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Voluntary versus enforced tax compliance: the slippery slope framework in the Brazilian context

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Abstract

Research on tax compliance was initially conducted using the classical economic paradigm. However, several papers have demonstrated that this “crime paradigm” only partially explains taxpayer behavior. In this context, a new pattern emerged, labeled the “service paradigm,” which assumes that taxpayers are not rational individuals only concerned with maximizing usefulness; they should also receive proper treatment and good-quality public services in return for paying taxes. This paper aims to evaluate both paradigms and their influences on the tax collection level and seeks to determine whether they affect enforced and voluntary tax compliance. The theoretical assumptions were verified through empirical assessment using an online experimentation method with Brazilian taxpayers. The results confirm the existence of trust-based interactions between taxpayers and public administration that leads to voluntary compliance, while policies based on the imposition of power result in enforced compliance.

Keywords Tax evasion · Tax compliance · Slippery slope framework · Crime paradigm · Service paradigm · Brazilian taxpayers

JEL Classification H24 · H26 · K42

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1 Introduction

The tax collection is closely related to the state of social welfare. Tax collection can be defined as the primary source for managing government spending and enabling the public investment needed for the population's well-being. In contrast, tax evasion has the potential to negatively and significantly affect a country's economic development (Siqueira and Ramos 2006).

Several studies involving taxpayer behavior initially emerged from the economic field, and they were solely grounded in the supposed rationality of individuals. In this context, two manuscripts have been highlighted: Allingham and Sandmo (1972) and Srinivasan (1973). These studies were based on the theory by Becker (1968) of crime and punishment, which accepted the classical economic paradigm according to which individuals adopt rational behaviors; in the taxpayers' case, the decision to pay or evade taxes results from a comparison between the financial benefits and the risk of being punished. Thus, the authors estimated the maximum risk of punishment, and the greater tendency of taxpayers to act honestly.

However, it has been observed that the rational economic paradigm does not fully explain taxpayer behavior, this limitation by determining that, although the likelihood of a tax punishment is minimal, a large proportion of the world's population complies with their tax obligations, a finding that led to conclude that other factors are involved in taxpayers' decisions and that they are not motivated exclusively by the desire to maximize economic return (Alm and Torgler 2011; Alm et al. 1992, 2012b).

Furthermore, the existence of other agents who influence the willingness to pay taxes is an idea that has been avoided in debates on the theme, especially in Brazil. The interaction of these agents affects an individual's behavior, and it has great importance in analyzing the practices of tax evasion (Leviner 2008).

Generally, there might be a type of psychological agreement involving all of these agents, particularly taxpayers, the government, and the regulators. Alm et al. (2012b) and Kirchler (2007) claimed that, when there is a trust-based interaction, citizens will be more likely or sensitive to paying their taxes, resulting in a reciprocal, cooperative environment. Conversely, the enforcement exercised by authorities might also be a source of influence on proper taxpayer behavior.

According to Kirchler (2007), there are two types of tax environment. The first is a police-like environment, in which taxpayers are seen by authorities as potential evaders; this paradigm is called "crime paradigm" and it is based on the economic rationality (Allingham and Sandmo 1972; Srinivasan 1973). To avoid tax evasion, tax supervisors focus on audits, diligences, and penalties.

Otherwise, Kirchler (2007) found that there is nearly a customer relationship between taxpayers and tax authorities, that is, a service-based environment in which the former is addressed as a client by the latter and contributes by paying taxes and in return receives good-quality services and adequate treatment. This exchange among both parties gives rise to a cooperative context that, as a consequence, reduces tax evasion. The fight against evasion, in this approach, occurs by increasing service quality, dutiful interactions, and the reasonable treatment of taxpayers,

with authorities seeking to advise taxpayers to comply with standards and not only to punish them.

Consequently, a new paradigm arises, called the “service paradigm,” which is opposed to the classical economic rationality. According to this new approach, taxpayers’ behavior is influenced by factors other than the wish to maximize individual utility; instead, they are influenced by other motivations, such as the interaction between the parties involved in tax matters.

Brazil shows a prominent tax environment to the assessment of both paradigms due to the higher tax burden and, consequently, the higher evasion. During 2015, for example, an estimated total of 678 billion reais average per month in taxes were collected in Brazil,¹ while the total amount of tax evasion was estimated to be 183 billion reais,² i.e., almost 27% of the total value collected.

In this context, this paper aims to assess the two main trends in tax compliance, the “crime paradigm” and the “service paradigm” using evidence from Brazilian taxpayers. In this context, the research question of this manuscript is *how are the Brazilian taxpayers’ behaviors affected by their interactions with tax authorities and government?*

Furthermore, Brazil provides an interesting context to this kind of evaluation due to the fact that for a couple of years reforms in the Brazilian taxation system has been discussed focusing on taxpayers and not solely companies. Additionally, this paper contributes to the development of public policies taking into consideration insights from the real Brazilian taxpayers.

Additionally, the Brazilian is the largest one of the Latin America and according to Torgler (2003a), that is a lack in the academic literature about the trends in tax compliance in Latin America because of the studies concentration in the USA.

The remaining of this paper is structured as follows: literature background, providing a deep analysis about both paradigms previously mentioned; methodological approach, demonstrating the research strategy to achieve the manuscript purpose; findings analysis and discussion; and conclusions.

2 Background and hypotheses development

This section outlines the main topics in the academic literature related to taxpayers’ behavior as a result of both the crime and service paradigms.

2.1 The crime paradigm

One explanation for tax compliance focuses on the supposed economic rationality of individuals, with the threat of detection and punishment being the main factor

¹ According to the estimate by the Commercial Association of São Paulo, available at <http://www.impostometro.com.br/>. Accessed on May 9, 2015.

² According to the estimate by the Brazilian Union of the National Treasury Prosecutors (SINPROFAZ), available at <http://www.quantocustaobrasil.com.br/>. Accessed on May 9, 2015.

influencing decisions about tax payment or evasion. According to this view, a taxpayer behaves as if playing a game, in which the bet involves assessing expected usefulness due to the benefits arising from any successful tax evasion and the uncertainty of detection and punishment, so that tax payment occurs because of the fear of being audited and punished (Alm and Torgler 2011; Alm et al. 1992; Leviner 2008).

