A self-employed taxpayer experimental study on trust, power, and tax compliance in eleven countries

Larissa M. Batrancea[1]* , Anca Nichita[2], Ruggero De Agostini[3,4], Fabricio Batista Narcizo[5,6], Denis Forte[7], Samuel de Paiva Neves Mamede[8], Ana Maria Roux-Cesar[8], Bozhidar Nedev[9], Leoš Vitek[10], József Pántya[11], Aidin Salamzadeh[12], Eleanya K. Nduka[13], Janusz Kudła[14], Mateusz Kopyt[14], Luis Pacheco[15], Isabel Maldonado[15], Nsubili Isaga[16], Serkan Benk[17] and Tamer Budak[18]

*Correspondence:
larissa.batrancea@ubbcluj.ro

[1] Department of Business, Babeş-Bolyai University, 7 Horea Street, 400174 Cluj-Napoca, Romania
Full list of author information is available at the end of the article

Abstract

The slippery slope framework explains tax compliance along two main dimensions, trust in authorities and power of authorities, which influence taxpayers' compliance attitudes. Through frequentist and Bayesian analyses, we investigated the framework's assumptions on a sample of 2786 self-employed taxpayers from eleven post-communist and non-post-communist countries doing business in five economic branches. After using scenarios that experimentally manipulated trust and power, our results confirmed the framework's assumptions regarding the attitudes of the self-employed taxpayers; trust and power fostered intended tax compliance and diminished tax evasion, trust boosted voluntary tax compliance, whereas power increased enforced tax compliance. Additionally, self-employed taxpayers from post-communist countries reported higher intended tax compliance and lower tax evasion than those from non-post-communist countries. Our results offer tax authorities insights into how trust and power may contribute to obtaining and maintaining high tax compliance levels amid global economic challenges, downturns, and increasing tax compliance costs.

Keywords: Self-employed taxpayers, Slippery slope framework, Voluntary tax compliance, Enforced tax compliance, Tax evasion

JEL Classification: H10, H20

Introduction

Citizens' willingness to pay taxes constantly engenders interest among researchers and practitioners, especially when governments dealing with harsh budgetary cuts have to manage fewer public funds collected through taxation. In such contexts, state authorities aim to find efficient ways of increasing tax compliance to ensure public goods and citizens' wellbeing. Authorities should consider different influencing factors to achieve the desired level of compliance. Consistent literature on the variables influencing tax compliance is highlighted through various disciplinary lenses ranging from economic, legislative, and psychological to political or sociological (Lamb et al. 2004; Martin

Batrancea *et al. Financial Innovation*   (2022) 8:96

Page 2 of 23

et al. 2009; Oats 2012). While early studies solely focused on economic factors, such as income, tax rate, penalty, and audit probability (Allingham and Sandmo 1972; Srinivasan 1973; Yitzhaki 1974), psychological factors have gained ground in the last two decades (Alm et al. 2010; Braithwaite 2008; Kirchler 2007; Torgler 2007; Wynter and Oats 2021).

Given the complex nature of tax compliance and the various influencing factors, the "slippery slope framework" (SSF) explains tax compliance by integrating economic and psychological determinants along two main dimensions: *trust in authorities* and *power of authorities* (Kirchler et al. 2008). Under the SSF assumptions, trust expresses taxpayers' belief that tax authorities are benevolent and interested in the common good of society, while power expresses taxpayers' perception of the capacity of authorities to detect and sanction tax evasion. Tax compliance levels improve by increasing trust in authorities or the power of authorities. Depending on the dimension being improved, tax compliance can be either voluntary (via an increase in trust) or enforced (via an increase in power).

The SSF dimensions relate to the interaction climate between taxpayers and authorities, which can vary from synergistic to antagonistic. The synergistic tax climate builds on mutual trust and a "service and client" attitude, where public authorities assist contributors during compliance. The antagonistic tax climate builds on mutual distrust and a "cops and robbers approach," where public authorities use power assuming that taxpayers are rational maximizers willing to evade if given a chance. Therefore, the overall quality of compliance depends on the nature of the interaction between tax authorities and taxpayers. Voluntary compliance emerges in a climate of mutual trust and taxpayer-oriented policies, where authorities and taxpayers collaborate. Conversely, enforced compliance emerges in a climate with lower trust and deterrent policies (lengthy tax audits, fines, penalties, and interest on penalties, prosecutions), where authorities and taxpayers usually collide.

This article investigates the main SSF assumptions on self-employed taxpayers in different economic sectors and markets in 11 post-communist (PCO) and non-post-communist (non-PCO) countries. This study's contribution to the existing literature is threefold. To the best of our knowledge, this is the first large-scale study testing the compliance framework on self-employed taxpayers from Europe, South America, Western and Eastern Africa, and Western Asia. In this sense, our sample included countries that had not been considered in similar studies (i.e., Bulgaria, Czech Republic, Nigeria, and Tanzania). By surveying 2786 entrepreneurs with real-life taxpaying experience and constant interactions with authorities, we offer insights into the compliance attitudes of active players in economic markets, thus complementing and supporting other findings from the literature that investigated the SSF (Batrancea et al. 2019; Kogler et al. 2013). Second, our methodological approach favors the association of Bayesian and frequentist analyses for investigating tax compliance attitudes. For that matter, using a Bayesian analysis of variance represents a novel approach in the tax behavior field because such analyses usually indicate no inflation of Type I errors with repeated testing (Han and Park 2018). Third, the study explores potential differences in tax compliance attitudes between participants from PCO and non-PCO countries, emphasizing certain political and economic transformations that might explain such differences.

This study divided countries into two groups: *PCO[1] countries*, i.e., Bulgaria, Czech Republic, Hungary, Poland, and Romania; *non-PCO countries*,[2] i.e., Brazil, Iran, Nigeria, Portugal, Tanzania, and Turkey. Countries were selected based on three rationales. First, the countries in our sample are relevant nations in their regions' economies. Second, some countries were targeted for their common geo-historical, economic, social, and political backgrounds shared before and after the dissolution of the Iron Curtain (applicable to PCO nations). Third, all countries were targeted for their diversity of markets, economic development levels, and tax systems highlighted by *Paying Taxes*[3] reports (i.e., tax rates, tax burden, time spent to comply, and post-filing index).

Our PCO group included countries that have undergone a similar post-communist transformation through a rapid transition toward democracy and a market economy (Balázs et al. 2014: 9). During the past three decades, when compared to other neighboring countries with similar backgrounds (e.g., Albania, Macedonia, and Serbia), these PCO nations have managed to progress rapidly and become significant European economies. Moreover, by complying with the European Union (EU) principles and regulations, they became members almost in the same period (i.e., the Czech Republic, Hungary, and Poland in 2004; Romania and Bulgaria in 2007) and important players in the common market. Following the consolidation of their democracies and market economies, business initiatives have thrived across these PCO countries, including self-employment. Regarding self-employed taxpayers, our PCO countries registered the following percentages for 2018[4]: Bulgaria 11.6%; the Czech Republic 16.9%; Hungary 10.23%; Poland 20.3%; Romania 25.2%. The similarity in self-employed percentages may also be explained by the common economic, political, and social path shared by PCO countries in our sample.

Among the non-PCO group, we chose countries that are important players in regional and international markets. For instance, Brazil, the largest Latin American economy and among the first ten global economies, is a major emerging market within the OECD (Organisation for Economic Co-operation and Development) and BRICS (Brazil, Russia, India, China, and South Africa). Nigeria is Africa's most populated country and its biggest economy; Tanzania is the seventh biggest African economy by GDP (according to the International Monetary Fund), while Turkey is an OECD member and an aspiring European Union (EU) member. In 2018, our non-PCO countries registered the following percentages of self-employed taxpayers: Brazil 32.8%; Iran 45.2%; Nigeria 81.5%; Portugal 16.6%; Tanzania 85.7%; Turkey 32%.

The remainder of the paper is organized as follows. "Brief literature review and research hypotheses" section tackles relevant studies in the field of tax behavior and announces the research hypotheses. "Research methodology" section describes the

---

[1] The acronym PCO denotes the countries that belonged to the former Eastern Bloc.

[2] For the purpose of this paper, we use the term non-PCO for countries in our sample that did not belong to the former Eastern Bloc.

[3] https://www.pwc.com/gx/en/services/tax/publications/paying-taxes-2020/overall-ranking-and-data-tables.html (accessed 13 September 2020). The post-filing index (the newest addition in the *Paying Taxes* reports) quantifies the procedures for claiming a VAT refund and correcting an error in a corporate income tax return. It ranges from 0 to 100, with 100 indicating the most efficient procedures (Price water house Coopers and World Bank Group 2020).

[4] We chose the year 2018 as a benchmark for reporting economic data since it is the most recent year covering all our indicators of interest.

research methodology, "Results" section reports on the empirical results, and "Discussion and conclusions" section draws on conclusions, policy implications, and future research directions.

Brief literature review and research hypotheses

Concerns about psychological determinants, such as "knowledge, attitudes, norms and fairness" (Kirchler et al. 2008), are embedded into the SSF dimensions. Regarding taxation and taxpaying, we deem that norms also play a key role (Górecki and Letki 2020). First, across modern societies (where applicable), taxpaying is regarded as the standard social norm followed by the majority (Alm et al. 1999), which supports the provision of public goods and services for the whole society. Without recurrent contributions from most taxpayers, authorities would face severe difficulties in delivering services, such as education, healthcare, social security, and infrastructure. Second, compliance with tax laws and regulations is considered ethical and right (van Brederode 2019). Taxpayers who ultimately pay their fair share contribute to the common good because they acknowledge the importance of cooperation in developing societies. US Supreme Court Justice Oliver Wendell Holmes Jr. famously stated in 1927 that "taxes are what we pay for a civilized society." As Frecknall–Hughes (2019: 23) noted, the supply of public services may be regarded as the "moral basis for imposing taxation." In this regard, taxpayers who ultimately engage in tax evasion disregard ethical norms (McGee et al. 2008) and free ride on others' tax contributions.

