Enforce Tax Compliance, but Cautiously: The Role of Trust in Authorities and Power of Authorities

Stefanos A. Tsikas*

Hannover Economic Papers (HEP) No. 589
March, 2017

Abstract

The "Slippery Slope Framework" hypothesizes that (an individual's) tax compliance is determined by both the tax authority's powerfulness and its trustworthiness, and that the two dimensions moderate each other. By employing a within-country fixed effects analysis for 25 European countries, this paper tests the conjecture that a slippery slope exists also on the aggregate level. Results show that both trust and power are positively correlated with higher tax compliance. Trust and power also moderate each other: the lower trust, the greater the compliance-increasing impact of power. However, the positive effect decreases with increasing coercion. Strong deterrence policies may eventually damage tax compliance.

JEL-codes: E62, H26, H30
Keywords: Tax compliance, Slippery Slope Framework, trust, power, institutions

*Leibniz University Hannover, School of Economics and Management, RTG 1723 "Globalization and Development", Koenigsworther Platz 1, D-30167 Hannover, Germany. Email: tsikas@glad.uni-hannover.de.

1 Introduction

Why do people pay taxes to their government? Since more than 40 years, this question is broadly debated in the economic literature. Based on Becker's (1968) approach towards what he called the "economics of crime", Allingham and Sandmo (1972), in their seminal paper, argued that the taxpayer's decision whether income is declared or not depends on the probability that this (unlawful) behavior will be detected and on the punishment inflicted in the case of exposure. As a rational and risk-neutral agent, Allingham and Sandmo (1972) theorize, the taxpayer engages in tax evasion as long as the expected payoff from underreporting income exceeds the expected costs of detection and punishment. Given low audit rates and mild sanctions, scholars quickly stumbled upon a surprisingly low prevalence of tax evasion. As alternative explanations to Allingham and Sandmo's neoclassic approach, social norms (Cowell, 1990; Alm et al., 1999; Frey and Torgler, 2007), psychic costs (Gordon, 1989; Falkinger, 1995), and intrinsic motivations to comply with the tax rule (See for example Alm et al., 1999; Feld and Frey, 2002, 2007; Torgler, 2003a, b; Torgler, 2005; Torgler, 2007) have been identified as further, behavioral forces triggering tax compliance.[1]

The determinants of intrinsic (or voluntary) tax compliance, for example the equity and complexity of the tax system, the efficiency and reliability of the government and the absence of corruption, can be understood as characteristic features of "good" institutions. When faced with high institutional quality, people seem to feel more obliged to pay taxes. Put differently, institutions need to appear trustworthy. Otherwise, taxpayers would not be tempted to pay taxes voluntarily. Rothstein (2000) names two conditions a government has to fulfill in order to be trusted: firstly, the government has to make credible that the chances of successful free-riding are small. Secondly, bureaucratic efficiency and a (successful) fight against corruption need to ensure that tax payments would benefit the public, but not private or special interests. Scholz and Lubell (1998) provide evidence that if trust (horizontally and vertically) prevails among taxpayers, the likelihood of tax evasion significantly decreases. Slemrod (2002) also finds that tax cheating is less prevalent in countries where the government appears to be more trustworthy.

With the "Slippery Slope Framework" (SSF) of tax compliance, Kirchler (2007) and Kirchler et al. (2008) add "trust in authorities" as a major factor determining tax compliance. The second determinant, "power of authorities", represents the deterrence tools introduced by Allingham and Sandmo (1972). According to the SSF, tax compliance can be improved by either increases in trust or power alone, or jointly by both. Power and trust have a positive but decreasing marginal return on tax compliance, and a moderating effect between trust and power is present: when

[1] Alm et al. (1992), Andreoni et al. (1998) and Slemrod (2007) give comprehensive literature reviews on the so-called tax compliance puzzle.

trust is low, increases in power matter most for increasing tax compliance and vice versa.

The SSF has been conceptualized to explain how an individual can be motivated to pay taxes, and presents a mechanism of how enforcement (power) and encouragement (trust) interact. From an aggregate, macroeconomic perspective however, power and trust can be viewed as production factors of tax revenues besides income, tax rate, and tax base. A country's government should thus be able to improve tax compliance by enhancing its trustworthiness and its enforcement capabilities. Power and trust interact, and are subject to different societal environments, namely an antagonistic and a synergistic tax climate (Kirchler et al. 2008, p. 211). The two tax climates might trigger distinct behavioral responses to taxation, calling for a carefully balanced mix of enforcement and encouragement.

I test these conjectures by transferring the SSF's main features to the aggregate level. For 25 EU member-states over the course of 14 years, I scrutinize whether aggregate measures of people's trust in authorities and a government's enforcement capabilities are associated with higher tax compliance, and whether trust and power interact and moderate each other. I employ a within-country fixed effects approach. This method allows to tackle the immanent endogeneity resulting from unobserved heterogeneity between European countries with respect to culture, norms, taste, and history. I do not claim to establish a causal link between trust, power, and tax compliance. Trust in authorities and power of authorities are, in the SSF, by definition purely reciprocal. Their connection to tax compliance is a feedback cycle, with either positive or negative dynamics. If, for example, trust increases, tax evasion declines, which has a positive influence on trust, which is again followed by higher tax compliance and so on. The same applies to "power of authorities".

The empirical analysis provides evidence for the existence of the hypothesized feedback cycle. Trust is highly significantly correlated with increases in tax compliance, and the effects are sizable. Power is also positively correlated with tax compliance. Compared to trust, the effect smaller in magnitude and not always significant. I also find evidence for the existence of a moderating effect: the lower trust, the larger is the compliance-increasing impact of power. However, the moderating effect decreases with increasing power: pronounced coercion eventually leads to less tax compliance. The findings are partly driven by Eastern European and poorer EU countries, where trust, power and tax compliance are less stable and more reactive to economic shocks.

The remainder of this paper is organized as follows: Section 2 gives a brief review on the SSF and the existing empirical evidence from micro- and macroeconomic analyses. Section 3 presents the methodology and the data used in this paper. Sections 4 provides a descriptive inquiry of the SSF. Section 5 presents the results of the within-country fixed effects analysis. Section 6 concludes.

2 The Slippery Slope Framework

According to the SSF, tax compliance depends on the power tax authorities exert and on the trust taxpayers have in tax authorities. Power is represented by deterrence instruments such as audits and fines. Trust depends mainly on how authorities approach taxpayers: if they signal trustworthiness and reliability, individuals are more likely to harbor confidence, which is also expressed through tax compliance. Authorities can ensure high or even complete tax compliance by relying solely on one of the two factors trust or power. In Figure 1, this assumption is fulfilled in the two-dimensional power/tax compliance and trust/tax compliance planes, where either trust or power is equal to zero. The diminishing returns of both trust and power on tax compliance represent the idea that once one factor is already highly developed, supplementary trust (or power) leads to diminishing increases in tax compliance.

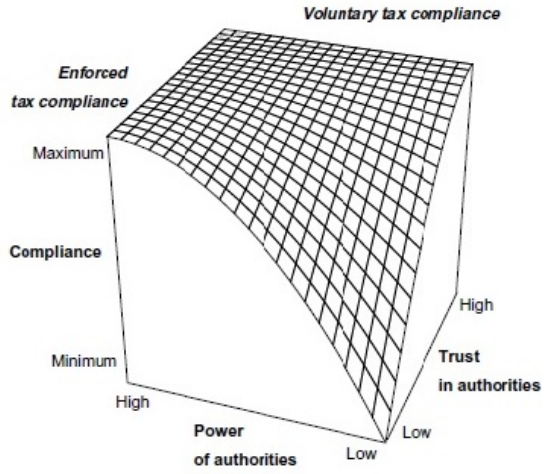

Figure 1: **The Slippery Slope Framework** (Kirchler et al. 2008, p.212.). High or even full tax compliance can be reached by "power of authorities" or "trust in authorities" alone (movement along the power/tax compliance and trust/tax compliance axes). However, power and trust interact and moderate each other (grid area): if trust is low, an increase in power has a large positive effect on tax compliance and vice versa. If power is dominates trust, tax compliance is perceived as being enforced. Vice versa, it is perceived as voluntary.

However, trust and power interact, moderating and perhaps even mutually reinforcing each other. The moderating effect is illustrated by the grid-area in Figure 1: when trust in authorities is low, a small increase in power has a substantially positive effect on tax compliance. The same applies for low power and an increase in trust. On the other hand, if trust (power) is very pronounced, even a large increase in power (trust) can only have a marginal positive impact on tax compliance.

The slippery slope character of the framework becomes best visible at rather low levels of both trust and power. In such a scenario, even slight decreases in one or both dimensions can have a largely negative effect on tax compliance. When trust, power, or both are high, a quite stable tax compliance equilibrium emerges.[2]

[2]Figure 1 shows that Kirchler et al. (2008) distinguish two different perceptions of tax compli-

2.1 Empirical Evidence - Individual Perspective

Several studies aimed at testing the SSF. Studied were the compliance-increasing effect, the interdependency, and the perception of "trust in authorities" and "power of authorities". Some analyses also scrutinized the distinction between coercive and legitimate power. The majority of studies consists of surveys among university students or self-employed taxpayers in European countries.

Wahl et al. (2010) experimentally tested taxpayers' motivations to comply with the tax rules under the slippery slope hypothesis. In their study, participants were endowed with an income, subject to taxation. Randomly, the experimenters checked some of the tax declarations and fined detected tax evaders. The setting was a fictitious country where four states could occur: an untrustworthy government (not service-oriented, corrupt) which exerts either low power (ineffective in auditing taxpayers) or high power (effective in auditing taxpayers), or an trustworthy government in a high- or low power environment. The participants then decided about the income they would report. Wahl et al. (2010) found that both high power and high trust lead to increases in tax compliance, compared to low power (trust) conditions. Tax payments were highest when both trust and power were strong, and lowest when both trust and power were weak. When trust was high, participants perceived compliance as being voluntary. When power was high (and trust low), tax payments were felt as being enforced. Furthermore, the authors found that in low-trust conditions, taxpayers tend to behave strategically by weighing costs and benefits of tax evasion, thus behaving as rational agents. By surveying students in Austria, Hungary, Romania and Russia, Kogler et al. (2013) confirmed the findings of Wahl et al. (2010).