Allingham and Sandmo (1972) are regarded as the trailblazers of this paradigm in the fiscal field. They published the seminal study “Income Tax Evasion: A Theoretical Analysis,” based on the famous work by Becker (1968) about crime and punishment. In that article, the authors considered the taxpayer to be entangled in a dilemma that involves the economic benefit of tax evasion practices and the risk of being detected and, as a consequence, being punished. According to the authors, the individual decision involves two options: disclosing the actual amount of income or choosing unrealistic reporting, depending on the probability of being investigated. If this likelihood is low, the taxpayer will choose to maximize economic usefulness, reporting only a part of, or none of, his or her income.

Therefore, the classical economic paradigm presupposes that the determination to pay taxes is a decision made under uncertainty (Muehlbacher et al. 2011). According to Allingham and Sandmo (1972), the doubt is based on the finding that omissions or mistakes in income disclosure do not lead to automatic reactions by tax authorities and the imposition of penalties. Thus, as reported by Kirchler (2007), taxpayers behave as if they are playing a game, in which uncertainties cause them to face the following dilemmas: (a) observing the law and being sure about the amount of wealth sacrificed; (b) breaking the law; thus obtaining, if successful, a gain; or (c) breaking the law and undergoing a sharp loss due to detection and punishment.

Thus, Murphy (2008) summarized the economic paradigm by claiming that individuals assess the opportunities and risks, breaking the law when they conclude that the likelihood of being detected and punished is small compared to the profit obtained as a result of the act. This decision is eminently rational and utilitarian.

It has been noted, however, that considering the actual probability of being inspected to be a deciding factor might not be suitable, to the extent that risk perception tends to be more relevant to taxpayer behavior (Bobek and Hatfield 2003), because this perception varies among individuals—so a taxpayer might overestimate the likelihood of being detected and punished, which might provide an additional explanation for tax compliance (Alm et al. 1992; Feld and Frey 2007; Gemmill and Ratto 2012). According to Alm and Torgler (2011) and Alm et al. (1992), empirical results have provided strong evidence that some individuals exaggerate the real possibility of being punished, as shown by Erard and Feinstein (1994), resulting in high tax compliance, while this risk is actually reduced, thus weakening the rational paradigm.

In either case, considering the assumptions of the classical economic paradigm of taxpayer rationality, as judiciously claimed by Allingham and Sandmo (1972), the government might resort, as primary tools for fighting tax evasion, to the tax rate, the burden of punishment, and the expenses to perform audits. The tax rate affects compliance levels by interfering with the economic usefulness of taxpayer decisions. The burden of punishment, in turn, increases the risk for taxpayers, as well as the expenses due to audits.

According to authors such as Alm and Torgler (2011) and Leviner (2008), there are only two effective tools to limit the adoption of illegal taxpayer behavior: continued audits and strict sanctions. Leviner (2008) described how these two coercive tools replace each other, although nothing prevents them from being used together. According to the author, despite reduced tax revenues being expected when the likelihood that the taxpayer is inspected decreases, this loss can be compensated for by increasing the severity of punishment for tax evasion, and the government can choose which of the two practices is more convenient.

Because of this emphasis on the increased likelihood that the taxpayer is audited and, in the case he or she has broken the law, punished, the classical economic paradigm is the source of the “crime paradigm,” the name of which is precisely derived from the authorities’ view that the taxpayer is a potential criminal who must be deterred from breaking the law (Alm and Torgler 2011), as well as the relentless attempts by these authorities to identify and punish tax evaders, which in turn creates an environment of “cops and robbers,” as noted by Kirchler (2007).

In conclusion, the models that rely on the supposed rationality of individuals adopt the central aim of taxpayer control through coercive methods, prominently based on detecting and punishing lawbreakers. When the use of these methods is effective, taxpayer compliance is derived from exerting the coercive power of the authorities into practice, so-called enforced compliance, bearing in mind that this compliance does not occur voluntarily but as a response to pressure from the authorities (Kirchler 2007).

This coercive context has the effect of creating an environment in which conflict between authorities and taxpayers prevails (Kirchler 2007). The former attempts to increase the risk perceptions of individuals. This aversive behavioral control entails counter control practices by taxpayers, who are always striving to maintain a safe distance from authorities. Cooperation is relegated to the background, unlike that which occurs in the “service paradigm,” and compliance derives from the coercive power of authorities; therefore, this behavior is forced instead of being a voluntary taxpayer action.

2.2 The service paradigm

The view that the classical economic paradigm is limited has gained widespread approval in a broad sense (Alm 1991; Alm et al. 1992, 2012a, b; Bobek and Hatfield 2003; Bosco and Mittone 1997; Feld and Frey 2007; Kirchler et al. 2014; Lisi 2012a; Posner 2000; Siqueira and Ramos 2005, 2006). This limitation stems from the recognition that human beings do not act solely in their own interests and to maximize the usefulness of their decisions. There are several everyday examples showing that awareness and moral sentiments also play major roles in the choices of individuals (Frank 1987).

Weigel et al. (1987) criticized the traditional models of tax evasion, which assume that all taxpayers will report lower income values and be deterred only when the probability of detection and the severity of punishment are significant. According to the authors, certain situations and environments cause the taxpayer to engage in

evasive practices, and certain personality types are particularly prone to this behavior. They concluded by stating that it might be foolish to disregard other motivations in research on tax compliance.

Meanwhile, Alm and Torgler (2011) considered this point further, stating that individuals do not always behave on a selfish and rational basis, being concerned only with their own interests, as depicted by the rational paradigm. According to the authors, many other factors affect taxpayer behavior, especially those grounded in ethics, and it is impossible to achieve a comprehensive approach to tax compliance by disregarding dimensions of this nature. They concluded by stating that empirical evidence shows that the rational paradigm is limited, since the likelihood of being inspected is minimal, and, contrary to what we might assume, most individuals comply with their tax obligations, an opinion supported by Alm et al. (2012b) and Posner (2000).

