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# Perceptions of trust and power are associated with tax compliance: A cross-cultural study

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## ABSTRACT

The slippery slope framework (SSF) of tax compliance postulates that taxpayers' compliance behaviour depends on the two dimensions: trust in authorities and power of authorities. In an attempt to overcome common-method biases, the present study tests the main assumptions of the SSF with a sample of 44 countries/regions. Country/region-level trust and power indices are calculated based on experimental data involving 14,509 participants and related to shadow economy estimates and – as an alternative indicator of non-compliance – corruption indices. The results indicate that both trust and power are negatively related to the size of the shadow economy and the extent of corruption. These results emphasise the importance of both SSF dimensions in combating tax evasion and counterproductive behaviour within a society in general.

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## KEYWORDS

Trust; power; shadow economy; corruption; tax compliance; tax evasion

## Introduction

Successful tax collection is pivotal for the functioning of modern societies. But what ensures that citizens pay their taxes? Traditional and most influential economic models of tax compliance focus on audits and fines as deterrents of tax evasion (Allingham and Sandmo 1972; Srinivasan 1973; Yitzhaki 1974). It is assumed that citizens are rational utility maximisers and that they only pay their taxes if economically this is the most profitable option. The limitations of perceiving taxpayers as rational utility maximisers have been discussed in various earlier publications (e.g. Andreoni, Erard, and Feinstein 1998; Fischer, Wartick, and Mark 1992; Kirchler et al. 2010), resulting in new directions of research that stress the importance of considering additional factors when

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analysing tax compliance, such as attitudes towards taxes and tax morale, social norms, and perceptions of distributive and procedural justice (for an extensive summary, see Kirchler 2007).

The slippery slope framework (SSF) of tax compliance (Kirchler 2007; Kirchler, Hoelzl, and Wahl 2008) combines both economic and social-psychological perspectives into a single conceptual framework by distinguishing between two dimensions: (1) trust in tax authorities, and (2) power of tax authorities. Trust in authorities emerges from taxpayers' understanding of tax laws, their perceptions of distributive and procedural fairness, the assumption that authorities work efficiently for the common interests of the society, and the conviction that other taxpayers pay their share as well. Power of authorities relates to citizens' perceptions of authorities' effectiveness in suppressing tax evasion through deterrence measures (i.e. audits and fines). The SSF postulates that both dimensions positively impact citizens' tax compliance through different channels. While high trust is assumed to result in high voluntary tax compliance, high power is expected to result in high enforced tax compliance. Hence, the two dimensions foster different motivations to comply with tax obligations, yet both facilitate the collection of higher tax revenues.

A considerable number of empirical studies have tested the key assumptions of the SSF and most have found supportive evidence. These studies can typically be characterised as experimental scenario studies (Kaplanoglou, Rapanos, and Daskalakis 2016; Kasper, Kogler, and Kirchler 2015; Kogler et al. 2013; Olsen et al. 2018; Wahl, Kastlunger, and Kirchler 2010) or questionnaire studies (Gobena and Van Dijke 2016; Kogler, Muehlbacher, and Kirchler 2015; Lozza et al. 2013; Muehlbacher, Kirchler, and Schwarzenberger 2011; Siglé et al. 2018). The most extensive study (Batrancea et al. 2019) tests and finds support for the SSF in a total of 44 countries/regions ( $N = 14,509$ ).

However, the designs of these studies may be prone to common-method biases, especially to so-called measurement context effects, where the independent and dependent variables are measured at the same point in time within the same sample (Podsakoff et al. 2003). As the topic of taxation encompasses a strong ethical component, potentially triggering socially desirable responses, the observed effects of trust and power might be inflated. In this article, we address this potential shortcoming by obtaining measures of the independent (i.e. trust and power) and dependent variables (i.e. tax compliance/evasion) from unrelated data sources and correlating these measures. Accordingly, we calculate trust and power indices on a country/region level based on the individual data from Batrancea et al. (2019) and relate them to the size of the shadow economy and the level of corruption as proxies for tax compliance. This serves as the validation of previous studies that find support for the assumptions of the SSF, and additionally contributes to the shadow economy and corruption literature by investigating the role of trust and power in these contexts.