Muehlbacher et al. (2011) surveyed roughly 3,000 taxpayers in Austria, the UK, and the Czech Republic, polling for perceptions of trust in authorities, power of authorities, voluntary and enforced compliance with statements that would proxy for these items. They found that voluntary tax compliance is positively associated with trust, power, and their interaction. Trust, however, had the largest effect. Power of authorities was found to be significantly positively associated with enforced compliance, while the association with vertical trust was negative.

These results are confirmed for a sample of self-employed Italian taxpayers by Kastlunger et al. (2013). Additionally, they found that trust is positively related to legitimate, but negatively related to coercive power. Despite legitimate power being correlated to enforced compliance, the perception of the latter led to increased tax evasion.

ance, namely "enforced tax compliance" and "voluntary tax compliance". The former is felt when power of authorities is high and the taxpayer does not have a lot of trust. In this case, audits and fines are felt as a sign of distrust on behalf of the government and as an act of caprice. The latter perception of one's tax compliance applies when trust is higher and power is low. Then, power is perceived as legitimate and the tax authority is seen as a respected ally.

Gangl et al. (2013) showed that Dutch taxpayers value a service-oriented respectful attitude of the tax authority with increased tax payments. This result seemed to be driven by the authority's trustworthiness. In yet another survey on self-employed taxpayers, Kogler et al. (2015) also confirmed trust as the main driver of voluntary compliance and power as the main driver of enforced compliance. With social norms, the authors identified an additional influencing factor for tax compliance, which was, however, not mediated by trust or power.

With an methodological approach similar to Wahl et al. (2010), Kaplanoglou and Rapanos (2015) found for Greece that power is perceived as legitimate only in high-trust conditions, and as coercive in low-trust conditions. In countries where trust deteriorated, tax compliance could be best increased by concentrating on the power dimension.

2.2 Empirical Evidence - Macroeconomic Perspective

Only very few studies addressed the macroeconomic implications of the slippery slope hypothesis. To date, Fischer and Schneider (2009), Ruiu and Lisi (2011), and Lisi (2012a) have tested Kirchler's concept on a cross-country basis. All three studies tested whether higher trust and higher power were positively correlated with an indicator for tax compliance, and whether trust and power had some joint influence on it. The studies used the same proxies for "trust in authorities" and "power of authorities". For trust, the item "confidence in national government" from the World Values Survey (WVS) was used.[3] Participants expressed their trust in government on a scale ranging from 1 = "no confidence at all" to 4 = "a great deal of confidence". For the power dimension, the Worldwide Governance Indicators (WGI) "Rule of Law" and/or "Government Effectiveness", published by the World Bank, were selected.[4]

Fischer and Schneider (2009), in their cross-country study, used WVS data from over 80,000 individuals in 73 countries (years 1997-2001). As the proxy for tax compliance, the authors use the "tax morale" item from the WVS.[5] Fischer and Schneider (2009) argue that tax morale identifies voluntary compliance and equate this with overall compliance. Yet, this procedure is questionable, since the SSF's basic ingredient is that tax compliance comprises of voluntary *and* enforced compliance. What is more, tax morale itself is an attitude rather than a quantifiable measure for

[3]The WVS is a worldwide survey concerned with people's values and beliefs. Covered are questions about norms, culture, health, education, religiosity, attitudes towards politics and family, culture and many more, complemented by socio-demographic statistics. Since 1981, six waves have been conducted, covering almost 100 countries on the basis of representative samples. Note that the survey-subjects were not followed over time.

[4]The indicators comprise of a large number of sub-indices, covering expert opinions on property rights protection, effectiveness of politics and the legal system, trustworthiness, among others. For a more exact description and the methodological background, see Kaufmann et al. (2010).

[5]This item is a question to which degree one finds cheating on taxes justifiable, evaluated on a scale from 1= "never justified" to 10= "always justified".

tax compliance.[6] Fischer and Schneider (2009) find positive associations between the different proxies for power, trust, and tax compliance. The interaction term, which was included to analyze the joint influence of power and trust, is positive and significant and the authors interpret this result as an interdependency, where "either effect grows larger as the other dimension increases" (p. 17). However, the validity of the results presented by Fischer and Schneider (2009) is contestable mainly due to the choice of their dependent variable.

Ruiu and Lisi (2011) rely on the same proxies for trust and power as Fischer and Schneider (2009). However, they proxy for tax compliance with the shadow economy estimates by Schneider et al. (2010). Ruiu and Lisi (2011) find that increases in power as well as in trust are related to a smaller shadow economy, with the influence of trust being more pronounced. Ruiu and Lisi (2011) also instrument for vertical trust with a WVS item polling for horizontal trust. However, the argument that trust in other people does not directly affect tax compliance behavior is weak. Recall Rothstein's (2000) anecdote: besides how reliable institutions are perceived, the belief of whether (many) fellow taxpayers evade taxes, which depends also on the authority's power, is a major determinant in the compliance decision. In a trimmed version of the 2011 working paper, Lisi (2012a) confirms his and his colleague's previous findings.

Summarizing, conditional correlations reveal that in countries where trust and power are at a higher levels than in other countries, so is tax compliance. However, endogeneity resulting from an omitted variable bias is likely at work, and the results might not reflect the direct influence of trust and power. Rather, heterogeneity of countries with respect to legal origin, culture, norms, taste, history of conflicts and economic development, and idiosyncratic shocks influenced and constituted trust and a country's legal capacities, which then influenced tax compliance.

3 Data and Empirical Strategy

Neither tax compliance nor trust in authorities and power of authorities are directly observable or measurable. Tax evasion is illegal and thus deliberately concealed behavior. Other facets of tax non-compliance include (legal) tax avoidance, tax flight, or even the refraining of taxable economic activities and are difficult to observe as well. Trust, in general or specifically in an institution, is highly subjective and based on personal beliefs and experiences. As a rough definition in economic terms, trust is the expectation that one's own vulnerability is not exploited by another party. What defines power and how the government should practice its power is first and fore-

[6] The choice of the WGI as the power-proxy is another issue, since they likely reflect rather trust than power in the sense of the Slippery Slope Framework. This is expressed through a very strong positive correlation between the WGI measures and the "confidence in..." proxies. Section 3 further elaborates on this issue.

most a philosophical debate and thus not clearly delineated. An empirical analysis incorporating these aspects therefore needs appropriate indicators that approximate tax compliance, power of authorities, and trust in authorities. In the following, the respective indicators I use in this paper are described in more detail.[7]

Tax Compliance. Capturing tax compliance, or rather tax non-compliance, is a difficult endeavor. Tax evaders go at lengths to keep their illegal actions secret. Many income sources are subject to a withholding tax, leaving only a small proportion of people (self-employed) with the possibility to under-report their income to the tax authorities. Consequentially, reported extents of tax evasion are usually rough estimates. A promising measure is the so-called tax gap, which reports the difference between planned (or theoretically due) and actually collected tax revenues.

In 2013, the CASE Network published the first internationally comparable estimates of the VAT Gap for the member states of the European Union. Today, estimates from 2000 to 2015 are available through different CASE reports. Using VAT Gaps to proxy for tax compliance is promising for mainly two reasons: firstly, with wages taxed at the source, VAT is the only important tax with the possibility to cheat on. This works best with cash-deals, where for example a handyman is hired and paid without issuing a bill. Secondly, in most developed economies, the VAT is the most revenue-intensive tax after the personal income tax (see for example Besley and Persson, 2013). In this sense, concentrating on the VAT Gap might give a meaningful measure for a society's readiness to engage in tax evasion.

In CASE (2013), the VAT Gap is defined as the difference between the theoretical VAT liability according to the national tax law (VTTL) and the actual VAT revenue per country and year (numbers are taken from Eurostat), divided by the VTTL. The VTTL is calculated by applying appropriate VAT rates to a theoretical consumption (or tax) base deduced from key macroeconomic figures ("top-down" approach, CASE 2013). The VTTL is adjusted for tax exemptions and exclusions. However, besides tax fraud, the VAT Gap is also influenced by unexpected revenue losses and bankruptcies.

The VAT Gaps calculated by CASE have been used by IMF (2015). They find that the VAT Compliance Gap increases with an increasing output gap, while higher expenditures on tax administration decreases the VAT gap. To transform the non-compliance measure to a compliance measure, I quantify tax compliance (TC) as 100% - VAT Gap (in %).[8]

Trust in authorities. In the choice of the trust indicator, I follow Fischer & Schneider (2009), Ruiu & Lisi (2011) and Lisi (2012a) and use a survey item from the

[7] Table A1 in the Appendix describes the data and different variables used in this paper.

[8] A shortcoming of the CASE measures is that numbers change in the yearly updates for some countries in some years. I decided to combine measures from 2002-2009 from CASE (2013) with measures from 2010-2014 (CASE, 2016). In some cases, this leads to small disturbances around the cutoff years 2009 and 2010.

European Social Survey (ESS)[9], polling for subjective "trust in national parliament". As the ESS does not poll for trust in tax authorities or trust in government, I use the survey item "trust in parliament" as the proxy for vertical trust. Respondents could answer on a scale ranging from 0 (no trust at all) to 10 (complete trust). The individual responses are aggregated in two ways: firstly, average trust in authorities is calculated per country and year.[10] Table A2 (in the Appendix) shows that overall average trust in EU countries seems quite low. With a maximum of 10, mean trust is 4.28. The maximal observed trust in a country is, with a value of 6.5, also quite distant from 10.[11] The second way of aggregation is the calculation of "trust shares". Per country and year, the percentage of respondents stating their trust was 0, 1, ..., 10 is captured. These shares are then summarized to different categories, namely 'lowtrust" (response 0, 1, 2, 3), "mediumtrust" (4, 5, 6), and "hightrust" (7, 8, 9, 10). In an additional step, the categories "non-trusting" (equivalent to "lowtrust") and "trusting" (mediumtrust or higher) are defined. Summary statistics for the trust shares can be found in Table A3 (in the Appendix).

Power of authorities. For "power of authorities", I use a proxy which is quite novel in economic analyses concerned with a state's enfocement capabilities: incarceration rates (per 100,000 of national population), provided by the Institute for Criminal Policy Research (ICPR), are not only arguably a more quantitative measure of governments' enforcement efforts compared to the WGIs, but are also closer to how power is defined in the SSF. Kirchler et al. (2008) characterize power as a "cops and robbers" attitude (pp. 212), where taxpayers are inherently suspicious and met by the government with audits and punishments.