Since its introduction to the tax behavior literature, the SSF of tax compliance has increasingly gained attention through theoretical and experimental studies. From mathematical formalizations (Lisi 2012a; Prinz et al. 2014) to tests using macroeconomic data (Lisi 2012b) and empirical extensions (Gangl et al. 2015; Kastlunger et al. 2013), this tax compliance model is a benchmark for studying how trust in authorities and the power of authorities can shape tax compliance levels.

The literature examining general tax behavior and this framework, in particular, has reported an increasing number of results from student samples (Batrancea et al. 2019; Carvalho Wilks and Pacheco 2014; Kaplanoglou and Rapanos 2015; Kogler et al. 2013; Lemoine and Roland-Lévy 2013) or individual taxpayers (Muehlbacher et al. 2011; Thurman 1989); however, empirical studies involving self-employed taxpayers or other categories of economic agents are still relatively scarce (Beer et al. 2019; Enachescu et al. 2019; Gangl et al. 2019, 2020; Kogler et al. 2015; Olsen et al. 2019; Wahl et al. 2010a, b).

In this context, we chose to survey self-employed[5] taxpayers because we believe their insights are crucial and valuable for the tax behavior field and overall economy for the following reasons. (a) They operate lucrative activities within tax systems. (b) Self-employed taxpayers regularly interact with tax authorities. (c) They are responsible for calculating, reporting, and paying taxes—a process that can sometimes be intricate because of tax law regulations (e.g., benefits, write-offs, exemptions, nondeductible expenses, and dependents). (d) They have more chances to evade taxes daily since they

---

[5] By "self-employed" taxpayers, we mean individuals officially registered with authorities for tax purposes, who run a business, trade or profession, earn income by working for themselves (e.g., sole proprietors or independent contractors), find opportunities on their own, take the risk of managing their business, and are required to file a tax return annually with regard to their economic activities.

can choose between reporting and underreporting cash-in-hand payments. (e) As opposed to employees, whose taxes are withheld at source by employers and then remitted to tax authorities, self-employed taxpayers face the bureaucratic hurdle of tax systems and regular interactions with tax authorities directly.

The SSF of tax compliance highlights the importance of tax compliance for authorities, the business environment, and citizens. As Riahi-Belkaoui (2008: 8) emphasized, a low tax compliance level associated with a low amount of collected tax revenues can hamper a country's economic development. Besides individual taxpayers, business leaders are also expected to comply with tax laws fully. A corporate taxpayer who complies with authorities' laws, rules, and regulations (when these authorities make substantial efforts to provide high-quality public goods and services, ensure overall wellbeing, efficiently monitor tax systems, and streamline compliance processes) also displays a sort of fiscal leadership, which can be emulated within economic markets and communities.

The theory behind the SSF states that trust and power instances (captured by the climate characterizing the interaction between taxpayers and tax authorities) determine the degree to which a taxpayer is willing to comply. Consequently, there are various tax compliance stances associated with the framework. First, intended tax compliance expresses taxpayers' general willingness to pay taxes and can increase under the influence of trust in authorities (Feld and Frey 2007) and the power of authorities (Kirchler and Wahl 2010). Voluntary tax compliance defines taxpayers' disposition to meet their tax obligations out of civic duty or the desire to support fellow citizens, and it is positively related to trust (James and Alley 2002). Enforced tax compliance emerges when taxpayers aim to avoid deterrent compliance strategies (frequent or extended audits; penalties and related accrued interests; prosecution or indictment) and is positively related to perceived power (Braithwaite 2003). Tax evasion is defined as deliberately breaking the law to mitigate taxes due, and it is negatively related to trust (Richardson 2008) and some instances of power (Andreoni et al. 1998).

In line with the framework assumptions, when we experimentally manipulate high trust in authorities versus low trust in authorities, we expect a higher level of intended tax compliance, a higher level of voluntary tax compliance, and a lower level of intended tax evasion. Similarly, we expect higher intended tax compliance, higher enforced tax compliance, and lower intended tax evasion would prevail when manipulating authorities' high versus low power.

Moreover, we investigated potential differences between the tax attitudes of self-employed taxpayers from PCO and non-PCO countries and levels of general tax morale.

Tax morale has been defined as taxpayers' intrinsic motivation to fulfill their taxpaying duties (Alm and Torgler 2011; Braithwaite and Ahmed 2005; Torgler 2005). Recent literature has linked tax morale with trust in government (Koumpias et al. 2021), compliance behavior (Halla 2012), social norms, and reciprocity (Doerrenberg and Peichl 2022). Tax morale has also been linked with tax ethics (Torgler and Murphy 2004), which is often regarded by many as "morality in action: the practical exercise of morality through human behavior" (van Brederode 2019: 1). From the SSF perspective, we believe that voluntary tax compliance would likely prevail among taxpayers with strong tax morale because, as Mickiewicz et al. (2019: 90) suggested, "tax morale will remain ‹‹quasi-voluntary››."

Batrancea *et al. Financial Innovation*   (2022) 8:96

Page 6 of 23

Table 1 Sample demographics

Continent	PCO/non-PCO	Country	Data collection method	Language	N	Gender (females %)	Age M (SD)
Europe	PCO	Bulgaria	Online	Bulgarian	222	51.8	31.50 (11.15)
	PCO	Czech Republic	Paper-based, online	Czech	204	50	42.90 (11.51)
	PCO	Hungary	Paper-based, online	Hungarian	189	49.7	43.56 (11.57)
	PCO	Poland	Online	Polish	422	31.30	40.49 (12.52)
	PCO	Romania	Paper-based, online	Romanian	303	53.8	32.10 (11.94)
	non-PCO	Portugal	Online	Portuguese	233	33	47.02 (9.54)
	non-PCO	Turkey	Paper-based, online	Turkish	329	14.3	38.55 (10.11)
South America	non-PCO	Brazil	Online	Portuguese	246	42.3	38.28 (13.27)
Asia	non-PCO	Iran	Paper-based	Persian	209	67	31.31 (8.41)
Africa	non-PCO	Nigeria	Paper-based	English	229	41.5	39.17 (10.41)
	non-PCO	Tanzania	Paper-based	English	200	19	35.68 (7.75)
Total					2786	39.7	38.23 (11.99)

Research methodology

Participants

This empirical study examined a sample from 11 countries on four continents: five PCO countries and six non-PCO countries. The subject pool included 2786 self-employed tax-payers doing business in various economic branches, of which 39.7% were women.[6] The overall mean age was 38.23 (*SD* = 11.99). Table 1 summarizes the sample demographics.

Material

The study examined the assumptions of the SSF in an international setting by using four different scenarios (embedded in four questionnaires) to manipulate trust in authorities and authorities' power within an imagined country called Varosia. Using an imagined country that matches the size and population number of participants' home country is a generalized standard practice when experimentally manipulating certain factors. This practice, which this study followed, ensures that participants address specific items in the questionnaire solely based on experimental manipulations, without any biases triggered by their attitudes toward the home country.

From the beginning, self-employed taxpayers were randomly assigned to one of the four scenarios embedded in the questionnaires: (1) high trust–high power; (2) low trust–high power; (3) high trust–low power; (4) low trust–low power. The first section of each scenario described trust-related information, while the second part introduced

---

[6] In most of our country subsamples, the number of self-employed women who participated in the study was lower than the number of self-employed men. One possible explanation could be that men are generally more numerous in developing self-employed business activities than women, irrespective of their age group (OECD 2018). According to the International Labour Organization, in 2018, 47.3% were self-employed out of total employment at global level. Depending on the income level, self-employed percentages varied: high-income countries 12.6%; upper-middle-income 41.9%; middle-income countries 52.4%; low-middle-income countries 66.3%; low-income countries 81.2%) https://data.world bank.org/indicator/SL.EMP.SELF.ZS?end=2018&start=1991 (accessed 13 September 2020).

power-related information. For example, authorities from high trust scenarios were presented as enjoying a good reputation among citizens, providing high-quality services, and supporting citizens, with few politicians embezzling tax money. Low trust scenarios stated the contrary; authorities from high power scenarios were presented as efficiently catching and punishing tax evaders while having a high budget and qualified staff to monitor tax systems. Low power scenarios stated the contrary.

The questionnaire had three parts: a *scenario* comprising the description of the imagined country, Varosia; *28 items* assessing the manipulation checks for trust in authorities (3 items[7]) and power of authorities (3 items[8]), intended tax compliance (3 items[9]), voluntary tax compliance (5 items[10]), enforced tax compliance (5 items[11]), intended tax evasion (5 items[12]), the degree of perceived similarity between Varosia and participant's home country (3 items[13]), and general tax morale (1 item[14]); *socio-demographical data*. Perceived similarity and general tax morale are unrelated to the experimental manipulations.

The items checking the manipulations of trust and power aligned with tax behavior literature, verifying the attention level with which self-employed taxpayers engaged in the experimental task. As suggested by the dependent variable's name, the items around intended tax compliance captured participants' general disposition toward taxpaying. Enforced tax compliance was defined as the extent to which participants would pay taxes for fear of being detected and sanctioned by tax authorities. Voluntary tax compliance was defined as the extent to which participants would willingly pay taxes based on a moral obligation toward the state and their peers. Finally, intended tax evasion captured participants' proclivity toward evading tax payments in five situations built around unquestionable evasion acts.