### ***Common proxies for trust and power***

The extant literature on tax behaviour reports other attempts of testing the SSF using external data sources, and most of these studies find support for the main assumptions of the SSF. With regard to the proxies for trust, we find that studies have used items

from the World Values Survey (WVS) asking about confidence in the national government (Fischer and Schneider 2009; Lisi 2019; Ruiu and Lisi 2011) and from the European Social Survey (ESS) inquiring about trust in the national government (Tsikas 2017), as well as indicators such as the government effectiveness indicator retrieved from the Worldwide Governance Indicators (WGI) dataset (Pukelienė and Kažemekaitytė 2016), and the Corruption Perceptions Index (CPI) produced by Transparency International (Mas'ud, Manaf, and Saad 2015; 2019). Power is almost always proxied by the WGI rule of law index (Fischer and Schneider 2009; Lisi 2019; Mas'ud, Manaf, and Saad 2015; Mas'ud, Manaf, and Saad 2019; Pukelienė and Kažemekaitytė 2016; Ruiu and Lisi 2011) except for a case where incarceration rates are used as a measure of the state's enforcement capabilities (Tsikas 2017).

It becomes evident that the selection of these proxies is quite heterogeneous, especially in the case of trust. Also, it is questionable whether all the selected variables adequately proxy for trust and power as defined in the SSF. For instance, it is a strong claim to assume that corruption proxies for trust. It also seems debateable to use government effectiveness as a trust proxy, where others use a closely related construct (i.e. the rule of law) as a proxy for power. Therefore, in the present study, we rely on trust and power indices directly derived from a classical experimental scenario study conducted in 44 countries/regions (Batrancea et al. 2019). This has the advantage of obtaining trust and power values based on operationalisations that are in line with the theoretical definitions of the SSF rather than using proxies that are conceptually debateable.

### ***Common proxies for tax compliance***

Tax compliance has also been proxied in different ways in the tax literature, for instance by attitudinal items from large-scale cross-national surveys like the WVS (Fischer and Schneider 2009) or the Eurobarometer (Pukelienė and Kažemekaitytė 2016). Another set of studies uses tax as the percentage of GDP (Mas'ud, Manaf, and Saad 2015; 2019), which we view as debateable since the tax-to-GDP ratio depends first and foremost on the tax system itself. Individual tax behaviour likely influences this ratio, but clearly to a smaller extent. With all things considered, the concepts closest to actual tax evasion are estimates of the VAT gap (Tsikas 2017), which are currently available only for EU countries, and estimates of the shadow economy, which Schneider (2004) defines as unreported income from legal economic activities that would generally be taxable (Lisi 2019; Ruiu and Lisi 2011). One main advantage of the latter proxy is that these shadow economy estimates are available for as many as 158 countries/regions (Medina and Schneider 2018).

## **Theoretical assumptions**

### ***The relations of trust in authorities and power of authorities with the shadow economy***

The size of the shadow economy increases with the burden imposed by taxes and social security contributions (Buehn and Schneider 2012; Dell'Anno, Gómez-Antonio, and

Pardo 2007; Johnson et al. 1997). An additional factor of influence is the degree of market regulations that reduce freedom of choice and lead to increased labour costs, incentivising people to engage in shadow economy activities (Johnson et al. 1997; Johnson, Kaufmann, and Zoido-Lobaton 1999).

Similar results are identified for the quality of institutions and public sector services (Dreher, Kotsogiannis, and McCorriston 2009; Dreher and Schneider 2010; Johnson, Kaufmann, and Zoido-Lobaton 1998; Schneider 2010). Research shows that if people perceive public institutions as efficient and discretionary, and their services as beneficial, they are less likely to transact in the shadow economy. Thus, if tax money is spent on efficient policies under the form of high institutional quality and beneficial public sector services, a certain level of taxation is seen as legitimate and, in principle, it should not incentivise people to engage in the shadow economy. Furthermore, the perceived efficiency of the public sector has an indirect effect on citizens' moral perspective of complying with tax laws (Torgler and Schneider 2009). In cases where political processes are perceived as fair and legitimate (Feld and Frey 2007) and taxpayers are treated in a service-oriented way (Kirchler, Hoelzl, and Wahl 2008; Wahl, Kastlunger, and Kirchler 2010), tax compliance levels increase, thereby directly influencing the size of the shadow economy. These factors correspond to the dimension of trust in authorities within the SSF. Hence, it can be assumed that enhancing trust in authorities and governmental institutions has a negative impact on the size of the shadow economy.

*Hypothesis 1: There is a negative relation between trust in authorities and the shadow economy.*

Deterrence and enforcement activities conducted by governmental authorities are discussed as relevant factors that have been investigated thoroughly in the tax compliance analysis (Allingham and Sandmo 1972; Andreoni, Erard, and Feinstein 1998), especially theoretically (Prado 2011; Sarte 2000), but also empirically (Buehn and Schneider 2012) in the context of the shadow economy. The main conclusion is that enforcement can effectively deter shadow economy activities, which reflects the dimension of power of authorities within the SSF.