Weber (1968) argued that the ability to punish offenders is one of the state's most important and essential characteristics. Without the power to sanction, Jacobs and Carmichael (2001) add, governments might cease to exist. The form of sanctions differs, and usually depends on the severity of the offense, but also on the belief whether sanctions should act as mere punishment or as one tool in the process of social re-integration. Death penalties aside, the harshest and ultimate sanction in most countries is the privation of freedom, that is, imprisonment. Research about incarceration and the nature of governmental power first and foremost took place in political sciences and sociology and is almost exclusively concerned with the USA. Incarceration rates in the USA are well above 700 (per 100,000 inhabitants), around

[9] The ESS aims at mapping social and political attitudes in Europe. Starting with the first wave in 2002, surveys are conducted every two years. To date, seven waves have been published, covering more than 30 European countries.

[10] The ESS does not come in a panel form. In each survey round, more than 1,000 individuals per country are surveyed. However, those who participated in one wave are not the same individuals who participated in subsequent waves. Also, not all countries are surveyed in each wave. Yet, the ESS is constructed such that for each country and in every round, a sample representative for the country's entire population is surveyed. That is, when data are aggregated, the observational points for different time-periods are comparable.

[11] Table A2 depicts summary statistics for all variables employed in this paper.

five times more than in the European Union (see Table A2). Because rising incarceration rates in the United States did not coincide with increased crime rates, scholars describe imprisonment primarily as a political force and the prison as a political institution (Shannon and Uggen, 2012; Smith, 2004). Jacobs and Carmichael (2001) argue that imprisonment is used to "manage the underlass", that is, to preserve the existing social order and to impose the values of the ruling majority on others (Smith, 2004). Garland (1991) argues that the US-government perceives the poor as a social problem, and incarceration as the favored treatment. Racial sentiments, the strength of the Republican party, class struggle, and a public opinion demanding retribution are other factors associated with imprisonment (Shannon and Uggen, 2012; Smith, 2004). Garland points out, that until the 1960s, incarceration in the USA was very similar to the numbers in Western Europe, and then started to climb sharply, resulting in growing pessimism and distrust of the state. Already Pincoffs (1966) noted a shift in the justification for punishment towards retribution and get-tough policies.

D'Amico and Williamson (2015) explain the considerable differences in imprisonment between countries with institutional surroundings resulting from different legal origins. As "common law" countries (for example the USA and the UK) are characterized by less regulation and slim bureaucracies, D'Amico and Williamson (2015) argue that these features lead to lower relative costs of imprisonment, compared to "civil law" countries. There, bureaucratic institutions are strong and have a long history, which makes alternative forms of punishment like fines, community services, and probations easier and cheaper to implement. Thus, "civil law" countries perhaps are in lesser need of deterrence, whereas "common law" countries have to rely on imprisonment as a social and political control of crime.

Smith (2004) sees imprisonment first and foremost as a demonstration of the coercive power of the state. In a sense, the government uses the size of the prison population as a signal to what extent it dislikes and punishes wrongdoing, for example tax evasion. Of course, only a vanishingly small number of prisoners are convicted tax evaders. I also do not argue that tax compliance is connected to incarceration rates because inmates are deprived of the opportunity to commit tax fraud. Instead, I regard incarceration rates as a deterring factor to tax evasion because they typify the risk of getting (severely) punished for engaging in unlawful behavior in general. Thus, imprisonment is a reflection for the "cops and robbers" attitude described by Kirchler et al. (2008).[12]

Yet, the "problem" of tax evasion might cease to exist without the assistance of trust and power, but because of technological change: Alm and Soled (2016) argue that the tax gap might wither out of a lack of opportunity to evade (or avoid)

[12]Before punishment must, of course, come detection. The probability of detection is a question of financial engagement. Later in this paper, expenditure on tax administration (TAE) is used as a control variable for power, complementing incarceration rates.

taxes, caused by increasingly cashless economies and transparency resulting from automated information exchange.

Econometric Approach. The variables described above are available for 25 European countries (EU members), which are followed over a course of 14 years (2002-2014, every two years), resulting in a maximum of 135 observations. The data is exploited with a within-country panel data analysis. In Equation (1), tax compliance (TC) in country i in year t is determined by the predictors of interest, trust in authorities and power of authorities. Vector $\mathbf{X_{it}}$ contains variables that likely affect tax compliance besides trust and power. The interaction of trust with power is included to analyze the interplay between the two predictors. Country fixed effects (FE_i) ensure that the effect of power and trust on tax compliance is estimated for each country by measuring yearly deviations from the country's respective mean. Because unobserved heterogeneity between countries is assumed to be time-invariant within entities, it is no longer a concern in the estimation process. The inclusion of time fixed effects (FE_t) captures the influence of aggregate time-dependent trends.

$$TC_{it} = \beta_0 + \beta_1 trust_{it} + \beta_2 power_{it} + \beta_3 trust_{it} \times power_{it} + \beta_4 \mathbf{X_{it}} + FE_i + FE_t + \epsilon_{it} \quad (1)$$

The approach in Equation (1) is repeated with the trust share categories defined above, which replace the simple trust-parameter. The respective coefficients reveal the relative impact of trust and power on the respective group's tax compliance, compared to those groups that are omitted for statistical reasons. Despite being geographically, politically, and economically closely tied, EU members differ quite distinctly with respect to economic development, culture, and their political or legal history. To test whether the effects of trust and power on tax compliance are driven by specific, perhaps more dynamic, groups of countries, trust, power, and the interaction term will be interacted with a series of dummy-variables. These indicators discriminate for example old and new EU-members or rich and poor European countries.

4 Descriptive Analysis

The SSF's most important hypothesis is the joint and interdependent influence of trust and power on tax compliance (Kirchler, 2007). Conceptually, the two determinants should also work independent of one another. In the two-dimensional trust-power space this assumption would imply that every spot on the trust-power space is defined.

However, independence (and absent correlation) between trust and power are not observed in European countries. Figure 2 depicts the two-dimensional trust-power space of all observations (not sorted by country or year) and reveals that the

two determinants are negatively correlated[13]: Trust is highest where incarceration rates are below the average of 125 (see Table A2). In countries where 150 or more people per 100,000 inhabitants are incarcerated, trust rarely exceeds a value of four. Countries where both, trust and power, are high are never observed.

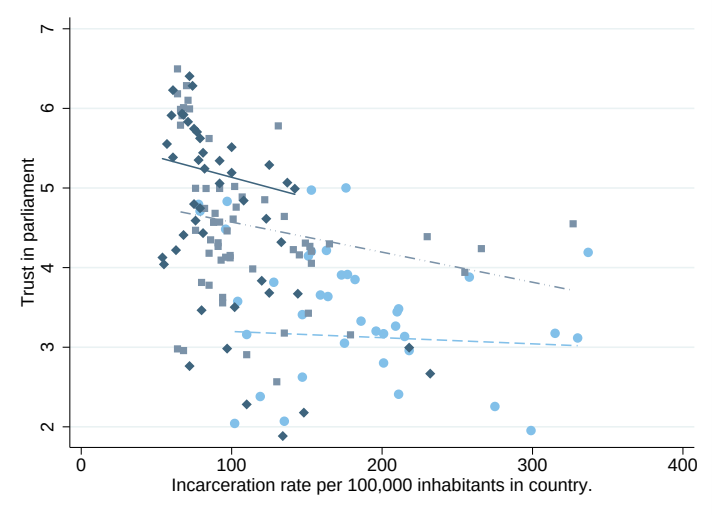

Figure 2: **Data plotted in the SSF's trust-power space.** Circles: observation corresponds with a tax compliance smaller or equal to 85%. Squares: tax compliance within 85% and 90%. Diamonds: tax compliance is above 90%. Lines represent linear fits for the different levels of tax compliance. The linear fits are corrected for outliers: For highest level of tax compliance (solid line), observations where trust was below 4 are omitted. Squares: included if trust was greater 3 and smaller than 6 (dash-dotted line). Lowest tax compliance: observations excluded if trust is greater than 4 (dashed line).

Of course, the plot in Figure 2 could be the mere representation of a data lacuna. In this paper, only a relatively small number of a special group of countries is covered over a short time-period. If all countries in all time periods could be observed, all spots on the trust-power space might indeed be covered. However, there are also arguments supporting the negative correlation of trust and power visible in Figure 2: recall that incarceration rates were defined as a tool a government can use to signal the dislike of deviant behavior and the willingness to punish infringements. Garland (2001) identified a coincidence of rising incarceration rates and growing distrust in the state in the USA. The argument of trust-damaging power is also embodied in the SSF. Kirchler et al. (2008) argue that individuals differentiate between the perception of "legitimate" and "coercive" power. The latter is characterized by the before-mentioned cops-and-robbers climate, where coercion crowds out trust. Thus, high power (coercion) and mutual trust arguably act as antagonistic strategies to ensure compliance with the law.

In fact, the two strategies vary substantially with respect to their success in ensuring tax compliance. The diamonds in Figure 2 denote observations associated

[13]Tables A4 and A5 report pairwise correlations of all variables used in this paper as well as for the trust-shares.

with tax compliance being above 90%. Tax compliance in this range is predominantly found among countries with above-average trust and below-average power. Squares depict tax compliance between 85% and 90%. Observations marked with circles represent tax compliance being less than 85%. Among these countries, above-average incarceration rates are much more frequent, compared to all other observations, and trust commonly is (well) below the sample-mean.

The lines in Figure 2 depict linear fits of the respective observations. The linear fits are corrected for outliers: for very high tax compliance (solid line), observations are only included if trust is greater or equal to 4. For a tax compliance between 85% and 90% (dash-dotted line), observations are incorporated if trust is in the range of 3 to 6. Where tax compliance is lowest (dashed line), observations are omitted if trust in authorities is 4 or above. All linear fits have a negative slope. However, the dashed line's slope is very flat, indicating that, if tax compliance is low, trust can be substituted by more power almost at will. The slopes of the dash-dotted line and the solid line are very similar, but steeper than the dashed line: higher tax compliance is associated with a more pronounced loss in trust resulting from a surge in power. Higher tax compliance is also connected to more trust. While both low (dashed line) and medium (dash-dotted line) tax compliance environments experience high incarceration rates, high tax compliance is commonly complemented by below-average power. The three linear fits do not intersect. Figure 2 might thus be interpreted as a slippery slope on the descriptive aggregate level. Contrary to the ideal in Figure 1, however, the slippery slope in the EU is tilted towards the trust-dimension: tax compliance increases with trust, and is complemented by declining power.