After reading the scenario, self-employed taxpayers were told to imagine earning income in Varosia by managing a self-employed business and paying taxes. They responded to 28 items, each containing a Likert-type answering scale from $1 =$ complete disagreement/very unlikely to $9 =$ complete agreement/very likely. On the whole, all scales used were highly reliable ($\alpha_{\text{trust check}} = 0.80$; $\alpha_{\text{power check}} = 0.80$; $\alpha_{\text{intended tax compliance}} = 0.82$; $\alpha_{\text{voluntary tax compliance}} = 0.90$; $\alpha_{\text{enforced tax compliance}} = 0.90$; $\alpha_{\text{intended tax evasion}} = 0.90$; $\alpha_{\text{similarity}} = 0.93$).

Except for general tax morale, we summed the item scores indicated by each participant for every dependent variable comprising three or more items. Across the 28 items, three were reversed-coded to follow the answering scale's general trend. The variables

---

[7] E.g., "In Varosia the interests of a few are considered stronger than the interests of the community" (reverse-coded).

[8] E.g., "It is easy to evade taxes in Varosia" (reverse-coded).

[9] E.g., "How much of your yearly income would you declare completely honestly?".

[10] E.g., "When I pay my taxes in Varosia as required by the regulations, I do so because I regard it as my duty as citizen".

[11] E.g., "When I pay my taxes in Varosia as required by the regulation, I do so because the tax office often carries out audits".

[12] E.g., "You could intentionally declare restaurant bills for meals you had with your friends as business meals. How likely would you be to declare those restaurant bills as business meals?".

[13] E.g., "How similar do you perceive the power of authorities in the country of Varosia in comparison to your own country?".

[14] This variable included only one item, namely: "Generally speaking, is cheating on tax never justified, always justified or something in between?".

trust in authorities and power of authorities were dummy coded with 1 = "low" and 2 = "high."

The socio-demographical data collected at the end of the questionnaires were gender, age, the economic branch where self-employed taxpayers conducted business (i.e., agriculture, constructions, energy and water, services, and trade), and revenue corresponding to two consecutive fiscal years (i.e., two years before data collection and one year before collection), expressed in the national currency. The choice of collecting revenue data was motivated by the fact that we aimed at targeting self-employed taxpayers who accumulated minimum experience in operating on the market by interacting with tax authorities, filing tax returns and paying taxes, or remitting consumption taxes and requesting VAT returns (if applicable). The variable gender was dummy coded with 0 = "male" and 1 = "female."

This study adapted scenarios and items on experimental manipulations, voluntary tax compliance, enforced tax compliance, intended tax compliance, and tax evasion from the extant literature (Kirchler and Wahl 2010; Wahl et al. 2010a). The general tax morale item was taken from Alm and Torgler (2006), while the experimental design and four types of questionnaires were drawn from Kogler et al. (2013) and Batrancea et al. (2019) (See material in Additional file 1: Appendix).

Procedure

The four types of questionnaires were first translated from English to the language of each country and then translated back to English by different independent translators to control for and eliminate possible inconsistencies. Portuguese was adapted to country specificity for Brazil and Portugal to survey local self-employed taxpayers.

Participants were asked to complete the questionnaires in paper format or created online (via Google Forms, LimeSurvey, or Qualtrics). On average, the task completion took about 15 min. Data were reported voluntarily since self-employed taxpayers were not paid or otherwise rewarded.

Overall, 2786 unique observations were collected during 2013–2020. As previously mentioned, one self-employed taxpayer filled only one questionnaire, irrespective of the type. The survey instrument is firmly grounded in the literature; it has high validity and high reliability, supported by smaller and larger-scale studies published in the last decade (Batrancea et al. 2019; Carvalho Wilks and Pacheco 2014; Kaplanoglou and Rapanos 2015; Kogler et al. 2013; Lemoine and Roland-Lévy 2013). Therefore, we could expand the data collection across this period without concerns that the data quality would be influenced by any factor outside our experimental manipulations of trust in and power of authorities.[15]

Participants were approached through various methods, including in-person, mass-mailing, snowball sampling (i.e., targeted self-employed taxpayers were asked to distribute questionnaires to other self-employed taxpayers), self-employed associations, announcements distributed by national chambers of commerce, and social media posts.

---

[15] As our results showed, the experimental manipulations worked across the entire sample in accordance with the assumptions of the slippery slope framework, even though we collected some observations amid the 2020 pandemic crisis.

Batrancea *et al. Financial Innovation* (2022) 8:96

Page 9 of 23

Data analysis

Given that data were not normally distributed and had low homoscedasticity, we used a log transformation that consisted in applying the natural logarithm (ln) to the dependent variables: manipulation checks for trust in and power of authorities; intended tax compliance; enforced tax compliance; voluntary tax compliance; intended tax evasion; similarity; tax morale. Following the log transformation, data deviated from the normal distribution and showed slight heteroscedasticity. Therefore, considering the distribution of scores and our country sample size, we ran a different analysis of variance (ANOVA) for each dependent variable. The motivation for choosing ANOVA is at least twofold: (a) it is a robust test; (b) given our large sample size, the central limit theorem provides some security on the normality of residuals. Where possible, we corrected for homoscedasticity.

We also considered the following: (1) it is not advisable to use too many null hypothesis statistical tests as the chance of at least one false positive grows with each subsequent test; (2) the use of correction for multiple comparisons can sometimes be too conservative (Berry and Hochberg 1999). For these reasons, frequentist analysis was associated with Bayesian analysis, which usually shows no inflation of the Type I error with repeated testing (Han and Park 2018).

Frequentist analysis was conducted using IBM SPSS Statistics version 26, and Bayesian analysis was carried out using the open-source JASP (Jeffrey's Amazing Statistics Program) version 0.13.1 (JASP Team 2020). We used JASP for the Bayesian analysis because the software allows a practical analysis technique in application and interpretation (van den Bergh et al. 2020). In the case of Bayesian analysis, JASP follows the suggestions of Rouder et al. (2012) and uses a default specification that facilitates result interpretation. In this sense, JASP generates an output that includes different models (i.e., the null and alternative models). An alternative model includes one or more variables and interactions over the null model. The JASP output shows the added predictive power of the alternative model as compared to the null model. For instance, if by including the factor "trust manipulation," the predictive power of the null model improves 20 times, then the Bayes Factor is 20 (i.e., $BF_{10} = 20$). If by including the factor "grouping," the predictive power of the null model is halved, then the Bayes Factor is 0.5 (i.e., $BF_{10} = 0.5$).

Results

The main tax compliance measures assessed within the SSF are intended tax compliance, voluntary tax compliance, enforced tax compliance, and intended tax evasion. As previously mentioned, the scores for every variable were obtained by summing the items in the questionnaire.

This study refers to scenarios as *conditions*: high trust–high power is Condition 1; low trust–high power is Condition 2; high trust–low power is Condition 3; low trust–low power is Condition 4.

Overall unadjusted medians and distribution of the sums depending on the condition are presented in Fig. 1.
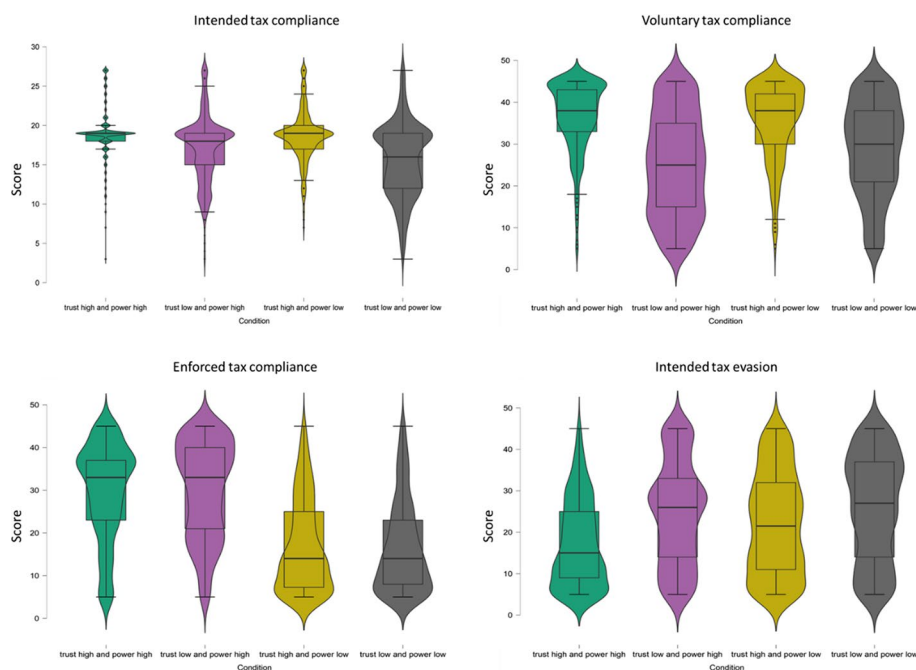
Fig. 1 Box plots and violin plots of tax compliance measures by condition

Table 2 Intercorrelations between tax compliance measures

Factor	1	2	3	4
1. Intended tax compliance	–	0.42***	0.13***	−0.26***
2. Voluntary tax compliance		–	−0.04*	−0.40***
3. Enforced tax compliance			–	0.07***
4. Intended tax evasion				–

***$p < 0.001$; *$p < 0.05$

Our analyses are based on the adjusted distributions obtained by applying the logarithmic transformation to all dependent variables. Correlations between the main tax compliance measures are depicted in Table 2.