*Hypothesis 2: There is a negative relation between power of authorities and the shadow economy.*

### **The relation of trust in authorities and power of authorities with corruption**

While the shadow economy is directly linked to tax evasion, we additionally use corruption as an alternative indicator of non-compliance in this study. Corruption can be defined as abusing power or resources for personal gain (Johnston 2001). On the one hand, corruption can be directly related to tax evasion, especially if there is corruption on the side of tax authorities and officials (Pirttilä 1999). Such acts, e.g. the systematic omission of auditing certain companies, can potentially erode the credibility and efficiency of tax administrations (Bowles 2019). Moreover, cases of alleged corruption among public figures (e.g. politicians accused of but not charged with tax

evasion) can be assumed to decrease citizens' willingness to contribute to the same public system.

On the other hand, corruption, as engaging in shadow economy activities, represents counterproductive societal behaviour. Both phenomena are closely intertwined as suggested by the results from a study using World Bank survey data on over 16,000 firms from 32 countries (Alm, Martinez-Vazquez, and McClellan 2016) and by other studies in the literature (Batrancea et al. 2018; Berdiev, Goel, and Saunoris 2018; Gillanders and Parviainen 2018; Goel and Saunoris 2017; Goel and Saunoris 2019). In addition, the corruption of tax officials is found to drive higher levels of evasion (Escobari 2012; Tanzi 2017). Consequently, it seems coherent to test the main assumptions of the SSF with corruption as an alternative indicator of non-compliance.

In line with this, the concept of trust has been frequently linked to corruption. Both are often described as opposing forces, where trust resembles the cooperative spirit of the society and corruption constitutes an expression of selfishness (Uslaner 1999; 2004). People who trust other members of the society are often assumed to also act in accordance with the law. A number of studies confirm that an increase in trust leads to higher anti-corruption scores (La Porta et al. 1997; Uslaner 1999; Uslaner 2004). Further results indicate that high corruption is strongly associated with low trust in political institutions and in civil servants' work for the benefit of the community (Anderson and Tverdova 2003; Chang and Chu 2006; Morris and Klesner 2010), and therefore suggest bidirectional causality. Independent of the direction of this relation, the postulated effects correspond to the trust dimension of the SSF from a conceptual standpoint.

*Hypothesis 3: There is a negative relation between trust in authorities and corruption.*

Studies on the relation between power of authorities and corruption are less prevalent in the literature. The general theoretical argument is that the net utility stemming from corruption must be worth the adverse effects associated with potential penalties (Jain 2001). Thus, if public authorities do not have the power to catch and punish people engaging in corruption, there will be no legal mechanism that prevents high corruption levels. This assumption resembles the power dimension of the SSF (Kirchler, Hoelzl, and Wahl 2008).

*Hypothesis 4: There is a negative relation between power of authorities and corruption.*

Altogether, we expect that trust in authorities and power of authorities are both negatively related to the size of the shadow economy and corruption levels. That is, higher trust and power scores should correspond to a smaller size of the shadow economy and a lower level of corruption.

## **Construction of key variables**

The aim of the present study is to test the association of trust in authorities and power of authorities with the shadow economy and corruption at a country/region level. As previously described, data of the independent variables (i.e. trust and power) stem from an experimental questionnaire study conducted in 44 countries/regions

(Batrancea et al. 2019). This original study investigates the effect of trust and power – as experimentally manipulated in the presented scenario – on participants’ tax compliance intentions. In contrast, we analyse similarity evaluations of participants with regard to the presented scenario and the perceptions of trust and power in their home countries/regions. Based on such data we derive country/region-level trust and power indices, which represent actual perceptions of trust and power. Independently, we draw country/region-level shadow economy and corruption data from other external sources and regress these on our obtained trust and power indices. Thus, the current study offers a completely different approach compared to Batrancea et al. (2019), relies on different variables, and thus offers novel insights.<sup>1</sup>

### ***The scenario-based experimental study***

#### ***Participants***

A total of 14,509 individuals from 44 countries/regions ( $M = 330$  per country/region,  $SD = 66$ ) took part in the original study (Batrancea et al. 2019). Participants were predominantly students of Economics or Business Administration (87.5%) and were recruited on a voluntary basis. Females constituted 52.5% of the sample; the mean age was 21.48 years ( $SD = 3.20$ ). Detailed information on sample size and demographics for each country/region is provided in [Figures S1–S3](#) in supplemental material.