Between-country variation in tax compliance, trust, and power is considerable. Within-country variation over time is typically less marked. Figure A1 (in the Appendix) depicts how trust evolved in the European countries over time. Where trust is comparably high (Western Europe and Scandinavia), it is also very stable. In Eastern Europe, trust is low, and subject to more variation. Incarceration rates usually are very stable over time. But, as Figure A2 (in the Appendix) shows, between-country differences are again pronounced. In countries where incarceration rates are comparably high, power fluctuates over time. Figure A3 (in the Appendix) depicts the development of tax compliance over time. Again, tax compliance is less volatile where it is at high levels. The Eastern European countries in the sample accessed the EU in 2004 (2007). Interestingly, tax compliance in these countries peaked in the years around the EU-accession, often considerably outperforming later and earlier numbers. CASE (2013) explains these discordant values with positive jumps in VAT intake and tax harmonization. Another reason could of course be the political will to meet certain criteria before de-facto entering the European Union.

Figure 3 adds tax compliance to Figure 2, representing the SSF's three-dimensional space of tax compliance, trust in authorities, and power of authorities. Portrayed

are the mean values per country over time. Colors fade from dark to light, indicating rising levels of tax compliance. As depicted in Figure 2, above-average trust coincides with below-average power and high levels of tax compliance. Countries with comparably high incarceration rates are confronted with low trust and a more widespread tax evasion. Yet, low power does not automatically lead to comparably high trust, which, in Figure 3, seems to be the main driver of high tax compliance. The Scandinavian countries in the sample, the Netherlands, and Luxembourg have both the highest tax compliance and trust. They are followed by the other Western European countries, of whose the United Kingdom, Spain, and Portugal imprison the largest share of their population. The Eastern European countries experience unanimously low trust and have comparable and below-average levels of tax compliance. Power varies quite a lot among these countries, but is usually above the rates of the other European countries.

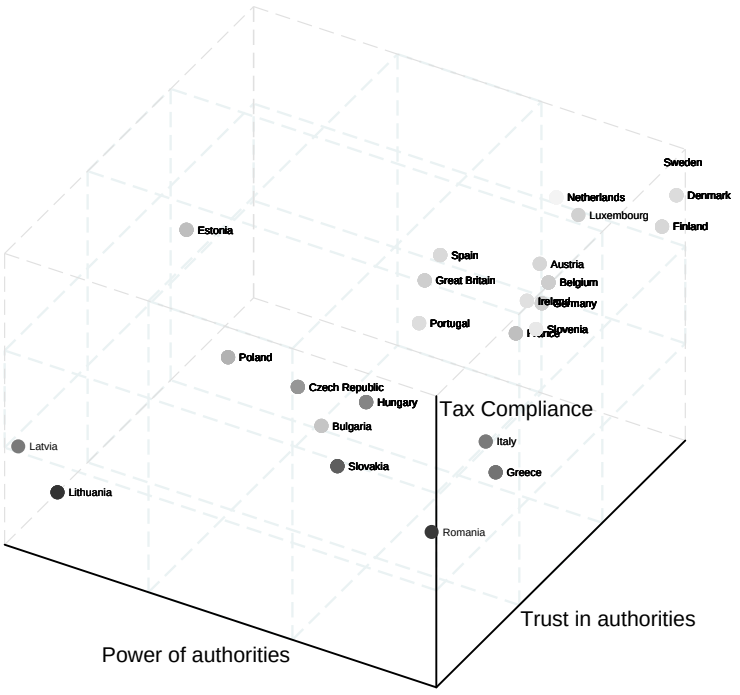

Figure 3: **Three-dimensional plot of trust in authorities, power of authorities, and tax compliance.** Axes represent normalized values (distance from the mean, in standard deviations). Colours represent different levels of tax compliance: starting at the minimum (black), colours fade to very light gray, indicating the maximum tax compliance in the sample. Depicted are the country-positions according to their mean values for the three variables over time. Figure A4 (in the Appendix) depicts the three-dimensional plots with all observations, not sorted by country or year.

5 Empirical Analysis

Table 1 reports the results of the within-country panel data analysis, set-up accordingly to Equation (1) in Section 3. Column (1) shows the baseline result. The coefficients' signs for trust in authorities and power of authorities are positive, and remain so when complemented by control variables. Trust is significantly positively associated with tax compliance: a one-point increase in trust on the 0-10 scale is predicted to raise tax compliance by 4.2 percentage points. The influence of power is much less pronounced in size and statistical significance. However, an increase in power as proxied by the imprisonment of one additional person per 100,000 inhabitants of a country is only a marginal change and should not be expected to have a sizable impact on tax compliance.

Table 1: **Correlates between tax compliance, trust in authorities, and power of authorities.** Estimates from the within-country fixed effects analysis.

Tax Compliance	(1)	(2)	(3)	(4)	(5)
lagged TC			−0.017		−0.053
			(0.143)		(0.195)
trust	4.196**	5.544**	5.747**	6.564***	7.788***
	(1.997)	(2.291)	(2.329)	(1.744)	(1.664)
power	0.092	0.130	0.154	0.265***	0.298***
	(0.106)	(0.114)	(0.104)	(0.080)	(0.102)
trust×power	−0.027	−0.036*	−0.038	−0.051***	−0.062***
	(0.017)	(0.02)	(0.023)	(0.017)	(0.021)
GDP		−0.001*	−0.003***	−0.003***	−0.003***
		(0)	(0)	(0)	(0)
unemployment		−0.579**	−1.052***	−1.238***	−1.345**
		(0.231)	(0.299)	(0.382)	(0.478)
VAT full rate		0.205	0.653**	0.784*	0.852*
		(0.366)	(0.246)	(0.422)	(0.486)
TAE				0.207	0.571
				(1.647)	(1.858)
Country FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	135	135	106	75	69
R^2	0.160	0.266	0.461	0.535	0.527

Note: Within-country fixed effects estimates (OLS). Tax Compliance (TC) is the dependent variable in all specifications. Year fixed-effects included and jointly significant (Wald-Test). Hausman-Tests show that a fixed-effects model should be favored over a random-effects model. TAE: Expenditure on tax administration. Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Model (2) adds the per-capita GDP (in PPP dollars), the percentage of unemployed in the labor force and the normal (full) VAT rate as control variables. The effect of an increase in GDP significant but zero in size. A one percentage point is correlated with a statistically significant decrease in tax compliance by around 0.6 percentage points.

Specification (3) adds a one-period lag of the dependent variable and accounts for

the likelihood that today's tax compliance depends on the prevalence of tax evasion in the past. The coefficient for lagged tax compliance (TC) is close to zero in both magnitude and statistical power. For trust, power, and the other variables included in model (2) this implies that their effect on tax compliance is not persistent. To gain continuous improvements in tax compliance, trust and power seem to have to increase in each time-period. Introducing lagged tax compliance leaves trust and power largely unchanged, but has an effect on the unemployment rate and on the VAT rate. In particular an increase in the latter is now predicted to have a positive effect on tax compliance. Perhaps this finding indicates that a higher tax rate does not trigger additional incentives to evade taxes, but that actual tax payments follow and coincide with an increase in the theoretical due tax liability (VTTL).

Besides punishment, the risk of getting caught is the second deterring factor to tax evasion. The opportunity to detect tax fraud depends on the number of tax audits, which are costly and require a budget. In models (4) and (5) the financial resources (as a percentage of GDP) provided for a country's tax administration (TAE) are therefore included as a further control variable. A higher budget is not associated with a statistically significant increase in tax compliance. Data for TAE are provided by the OECD only between 2005-2013, leading to a sizable loss of observations. The gains in magnitude, and especially for "power" the gain in significance, are rather a consequence of the loss of time-periods than of the inclusion of TAE and depict the effects for OECD countries.

To test the interplay between trust and power, the interaction term of the two determinants is incorporated in the analysis. Table 1 shows that the interaction term is negative and robust in magnitude across all models, and statistically significant in specifications (2), (4) and (5). However, interpreting the interaction between two continuous variables is rather difficult. To illustrate the effect of a simultaneous increase of trust and power, Figure 4 depicts the marginal effect of an increase in trust (power) on tax compliance, evaluated at different levels of power (trust).

Panel A of Figure 4 shows that the positive effect of an increase in trust on tax compliance is only significant at very low levels of power and eventually turns negative if the prison population exceeds 135 of 100,000 inhabitants. Panel B confirms the small impact of additional power on tax compliance. If trust is below the sample average, a significant moderating effect is found. But also here, the impact of power on tax compliance decreases with increasing trust and eventually the marginal effect becomes negative, albeit being statistically insignificant. Figure 4 suggests evidence in favor of the moderating effect hypothesized by Kirchler et al. (2008): at low levels of one factor, an increase in the moderator variable has the most pronounced and positive influence on tax compliance. Contrary to Figure 1 however, high power, if dependent on trust in authorities, negatively affect tax compliance.