Also in agreement with this line of thought, Alm et al. (2012b) claimed that the results of empirical research suggest the relevance of other motivations underlying the notion of taxpayer rationality, for example guilt, morality, and altruism. According to the authors, studies have shown that motivations are affected by social standards, justice, equity, trust, reciprocity, tax ethics, and even patriotism. They concluded by stating that the rational paradigm neglects many important elements involved in the act of observing tax legislation, insofar as this behavior is grounded on a single utilitarian motivation, disregarding other factors and players that interact with taxpayers and influence their behavior.

Therefore, according to this understanding, there are numerous factors influencing taxpayer behavior rather than simply the wish to obtain immediate financial advantages, and these reasons explain why many people observe the law (Alm and Torgler 2006). Injustice (Alm and Torgler 2011; Alm et al. 2012a; Skinner and Slemrod 1985; Weigel et al. 1987), the opportunity to evade (Alm et al. 2012a; Kirchler 2007; Weigel et al. 1987), acceptance of evasion practices by society (Alm and Torgler 2011; Alm et al. 2012a, b; Weigel et al. 1987), tax morality (Alm and Torgler 2006; Frey and Torgler 2007; Halla 2012; Kirchler 1997), lack of transparency in the use of public resources (Marton 2003), mental segregation of taxes due (Muehlbacher and Kirchler 2013), ethics (Reckers et al. 1994), and tax inequality (Spicer and Becker 1980) are just some of the motivations that lead taxpayers to comply or not comply with their tax obligations, and they reinforce the notion that the “crime paradigm” is limited.

Another issue that becomes relevant in this paradigm is the finding that there are other actors interacting in the process of paying taxes (Alm et al. 2012a). According to Alm et al. (2012b), taxes are not paid by an individual act; there is taxpayer interaction, for instance, with accountants and tax agents, and in addition, collected taxes are spent by public officials who represent citizens. In this sense, the “service paradigm” also regards the payment of taxes as a complex act that involves a series of interactions, and it is necessary to consider, in the analysis of tax compliance, not only rational and selfish taxpayers but also citizens who interact with other players, especially tax officials and politicians, who decisively influence their behavior (Kirchler 2007).

Alm et al. (2012a, b) drew attention to the decisive role played by the government in this process, insofar as it is responsible for the features of the tax system imposed on taxpayers. In addition, the authors warned that the manner in which communication occurs on the part of political agents, regarding decisions about taxes and how collected taxes are allocated, constitutes a relevant factor. Ultimately, they claimed that tax authorities who act under government orders consist of another category of players whose acts are sources of influence on taxpayer behavior since they provide services, implement controls, and impose sanctions.

Feld and Frey (2007) also argued that proper expenditure of the amount of collected taxes is very important, insofar as the waste of public money erodes trust and, as a consequence, affects tax compliance; thus, McGee et al. (2008) demonstrated in an empirical study that corruption is the strongest argument justifying tax evasion practices.

In this vein, Alm and Torgler (2011) stated that some scientific studies have suggested that some citizens tend not to observe tax legislation if they disagree with how the government spends the collected amounts, believing that the allocation of resources generated by taxes is unfair and irresponsible. They cited, as an example, another study conducted by themselves (Alm and Torgler 2006). Bahl and Bird (2008) and Bird et al. (2008) also warned that corruption plays a major role in this discussion, requiring efforts by governments to become more legitimate and responsive, thus favoring tax compliance.

This occurs because the “service paradigm” assumes that taxpayers’ trust in the government exerts a great influence on the tax compliance level, as advocated, for instance, by Kirchler (2007), as well as empirically demonstrated by Hammar et al. (2009). Torgler (2003b) also found empirically that the trust level has a significant, positive effect on citizens’ tax morality, with a consequent increase in the compliance level.

According to Feld and Frey (2002, 2007), there is a real contractual relationship between taxpayers and the state; one party has the obligation to give some of their resources, and the other has the duty to provide public services in return. The authors added that the approach to taxpayers affects their attitude, making an analogy with the customer who is willing to pay a higher price for a product because of the better treatment offered by a particular business (Hartner et al. 2008). Authors such as Kirchler have called this behavior procedural justice, which is the proper treatment by the authorities, including respect, dignity, and education.

Thus, citizens are no longer addressed as potential criminals who seek only the best means of breaking the laws and maximizing usefulness, providing the “crime paradigm” with a basis; rather, they become actual customers of public administration, giving rise to a relationship of respect, which generates trust and a cooperative environment between these social players (Kirchler 2007).

In short, the “service paradigm” stands opposed to the “crime paradigm.” The roles played by authorities and taxpayers are completely antagonistic. In the first paradigm, authorities act by advising, and strengthening cooperation and trust, thus obtaining voluntary compliance from the taxpayers who are addressed as a form of customer whose collaboration consists of collecting taxes; in return, they receive proper treatment and good-quality services. In the second paradigm, in turn,

authorities act as policemen, always on the alert to detect violators of tax legislation and to apply the severe sanctions arising as a result, insofar as it is assumed that taxpayers act rationally when attempting to increase their individual economic benefit, thus avoiding the burden of law. The “service paradigm” therefore strengthens voluntary compliance, compared to the “crime paradigm,” which aims at enforced compliance.

2.3 Interconnecting the crime and service paradigms

The “crime paradigm” assumes taxpayer rationality so that compliance with the law cannot be taken for granted, requiring public and private investment to ensure compliance (Becker 1968). Among the tools available to authorities to ensure the success of this venture, the severity of punishment and increased likelihood of detection stand out, with the latter regarded as expensive (Kirchler 2007; Kirchler et al. 2014), channeling these investments.

As a result, there emerges a serious resource allocation issue. In theory, increasing the probability of detection generates more revenue, but it requires large investment by the public administration (Skinner and Slemrod 1985; Raskolnikov 2006). To avoid this requirement, it is natural that the government chooses to increase tax fines, compensating for the lack of investment in audits (Becker 1968; Kirchler et al. 2010; Raskolnikov 2006), which results in draconian penalties (Siqueira and Ramos 2005), as seems to be the case in Brazil where some penalties reach 225% of the amount evaded. Becker (1968) reported that the approach of choice to the severity of punishment, compared to the increased likelihood of detection, had already been adopted by the Anglo–Saxon countries in the 18th and 19th centuries, and at the time of his study, the same practice was maintained by communist and developing countries, a panorama that does not seem to have changed.