#### ***Procedure and material***

Data were collected between mid-2011 and 2013, with the majority of questionnaires being completed in 2012. Importantly, the original study comprised a  $2$  (low trust vs. high trust)  $\times$   $2$  (low power vs. high power) between-subjects scenario-based experiment resulting in four conditions: (1) low trust and low power, (2) low trust and high power, (3) high trust and low power, and (4) high trust and high power. Individuals were randomly assigned to one of the conditions, and after reading the respective description of the fictitious country, Varosia, they had to complete a questionnaire. The core measure of the present study addressed the similarity between the scenario and the respective home country/region and was assessed with three items. One item measured the general similarity between the description of Varosia in the scenarios and the country/region of participation (i.e. ‘How similar do you perceive the country of Varosia in comparison to your own country?’). Two further items specifically addressed the similarity of trust and power descriptions in Varosia and the respective home country/region (e.g. ‘How similar do you perceive the trust in authorities in the country of Varosia in comparison to your own country?’). The answering format ranged from 1 (very dissimilar) to 9 (very similar). Detailed information on the procedure and the complete material are provided in [supplementary material \(Appendices A and C\)](#).

### ***Data for country/region-level analyses***

#### ***Trust and power at the country/region level***

First, for each country/region, we extracted the mean similarity of the three similarity items for each of the four conditions. To compute a trust index per country/region, we

subtracted the mean perceived similarity of trust score in the two low trust conditions from the mean similarity score in the two high trust conditions. Subtracting the mean scores of the condition pairs with identical trust configurations eliminates the influence of power descriptions. Therefore, the resulting index provides an estimate of participants' trust in the authorities from their home country/region. Equation (1) provides a formal description of computing the trust index for country  $y$  (i.e.  $Trust_y$ ).  $SimTrust$  is the score corresponding to the similarity of trust (i.e. 'How similar do you perceive the trust in authorities in the country of Varosia in comparison to your own country?'),  $T$  and  $P$  with the subscripts *high* and *low* indicate the described combination of trust and power.

$$Trust_y = \frac{M(SimTrust_{T_{high}P_{high}})_y + M(SimTrust_{T_{high}P_{low}})_y}{2} - \frac{M(SimTrust_{T_{low}P_{high}})_y + M(SimTrust_{T_{low}P_{low}})_y}{2} \quad (1)$$

In the same way, calculations of the power index were performed by subtracting the mean perceived similarity of power score in the two low power conditions from the mean similarity score in the two high power conditions. Equation (2) shows the formula of computing the power index for country  $y$  (i.e.  $Power_y$ ). Here,  $SimPower$  is the score corresponding to the similarity of power (i.e. 'How similar do you perceive the power of authorities in the country of Varosia in comparison to your own country?').

$$Power_y = \frac{M(SimPower_{T_{high}P_{high}})_y + M(SimPower_{T_{low}P_{high}})_y}{2} - \frac{M(SimPower_{T_{high}P_{low}})_y + M(SimPower_{T_{low}P_{low}})_y}{2} \quad (2)$$

The questionnaire also included one item asking about the general perceived similarity between Varosia and the home country/region (i.e. 'How similar do you perceive the country of Varosia in comparison to your own country?'). The correlations between the two different possible calculations were high ( $Trust_{specific}$  and  $Trust_{general}$  being correlated with  $r(42) = 0.97$ ,  $p < 0.001$ ;  $Power_{specific}$  and  $Power_{general}$  being correlated with  $r(42) = 0.93$ ,  $p < 0.001$ ). All reported results were unaffected by choosing one or the other version, and therefore we opted for the indices based on the specific similarity items of trust and power.

### **Shadow economy estimates**

Estimates of the shadow economy are available for as many as 158 countries/regions (Medina and Schneider 2018). Estimates are based on an indirect structural equation model approach (the multiple indicators multiple causes approach), and the shadow economy is formalised as the outcome of multiple measurable causes such as unemployment rates, the degree of regulation, and tax burdens. The estimates refer to the shadow economy as a percentage of GDP. We extracted data from 2012 to 2015, as the majority of data on trust and power were collected in 2012, and the source



provided shadow economy data until 2015 based on the same method. Scores for 2015 in our sample range from 6.94% (Switzerland) to 43.12% (Thailand).<sup>2</sup>

### **Corruption estimates**

Corruption data were drawn from Transparency International's CPI. The index ranks countries by their level of perceived public sector corruption and is calculated by aggregating up to 13 different sources of data that are corruption-related. Data from each source are standardised and averaged per country/region. CPI scores range from 0 (highly corrupt) to 100 (very clean). Hence, high scores indicate a low level of corruption.<sup>3</sup> We extracted CPI scores for the years ranging from 2012 to 2018.<sup>4</sup> Scores for 2018 in our sample range from 28 (Iran) to 85 (Switzerland).