In summary, Table 1 presents evidence for the validity of the slippery slope hypothesis. Ceteris paribus, trust and power (independently of one another) are

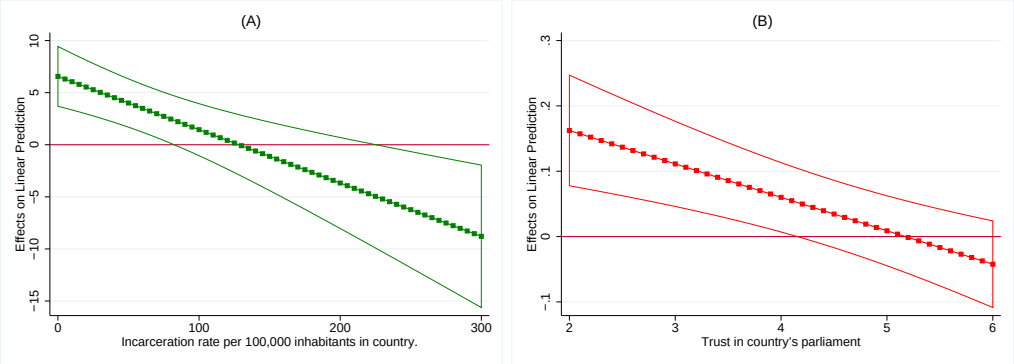

Figure 4: **Analyzing the trust-power interaction (Table 1, specification 4)**. Panel A shows the marginal effect of an one unit increase in trust on tax compliance, evaluated at different incarceration rates. Panel B depicts the marginal effect of one additional prisoner (per 100,000 inhabitants) on tax compliance, evaluated at different levels of trust in authorities. 90% confidence intervals are depicted.

positively associated with tax compliance. In line with the broad literature on the importance of "soft factors" for tax compliance, a taxpayer-government relationship characterized by mutual trust and respect seems a far more relevant vehicle against tax evasion than coercion and deterrence. The trust-power interplay strengthens this implication: trust is most important when power is at low levels and vice versa. Acting too powerful in a trusting environment seems to be harmful, and eschewing coercion in a non-trusting society rather adverse.

5.1 Testing for country-group characteristics

Despite being geographically and politically closely tied, the European countries analyzed in this study differ quite substantially with respect to some key economic figures, their historical background, and their legal origin. The results presented in Table 1 might be driven by particular groups of countries. For instance, of the 25 countries in this sample, 10 became a EU-member not before 2004[14] or 2007[15] and are characterized by their history as former socialist countries (or even Soviet republics) and underdeveloped economic capacities compared to Western European countries. Drawing back on Figure 3, the new EU members are typically those characterized by low trust, low tax compliance, and high incarceration rates. Furthermore, these three factors are far more volatile over time, compared to most Western European countries (see Figures A1-A3).

Model (1) in Table 2 interacts trust, power, and the trust-power interaction with an "EU 27" dummy that takes the value of 1 if the country is one of the new EU members. The trust-coefficient for new EU members is larger in magnitude

[14]Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. Cyprus and Malta accessed the EU in 2004 as well, but are not part of the sample.

[15]Bulgaria and Romania. Croatia became the 28th EU member in 2013, but is not part of the sample either.

compared to the "old" EU members. The impact of trust is not significant for the latter group of countries. In Western Europe, trust is comparably high and stable. A further increase in trust there seemingly has a lesser impact compared to Eastern European countries, where trust is low and room for improvements evidently larger. Regarding power, the impact on tax compliance remains insignificant for both groups, but is again greater for the Eastern European countries. While the interaction term is insignificant and close to zero for the Western European countries, it is significant for Eastern European countries.

Table 2: **Testing for country-group characteristics and their influence on trust, power, and tax compliance.**

Tax Compliance	(1) EU27	(2) Low GDP	(3) Low Gov.rev.	(4) High trust	(5) High power
trust	3.792	4.217***	5.881***	6.218**	8.571***
	(3.193)	(1.498)	(2.017)	(2.478)	(2.694)
Dummy × trust	4.208*	4.836***	6.887***	4.836*	14.60***
	(2.280)	(1.418)	(2.116)	(2.475)	(3.986)
power	0.017	0.067	0.202**	0.150	0.306**
	(0.156)	(0.080)	(0.083)	(0.117)	(0.128)
Dummy × power	0.120	0.164**	0.085	0.306	0.157
	(0.121)	(0.077)	(0.123)	(0.237)	(0.126)
trust×power	−0.009	−0.014	−0.04**	−0.041*	−0.065**
	(0.038)	(0.015)	(0.018)	(0.02)	(0.025)
Dummy × trust×power	−0.033*	−0.045***	−0.022	−0.049	−0.054**
	(0.018)	(0.011)	(0.025)	(0.048)	(0.023)
Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	135	135	135	135	135
R^2	0.280	0.340	0.330	0.280	0.315

Note: Within-country fixed effects estimates. Tax Compliance (TC) is the dependent variable in all specifications. Year fixed-effects included and jointly significant (Wald-Test). Hausman-Tests show that a fixed-effects model should be favored over a random-effects model. Controls are GDP, unemployment rate, and the full VAT rate. EU27 takes the value of 1 for countries who accessed the EU in 2004 or 2007, respectively. The dummy variables "Low GDP" and "Low Gov.Rev." (Low Government Revenue) take the value of 1 if GDP or government revenues as a share of GDP were more than 1 standard deviation below the mean (pooled sample). The dummies "High trust" and "High power" are one if trust or power were more than 1 standard deviation above the mean (calculation over pooled sample).
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Model (2) in Table 2 differentiates countries according to their GDP. The dummy variable "Low GDP" takes the value of 1 whenever a country, in a given year, has a per capita GDP which is more than 1 standard deviation below the pooled sample-average. With respect to the impact of trust in authorities on tax compliance, it does not matter much whether a country had a subpar GDP or not. A look at the power coefficient reveals that higher incarceration rates are significantly positively correlated to increases in tax compliance in poor European countries. The same is true for the moderating effect. Tax compliance seems to be much more sensitive

to the interplay between trust and power in comparably poor European countries, where trust is relatively low and, together with power and tax compliance, less stable.[16]

Model (3) repeats the exercise from specification (2) for government revenues as a share of GDP. For both groups of countries, that is, those with below-average government revenues and those with an (above-)average public budget, trust is highly significantly correlated with increases in tax compliance. Yet, the effect is markedly stronger in magnitude when revenues were more than 1 standard deviation below the sample-mean. Interestingly, power and the moderating effect between trust and power are significant for those countries with at least average government revenues.[17]

The last two specifications in Table 2 add a dummy which is 1 if either trust or power are more than 1 standard deviation above the sample mean. In both cases, trust is strongly and significantly correlated with tax compliance. As indicated by the large trust-coefficient in model (5) of Table 2, trust would work best in countries with large room for improvements. High incarceration rates are typically complemented by underdeveloped trust and tax compliance (see Figures 2 and 3). Starting from a low level, gains in trust have a sizable impact in countering tax evasion. The influence of power on tax compliance is only significant for those countries where power is comparably low. In line with Figure 4, in countries where incarceration rates are quite low (and trust often well-developed), an increase in power is predicted to improve tax compliance. With respect to the moderating effect between trust and power, it does not seem to make a difference whether a country has above-average trust and/or power.

5.2 Trust in authorities approximated by trust shares

Table 3 reports the results from the utilization of the trust shares introduced in Section 3. Model (1) of Table 3 shows how an one percentage point growth in the group of the non-trusting population impacts tax compliance relative to an increase in the group size of the trusting population. More precisely, model (1) and its counterpart model (2) analyze the effect of a loss in trust, relative to a gain in trust. A one percentage point increase of the non-trusting population is predicted to result in 35% less tax compliance relative to an equal increase in the trusting population. If the non-trusting population was fixed in size, additional power is correlated with decreasing tax compliance. Remarkably, however, if a loss in trust is met by stronger enforcement, tax compliance is predicted to increase, as indicated by the interaction term in model (1).

[16] With the exception Slovenia, all countries that accessed the EU in 2004 or later belonged to the Low GDP group at least in one year.

[17] Apart from Eastern European countries, also the GIIPS countries (without Italy), the Netherlands and the UK in some time periods had below-average government revenues. Notably, the named countries fare quite average with respect to trust and power, leaving room for improvements in either dimension.

Table 3: **Trust in authorities approximated by group-sizes of people with different trust-levels**

Tax Compliance	(1)	(2)	(3)	(4)	(5)
nontrusting	−35.02**				
	(13.29)				
nontrusting × power	0.226**				
	(0.106)				
trusting		35.02**			
		(13.29)			
trusting × power		−0.226**			
		(0.106)			
lowtrust				−21.45	
				(26.62)	
lowtrust × power				0.059	
				(0.282)	
mediumtrust			49.38***	23.63	45.08***
			(15.12)	(29.97)	(14.11)
mediumtrust × power			−0.351***	−0.287	−0.347***
			(0.115)	(0.349)	(0.115)
hightrust					21.45
					(26.62)
hightrust × power					−0.0590
					(0.282)
power	−0.106***	0.121	0.131*	0.085	0.144*
	(0.035)	(0.095)	(0.067)	(0.236)	(0.072)
Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	135	135	135	135	135
R^2	0.272	0.272	0.259	0.281	0.281

Note: Within-country fixed effects estimates (OLS). Tax Compliance (TC) is the dependent variable in all specifications. Year fixed-effects included and jointly significant (Wald-Test). Hausman-Tests show that a fixed-effects model should be favored over a random-effects model. Controls are GDP, unemployment rate, and the full VAT rate. Coefficients for the different trust-shares (nontrusting, trusting, lowtrust, mediumtrust, hightrust) report the effect of a one percentage-point increase in group size relative to the omitted reference group(s). Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In most European countries, the by far largest group is the one of people having "mediumtrust" in authorities. Model (3) analyzes the effect of an increase in group size in this middle class and shows that, compared to the "lowtrust" and the "hightrust" population, a gain in the average trust region has a very large effect on tax compliance. In the "mediumtrust" group, an increase in power is also positively correlated with tax compliance. The interaction term is highly significant and is of comparably large magnitude. This finding could be interpreted as a particularly high sensitivity towards the interplay of trust and power in the "mediumtrust" group, especially when compared to the share of the "lowtrust" and "hightrust" population: for these two groups, the moderating effect is insignificant and very small, perhaps indicating to a lack of sensitivity towards increases in power (trust), when trust (power) is already at very high levels. Specification (4) confirms that an increase

in "lowtrust" leads to less tax compliance relative to an increase in the "hightrust" reference group. When trust is average, improvements in this factor have a more pronounced effect as it would be the case when trust was already high (model (4) and model (5)).

Figure 5 shows the marginal effect of an increase in power, evaluated at different shares of non-trusting people in a society. The analysis of the trust-power interaction term in model (1) of Table 3 gives a neat illustration of the moderating effect described by Kirchler et al. (2008): the lower trust in society, the more can additional power increase tax compliance. The other way round, if trust in society was (already) high (low share of non-trusting people), more coercion does not seem to be a feasible vehicle to less tax evasion. Power is the less effective, the higher trust in authorities is.