Although from the economic point of view it might seem appropriate, this approach does not withstand fairly rigorous analysis. Beccaria (2012) noted that the probability of detection is more critical than the burden of punishment, and the most recent authors have agreed with him, e.g., Leviner (2008). There is no point to an extremely drastic punishment if the probability of detection is minimal, as stated by Weigel et al. (1987), who claimed that the fear of punishment depends on detection certainty and punishment severity.

In addition, excessive punishment causes severely deleterious effects. It generates greater resistance, tax disputes, and costs for the tax administration (Raskolnikov 2006). It also affects trust in the government, leading taxpayers to adopt negative attitudes about authorities (Alm et al. 2012a), thus undermining voluntary compliance, which is crucial for increasing tax collection (Kirchler 2007). This fact is worse in environments in which the likelihood of detection is reduced, since the few taxpayers who subject to audits and consequent punishment feel extremely wronged, further diminishing their trust in the government, especially if the penalty is excessive.

Leviner (2008) stated that imposing extremely severe penalties on a few individuals is arbitrary, draconian, and discriminatory, especially because many people

practice evasion, but only a few are detected and punished. The author noted that applying an extreme form of punishment undermines the democratic rule of law, with a high risk of causing widespread conflict between citizens and the government. A similar position was expressed by Skinner and Slemrod (1985), who observed that a system in which few taxpayers are severely punished gives rise to a widespread sense of injustice, insofar as it affects equity.

Following this line of thought and accepting the assumption of the “service paradigm,” according to which trust is a vector of voluntary tax compliance, we encounter a vicious circle, in which the government, given the limited cooperation of taxpayers, must strengthen enforced compliance, and because the increased likelihood of detection generates costly expenses, it chooses to impose severe penalties on the few who are caught breaking the law. The imposition of drastic penalties for a few taxpayers, in turn, causes the additional erosion of voluntary compliance, forcing the government to impose even more enforced compliance.

According to Alm et al. (2012b), this is a cycle in which high levels of suspicion by the taxpayer prevail. The result of this vicious circle is an unsustainable system with increased tax litigation and high evasion levels, as seems to be the case in Brazil.

There is also a need to consider that the taxpayer does not always purposefully adopt attitudes aimed at evading taxes (Leviner 2008). In some cases, the individual makes a mistake in interpreting the law, especially due to the great complexity of tax legislation. In such cases, the imposition of severe penalties becomes particularly disturbing (Leviner 2008), renewing the sense of injustice by the taxpayer and damaging voluntary compliance even further.

Following this analysis, it is natural to conclude that the best option to fight tax evasion is the increased probability of detection and not the burden of punishment, which concurs with the long-standing views of Beccaria (2012) and Skinner (2006). As advocated by Leviner (2008), the punishment severity should be used only as a supplementary strategy.

Nevertheless, as already noted, increased probability of detection incurs high costs, so that these investments will certainly impose difficult choices on the government, which, to increase tax collection, must invest large amounts of money that could be used to fund other strategic fields, such as health and education, thus representing a clear trade-off dilemma. As a result, public policies aimed at fighting tax evasion or any other illegal conduct encounter an even broader problem, which is the difficulty of optimal allocation of public resources, as mentioned by Becker (1968).

The “service paradigm” approach, in which the trust environment surrounding taxpayers and authorities create a cooperative setting that positively affects tax collection, might be an effective alternative to overcome this dilemma, so that the government could control the issue in a rather effective manner by adopting policies more consistent with this paradigm.

In this sense, each individual has beliefs of his or her own about compliance with tax obligations, and there is a broad range of behaviors (Alm and Torgler 2011). The “crime paradigm” tends to regard the taxpayer as unique, always motivated by individual economic benefit, which, according to Alm et al. (2012a, b), is a mistake. Braithwaite (1995, 2003, 2009, 2011), along these lines, reported that the

motivational attitudes of individuals vary, and identified five of them: two positive (commitment and capitulation) and three negative (resistance, disengagement, and game playing).

The author explained what characterizes each of these motivational attitudes. Commitment reflects taxpayer trust in the fiscal system and the moral sense of willingness to provide his or her share in the interest of the collectivity. This behavior reflects the belief that the system should be supported by all. Meanwhile, capitulation reflects acquiescence to the power of the tax administration as the legitimate authority, as well as the perception that it is a benevolent power, provided that the individual acts appropriately. These two attitudes are regarded as positive, favoring tax compliance insofar as there is taxpayer alignment with the interests of authorities.

In contrast, there are three negative motivational attitudes, referred to by the author as “challenge attitudes,” which hinder tax compliance since taxpayers demonstrate their disagreement with acting in the way authorities want. Resistance is characterized by taxpayers’ doubts about the real intentions of the tax administration to behave cooperatively, leading individuals to realize that they must adopt a careful or even hostile attitude to fighting the coercion imposed by authorities. Disengagement is related to resistance, but in this case, there is a generalized disenchanting feeling against the authorities, leading taxpayers to fail to cooperate and even to show some concern about tax compliance. In game playing, the taxpayer adopts a combative attitude, which seems to reflect pleasure in challenging the tax authorities and in analyzing gaps and calculating how to reduce the amount to be paid in taxes.

Therefore, considering the five different attitudes and beliefs of taxpayers revealed above, the responses by authorities might be adapted according to the various taxpayers’ categories and characteristics (Kirchler 2007). Braithwaite (2009) argued that the authorities should be strict when dealing with persistent tax evaders, but regarding those who adopt a positive, motivational attitude, the better approach is to educate, assist, and support, which is a view endorsed by Muehlbacher et al. (2011). Thus, it is crucial that the authorities adapt their responses to achieve a larger number of taxpayers (Lemoine and Roland-Lévy 2012) whose motives to evade vary broadly, so that a part of the society recognizes the need and advantages of taxes, but this sense of community is not shared by everyone (Alm et al. 2012a).

Leviner (2008) also addressed this theme by claiming that it is the responsibility of public officials to cooperate with taxpayers, aiming to reduce or avoid feelings of resentment, antagonism, and distrust. The author stated that this attitude fosters a connection between taxpayers and public officials, occasionally evoking voluntary compliance. However, the author warned that, when such practices are not sufficient to obtain voluntary compliance, public officials should be rigorous but fair, demonstrating that the tools of the “crime paradigm,” despite their harmful effects, cannot be discarded.