As shown, tax compliance measures were moderately correlated, ranging from $r = 0.42$, $p < 0.001$, between intended and voluntary tax compliance to $r = -0.40$, $p < 0.001$, between voluntary tax compliance and intended tax evasion.

Manipulation checks

We analyzed whether the perceived trust and power scores differed concerning our *low* versus *high* manipulations. To assess the effectiveness of our experimental setting, we conducted two one-way ANOVAs with planned contrasts.

Trust manipulation check

The first analysis investigated the effectiveness of trust manipulation. To this end, we ran a one-way ANOVA with the factor condition as the independent variable and the natural logarithm of the trust score as the dependent variable. Planned contrasts were

coded to compare the two conditions with high trust (i.e., Conditions 1 and 3) against those with low trust (i.e., Conditions 2 and 4). As expected, trust manipulation had a significant effect on trust scores, $F(3,2780) = 272.28$, $p < 0.001$. Planned contrasts corrected for homoscedasticity revealed that trust scores in Conditions 1 (M = 2.86, SD = 0.26) and 3 (M = 2.77, SD = 0.29) were significantly higher than trust scores in Conditions 2 (M = 2.47, SD = 0.40) and 4 (M = 2.48, SD = 0.31). The frequentist analysis was associated with a Bayesian one-way ANOVA. The Bayesian ANOVA suggested that including the condition factor greatly improved model likelihood, $BF_{10} = 5.20 \times 10^{150}$, which supports our conclusion that trust scores were significantly different in the four conditions. We then compared Conditions 1 and 3 (M = 2.81, SD = 0.28) against Conditions 2 and 4 (M = 2.48, SD = 0.36) with a Bayesian independent *t*-test. The results suggested that Conditions 1 and 3 likely have a higher trust score than Conditions 2 and 4, $BF_{10} = 5.82 \times 10^{147}$.

Power manipulation check

The second analysis investigated the effectiveness of power manipulation. Similarly, we ran a one-way ANOVA with the factor condition as the independent variable and the natural logarithm of the power score as the dependent variable. Again, planned contrasts were coded to compare the two conditions with high power (i.e., Conditions 1 and 2) against those with low power (i.e., Conditions 3 and 4). As expected, power manipulation had a significant effect on power scores, $F(3,2780) = 177.305$, $p < 0.001$. Planned contrasts corrected for homoscedasticity revealed that power scores in Conditions 1 (M = 2.80, SD = 0.26) and 2 (M = 2.76, SD = 0.25) were significantly higher than power scores in Conditions 3 (M = 2.45, SD = 0.50) and 4 (M = 2.52, SD = 0.30). The frequentist analysis was associated with a Bayesian one-way ANOVA. The Bayesian ANOVA suggested that including condition as a factor greatly improved the likelihood of the model, $BF_{10} = 2.70 \times 10^{101}$, which supports our conclusion that power scores were significantly different across the four conditions. The comparison of Conditions 1 and 2 (M = 2.78, SD = 0.26) against the Conditions 3 and 4 (M = 2.48, SD = 0.42) was carried out with a Bayesian independent *t*-test. The results suggested that Conditions 1 and 2 were likely to score higher in power than Conditions 3 and 4, $BF_{10} = 2.53 \times 10^{99}$.

Measures of tax compliance

This section investigates the effects of trust manipulation, power manipulation, and country grouping on tax compliance measures. Given the lack of normality and homoscedasticity, data are assessed with four different ANOVAs, while the logarithmic transformation was applied to the scores of the dependent variables (see "Data analysis" section for details).

Intended tax compliance

Using a three-way ANOVA, we investigated how trust, power, and country grouping (hereinafter PCO/non-PCO)[16] influenced intended tax compliance. The analysis

---

[16] By PCO, we mean all self-employed taxpayers that participated in the study and were from PCO countries. The same applies to non-PCO.

revealed that trust was a significant factor in determining tax compliance at an intentional level; having high trust in government ($M = 2.92$, $SD = 0.19$) was associated with a higher level of intended tax compliance than having low trust in government ($M = 2.75$, $SD = 0.33$), $F(1, 2777) = 302.64$, $p < 0.001$, with a medium effect size, $d = 0.63$ (Cohen 1988).[17] A Bayesian three-way ANOVA supported the results of the frequentist analysis, $BF_{10} = 3.40 \times 10^{59}$. Moreover, the analysis revealed that power was a significant factor in determining intended tax compliance. Namely, perceiving authorities as highly powerful ($M = 2.87$, $SD = 0.25$) was associated with a higher level of intended tax compliance than when authorities are perceived as weak ($M = 2.80$, $SD = 0.30$), $F(1, 2777) = 57.92$, $p < 0.001$, with a small effect size, $d = 0.25$. A Bayesian three-way ANOVA supported the frequentist analysis results, $BF_{10} = 6.06 \times 10^{8}$. We also tested the main effect of country grouping, which was significant; being a PCO national ($M = 2.88$, $SD = 0.21$) was associated with a higher level of intended tax compliance than being a non-PCO national ($M = 2.79$, $SD = 0.33$), $F(1, 2777) = 89.10$, $p < 0.001$, with a small effect size, $d = 0.33$. A Bayesian three-way ANOVA supported the results of the frequentist analysis, $BF_{10} = 2.99 \times 10^{13}$.

The trust × power interaction was significant, $F(1, 2777) = 20.62$, $p < 0.001$, $\eta_p^2 = 0.01$, suggesting that, although trust increased intended tax compliance, participants in high-power conditions registered a smaller effect of trust than participants in low-power conditions. Namely, the mean difference between the low-power conditions was Condition 3 – Condition 4 = 0.22, whereas the mean difference between the high-power conditions was Condition 1 – Condition 2 = 0.13. Finally, the interaction trust × country grouping was also significant, $F(1, 2777) = 142.68$, $p < 0.001$, $\eta_p^2 = 0.05$. According to our results, trust had more impact on the compliance intentions of non-PCO nationals. The PCO mean difference in intended tax compliance scores between high-trust and low-trust conditions was 0.06. An independent *t*-test corrected for homoscedasticity and suggested that this difference was significant, $t(1121.86) = 4.92$, $p < 0.001$. For non-PCO nationals, the same mean difference was 0.29. Again, an independent *t*-test corrected for homoscedasticity and suggested that this difference was significant, $t(1113.55) = 18.01$, $p < 0.001$.

We also collected data on revenue corresponding to two fiscal years, gender, age, and economic branch. The latter was a categorical variable with more than two levels; hence, we coded it with 5 different dummy variables, one for each branch (i.e., agriculture, trade, constructions, energy and water, and services), to use it as a covariate. Since not all participants provided complete socio-demographic data, we excluded them from the main analysis to improve power. Nevertheless, we decided to run a second set of analyses of covariance (ANCOVA) only with participants who answered every item to control for the effects of these possible covariates. The results suggested that age was a significant covariate, $F(1, 2303) = 31.89$, $p < 0.001$, $\eta_p^2 = 0.01$, indicating that older self-employed taxpayers reported higher taxpaying intentions. Other covariates did not reach significance; however, including these covariates did not alter the results of the ANOVA discussed above.

---

[17] All subsequent effect sizes were reported according to the conventions set by Cohen (1988).

Enforced tax compliance

The second analysis investigated the effects of trust, power, and country grouping on enforced tax compliance using a three-way ANOVA. The results showed that trust was not a significant factor in determining enforced tax compliance, supported by the Bayesian three-way ANOVA, $BF_{10} = 0.04$. Conversely, the analysis revealed that power was a significant factor in shaping enforced tax compliance; perceiving authorities as very powerful (M = 3.29, SD = 0.54) was associated with a higher level of enforced compliance than when they were perceived as weak (M = 2.60, SD = 0.66), $F(1, 2778) = 890.12$, $p < 0.001$, with large effect size, $d = 1.14$. The Bayesian three-way ANOVA supported the results of the frequentist analysis, $BF_{10} = 1.58 \times 10^{165}$. We also tested the main effect of country grouping, which was significant. Initially, being a PCO national (M = 2.96, SD = 0.70) seemed to be associated with a higher level of enforced tax compliance than being a non-PCO national (M = 2.92, SD = 0.69), $F(1, 2777) = 4.20$, $p = 0.041$, with a small effect size, $d = 0.06$; however, the Bayesian three-way ANOVA did not support the frequentist analysis results, $BF_{10} = 0.11$. Given the minimal effect size and the BF value below 1, this main effect was considered negligible. The interaction trust × country grouping was significant, $F(1, 2777) = 6.35$, $p = 0.012$, $\eta_p^2 = 0.02$, suggesting that trust might negatively affect PCO nationals and positively affect non-PCO nationals. Nevertheless, the PCO mean difference of -0.05 between high-trust and low-trust conditions was non-significant, $t(1338) = 1.32$, $p = 0.188$. Similarly, the non-PCO mean difference of 0.05 was non-significant, $t(1444) = -1.42$, $p = 0.157$, as were other interactions.