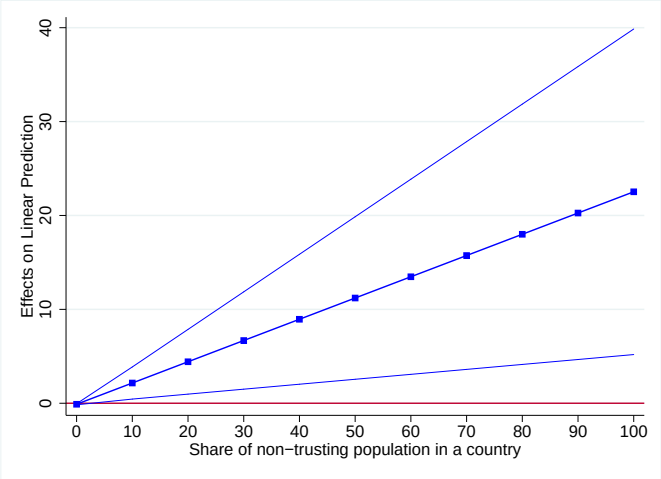

Figure 5: **The impact of power on tax compliance, dependent on the level of trust in society**. Illustrated is the marginal effect of an one additional prisoner, evaluated at the size of the non-trusting population. Non-trusting if response to question about trust in parliament was between 0 and 3. Trusting if response to same question was between 4 and 10. 90% confidence intervals are depicted.

6 Conclusions

With the Slippery Slope Framework of tax compliance, Kirchler (2007) and Kirchler et al. (2008) provided a conceptual tool to combine two main strands of tax compliance literature, namely tax enforcement and voluntary or morally obliged tax contributions, which depend on an individual's trust in tax authorities, or institutions in general. The SSF also provides a mechanism how trust and power interact in jointly explaining tax compliance.

Kirchler et al. (2008) argue that trust in authorities and power of authorities act as substitutes: power and trust both can result in high (or complete) tax compliance,

even if one factor is low or ineffective. From the taxpayer's perspective, only the perception of tax compliance differs.

In this paper, I shift the SSF's perspective from the individual to an aggregate, macroeconomic level. Regarding trust in authorities and power of authorities as additional determinants of a government's tax revenues, I tested the hypotheses that power and trust both independently and jointly explain a country's degree of tax compliance. With the use of panel data, I addressed the endogeneity problem arising from unobserved heterogeneity present in former publications. I also introduced novel indicators for measuring tax compliance (VAT Gaps by CASE Network) and power of authorities (incarceration rates).

The empirical analysis in this paper provides evidence that trust (independently of power) has a strong and significant influence on tax compliance in EU countries. Power of authorities (independently of trust) impacts tax compliance positively as well, but its influence is weaker and less robust, compared to trust in authorities.

I also find evidence for the existence of a moderating effect on the macro-level: the lower trust in society is, the greater the compliance-increasing effect of additional power. However, the interaction of trust and power is only associated with improved tax compliance for rather moderate levels of power. The joint positive influence is decreasing in incarceration rates.[18] Pronounced coercion damages trust in authorities, and eventually tax compliance.

The results in this paper correspond to recent findings in experimental economics: Dwenger et al. (2016) conducted a field experiment in Germany, where they incentivized tax compliance through deterrence and rewards for a small municipal tax that de-facto relied entirely on voluntary tax payments. Dwenger et al. (2016) found that around 20% of taxpayers complied despite the absence of any audit probability or penalty scheme. The introduction of tax enforcement had a strong effect on tax compliance for former evaders. Contrary to the results in this paper, however, Dwenger et al. (2016) do not find that deterrence crowds out intrinsic motivations (on the individual level). Mendoza and Wielhouwer (2015) conducted a (non-cooperative) tax compliance game and found that higher penalties for tax evasion made an incorporation of trust into (honesty was rewarded with a smaller audit probability) a compliance-strategy less feasible. The authors conclude that the best response to tax evasion might be the opposite to increasing deterrence, stressing the importance of "soft factors" for tax compliance.

Figures 2 and 3 suggest the existence of a slippery slope on a more descriptive, cross-country level. Between European countries, tax compliance increases in trust, but decreases in power, representing a trade-off between trust in authorities and power of authorities. At first sight, this picture seems to contradict the empirical results, where power is positively correlated with tax compliance. Recall the

[18] Lisi (2012b), in a short theoretical contribution to the SSF, derives a trust-maximizing enforcement level. If power is pushed beyond the optimum, trust starts to decline.

moderating effect, however: countries confronted with high tax evasion typically act coercively, which is associated with less trust and less tax compliance, possibly resulting in a negative feedback cycle.

Data restrictions limited the sample size with respect to country-coverage and time-periods. Interesting questions that remain unanswered are whether the feedback mechanism holds for countries worldwide (especially developing economies), and how trust and power affect tax revenues in the long term. Likely, explanations for the differences between countries date back until the origins of nations and their institutions. Another open task might be the attempt to break the proposed feedback cycle, implementing channels of causality running from trust and power towards tax compliance.

The results in this paper can also be used as a starting point to analyze the SSF from the public finance perspective on a more conceptual level. As argued in this paper, power of authorities and trust in authorities are looked upon as additional production factors to tax revenue. From this perspective, the linear fits in Figure 2 could be interpreted as isoquants. High trust produces high tax revenues (or compliance), a focus on coercion leads to less tax compliance. Trust in authorities and power of authorities are costly for the government to supply, calling for the derivation of an optimal policy mix of providing the two (public) goods. Meanwhile, consuming power and trust might be connected to contradicting behavioral responses on behalf of the taxpayers, leading to distortionary taxation in both cases.

References

Allingham, M.G. and Sandmo, A. (1972).Income Tax Evasion: A Theoretical Analysis, Journal of Public Economics 1: 323-338.

Alm,J ., McClelland, G.H., and Schulze, W.D. (1992).Why do people pay taxes?, Journal of Public Economics 48: 21-38.

Alm, J., McClelland, G.H., and Schulze ,W.D. (1999).Changing the Social Norm of Tax Compliance by Voting, KYKLOS 52: 141-171.

Alm, J. and Soled, J.A. (2016).W(h)ither the Tax Gap?, Tulane Economics Working Paper Series No. 1618.

Andreoni, J., Erard, B., Feinstein, J. (1998).Tax Compliance, Journal of Economic Literature 36: 818-860.

Becker, G.S. (1968).Crime and Punishment: An Economic Approach, Journal of Political Economy 76: 169-216.

Besley,T. and Persson,T. (2013).Taxation and Development, Handbook of Public Economics 5: 51-110.

CASE Network Reports (2013).Study to quantify and analyse the VAT Gap in the EU-27 Member States, No. 116.

CASE Network Reports (2014).2012 Update Report to the Study to quantify and analyse the VAT Gap in the EU-27 Member States, No. 120.

CASE Network Studies & Analyses (2016).Study and Reports on the VAT Gap in the EU-28 Member States: 2016 Final Report, No. 483.

Cowell, F.A. (1990).Cheating the Government, Cambridge: MIT Press.

D'Amico, J.D. and Williamson, C. (2015).Do legal origins affect cross-country incarceration rates?, Journal of Comparative Economics 43: 595-612.

Dwenger, N., Kleven, H., Rasul, I., Rincke, J. (2016).Extrinsic and Intrinsic Motivations for Tax Compliance: Evidence from a Field Experiment in Germany, American Economic Journal: Economic Policy 8: 203-232.

Falkinger, J. (1995).Tax evasion, consumption of public goods and fairness, Journal of Economic Psychology 16: 63-72.

Feld, L.P. and Frey, B.S. (2002).Trust breeds trust: How taxpayers are treated, Economics of Governance 3: 87-99.

Feld, L.P. and Frey, B.S. (2007).Tax Compliance as the Result of a Psychological Tax Contract: The Role of Incentives and Responsive Regulation, LAW and POLICY 29: 102-120.

Fischer, J.A.V. and Schneider, F. (2009).The puzzle of tax compliance revisited: testing the 'slippery slope' hypothesis for trust and power against field data: Conference Paper.

Frey, B.S. and Torgler, B. (2007).Tax morale and conditional cooperation, Journal of Comparative Economics 35: 136-159.

Gangl, K., Muehlbacher, S., de Groot, M., Goslinga, S., Hofmann, E., Kogler ,C., Antonides, G., and Kirchler, E. (2013)."How can I help you?" Perceived Service Orientation of Tax Authorities and Tax Compliance, FinanzArchiv 69: 487-510.

Garland, D. (1991).Sociological Perspectives on Punishment, in Tonry, M. "Crime and Criminal Justice: A Review of Research", Chicago: University of Chicago Press: 115-166.

Garland, D. (2001).The Culture of Control: Crime and Social Control in Contemporary Society, Chicago: University of Chicago Press.

Gordon, J.P.F. (1989).Individual Morality and Reputation Costs as Deterrents to Tax Evasion, European Economic Review 33: 797-805.

IMF (2015). Current Challenges in Revenue Mobilization: Improving Tax Compliance.

Jacobs, D. and Carmichael, J.T. (2001).The Politics of Punishment across Time and Space: A Pooled Time-Series Analysis of Imprisonment Rates, Social Forces 80: 61-91.

Kaplanoglou, G. and Rapanos, V.T. (2015).Why do people evade taxes? New experimental evidence from Greece, Journal of Behavior and Experimental Economics 56: 21-32.

Kastlunger, B., Lozza, E., Kirchler, E., and Schabmann, A. (2013).Powerful authorities and trusting citizens: The Slippery Slope Framework and tax compliance in Italy, Journal of Economic Psychology 34: 36-45.

Kaufmann, D., Kraay, A., and Mastruzzi, M. (2010).The Worldwide Governance Indicators: Methodology and Analytical Issues, Policy Research Working Paper 5430.

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

Kirchler, E., Hoelzl, E., and Wahl, I. (2008).Enforced versus voluntary tax compliance: The "slippery slope" framework, Journal of Economic Psychology 29: 210-225.

Kogler, C., Batrancea, L., Nichita, A., Pantya, J., Belianin, A., and 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, Journal of Economic Psychology 34: 169-180.