Thus, on the one hand, if the idea is embodied that tax authorities should strengthen cooperation to increase voluntary compliance, on the other hand, they should be tough with persistent tax evaders, as advocated by Leviner (2008). This therefore accounts for the largest number of individuals whose attitudes toward taxation vary enormously, and the fact that evasion can stem from bad faith or even

mistaken interpretations of the law, to provide just two examples. Additionally, as the author wrote, this attitude is necessary to encourage those people who observe tax legislation, in order to demonstrate that it is the correct attitude.

Along this line of thought, Ahmed (2005) argued that the penalties should be applied only after the authorities seek tax compliance through educational and persuasive practices. In this regard, the author cited the ATO compliance model, which is a compliance model provided by the Australian government that presupposes the community awareness that tax noncompliance results in responses from authorities, and that these responses will be more strenuous than those previously applied.

There is evidence that such initiatives are well accepted by the general population, as reported by Devos (2008). In a study conducted in Australia, the author concluded that the results were consistent with the “carrot and stick” literature, demonstrating that there is a preference for rather positive and educational approaches, compared to exclusively punitive approaches.

Thus, either because of the above-discussed dilemmas of choice or due to the realization that taxpayers do not constitute a single and homogeneous group (Alm et al. 2012a), interconnecting the “crime” and “service” paradigms emerges as a promising option. The theoretical framework supports the view that, through the adoption of the most appropriate tools of each and the most effective allocation of resources, it is possible to increase tax compliance. As taxpayers’ trust gradually increases and hence also voluntary tax compliance, it might be possible to reduce the use of tools from the “crime paradigm” without affecting the tax collection amount, given that voluntary compliance might compensate for enforced compliance.

Along these lines, as thoughtfully noted by Alm and Torgler (2011), the adoption of strategies considering the “crime paradigm” might be a good starting point to control tax evasion, but gradually, there is a need to adopt other strategies more aligned with the “service paradigm.” Similarly, Alm et al. (1995) claimed that detection and punishments are reasonable initial strategies, but they argued that a multi-faceted approach, which emphasizes enforcement without ignoring other strategies, is needed, as well as the use of rewards.

Corroborating this view, Leviner (2008) emphasized that the analysis of the economic paradigm serves as the initial strategy for understanding taxpayer behavior, but it can lead to an overly punitive system, which can be counter-productive, and factors other than only taxpayer wishes to increase usefulness might be considered, thus balancing the strategies to fight tax evasion. Kastlunger et al. (2013) shared the same opinion.

2.4 The slippery slope framework and the study hypotheses

The slippery slope framework model, devised by Kirchler (2007) and applied in research conducted by Wahl et al. (2010), connects both paradigms indicated above within a single framework (Alm et al. 2012a). The model recognizes the existence of an interrelationship between authorities and taxpayers. The way that this interaction occurs affects the tax compliance level, either through cooperation between these players or due to the exercise of power by authorities (Kirchler 2007).

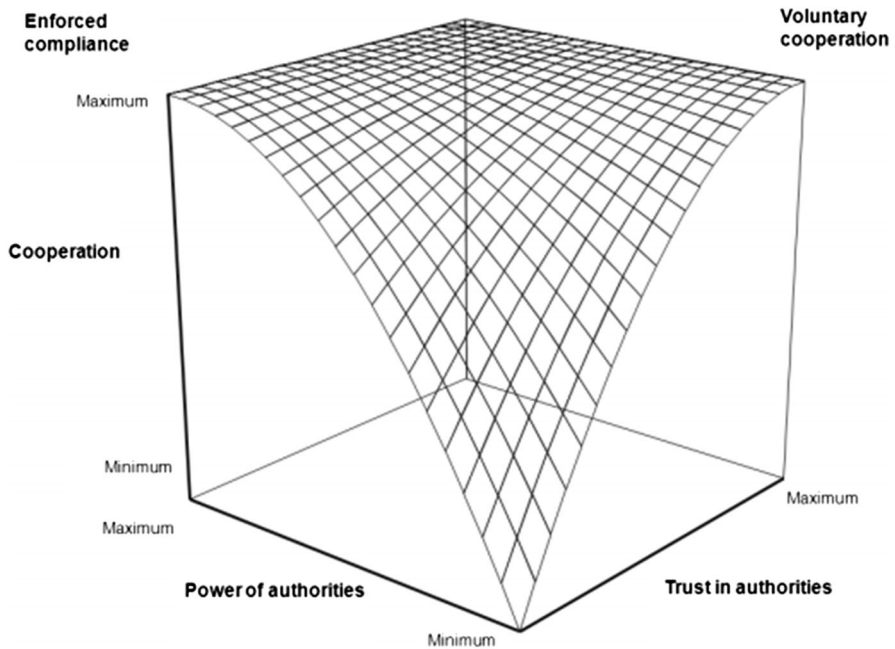


Fig. 1 Slippery slope framework of tax compliance behavior. *Source:* Kirchler (2007)

Kirchler (2007) summarized the slippery slope framework by explaining that it relies on two approach types. The first is based on the crime paradigm, in which a mistrusting environment is assumed, as well as a lack of cooperation between authorities and taxpayers, and where compliance is the result of the power to impose enforced payment of taxes. The second is grounded in the service paradigm, in which there prevails an environment of trust and respectful interaction between authorities and taxpayers, and, as a result, tax compliance stems from voluntary cooperation.

According to Kastlunger et al. (2013), the two approaches mentioned by Kirchler (2007) increase the level of tax compliance, either through the exercise of power or due to trust, with the exception that the quality of compliance differs. The authors also mention that the latter is preferred because it does not turn taxpayers into opponents of tax authorities, and it avoids the control costs.

Kirchler (2007) demonstrated the interaction among cooperation, power of authorities, and trust in authorities through Fig. 1.

As can be seen in Fig. 1, increases in power and trust of authorities promote a direct increase in cooperation. This result can be achieved through enforcement policies or by voluntary cooperation.