Similarly, we ran an ANCOVA to control for revenue, age, gender, and economic branch. The results suggested that the revenue from the two years prior to data collection was a significant covariate, $F(1, 2303) = 13.39$, $p < 0.001$, $\eta_p^2 = 0.006$, as was the revenue of one year before data collection $F(1, 2303) = 5.86$, $p = 0.016$, $\eta_p^2 = 0.003$. Moreover, we found that gender was a significant covariate, $F(1, 2303) = 4.59$, $p = 0.032$, $\eta_p^2 = 0.002$, with self-employed women feeling more enforced to comply. The dummy variables used for economic branch were significant covariates, i.e., agriculture, $F(1, 2303) = 5.77$, $p = 0.016$, $\eta_p^2 = 0.003$; trade, $F(1, 2303) = 5.24$, $p = 0.022$, $\eta_p^2 = 0.002$; constructions, $F(1, 2303) = 7.28$, $p = 0.007$, $\eta_p^2 = 0.003$; energy and water, $F(1, 2303) = 9.38$, $p = 0.002$, $\eta_p^2 = 0.004$; services, $F(1, 2303) = 5.48$, $p = 0.019$, $\eta_p^2 = 0.002$. The influence of age was insignificant; however, including covariates did not alter most of the ANOVA results. The only difference was that the interaction trust × country grouping was not significant anymore, suggesting that the covariates drove this effect.

Voluntary tax compliance

The third analysis investigated the effects of trust, power, and country grouping on voluntary tax compliance using a three-way ANOVA. The results showed that trust was a significant factor in determining voluntary tax compliance; having high trust in government (M = 3.53, SD = 0.30) was associated with a higher level of voluntary tax compliance than having low trust in government (M = 3.16, SD = 0.58), $F(1, 2773) = 442.81$, $p < 0.001$, with a large effect size, $d = 0.80$. A Bayesian three-way ANOVA supported the frequentist analysis results, $BF_{10} = 1.15 \times 10^{85}$. At first, the analysis indicated that power could be a significant factor in determining voluntary tax compliance, $F(1, 2773) = 12.60$,

$p < 0.001$, $d = 0.12$; however, the Bayesian three-way ANOVA did not support the frequentist analysis results, $BF_{10} = 4.27$. We also analyzed the main effect of country grouping, which was significant; being a PCO national (M = 3.39, SD = 0.44) appeared to be associated with a higher level of voluntary tax compliance than being a non-PCO national (M = 3.31, SD = 0.57), $F(1, 2773) = 22.15$, $p < 0.001$ (small effect size, $d = 0.16$). A Bayesian three-way ANOVA supported the frequentist analysis results, $BF_{10} = 251.63$, though the difference was minimal.

The trust × power interaction was significant $F(1, 2773) = 33.71$, $p < 0.001$, $\eta_p^2 = 0.01$, suggesting that, while trust positively influenced voluntary tax compliance, participants in the low-power conditions registered a smaller effect of trust than participants in the high-power conditions. The mean difference between low-power conditions was Condition 3 − Condition 4 = 0.27, whereas the mean difference between high-power conditions was Condition 1 − Condition 2 = 0.48. Similarly, the interaction trust × country grouping was significant $F(1, 2773) = 89.02$, $p < 0.001$, $\eta_p^2 = 0.03$. The interaction suggests that, although trust positively influenced voluntary tax compliance, PCO self-employed taxpayers registered a smaller effect of trust than non-PCO self-employed taxpayers. Namely, for PCO nationals, the mean difference between high-trust and low-trust conditions was 0.20; for non-PCO nationals, the mean difference was 0.53.

The three-way interaction trust × power × country grouping was significant, $F(1, 2773) = 11.46$, $p = 0.001$, $\eta_p^2 = 0.004$, suggesting that trust positively affected voluntary tax compliance for PCO nationals. Moreover, participants in low-power conditions showed a smaller effect of trust than participants in high-power conditions. The mean difference between low-power conditions was Condition 3 − Condition 4 = 0.16, whereas the mean difference between high-power conditions was Condition 1 − Condition 2 = 0.24. When combined with power, trust had a similar but larger positive effect for non-PCO nationals. In their case, the mean difference between low-power conditions was Condition 3 − Condition 4 = 0.37, while the mean difference between high-power conditions was Condition 1 − Condition 2 = 0.70. The interaction power × country grouping was non-significant.

We also ran an ANCOVA to control for revenue, age, gender, and economic branch. The results showed that gender was a significant covariate, $F(1, 2302) = 9.99$, $p = 0.002$, $\eta_p^2 = 0.004$, as was age, $F(1, 2303) = 42.58$, $p < 0.001$, $\eta_p^2 = 0.02$, meaning that self-employed women and older participants displayed higher voluntary tax compliance. The other variables were not significant covariates; however, including covariates did not alter most of the ANOVA results. The only difference was that the country grouping main effect was no longer significant, suggesting that covariates drove this effect.

Intended tax evasion

We investigated the effects of trust, power, and country grouping on intended tax evasion using a three-way ANOVA. The analysis revealed that trust was a significant factor in determining intended tax evasion; having a high trust in government (M = 2.77, SD = 0.69) was associated with a lower level of intended tax evasion than having low trust in government (M = 3.06, SD = 0.66), $F(1, 2776) = 121.56$, $p < 0.001$ (medium effect size, $d = 0.43$). A Bayesian three-way ANOVA supported the results of the frequentist analysis, $BF_{10} = 1.88 \times 10^{24}$. Moreover, the analysis revealed that power was a significant

factor in determining intended tax evasion; perceiving authorities as very powerful (M = 2.83, SD = 0.69) was associated with a lower level of intended tax evasion than perceiving authorities as weak (M = 2.99, SD = 0.68), $F(1, 2776) = 37.81$, $p < 0.001$, with a small effect size, $d = 0.23$. A Bayesian three-way ANOVA supported the results of the frequentist analysis, $BF_{10} = 2.65 \times 10^6$. The last main effect we tested was country grouping, which turned out to be significant; being a domestic PCO self-employed taxpayer (M = 2.82, SD = 0.68) was associated with a lower level of intended tax evasion than being a domestic non-PCO taxpayer (M = 3.00, SD = 0.69), $F(1, 2776) = 49.77$, $p < 0.001$, with a small effect size, $d = 0.26$. The Bayesian three-way ANOVA supported the frequentist analysis results, $BF_{10} = 1.26 \times 10^8$.

The trust × power interaction was significant, $F(1, 2776) = 15.35$, $p < 0.001$, $\eta_p^2 = 0.01$, suggesting that, on the one hand, trust mitigated intentions to evade taxes. On the other hand, the interaction also suggests that participants in high-power conditions registered a bigger effect of trust than participants in low-power conditions. Namely, the mean difference between low-power conditions was Condition 3 – Condition 4 = 0.18, whereas the mean difference between high-power conditions was Condition 1 – Condition 2 = 0.39.

The trust × country grouping was also significant, $F(1, 2776) = 8.29$, $p = 0.004$, $\eta_p^2 = 0.003$, suggesting that trust mitigated intentions to evade taxes. Furthermore, domestic non-PCO taxpayers registered a bigger trust effect than domestic PCO taxpayers. The PCO mean difference between high-trust and low-trust conditions was − 0.21, whereas the non-PCO mean difference was − 0.35.

Finally, the three-way interaction trust × power × country grouping was also significant, $F(1, 2776) = 27.24$, $p < 0.001$, $\eta_p^2 = 0.01$. This interaction suggests that trust decreased tax evasion intentions for domestic PCO taxpayers. Moreover, these self-employed taxpayers in low-power conditions showed a bigger effect of trust than self-employed taxpayers in high-power conditions; for domestic PCO taxpayers, the mean difference between low-power conditions was Condition 3 – Condition 4 = − 0.24, whereas the mean difference between high-power conditions was Condition 1 – Condition 2 = –0.17. Conversely, for domestic non-PCO taxpayers, power seemed to have a different effect when combined with trust; the mean difference between low-power conditions was Condition 3 – Condition 4 = –0.12, whereas the mean difference between high-power conditions was Condition 1 – Condition 2 = –0.58. Therefore, for domestic PCO taxpayers, high power reduced the effect of trust in mitigating tax evasion. For domestic non-PCO taxpayers, increasing power might have strengthened the effect of trust in curbing tax evasion. The other interaction was non-significant.

We ran an ANCOVA to control for revenue, age, gender, and economic branch. The results suggested that gender was a significant covariate, $F(1, 2303) = 4.05$, $p = 0.044$, $\eta_p^2 = 0.002$, as was age, $F(1, 2303) = 29.54$, $p < 0.001$, $\eta_p^2 = 0.01$, though effects were small. The other covariates did not reach significance; however, including covariates did not influence the ANOVA results.

Similarity and tax morale by country grouping

We further assessed the differences between PCO and non-PCO nationals concerning general tax morale and perceived similarity.

Table 3 Descriptive statistics of similarity corresponding to the four conditions (PCO *vs.* non-PCO)

| | Condition 1 | | Condition 2 | | Condition 3 | | Condition 4 | |
	PCO	non-PCO	PCO	non-PCO	PCO	non-PCO	PCO	non-PCO
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Similarity	2.05 (0.69)	1.86 (0.74)	2.90 (0.41)	2.81 (0.56)	2.18 (0.69)	2.22 (0.64)	2.85 (0.47)	2.80 (0.64)

Values for similarity are the natural logarithm of the sum of participants' responses

Tax morale by country   For general tax morale, an independent samples *t*-test adjusted for homoscedasticity showed that PCO nationals (M = 1.39, SD = 0.69) reported higher levels of tax morale than non-PCO nationals (M = 1.32, SD = 0.76), $t(2783.12) = 2.59$, $p = 0.010$, $d = 0.10$. Given the small effect size, a Bayesian independent samples *t*-test replicated the analysis, indicating that the likelihood of a difference was similar to the absence of a difference, $BF_{10} = 1.16$. These results suggest a potential difference between PCO and non-PCO nationals regarding tax morale.