Kogler, C., Muehlbacher, S., and Kirchler, E. (2015).Testing the "slippery slope framework" among self-employed taxpayers, Economics of Governance 16: 125-142.

Lisi, G. (2012a).Testing the slippery slope framework, Economics Bulletin 32: 1369-1377.

Lisi, G. (2012b).Unemployment, tax evasion and the slippery slope framework, International Review of Economics 59: 297-302.

Mendoza, J.P. and Wielhouwer, J.L. (2015).Only the Carrot, Not the Stick: Incorporating Trust into the Enforcement of Regulation, PLoS ONE 10.

Muehlbacher, S., Kirchler, E., Schwarzenberger, H. (2011).Voluntary versus enforced tax compliance: empirical evidence for the "slippery slope" framework, European Journal of Law and Economics 32: 89-97.

OECD (2015). Tax Administration 2015: Comparative Information on OECD and Other Advanced and Emerging Economies, Paris: OECD Publishing.

Pincoffs, E.L. (1966).The Rationale of Legal Punishment, New York: Humanities Press.

Rothstein, B. (2000).Trust, Social Dilemmas and Collective Memories, Journal of Theoretical Politics 12: 477-501.

Ruiu, G. and Lisi, G. (2011).Tax Morale, Slippery-Slope Framework and Tax Compliance: A Cross-section Analysis, Working Paper.

Schneider, F., Buehn, A., and Montenegro, C.E. (2010).Shadow Economies All over the World: New Estimates for 162 countries from 1999 to 2007, Policy Research Working Paper 5356.

Scholz, J.T. and Lubell, M. (1998).Trust and Taxpaying: Testing the Heuristic Approach to Collective Action, American Journal of Political Science 42: 398-417.

Shannon, S. and Uggen, C. (2012). Incarceration as a Political Institution, in Amenta, E., Nash, K. and Scott, A. "The Wiley-Blackwell Companion to Political Sociology", Wiley Blackwell: 214-225.

Slemrod, J. (2002).Trust in Public Finance, NBER Working Paper 9187.

Slemrod, J. (2007).Cheating Ourselves: The Economics of Tax Evasion, Journal of Economic Perspectives 21: 25-48.

Smith, K. (2004).The Politics of Punishment: Evaluating Political Explanations of Incarceration Rates, The Journal of Politics 66: 925-938.

Torgler, B. (2003a).Tax Morale, Rule-Governed Behaviour and Trust, Constitutional Political Economy 14: 119-140.

Torgler, B. (2003b).To evade taxes or not to evade: that is the question, Journal of Socio-Economics 32: 283-302.

Torgler, B. (2005).Tax morale and direct democracy, European Journal of Political Economy 21: 525-531.

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

Wahl, I., Kastlunger, B., and Kirchler, E. (2010).Trust in Authorities and Power to Enforce Tax Compliance: An Empirical Analysis of the "Slippery Slope Framework", Law and Policy 32: 383-406.

Weber, Max (1968).Economy and Society, University of California Press.

Appendix

Table A1: **Sources and Descriptions of the data used in this paper**

Variable	Source	Description
Tax Compliance = 100% - VAT-Gap	CASE Network Reports 2013, 2014, 2016	VAT-Gap: Difference between the estimated, theoretical tax liability in a country and the actual VAT (Value Added Tax) revenue collected, as a share of the theoretical tax liability.
Trust in authorities	European Social Survey (ESS)	ESS Rounds 1-7; Individual answers on how high is "trust in parliament", on a scale from 0 (no trust at all) to 10 (complete trust).
Power of authorities	Institute for Criminal Policy Research (ICPR)	Prison population rate (per 100,000 of national population)
Per-capita GDP	World Bank	In PPP-dollars.
Unemployment rate	World Bank	Unemployed among the total labor force, in percent
Value Added Tax (VAT) rate	CASE (2013)	Full rate in a country in a given year. Reduced rates and exemptions are not considered.
Expenses for tax administration (TAE)	OECD (2015)	As a percentage of GDP.

Table A2: **Summary statistics for Table 1 and Table 2**

variable	N	mean	sd	min	median	max	skewness
Tax Compliance	136	85.8	8.63	61	88	99	-.99
trust	142	4.28	1.09	1.88	4.25	6.5	-.06
power	141	127	63	54	102	337	1.39
GDP	142	33685	10936	13448	34726	86168	1.2
unemployment	142	8.58	4.01	2.6	7.7	25.2	1.6
VAT rate	136	20.6	2.58	15	20	27	.243
TAE	78	.241	.0733	.108	.236	.421	.379

*Source:*Own calculations, based on the data described in Table A1. TAE: expenditure on tax administration (share of GDP).

Table A3: **Summary statistics for trust shares**

variable	mean	sd	min	median	max	skewness
non-trusting	.383	.179	.0961	.375	.79	.34
trusting	.617	.179	.21	.625	.904	-.34
lowtrust	.383	.179	.0961	.375	.79	.34
mediumtrust	.402	.0826	.163	.412	.542	-.703
hightrust	.215	.132	.0344	.182	.566	.89

Source: Own calculations.

Table A4: **Pearson correlations for data used in this paper**

Variables	Tax Compliance	trust	power	GDP	unemployment	VAT rate	TAE
Tax Compliance	1.000						
trust	0.466	1.000					
	(0.000)						
power	-0.515	-0.504	1.000				
	(0.000)	(0.000)					
GDP	0.449	0.679	-0.529	1.000			
	(0.000)	(0.000)	(0.000)				
unemployment	-0.323	-0.454	0.337	-0.406	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)			
VAT rate	0.064	0.202	-0.177	-0.068	-0.003	1.000	
	(0.462)	(0.018)	(0.040)	(0.432)	(0.968)		
TAE	0.131	0.014	-0.232	0.104	-0.377	0.130	1.000
	(0.263)	(0.900)	(0.041)	(0.363)	(0.001)	(0.268)	

Source: Own calculations. p-values in parentheses.

Table A5: **Pearson correlations for trust-shares, tax compliance, and power**

Variables	Tax Compliance	power	non-trusting	trusting	mediumtrust	hightrust
Tax Compliance	1.000					
power	-0.515	1.000				
	(0.000)					
non-trusting	-0.482	0.512	1.000			
	(0.000)	(0.000)				
trusting	0.482	-0.512	-1.000	1.000		
	(0.000)	(0.000)	(0.000)			
mediumtrust	0.334	-0.297	-0.725	0.725	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)		
hightrust	0.440	-0.507	-0.903	0.903	0.358	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Source: Own calculations. p-values in parentheses.