Wahl et al. (2010) demonstrated the validity of the model. The study evaluated different scenarios, considering high and low trust and power as explanatory variables, as well as the influence on the tax compliance level, i.e., the dependent variable or effect. The results showed that the tax compliance level is higher in environments

in which trust and the power of authorities are significant. Similarly, the authors demonstrated that the voluntary compliance level is higher in high reliability environments, and that enforced compliance has more influence when trust is low and power is high.

Muehlbacher et al. (2011), using an online questionnaire among participants in Austria, the UK, and the Czech Republic, identified that strong trust in tax authorities affects voluntary compliance with tax obligations, whereas the power given to the authorities has the effect of increasing enforced tax compliance. Additionally, the findings revealed that enforced compliance is negatively related to trust, suggesting that the variable induces voluntary tax compliance, reducing the perception that the individual is forced to pay taxes.

Lemoine and Roland-Lévy (2012) tested the model with French taxpayers, and they concluded that the results were fully in line with the assumptions of the slippery slope framework in the sense that trust and strength influenced two different compliance types, voluntary and enforced, respectively.

Meanwhile, Benk and Budak (2012) tested the model in Turkey and found that trust in authorities provides voluntary tax compliance. Furthermore, in contrast to what the authors hypothesized, authority power perception also influences voluntary compliance and contributes to enforced tax compliance, which does not occur with the trust level, thus confirming the framework.

Lisi (2012a) chose to test the framework using the regression technique, diverging from the methods adopted by researchers, including in this study. Nevertheless, the results confirmed the validity of the slippery slope framework in the sense that increased trust and power result in decreased tax evasion levels. The results also show that trust produces a more significant effect than power, providing a clue as to the validity of the “service paradigm.”

Lisi (2012b) also proposed studying the model by checking the relationships among tax compliance, tax evasion, and unemployment rate. The results demonstrated that, using a mix of deterrent instruments, trust in authorities is maximized, positively affecting voluntary compliance and, consequently, reducing tax evasion. According to the author, this could lead to a reduced unemployment rate.

Lozza et al. (2013) conducted a comparative study in Italy, with individuals of left and right-wing political preferences, and they confirmed, as proposed by the model, that there are two different means of influencing tax compliance: trust and power.

Meanwhile, Kastlunger et al. (2013) also tested the model in Italy using an online survey with 389 self-employed professionals, resorting to the structural equation method. The results confirmed the assumptions of the slippery slope framework in the sense that trust produces voluntary tax compliance, while power generates enforced compliance. The authors found that trust and power are positively related to power regarded as legitimate.

Gangl et al. (2013) also conducted an empirical study of the model (survey) with Dutch taxpayers and found that the “service paradigm” facilitates tax compliance and is an effective means to increase individuals’ trust, a result in agreement with the assumptions of the slippery slope framework. The study also found that women,

elderly taxpayers, and greater awareness of the probability of audits and penalties also positively influence tax compliance.

Finally, Kogler et al. (2013) proposed testing the assumptions of the framework in four European countries that differ in cultural and economic terms. The results confirmed the influence of trust and power as determinants of tax compliance, and the survey participants allocated to the group in which trust was high showed more voluntary compliance, while those from the high-power group showed more enforced observance. It is worth noting that the results also showed that Russian participants had a lower voluntary compliance level than the other participants. According to the authors, this finding might be the consequence of a lower level of Russian trust in authorities, confirmed by the country having a poor position on Transparency International's list compared to other respondents.

Considering the theoretical review presented, this research aims to evaluate the crime and service paradigms and their influences on tax collection amounts and to verify whether they affect, respectively, enforced and voluntary tax compliance. It also intends to compare the results obtained with the results of applying to other countries the "slippery slope" framework created by the researcher Erich Kirchler, of the University of Vienna.

To answer the research question and to meet the objectives established, we followed the line of hypotheses derived from the slippery slope framework (Wahl et al. 2010), proposing the following hypotheses:

H₁: High taxpayer trust in government leads to more voluntary tax compliance.

H₂: High perception of tax authorities' power by taxpayers leads to greater enforcement of tax compliance.

3 Methodology

To test the hypotheses raised in this study, we used an experimental method, seeking to grasp how taxpayers' trust in the government and the authorities' power perceptions influence tax compliance. In summary, we simulated four jurisdictions as previously shown in Fig. 1, provided by Kirchler (2007): (1) high trust in government authorities; (2) low trust in government authorities; (3) great power of government authorities; and (4) low power of government authorities. The experimental details are presented in Appendix A.

To achieve these aims, we devised a piece of software and made it available to participants through the Internet, which replicated the slippery slope framework and the study conducted by Wahl et al. (2010). Through this software, participants were randomly distributed into different simulated scenarios and were asked to respond to the amount of taxes they wanted to pay; furthermore, they also answered a survey based on a Likert scale, as shown in Appendix A.

The experiment was accessed through the Internet, and the participants were reached using the snowball sampling methodology; that is, the link was disseminated through e-mail messages, creating a chain of display and capture of subjects.

By accessing the link on the Web site, the participants received initial instructions, and they were then randomly assigned into four different sets, each one

Table 1 Frequency of the variables gender, education, and group

Variable	Category	<i>N</i>	%	Accumulated <i>N</i>	Accumulated %
Gender	Female	158	41	158	41
	Male	231	59	389	100
Educational level	Elementary school	3	1	25	6
	High school	23	6	136	35
	Higher education	151	39	389	100
	MA/MS	88	23	113	29
	Ph.D.	22	6	22	6
	Graduate courses	102	26	238	61
Group	High trust and high power	96	25	96	25
	High trust and low power	81	21	177	46
	Low trust and high power	110	28	287	74
	Low trust and low power	102	26	389	100

representing one different hypothetical jurisdiction. Following this, each participant was asked to read the description of the tax law in each country as a native taxpayer.

After the introduction of the features, the respondents were asked to answer two questions to assess their knowledge and reading regarding the context about the features of the simulation. Aiming to reduce bias in data collection, we excluded respondents who showed a high level of inconsistency in their answers.

Subsequently, participants were required to answer a survey to assess the voluntary and enforced compliance levels, considering the characteristics of the simulated country, following the same approach employed by Wahl et al. (2010). Once this was done, it was up to each participant to disclose the income tax amount payable for ten consecutive periods.