## **Empirical models and results**

### **Trust and power indices**

One precondition of calculating trust and power indices per country/region was a successful experimental manipulation of low versus high trust and power, respectively, in the experimental study. Appendix D in supplemental material provides all the details on these analyses, clearly indicating that the manipulation of both factors was successful. Equations (1) and (2) explain the calculation of the trust and power indices per country/region. To illustrate an example, Table 1 depicts Australian participants' similarity scores of the two items on perceived similarity of trust and power comparing Varosia and their home country. Participants in Australia perceived higher similarity of trust in the two high trust conditions and higher similarity of power in the two high power conditions. Therefore, both resulting indices are positive. Inserting the values from Table 1 into Equation (1), the resulting trust index is:  $(4.98 + 3.83)/2 - (3.59 + 2.88)/2 = 1.17$ . Equation (2) yields a power index, i.e.  $(5.65 + 3.56)/2 - (3.55 + 2.49)/2 = 1.59$ .

After calculating trust and power indices, we z-transformed the variables for further analyses. Figure 1 shows the distribution of trust and power indices for all countries/regions. The overall correlation between the two indices is  $r(42) = 0.74, p < 0.001$ .

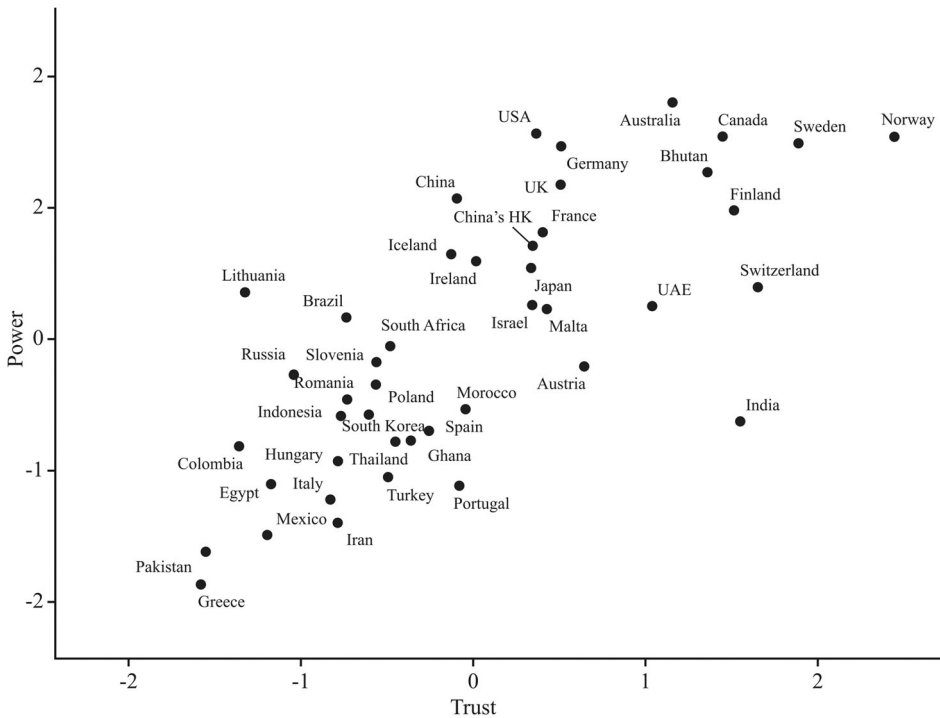
### **The relation of trust and power with the shadow economy**

To test Hypotheses 1 and 2, we ran three linear mixed-effects models. In Model (1), only trust was entered as a fixed effect. In Model (2), only power was entered as a fixed effect. In Model (3), both independent variables along with their interaction were

**Table 1.** Means and standard deviations of perceived similarity of trust and power between Varosia and Australia by condition.

Item	Low trust		High trust	
	Low power	High power	Low power	High power
Trust similarity	2.88 (2.06)	3.59 (2.32)	3.83 (2.26)	4.98 (2.10)
Power similarity	2.49 (1.78)	3.56 (2.21)	3.55 (2.35)	5.65 (2.06)

Notes: N = 355. Higher scores indicate higher perceived similarity between Varosia and Australia.



**Figure 1.** Scatterplot of trust and power indices.

entered as fixed effects. The dependent variable consisted of shadow economy estimates for the four years ranging from 2012 to 2015. To account for these multiple observations per country/region, we specified a random intercept for country/region. Results are shown in Table 2 and Figure 2.