Similarity by country   The next variable of interest was the perceived similarity between Varosia and participants' home countries, which aimed to investigate whether it differed for PCO and non-PCO nationals. The first step was to assess the presence of a significant interaction between condition and country grouping via a two-way independent ANOVA. The analysis showed a significant interaction, $F(1, 2775) = 4.56$, $p = 0.003$; hence, we split our self-employed taxpayers into PCO and non-PCO and ran two separate one-way ANOVAs. Table 3 presents the descriptive statistics corresponding to the four conditions divided by PCO and non-PCO. The results showed that condition was a significant factor concerning perceived similarity for PCO nationals, $F(3, 1333) = 188.21$, $p < 0.001$. A posthoc Tukey HSD showed that in Condition 2 (trust low–power high) and Condition 4 (trust low–power low), the similarity was not significantly different. Nevertheless, the similarity was significantly different ($p < 0.05$) between Conditions 2 and 3 (trust high–power low) and between Conditions 2 and 1 (trust high–power high). Moreover, the Tukey HSD test showed that the similarity in Condition 3 was significantly different ($p < 0.05$) from that in Condition 1. Moreover, for non-PCO nationals, condition was also a significant factor concerning perceived similarity, $F(3, 1442) = 187.88$, $p < 0.001$. Again, the posthoc Tukey HSD showed results that were similar to the case of PCO nationals.

Interestingly, PCO and non-PCO nationals perceived Condition 2 (*trust low–power high*) as the most similar to their home country, while Condition 1 (*trust high–power high*) was regarded as the most dissimilar. To detect differences in how similar PCO and non-PCO self-employed taxpayers perceived these two scenarios, we compared PCO nationals to non-PCO nationals in Conditions 1 and 2. For Condition 1, an independent samples *t*-test adjusted for homoscedasticity showed that PCO nationals significantly perceived Varosia as more similar to their home country than non-PCO nationals, $t(706.78) = 3.68$, $p < 0.001$, $d = 0.27$. For Condition 2, an independent samples *t*-test adjusted for homoscedasticity showed that PCO nationals significantly perceived Varosia as more similar to their home country than non-PCO nationals, $t(636.67) = 2.42$, $p = 0.016$, $d = 0.18$. Overall, these results suggest that PCO and non-PCO nationals showed the same pattern of outcomes concerning similarity; however, PCO nationals

perceived the scenarios entailing high power as more similar to their home country than their non-PCO counterparts.

Discussion and conclusions

This article presents the results of the first large-scale investigation testing the assumptions of the slippery slope framework (SSF) on self-employed taxpayers from eleven countries on four continents. We used a frequentist ANOVA associated with Bayesian analysis to show that, in accordance with the framework assumptions, *trust in authorities* and *power of authorities* are strong primary drivers of taxpaying attitudes among self-employed entrepreneurs operating in different economic branches and market economies. The overall results of this large-scale research align with other studies investigating the SSF assumptions on larger or smaller samples (Batrancea et al. 2019; Carvalho Wilks and Pacheco 2014; Lemoine and Roland-Lévy 2013; Kogler et al. 2013). Therefore, our study supports the assumptions of the tax compliance framework through survey data collected from 2786 self-employed taxpayers who accumulated real-life taxpaying experience while running their businesses.

First, we showed that higher intended tax compliance was triggered by higher trust in public authorities. A similar positive result (albeit smaller) was obtained when self-employed taxpayers perceived authorities as very powerful. Overall, PCO nationals reported higher intended tax compliance than non-PCO nationals. Significant interactions between our variables of interest also revealed noteworthy results. The two-way interaction between trust and power suggested that when both variables were high, they did not boost each other's impact but dampened it; the effect of trust on intended tax compliance was reduced when increased power was already present. Moreover, the three-way interaction, including country grouping, suggested that boosting trust yielded more compliance for non-PCO nationals than for PCO nationals when power was high. We suggest that the significantly higher levels of intended tax compliance reported by PCO nationals could stem from a generalized behavior of obedience to government authorities that prevailed in their former political regimes and still echoes in current societies. Once centralized economies, PCO countries functioned based on strict enforcement and deterrence while lacking fundamental freedom rights concerning economic initiatives, movement, political rights, and speech. Citizens had no opportunity to experience the freedom of choice and develop a solid compliance behavior fueled mainly by trust. After decades of enforced obedience, one would expect a generalized unsubmissive behavior toward rules enacted by public authorities in these countries. Interestingly, PCO countries have overcome past economic and social development obstructions. This ingrained obedience was transformed into mindful compliance with the market economy rules, which must also be followed. Hence, the liabilities of their origin have transformed into an upper hand that can trigger higher taxpaying intentions. Additionally, the stronger reaction to power manipulations of PCO participants could also stem from the EU membership status of their home countries. Being an EU member entails following specific membership criteria, directives, laws, rules, and regulations concerning national and EU public authorities.

Second, trust decreased the overall intended tax evasion, as did power to a lesser degree. We also found that country grouping mainly affected tax evasion, with PCO

nationals being less inclined to evade taxes than non-PCO nationals. Additionally, the interaction between trust and country grouping indicated that non-PCO nationals were slightly more responsive to trust than PCO nationals. The three-way interaction supports the idea that trust and power can jointly decrease tax evasion; however, power reduced the effect of trust for PCO nationals, while power seemed to increase the importance of trust in reducing tax evasion for non-PCO nationals. Considering all variables of influence, it seems that mitigating tax evasion in PCO countries could be achieved more effectively through deterrent strategies, while in non-PCO countries, enhancing trust-based strategies might be an appropriate solution.

Third, as expected, the power of authorities strongly influenced enforced tax compliance; perceiving authorities as powerfully monitoring tax systems determined self-employed taxpayers to report high enforced compliance levels. As for country grouping, self-employed taxpayers from PCO and non-PCO countries reported similar enforced tax compliance.

Fourth, self-employed taxpayers were more willing to pay taxes voluntarily when they operated with higher trust in authorities. The interaction of trust and power suggested that power alone was not a relevant factor; however, in combination with trust, power moderated and reinforced the effect of trust on voluntary tax compliance. Increasing trust in high-power contexts generated higher levels of compliance than in low-power contexts. Moreover, the interaction between trust and power was stronger for non-PCO self-employed taxpayers than for PCO taxpayers. Considering this result and extrapolating it to the real-world context, governmental institutions from both PCO and non-PCO countries could emphasize strategies that boost taxpayers' trust when perceptions of power are high. A trust-based approach is more cost-effective in the long run than a deterrent approach.

Moreover, trust breeds trust (Feld and Frey 2002); mutual trust favors cooperation between businesses and authorities while creating a synergistic climate. On the one hand, if entrepreneurs believe that authorities support citizens' wellbeing and economic development, they give back to societies by fully complying with tax laws. On the other hand, if governments register high compliance rates, they can improve the quality of public goods and services while creating opportunities for businesses to thrive in national markets or to expand internationally. Therefore, government authorities must understand how they can capitalize on taxpayers' willingness to comply voluntarily to benefit the system (civil servants, businesses, NGOs, and citizens). In our case, this voluntary basis plays a significant role since we are dealing with self-employed taxpayers.

Additional analyses revealed that self-employed taxpayers from PCO countries had slightly higher tax morale than non-PCO nationals. Although unrelated to our experimental manipulations, this result is in line with general taxpaying intentions reported by PCO taxpayers; it shows consistency between their attitudes toward taxpaying and inner motivations to pay fiscal dues in real life (i.e., tax morale). We believe that a robust informal institution such as tax morale could trigger significant positive changes in the taxpaying context (Cyan et al. 2017; Halla 2012). When most entrepreneurs deem tax evasion unjustifiable at the microeconomic level, they could display a higher propensity toward taxpaying and influence others to act similarly, even via social pressure (Battiston and Gamba 2016). Thus, a generalized compliance behavior would stimulate a healthy

Batrancea *et al. Financial Innovation* (2022) 8:96

Page 19 of 23

economic system where interconnected companies motivate one another. In this situation, a motivational synergy of taxpaying could be plausible. At the macroeconomic level, tax morale could indirectly assist tax authorities and complement their monitoring of tax systems.

Regarding similarity, PCO and non-PCO nationals singled out the *trust low–power high* condition as the most similar to their home country, while *trust high–power high* was reported as the most dissimilar. This indicates that self-employed taxpayers perceived national authorities as capable of levying taxes and sanctioning evasion but not trustworthy enough to ensure wellbeing. In light of these results, the study of perceptions gains even more importance. Taxpayers could eventually comply if they develop clear and accurate perceptions in line with the actual quality of public goods available in society and with authorities' real efforts to reduce tax evasion. Nevertheless, when perceptions are distorted, even if taxpayers' benefits are apparent, they could be more prone to non-compliance. One proof of such distortions is that our PCO countries generally rank higher (with few exceptions) than our non-PCO countries regarding human development, corruption perceptions, the rule of law, transformations toward democracy, the market economy, or the evolution of the business environment[18]; however, self-employed taxpayers' trust in national authorities is still relatively low. Furthermore, our results suggest that, although the high-power and high-trust condition seemed the least applicable to their own countries, PCO self-employed taxpayers still perceived it as slightly more similar than non-PCO nationals. This seems to imply that high trust in a high-power context is somewhat more relatable to the experience of PCO nationals (at least after the dissolution of the Eastern Bloc). One possible explanation of PCO nationals' propensity for self-identifying with high-power contexts nests within the recent history of these PCO countries, which experienced some form of autocratic regime where high power prevailed at all levels.