3.1 Sample

Our sample was initially composed of 1063 respondents; however, a large part of this set had to be eliminated due to a lack of answers. After the exclusion of inconsistent surveys, 389 valid surveys remained, with an average respondent age of 34 years, minimum age of 17 and maximum of 69 years.

A larger proportion of these respondents was composed of men (59%). The educational level had a prevalence of higher education (39%), followed by graduate courses (26%). Regarding the four groups, there was a sufficiently good balance to enable the application of statistical tests (Neter et al. 1996). Group 3 had the largest number of valid respondents (28%), while group 2 had the smallest number (21%), as demonstrated in Table 1.

Therefore, 389 respondents remained, constituting a significant number of observations, thus ensuring a decrease in sampling error and the increased sensitivity (power) of the test (Hair et al. 2006).

3.2 Statistical approach

Specifically, the experiment aimed to answer the research question, testing hypotheses H_1 and H_2 of this study, which was done by evaluating the associations between the variables “trust” and “power” in the questions related to voluntary compliance (Q1–Q8) and enforced compliance (Q9–Q14), described in Appendix A.

Regarding statistical procedures, we evaluated the hypotheses using the following techniques: (i) factor analysis and analysis of variance (ANOVA) and (ii) multivariate analysis of variance (MANOVA), which is the main test of our hypotheses.

3.2.1 Factor analysis and ANOVA

Factor analysis and ANOVA were used to evaluate whether there is an effect of the factors of trust, power, trust and power interaction, and control variables (gender and age) on the amount of taxes paid. In cases with statistical significance for interaction, we used Tukey’s test for multiple comparisons to identify the various groups.

We evaluated the effects of the independent variables “trust” and “power” on the average amount paid in taxes (average over ten periods), which in this case was regarded as a dependent variable. The intention was not, in this regard, to test any methodological hypothesis, it was rather understood that this evaluation enabled a broader discussion of the research question.

More specifically, we created two factors through the factor analysis technique. The first one was developed considering questions Q1–Q8 and for this reason was labeled as *Factor Voluntary* due to the voluntary compliance of these questions. The second factor was called *Factor Enforced* and considered questions from Q9–Q14, relating to the enforcement scenario. The main purpose of this procedure was to generate factors for which the weight was greater than the eigenvalue 1, potentializing the variability that was explained considering only questions where, as much as possible, the total variability of the eight questions related to the voluntary compliance and the six questions of enforced compliance. Following Hair et al. (2006), only questions with an individual weight higher than 0.40 remained for both factors (*Factor Voluntary* and *Factor Enforced*).

Subsequently, the factors were transformed to achieve the normality assumed in the ANOVA model. This procedure was done through the formula: $(\text{Factor} + 4)^2$. Subsequently, the remaining factors were labeled FVT = factor voluntary transformed and FET = factor enforcement transformed.

These new factors were employed as dependent variables in the ANOVA models, as expressed in Eqs. (1) and (2).

$$FVT_{ijkn} = \mu + \beta_1 \text{Trust}_i + \beta_2 \text{Power}_j + \beta_3 \text{Gender}_k + \beta_4 \text{Age}_n + \beta_5 \text{Trust} * \text{Power}_{ij} + e_{ijkn} \quad (1)$$

$$FET_{ijkn} = \mu + \beta_1 \text{Trust}_i + \beta_2 \text{Power}_j + \beta_3 \text{Gender}_k + \beta_4 \text{Age}_n + \beta_5 \text{Trust} * \text{Power}_{ij} + e_{ijkn} \quad (2)$$

where FVT_{ijkn} and FET_{ijkn} are the response variables, μ is the general average, β_s are the factors' effect on response variables, respectively, considering the levels' dimension of each variable (i, j, k and n), and e is the error term.

It is important to mention that the ANOVA model does not offer estimated parameters such as usual linear regressions. The outputs of this approach are the sum of squares, degrees of freedom, and the mean of squares, as well as the F -statistics and p -values. Conjugating this specificity of ANOVA with our study's purpose, we chose to show only F -statistics and p -values in related tables in Sect. 4, which are the measures needed to evaluate the statistical significance of the trust and power factors' effect on Brazilian taxpayer's compliance with tax payments.

3.2.2 Multivariate analysis of variance (MANOVA)

MANOVA, which is a supplementary technique of analysis of variance (Hair et al. 2006), was used to evaluate associations among the factors of trust, power, trust and power interaction, and control variables (gender and age), with scores on the voluntary (Q1–Q8) and enforced (Q9–Q14) compliance questions. In other words, trust and power were used as independent variables, and voluntary and enforced compliance were dependent variables, including gender and age as control variables, as denoted in Eqs. (3) and (4).

$$[Q1 \dots Q8] = [\beta_1 \text{Trust} \mid \beta_2 \text{Power} \mid \beta_3 \text{Gender} \mid \beta_4 \text{Age} \mid \beta_5 \text{Trust} * \text{Power}] + e \quad (3)$$

$$[Q9 \dots Q14] = [\beta_1 \text{Trust} \mid \beta_2 \text{Power} \mid \beta_3 \text{Gender} \mid \beta_4 \text{Age} \mid \beta_5 \text{Trust} * \text{Power}] + e \quad (4)$$

In both equations, the left side denotes the matrix of dependent variables, composed by the questions, and the right side represents the matrix of predictor variables, expressing the variables trust, power and trust*power as well as the control variables gender and age. The β_s are the factors' effect on response variables. The same consideration for the outputs of F -statistic and p -values of ANOVA is applicable here.

In this sense, if the factors trust and power have an impact on voluntary (Q1...Q8) and enforced (Q9...Q14) compliance, it is expected that they will be statistically significant considering F -statistics and P -values.

4 Results

This subsection presents the sample composition with more details about the respondent features, and the results obtained through the factor analysis and ANOVA as well as MANOVA techniques.