Model (1) shows that trust is negatively related to the size of the shadow economy. An increase in trust by one SD corresponds to a decrease in the size of the shadow economy by roughly five percentage points. Model (2) reveals that the effect of power runs similarly to the one of trust, corresponding to a decrease of about six percentage points. When including both indices along with their interaction in Model (3), we only find a significant negative effect of power. This indicates that trust and power explain similar variance proportions of the size of the shadow economy, while power seems to explain a slightly larger share. This is supported by the  $R^2$  values in Table 2 and further direct model comparisons. While Model (3) is not significantly better at explaining the data than Model (2), with  $\chi^2(2) = 1.57$ ,  $p = 0.457$ , Model (3) performs better than Model (1), with  $\chi^2(2) = 9.99$ ,  $p = 0.007$ . In other words, the model fit of power alone is not significantly different from the model fit including both indices, but the model fit of trust alone is inferior to the model fit including both indices. Overall, the results support both Hypothesis 1 and Hypothesis 2.<sup>5</sup>

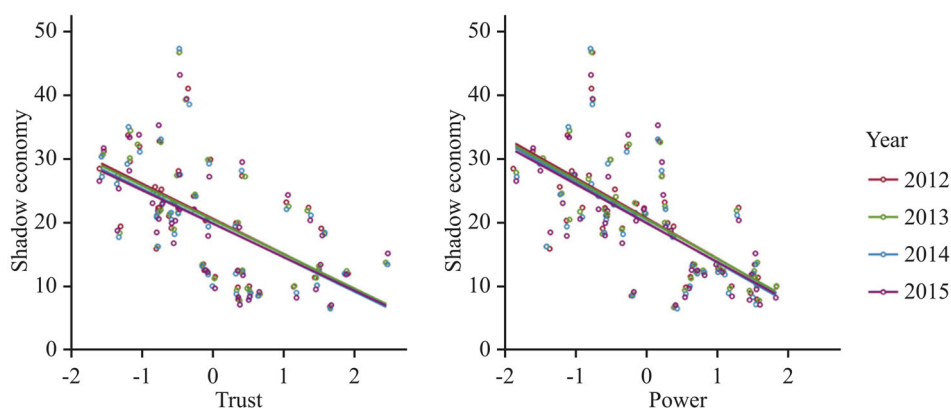
### ***The relation of trust and power with corruption***

The models for the dependent variable (the CPI) followed the same structure as in the previously described models. The only difference is that for corruption we entered

**Table 2.** Linear mixed-effects models with the shadow economy as the dependent variable.

Fixed effects	Model (1)		Model (2)		Model (3)	
	B	SE	B	SE	B	SE
Intercept	20.11***	1.12	20.11***	1.02	19.73***	1.26
Trust	-5.39***	1.14			-1.88	1.53
Power			-6.24***	1.03	-4.92***	1.50
Trust $\times$ Power					0.53	1.05
Random effects	$\sigma^2$		$\sigma^2$		$\sigma^2$	
Intercept	55.38		45.70		44.09	
Residual	0.73		0.73		0.73	
Fit indicators						
Pseudo $R^2_{\text{marginal}}$	0.34		0.45		0.47	
AIC	704.2		695.8		698.2	

Note: N = 176, and  $N_{\text{class-level}}=44$ ; \*\*\* $p < 0.001$ .

**Figure 2.** Scatterplot of shadow economy estimates by trust and power.

Note: Points are horizontally jittered.

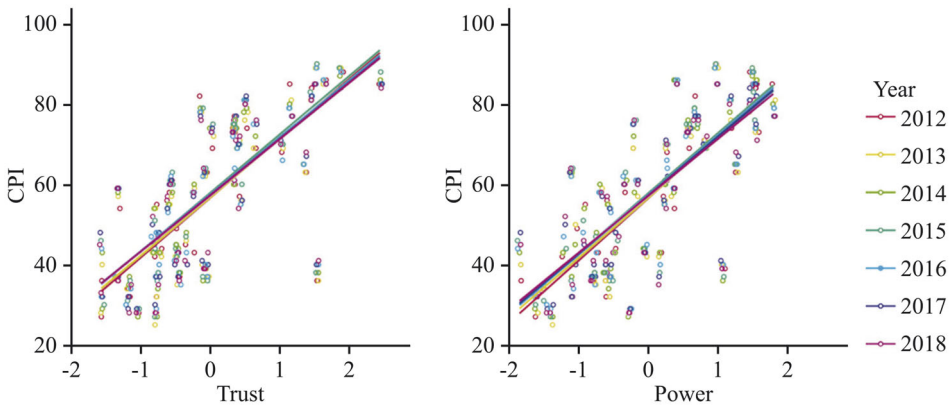
**Table 3.** Linear mixed-effects models with the CPI as the dependent variable.