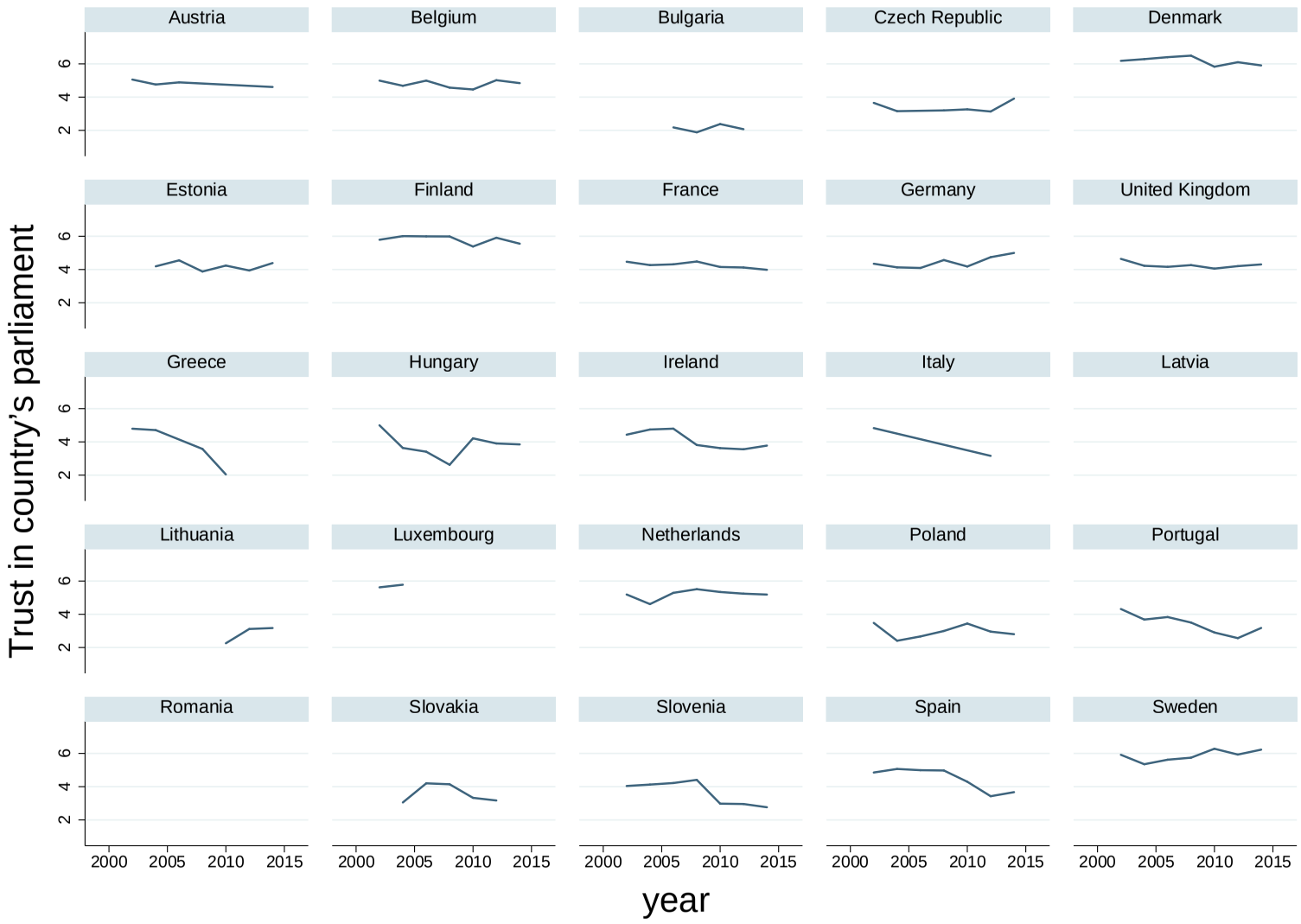

Figure A1: **Trust in authorities within countries over time**

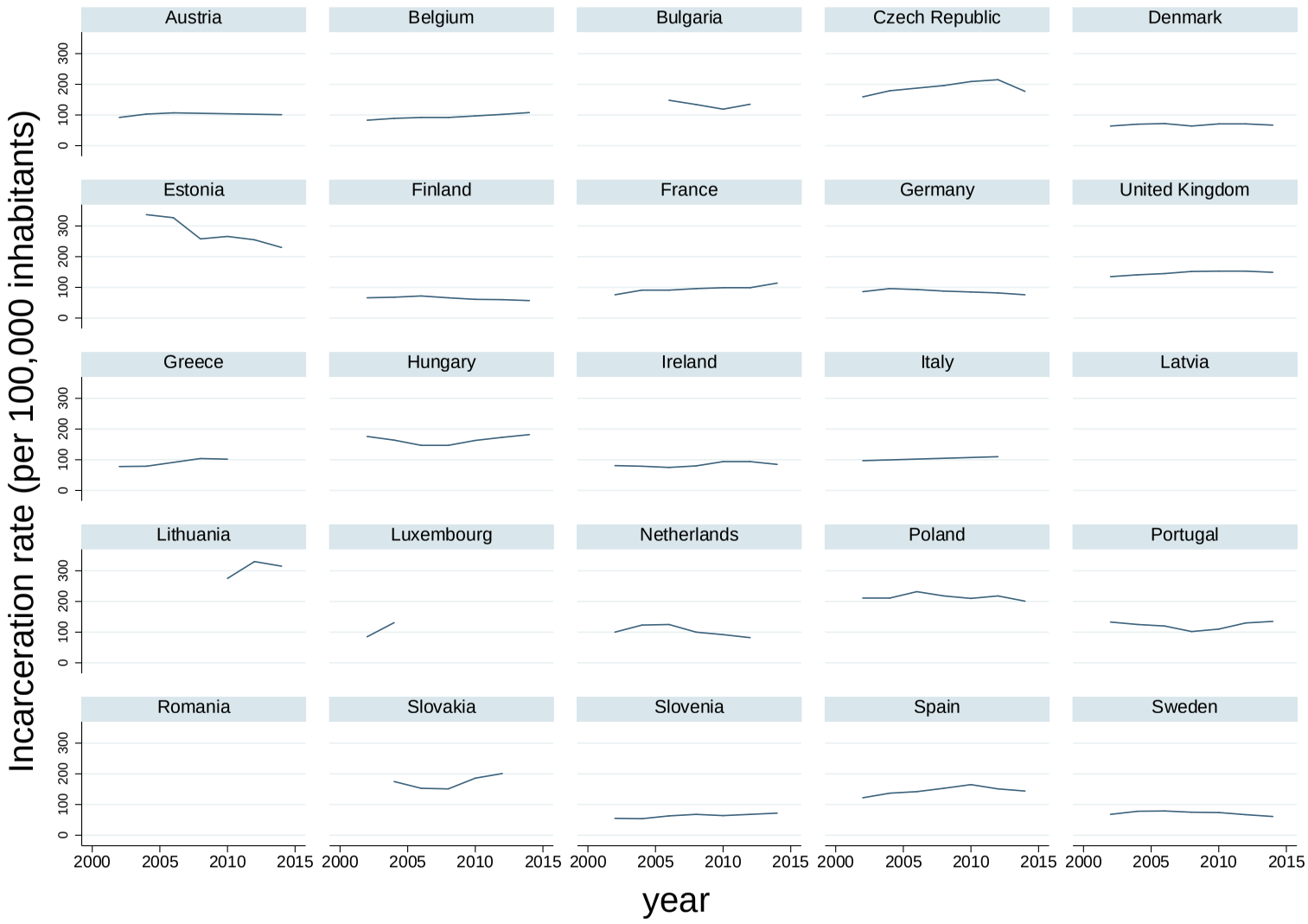

Figure A2: **Power of authorities within countries over time**

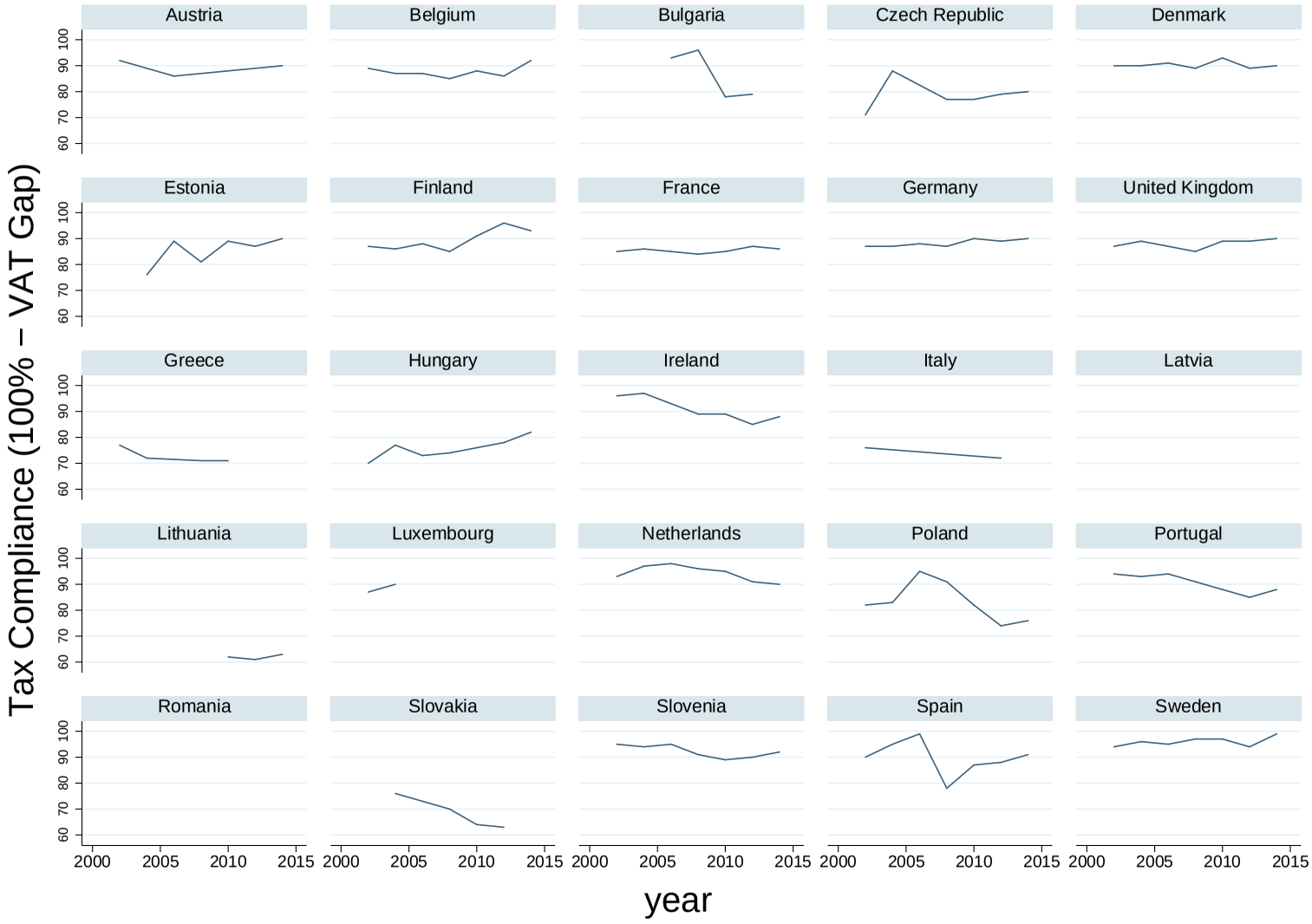

Figure A3: **Tax Compliance within countries over time**

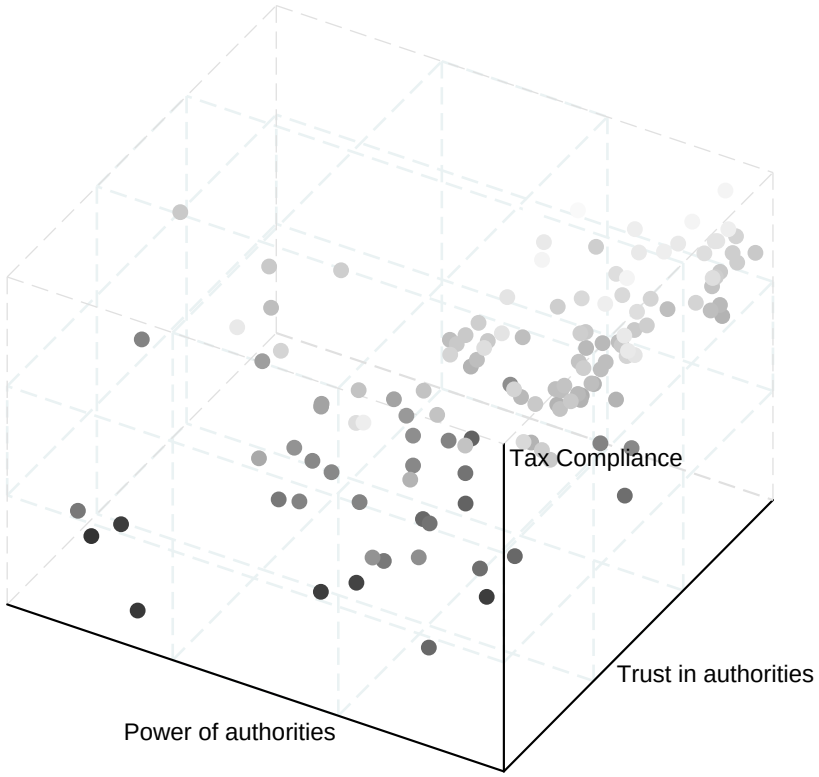

Figure A4: **Three-dimensional plot of trust in authorities, power of authorities, and tax compliance.** Axes represent normalized values (distance from the mean, in standard deviations). Colours represent different levels of tax compliance: starting at the minimum (blue), colours fade from dark to light, indicating the maximum tax compliance in the sample. Depicted are all observations, not sorted by country or year.