6	(100 , 50)	(98 , 54)	(96 , 59)	(94 , 63)	(93 , 68)	(91 , 72)

Notes: In each allocation, the first value is the number of tokens the decision-maker keeps for themselves and the second value is the number of tokens the other person receives.

Table 2: Mediation Analysis with Structural Equation Modeling

	<i>Compliance</i>	<i>Compliance</i>	<i>Risk</i>	<i>Compliance</i>	<i>Risk</i>
	Tobit (1)	SEM (2)	SEM (3)	SEM (4)	SEM (5)
<i>Risk</i>	-0.071*** (0.017)	-0.021*** (0.005)		-0.022*** (0.004)	
<i>SVO</i>	0.023*** (0.003)	0.007*** (0.001)	-0.018*** (0.005)		
<i>Female</i>	0.694*** (0.080)	0.208*** (0.023)	-0.651*** (0.157)	0.237*** (0.020)	-0.586*** (0.139)
<i>Age</i>	0.007 (0.012)	0.002 (0.003)	-0.045* (0.025)		
<i>Econ major</i>	-0.226*** (0.082)	-0.059** (0.025)	-0.154 (0.171)		
<i>Trust in Gov.</i>	0.158** (0.069)	0.051** (0.020)	-0.474*** (0.142)		
<i>Past participation</i>	-0.421*** (0.083)	-0.114*** (0.024)	-0.228 (0.170)		
<i>Constant</i>	0.614** (0.298)	0.531*** (0.084)	7.414*** (0.611)	0.623*** (0.031)	6.380*** (0.104)
<i>Var (Compliance)</i>		0.153*** (0.004)		0.169*** (0.003)	
<i>Country Fixed Effect</i>	YES	YES	YES	NO	NO
<i>Round Fixed Effect</i>	YES	YES	YES	NO	NO

Notes. Robust standard errors between parentheses. Tobit model is censored at 0 and 1.

* $p < 0.1$

** $p < 0.05$

*** $p < 0.01$