We acknowledge that our study has some limitations, which might prompt additional research. Future studies could consider investigating the framework on representative samples drawn from a broader range of countries. Comparing the tax attitudes of PCO nationals with those of self-employed taxpayers from only developed countries may also yield interesting results. Additionally, future research can compare self-reported and actual tax compliance levels elicited in laboratory experiments on the same participants because attitudes might sometimes differ from actual behavior. Although our study measures self-reported tax compliance levels, manipulation checks suggested that the observed effects on tax compliance measures at the intentional level were accurate, robust, and reliable. This is because all our experimental manipulations followed a standard procedure; any effect that could bias results (e.g., Hawthorne effect or time effect) would affect all groups and would not influence the differences between groups. For the same reason, we did not assess single countries, as participants were randomized within and not between countries; hence, the observed effects could be compared without controlling for participants' country of

---

[18] Data on 2018 country rankings (Human Development Index, Transparency International Corruption Perceptions Index, Bertelsmann Foundation Transformation Index, World Economic Forum Executive Opinion Survey) can be found at: http://hdr.undp.org/en/data; http://www.transparency.org/en/cpi/2018/results (accessed September 13, 2020).

origin. Future studies could also include top management of other economic entities, such as small, medium-sized, and large enterprises, which contribute substantially more to public budgets than self-employed taxpayers. Last but not least, surveying decision-makers from companies operating in multiple international markets could also be considered to see whether corporate culture moderates the effects of trust and power on taxpaying attitudes.

Our study targeted tax authorities, professionals, individual and corporate taxpayers, and potential investors willing to enter PCO or non-PCO markets. For investors, grasping the dynamics of the interaction with tax authorities through self-employed taxpayers' perceptions may assist in directing investments toward a particular region (be it a PCO or a non-PCO state). Moreover, understanding how self-employed taxpayers reason can assist both PCO and non-PCO authorities develop better strategies to support *tax compliance*. One such strategy, which is heavily grounded on scientific results and has become a top choice for many tax authorities, is the cooperative compliance approach based on *trust* and cooperation (Kirchler et al. 2014; OECD 2013). Other strategies could include double taxation agreements, increased collaborations between national tax authorities, regular training and courses for tax officers to enhance the *power* of authorities, or even whistleblowing (Amir et al. 2018).

Our results offer tax authorities insights into the role that trust and power could play in obtaining and maintaining high tax compliance levels amid global economic challenges, downturns, and increasing tax compliance costs. Moreover, these results could support authorities in transforming tax policies to ensure a transition from an antagonistic to a synergistic climate, which would benefit both parties. The transition could be attained by increasing self-employed taxpayers' trust in national authorities through raising public accountability, transparency, and efficiency, mitigating bureaucracy and corruption, and promoting ethical behavior, fairness, and equity. Consequently, fostering trust could increase voluntary compliance for self-employed taxpayers, enabling governments to levy more tax revenue. Such benefits are countless; they would eventually translate into less money allocated for expenditures on monitoring and chasing tax evaders and more funding for state budgets and high-quality public goods.

Abbreviations

ANOVA	Analysis of variance
BF	Bayes Factor
BRICS	Acronym used to designate the most important emerging economies worldwide, i.e., Brazil, Russia, India, China, South Africa
PCO	Post-communist countries
non-PCO	Non-post-communist countries
ln	Natural logarithm
M	Mean
OECD	Organisation for Economic Co-operation and Development
SD	Standard deviation
SSF	Slippery slope framework of tax compliance

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40854-022-00404-y.

Additional file 1. Questionnaire structure.

Availability of data and materials
The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests
The authors declare that they have no competing interests.

Author details
[1]Department of Business, Babeş-Bolyai University, 7 Horea Street, 400174 Cluj-Napoca, Romania. [2]Faculty of Economics, "1 Decembrie 1918" University of Alba Iulia, 15-17 Unirii Street, 510009 Alba Iulia, Romania. [3]Department of Psychology, University of York, Heslington, York YO10 5DD, UK. [4]BPP Education Group, Department of Psychology, School of Business, BPP University, 137 Stamford Street, London SE1 9NN, UK. [5]Department of Computer Science, IT University of Copenhagen, Rued Langgards Vej 7, 2300 Copenhagen, Denmark. [6]Office of CTO, GN Audio As (Jabra), Lautrupbjerg 7, 2750 Ballerup, Denmark. [7]Business Management Graduate Program, Strategic Finance Department, Mackenzie Presbyterian University, 163 Rua Maria Antônia, São Paulo 01302-907, Brazil. [8]Center for Applied Social Sciences, Mackenzie Presbyterian University, 930 Rua da Consolação, São Paulo 01302-907, Brazil. [9]Department of Finance and Accounting, Faculty of Economics and Business Administration, Sofia University "St. Kliment Ohridski", 125 Tsarigradsko Shose Blvd., Block 3, 1113 Sofia, Bulgaria. [10]Department of Public Finance, Faculty of Finance and Accounting, Prague University of Economics and Business, Winston Churchill Sq., 13067 Prague 3, Czech Republic. [11]Department of Social Psychology, Institute of Psychology, ELTE Eötvös Loránd University, Egyetem tér 1-3, Budapest 1053, Hungary. [12]Faculty of Management, University of Tehran, Jalal-Ale-Ahmad Street, Nasr Bridge, Tehran 1411713114, Iran. [13]Department of Economics, University of Nigeria, Nsukka, Enugu State, Nigeria. [14]Faculty of Economic Sciences, University of Warsaw, 44/50 Długa Street, 00-241 Warsaw, Poland. [15]Department of Economics and Management/REMIT, Portucalense University, Rua Dr. António Bernardino de Almeida, 541-619, 4200-072 Porto, Portugal. [16]School of Business, Mzumbe University, Mzumbe, P.O. Box 6, Morogoro, Tanzania. [17]Department of Public Finance, Faculty of Economics and Administrative Studies, Inonu University, 44280 Battalgazi, Malatya, Turkey. [18]Department of Public Finance, Faculty of Economics, Administrative and Social Sciences, Alanya Alaaddin Keykubat University, 07400 Alanya, Antalya, Turkey.

References
Allingham MG, Sandmo A (1972) Income tax evasion: a theoretical analysis. J Pub Econ 1:323–338. https://doi.org/10.1016/0047-2727(72)90010-2

Alm J, Torgler B (2006) Culture differences and tax morale in the United States and in Europe. J Econ Psychol 27:224–246. https://doi.org/10.1016/j.joep.2005.09.002

Alm J, Torgler B (2011) Do ethics matter? Tax compliance and morality. J Bus Ethics 101:635–651. https://doi.org/10.1007/s10551-011-0761-9

Alm J, McClelland GH, Schulze WD (1999) Changing the social norm of tax compliance by voting. Kyklos 52:141–171. https://doi.org/10.1111/j.1467-6435.1999.tb01440.x

Alm J, Martinez-Vasquez J, Torgler B (2010) Developing alternative frameworks for explaining tax compliance. Routledge, Abingdon

Amir E, Lazar A, Levi S (2018) The deterrent effect of whistleblowing on tax collections. Eur Account Rev 27:939–954. https://doi.org/10.1080/09638180.2018.1517606

Andreoni J, Erard B, Feinstein JS (1998) Tax compliance. J Econ Lit 36:818–860

Balázs P, Bozóki A, Catrina S, Gotseva A, Horvath J, Limani D et al (2014) 25 years after the fall of the iron curtain: the state of integration of east and west in the European Union

Batrancea L, Nichita A, Olsen J, Kogler K, Kirchler E, Hoelzl E et al (2019) Trust and power as determinants of tax compliance across 44 nations. J Econ Psychol 74:102191. https://doi.org/10.1016/j.joep.2019.102191

Battiston P, Gamba S (2016) The impact of social pressure on tax compliance: a field experiment. Int Rev Law Econ 46:78–85. https://doi.org/10.1016/j.irle.2016.03.001

Beer S, Kasper M, Kirchler E, Erard B (2019) Do audits deter or provoke future tax noncompliance? IMF Working Paper WP/19/223

Berry DA, Hochberg Y (1999) Bayesian perspectives on multiple comparisons. J Stat Plan Infer 82(1–2):215–227. https://doi.org/10.1016/S0378-3758(99)00044-0

Braithwaite V (2003) Dancing with tax authorities: motivational postures and non-compliant actions. In: Braithwaite V (ed) Taxing democracy. Understanding tax avoidance and tax evasion. Ashgate, Aldershot, pp 15–39

Braithwaite V (2008) Defiance in taxation and governance. Edward Elgar, Cheltenham

Braithwaite V, Ahmed E (2005) A threat to tax morale: the case of Australian higher education policy. J Econ Psychol 26(4):523–540. https://doi.org/10.1016/j.joep.2004.08.003

Carvalho Wilks D, Pacheco L (2014) Tax compliance, corruption and deterrence: an application of the slippery slope model. In: Teixeira AAC, Maia A, Moreira JA, Pimenta C (eds) Interdisciplinary insights on fraud. Cambridge Scholars Publishing, Newcastle upon Tyne, pp 87–104

Cohen J (1988) Statistical power analysis for the behavioral sciences. Routledge, New York

Cyan MR, Koumpias AM, Martinez-Vazquez J (2017) The effects of mass media campaigns on individual attitudes towards tax compliance; quasi-experimental evidence from survey data in Pakistan. J Behav Exp Econ 70:10–22. https://doi.org/10.1016/j.socec.2017.07.004

Doerrenberg P, Peichl A (2022) Tax morale and the role of social norms and reciprocity - evidence from a randomized survey experiment. FinanzArchiv 78(1–2):44–86. https://doi.org/10.1628/fa-2021-0016

Enachescu J, Olsen J, Kogler C, Zeelenberg M, Breugelmans SM, Kirchler E (2019) The role of emotions in tax compliance behavior: a mixed-methods approach. J Econ Psychol 74:102194. https://doi.org/10.1016/j.joep.2019.102194