Fixed effects	Model (1)		Model (2)		Model (3)	
	B	SE	B	SE	B	SE
Intercept	57.30***	1.83	57.30***	1.75	56.63***	1.97
Trust	14.27***	1.85			7.29**	2.39
Power			14.69***	1.77	9.22***	2.36
Trust $\times$ Power					0.93	1.65
Random effects	$\sigma^2$		$\sigma^2$		$\sigma^2$	
Intercept	146.27		134.38		108.15	
Residual	5.52		5.52		5.52	
Fit indicators						
Pseudo $R^2_{\text{marginal}}$	0.57		0.60		0.68	
AIC	1,638.4		1,634.7		1,629.2	

Note: N = 308, and  $N_{\text{class-level}}=44$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

seven CPI observations ranging from 2012 to 2018. Results are shown in [Table 3](#) and [Figure 3](#).

Model (1) shows that trust is positively related to the CPI. An increase in trust by one SD corresponds to an increase in the CPI by roughly 14 points. Model (2) reveals



**Figure 3.** Scatterplot of CPI by trust and power.  
Note: Points are horizontally jittered.

that the effect of power runs similarly to the effect of trust, corresponding to an increase of about 15 points. When including both indices along with their interaction in Model (3), we find significant positive effects of both trust and power.  $R^2$  values in Table 3 suggest similar shares of explained variance by Model (1) and Model (2), but increased explained variance by Model (3). Direct model comparisons confirm this, namely Model (3) is significantly better at explaining the data than both Model (1), with  $\chi^2(2) = 13.20$ ,  $p = 0.001$ , and Model (2), with  $\chi^2(2) = 9.49$ ,  $p = 0.008$ . In other words, the data are explained best if both dimensions of trust and power are accounted for. The results are in support of both Hypothesis 3 and Hypothesis 4.

### **Stability of estimates over the years**

As previously explained, we consider multiple years for each model as regards both dependent variables. We explore whether the reported effects of trust and power indicate any variability over the years. Figures 2 and 3 show separate fitted lines for the respective years. These relations seem quite stable. To test their stability, we include random slopes of the effect(s) of trust (and/or power) varying between years in all models. The results reveal that none of these random slopes significantly contributes to the model fits, suggesting stable relationships over the years.<sup>6</sup>

### **Discussion**

We aim at validating the main assumptions of the SSF in a cross-country/region context by testing the relationship between experimental data and two different indicators of tax compliance. Testing the assumptions of the SSF with external macroeconomic data on the shadow economy as a proxy for tax compliance is successful. The tested models reveal that higher levels of both trust and power are associated with a decrease in the shadow economy. Model comparisons suggest that trust and power explain similar variance proportions, but power explains a slightly larger share. With regard to perceived corruption as an alternative proxy for tax compliance, the results also support

the assumptions of the SSF. Trust and power are both related to the CPI and most variance is explained when both dimensions are accounted for.

Our empirical results have important implications for the tax literature. First, they provide clear support for previous studies that might have been prone to certain common-method biases. This support is significant because social desirability and demand effects are concerns frequently raised when interpreting results of primary studies on an ethically charged topic such as taxes. Second, our results suggest not only that the SSF is a tax compliance framework that can be applied cross-nationally (also see Batrancea et al. 2019), but also that it can be applied as a policy instrument to amend counterproductive collective behaviour in order to enhance compliance with regulations. The results advocate that governmental authorities should aim at increasing citizens' trust in their administrative capacities and at implementing powerful measures targeted at those members of the society who freeride on others' contributions to the public goods system.

Since we introduce corruption, another form of counterproductive behaviour, as an alternative proxy for tax compliance, our results might also contribute to the specific literature on corruption. We find that a society with a higher level of trust in authorities faces less corruption. This corroborates the claim that people who have faith in others and trust their authorities are more likely to endorse strong standards of moral and legal behaviour (Uslaner 2004).

The design of our study does not allow to infer causal relations between our key variables. From a theoretical perspective, a bidirectional interpretation seems most feasible, according to which trust and power influence the shadow economy and corruption, and perceptions of these phenomena in turn influence the experiences related to trust in and power of authorities.

Another limitation refers to the applied shadow economy estimates. As outlined in earlier sections, based on the definition of the shadow economy, this construct seems suited to be used as a proxy for tax evasion. However, serious concerns have recently been raised about the quality of these estimates (Feige 2016a; Feige 2016b; Schneider 2016). Despite this criticism, such estimates are the sole source available covering the variety of nations/regions in our sample. The only alternative source we can find is a single item in the IMD World Competitiveness Yearbook (results reported in supplemental material) that is available for 37 countries/regions in our sample. Analyses including the reduced sample of 37 countries/regions only are in line with the inference we draw based on the main analysis. We therefore feel confident to infer that we successfully test the SSF using an external dependent variable as a proxy for tax evasion.