Feld LP, Frey BS (2002) Trust breeds trust: how taxpayers are treated. Econ Gov 3:87–99. https://doi.org/10.1007/s101010100032

Feld LP, Frey BS (2007) Tax compliance as the result of a psychological tax contract: the role of incentives and responsive regulation. Law Policy 29:102–120. https://doi.org/10.1111/j.1467-9930.2007.00248.x

Frecknall-Hughes J (2019) The moral basis for taxation. In: van Brederode RF (ed) Ethics and taxation. Springer, Singapore, pp 23–45

Gangl K, Hofmann E, Kirchler E (2015) Tax authorities' interaction with taxpayers: a conception of compliance in social dilemmas by power and trust. New Ideas Psychol 37:13–23. https://doi.org/10.1016/j.newideapsych.2014.12.001

Gangl K, Hartl B, Hofmann E, Kirchler E (2019) The relationship between Austrian tax auditors and self-employed taxpayers: evidence from a qualitative study. Front Psychol 10:1034. https://doi.org/10.3389/fpsyg.2019.01034

Gangl K, Hofmann E, Hartl B, Berkics M (2020) The impact of powerful authorities and trustful taxpayers: evidence for the extended slippery slope framework from Austria, Finland, and Hungary. Policy Stud 41:98–111. https://doi.org/10.1080/01442872.2019.1577375

Górecki MA, Letki N (2020) Social norms moderate the effect of tax system on tax evasion: evidence from a large-scale survey experiment. J Bus Ethics 172:727–746. https://doi.org/10.1007/s10551-020-04502-8

Halla M (2012) Tax morale and compliance behavior: first evidence on a causal link. The BE J Econ Anal Policy 12(1):1–27. https://doi.org/10.1515/1935-1682.3165

Han K, Park BU (2018) Smooth backfitting for errors-in-variables additive models. Ann Statist 46(5):2216–2250. https://doi.org/10.1214/17-AOS1617

http://hdr.undp.org/en/data (accessed September 13, 2020)

http://www.transparency.org/en/cpi/2018/results (accessed September 13, 2020)

https://data.worldbank.org/indicator/SL.EMP.SELF.ZS?end=2018s&start=1991 (accessed 13 September 2020)

https://datahelpdesk.worldbank.org/knowledgebase/articles/906519 (accessed 14 September 2020)

https://www.pwc.com/gx/en/services/tax/publications/paying-taxes-2020/overall-ranking-and-data-tables.html (accessed 13 September 2020)

James S, Alley C (2002) Tax compliance, self-assessment and tax administration. J Financ Manag Pub Serv 2(2):27–42

JASP Team (2020). JASP (Version 0.13.1) [Computer software]

Kaplanoglou G, Rapanos VT (2015) Why do people evade taxes? New experimental evidence from Greece. J Behav Exp Econ 56:21–32. https://doi.org/10.1016/j.socec.2015.02.005

Kastlunger B, Lozza E, Kirchler E, Schabmann A (2013) Powerful authorities and trusting citizens: the slippery slope framework and tax compliance in Italy. J Econ Psychol 34:36–45. https://doi.org/10.1016/j.joep.2012.11.007

Kirchler E (2007) The economic psychology of tax behaviour. Cambridge University Press, Cambridge

Kirchler E, Wahl I (2010) Tax compliance inventory TAX-I: designing an inventory for surveys of tax compliance. J Econ Psychol 31:331–346. https://doi.org/10.1016/j.joep.2010.01.002

Kirchler E, Hoelzl E, Wahl I (2008) Enforced versus voluntary tax compliance: the "slippery slope" framework. J Econ Psychol 29(2):210–225. https://doi.org/10.1016/j.joep.2007.05.004

Kirchler E, Kogler C, Muehlbacher S (2014) Cooperative tax compliance from deterrence to deference. Curr Dir Psychol Sci 23(2):87–92. https://doi.org/10.1177/0963721413516975

Kogler C, Batrancea L, Nichita A, Pantya J, Belianin A, Kirchler E (2013) Trust and power as determinants of tax compliance: testing the assumptions of the slippery slope framework in Austria, Hungary, Romania and Russia. J Econ Psychol 34:169–180. https://doi.org/10.1016/j.joep.2012.09.010

Kogler C, Muehlbacher S, Kirchler E (2015) Testing the "slippery slope framework" among self-employed taxpayers. Econ Gov 16(2):125–142. https://doi.org/10.1007/s10101-015-0158-9

Koumpias AM, Leonardo G, Martinez-Vazquez J (2021) Trust in government institutions and tax morale. FinanzArchiv 77(2):117–140. https://doi.org/10.1628/fa-2021-0006

Lamb M, Lymer A, Freedman J, James S (2004) Taxation: an interdisciplinary approach to research. Oxford University Press, Oxford

Lemoine J, Roland-Lévy C (2013) Are taxpayers, who pay their taxes, all cooperative citizens? Citizensh Teach Learn 8:195–213. https://doi.org/10.1386/ctl.8.2.195_1

Lisi G (2012a) Unemployment, tax evasion and the slippery slope framework. Int Rev Econ 59(3):297–302. https://doi.org/10.1007/s12232-012-0165-x

Lisi G (2012b) Testing the slippery slope framework. Econ Bull 32(2):1369–1377

Martin IW, Mehrotra AK, Prasad M (eds) (2009) The new fiscal sociology: taxation in comparative and historical perspective. Cambridge University Press, Cambridge

McGee R, Ho SSM, Li AYS (2008) A comparative study on perceived ethics of tax evasion: Hong Kong vs the United States. J Bus Ethics 77:147–158

Mickiewicz T, Rebmann A, Arnis S (2019) To pay or not to pay? Business owners' tax morale: testing a neo-institutional framework in a transition environment. J Bus Ethics 157:75–93. https://doi.org/10.1007/s10551-017-3623-2

Muehlbacher S, Kirchler E, Schwarzenberger H (2011) Voluntary versus enforced tax compliance: empirical evidence for the "slippery slope" framework. Eur J Law Econ 32:89–97. https://doi.org/10.1007/s10657-011-9236-9

Oats L (2012) Taxation: a fieldwork research handbook. Routledge, Abingdon

OECD (2013) Co-operative compliance: a framework. From enhanced relationships to co-operative compliance. OECD Publishing, Paris

OECD (2018) OECD employment outlook 2018. OECD Publishing, Paris

Olsen J, Kasper M, Kogler C, Muehlbacher S, Kirchler E (2019) Mental accounting of income tax and value added tax among self-employed business owners. J Econ Psychol 70:125–139. https://doi.org/10.1016/j.joep.2018.12.007

Price water house Coopers, World Bank Group (2020) Paying taxes 2020: the changing landscape of tax policy and administration across 190 economies

Prinz A, Muehlbacher S, Kirchler E (2014) The slippery slope framework on tax compliance: an attempt to formalization. J Econ Psychol 40:20–34. https://doi.org/10.1016/j.joep.2013.04.004

Riahi-Belkaoui A (2008) Bureaucracy, corruption and tax compliance. In: McGee R (ed) Taxation and public finance in transition and developing economies. Springer, Miami, pp 3–10

Richardson G (2008) The relationship between culture and tax evasion across countries: additional evidence and extensions. J Int Account Auditing Tax 17:67–78. https://doi.org/10.1016/j.intaccaudtax.2008.07.002

Rouder JN, Morey RD, Speckman PL, Province JM (2012) Default Bayes factors for ANOVA designs. J Math Psychol 56(5):356–374. https://doi.org/10.1016/j.jmp.2012.08.001

Srinivasan T (1973) Tax evasion: a model. J Pub Econ 2(4):339–346. https://doi.org/10.1016/0047-2727(73)90024-8

Thurman QC (1989) General prevention of tax evasion: a factorial survey approach. J Quant Criminol 5(2):127–146. https://doi.org/10.1007/BF01062520

Torgler B (2005) Tax morale and direct democracy. Eur J Pol Econ 21(2):525–531. https://doi.org/10.1016/j.ejpoleco.2004.08.002

Torgler B (2007) Tax compliance and tax morale: a theoretical and empirical analysis. Edward Elgar, Cheltenham

Torgler B, Murphy C (2004) Tax morale in Australia: what shapes it and has it changed over time? J Aust Tax 7(2):298–335

van Brederode RF (2019) Ethics and taxation. Springer, Singapore

van den Bergh D, van Doorn J, Marsman M, Draws T, van Kesteren E-J, Derks K et al (2020) A tutorial on conducting and interpreting a Bayesian ANOVA in JASP. L'Année Psychologique 120(1):73–96. https://doi.org/10.3917/anpsy1.201.0073

Wahl I, Kastlunger B, Kirchler E (2010a) Trust in authorities and power to enforce tax compliance: an empirical analysis of the "slippery slope framework." Law Policy 32(4):383–406. https://doi.org/10.1111/j.1467-9930.2010.00327.x

Wahl I, Endres M, Kirchler E, Böck B (2010b) Voluntary and enforced cooperation in social dilemmas: transferring the "slippery slope framework" to the public transport system. In: Fletchenhauer D, Pradel J, Hoelzl E (eds), A boat trip through economic change: proceedings of the IAREP/SABE/ICABEEP 2010 conference. Pabst Science Publishers, Cologne

Wynter CB, Oats L (2021) Knock, knock: the taxman's at your door! Practice sense, empathy games, and dilemmas in tax enforcement. J Bus Ethics 169:279–292. https://doi.org/10.1007/s10551-019-04300-x

Yitzhaki S (1974) A note on 'Income tax evasion: a theoretical analysis.' J Pub Econ 3:201–202

Publisher's Note