Another potential limitation is the high correlation between the trust index and the power index. We suspect that this stems from a holistic representation of the authorities presented in the scenario, rather than forming two distinct representations of the degree of trust and of power in the countries/regions described. This assumption is supported by the relatively stable answering patterns for the three similarity items (the general item and the two specific items on trust and power; the three correlation coefficients ranging between  $r = 0.64$  and  $r = 0.72$ ), ultimately resulting in a high correlation between trust and power. It remains unclear whether this high correlation expresses an artefact of our operationalisation or whether it reflects the representation of public authorities that people hold in

everyday life. It could be the case that citizens perceive the effectiveness of their government more globally, in the sense of functional vs. dysfunctional, rather than distinguishing between dimensions such as trust and power. Irrespective of this potential limitation, our operationalisation of trust and power as defined in the SSF represents a strength of the present study and is unique in comparison to other indirect studies on the SSF.

The sample of our study consisted of 44 countries/regions, which is considerable, given that the primary data representing the basis for our independent variables (i.e. trust and power indices) were collected from 14,509 participants. They were university students from one or several cities per country/region, predominantly from the field of Economics. In recent years, the acronym ‘WEIRD’ (‘Western, educated, industrialised, rich, and democratic’) has been introduced to criticise common sample compositions from which inferences are drawn (Henrich, Heine, and Norenzayan 2010). Referring to this acronym, we deem that our sample is not as ‘WEIRD’ as other common sample compositions used in behavioural studies. In the context of tax research, student samples have also been criticised because of their limited experience in taxpaying (Alm 2012; Alm, Bloomquist, and McKee 2015; Choo, Fonseca, and Myles 2016; Marriott 2014; Muehlbacher and Kirchler 2016). In our study, the focus is not on compliance or the intention to comply but on the perceived similarity between an experimental scenario and participants’ home country/region. One advantage of surveying students in all countries/regions is that the resulting samples are probably more comparable than convenience samples (given the average sample size per country/region). However, since student samples are not representative, our country/region indices of trust and power should not be interpreted as absolute estimates.

In conclusion, our results emphasise the importance of the trust and power dimensions advanced by the SSF of tax compliance in combating tax evasion, and – in a broader sense – counterproductive behaviour. Such behaviour imposes negative externalities on the overall society, in particular by depleting state budgets of substantial tax proceeds that could otherwise finance the system of public goods and services. The practical implications stemming from our empirical results are that public authorities could motivate taxpayers to comply with tax laws by consistently fostering their trust in authorities’ capacity of ensuring general welfare and by monitoring tax systems through powerful deterrent strategies meant to curb non-compliance.

## Notes

1. The datasets and R code to reproduce our analyses are publicly available at <https://osf.io/fq5ds/>.
2. In our analyses, we use indicators from different years to be transparent and informative in terms of robustness, given that the optimal time periods concerning our analyses seem debatable.
3. Note that we assumed negative relations between the two independent variables (trust and power) and corruption. The CPI metric denotes higher values as lower levels of corruption. This means that a positive statistical relation between our independent variables and the CPI would be in line with the assumed conceptual relation.
4. Due to availability, we decided to use CPI data until 2018 also because the respective calculation method is not consistent over the years, and we thus considered the longer time period as more transparent in terms of consistency of the results.
5. Note that we additionally find a single item in the International Institute for Management Development (IMD) World Competitiveness Yearbook Executive Opinion Survey that

directly measures tax evasion in 37 of our 44 countries/regions (i.e. ‘Tax evasion is a common practice in your country’). Participants are mid- and upper-level managers. The results confirm the general finding reported in this section; however, both trust and power are significant in the final model, which also explains the data best. See Table S2 and Figure S6 in supplemental material and the Discussion section for details.

6. Shadow economy; Model (1) vs. Model (1) with a random slope of trust:  $\chi^2(2) = 1.70$ ,  $p = 0.427$ .  
Shadow economy; Model (2) vs. Model (2) with a random slope of power:  $\chi^2(2) = 0.57$ ,  $p = 0.751$ .  
Shadow economy; Model (3) vs. Model (3) with a random slope of trust:  $\chi^2(2) = 1.21$ ,  $p = 0.751$ .  
Shadow economy; Model (3) vs. Model (3) with a random slope of power:  $\chi^2(2) = 0.08$ ,  $p = 0.994$ .  
Corruption; Model (1) vs. Model (1) with a random slope of trust:  $\chi^2(2) = 0.48$ ,  $p = 0.785$ .  
Corruption; Model (2) vs. Model (2) with a random slope of power:  $\chi^2(2) = 1.73$ ,  $p = 0.422$ .  
Corruption; Model (3) vs. Model (3) with a random slope of trust:  $\chi^2(2) = 0.04$ ,  $p = 0.998$ .  
Corruption; Model (3) vs. Model (3) with a random slope of power:  $\chi^2(2) = 1.28$ ,  $p = 0.734$ .

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