Table 2 Frequency and percentage of answers 1–5 from the compliance questions

Compliance	Question	Statistics	Answers				
			1	2	3	4	5
Voluntary	Q1	<i>N</i>	3	23	24	127	212
		%	1	6	6	33	54
	Q2	<i>N</i>	42	43	24	108	172
		%	11	11	6	28	44
	Q3	<i>N</i>	40	43	17	100	189
		%	10	11	4	26	49
	Q4	<i>N</i>	58	66	28	83	154
		%	15	17	7	21	40
	Q5	<i>N</i>	45	53	12	108	171
		%	12	14	3	28	44
	Q6	<i>N</i>	72	65	36	129	87
		%	19	17	9	33	22
	Q7	<i>N</i>	96	53	26	112	102
		%	25	14	7	29	26
Q8	<i>N</i>	9	39	15	119	207	
	%	2	10	4	31	53	
Forced	Q9	<i>N</i>	72	67	33	50	167
		%	19	17	8	13	43
	Q10	<i>N</i>	56	64	65	73	131
		%	14	16	17	19	34
	Q11	<i>N</i>	61	63	104	58	103
		%	16	16	27	15	26
	Q12	<i>N</i>	75	84	82	90	58
		%	19	22	21	23	15
	Q13	<i>N</i>	26	67	55	115	126
		%	7	17	14	30	32
Q14	<i>N</i>	46	65	69	90	119	
	%	12	17	18	23	31	

Answers were computed in a Likert's scale from 1 (absolutely disagree) to 5 (absolutely agree)

4.1 Descriptive statistics

Regarding the compliance questions (Q1–Q14), it was observed that most of the questions related to voluntary compliance (Q1–Q8) had higher proportions of total agreement (answer = 5), representing 54% of the answers in Q1, 44% in Q2, 49% in Q3, 40% in Q4, 44% in Q5, and 53% in Q8.

Only in Q6 and Q7 was the highest score not observed with total agreement. However, in these two cases, the highest proportion occurred in partial agreement

Table 3 Descriptive analysis of the questions for each variable under study

Statistic/variable	Voluntary compliance							Enforced compliance							
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	
Mean															
Trust															
High	4.6	4.3	4.5	4.7	4.7	3.9	2.3	4.6	3.4	2.5	2.6	2.6	3.4	2.9	
Low	4.1	3.4	3.4	2.6	3.0	2.7	3.9	3.9	3.5	4.2	3.7	3.2	3.8	3.9	
Power															
High	4.4	3.8	3.9	3.5	3.7	3.2	3.2	4.3	4.7	3.8	3.4	2.9	4.0	3.5	
Low	4.3	3.9	3.9	3.6	3.9	3.3	3.1	4.2	2.1	3.0	2.9	2.9	3.3	3.4	
Trust * power															
High trust and high power	4.7	4.3	4.6	4.7	4.7	3.9	2.4	4.7	4.6	2.8	2.8	2.7	3.6	3.0	
High trust and low power	4.6	4.3	4.4	4.6	4.7	4.0	2.2	4.5	2.0	2.1	2.3	2.5	3.1	2.8	
Low trust and high power	4.1	3.4	3.4	2.5	2.9	2.5	3.9	3.9	4.7	4.6	4.0	3.1	4.2	3.9	
Low trust and low power	4.0	3.5	3.4	2.7	3.2	2.8	3.8	3.9	2.2	3.7	3.4	3.3	3.4	3.8	

(answer = 4), 33% in Q6 and 29% in Q7, indicating a good score for voluntary compliance. Table 2 depicts the frequencies and proportions for each question.

Concerning enforced compliance (Q9–Q14), higher scores prevailed but in smaller proportions, compared to questions about voluntary compliance, with 43% for total agreement in Q9, 34% in Q10, 32% in Q12, and 31% in Q14. Q11 showed 27% neither agreement or disagreement and 26% total agreement, while Q12 showed 23% partial agreement.

Additionally, we also analyzed the answers' averages among the groups of respondents, as shown in Table 3.

The results provided by Table 3 indicate that questions related to voluntary compliance have higher averages in a Likert's scale than those expressing the enforced compliance, while the total average of voluntary compliance was 3.8 and the total average for enforced compliance was 3.3.

Table 3 also denotes that respondents randomly allocated in a simulated country with high trust in government authorities and with high power of tax evasion detection were those who attributed high scores for the questions; the total average of high trust and high power was 3.8. Nevertheless, participants who answered the questions considering a jurisdiction with low trust in government and low power of evasion detection were those who provided the lowest scores for the questions, with a total average of 3.4. These results are a first indication that both of our hypotheses are aligned with the previous literature in the Brazilian environment.

4.2 Hypotheses evaluation

This subsection presents the statistical procedures employed to evaluate both hypotheses. In order to provide a better view of these findings, the next topics are focused on each hypotheses' conjectures.

Before adjusting the ANOVA and MANOVA, we calculated the Cronbach's alpha coefficient, which was 0.74 for voluntary compliance and 0.67 for enforced compliance, both considered as acceptable values (Murphy and Davidshofer 1988). The Cronbach's alpha measures the correlation between answers on the questionnaire by examining those provided by participants, with an average correlation between questions (Hora et al. 2010). Scores greater than 0.6 indicate that the instrument is reliable, and it provides stable and consistent measurement. Values less than 0.6 indicate that the instrument has heterogeneous variability between its items; therefore, this variability can lead to wrong conclusions (Murphy and Davidshofer 1988).

4.2.1 Findings for hypothesis 1

Considering Hypothesis 1—*High taxpayer trust in government leads to more voluntary tax compliance*—we analyzed the main association between voluntary compliance and the factor trust. Beginning with the factor analysis to compose the *Factor Voluntary*, as described above, we considered questions from Q1 to Q8, as demonstrated in Table 4.

Table 4 Factor analysis for voluntary compliance

Factor	Question	Weight on factor voluntary
Factor voluntary	Q3	0.77
	Q4	0.75
	Q5	0.76
	Q8	0.49
No factor	Q1	
	Q2	
	Q6	
	Q7	
Eigenvalue		4.02
% Explained variability		0.50
% Explained accumulated variability		0.50

Table 5 ANOVA for voluntary compliance—FVT

Variable	F-statistics	P-value
Trust	156.36	<0.0001
Power	0.1	0.7472
Gender	4.46	0.0353
Age	10.12	0.0016
Trust*power	1.75	0.1868

Table 6 MANOVA for voluntary compliance

Variable	F-statistics	P-value
Trust	61.41	<0.0001
Power	1.22	0.2879
Gender	0.94	0.4855
Age	3.11	0.0020
Trust*power	0.55	0.8192

The *Factor Voluntary* was composed only by questions Q3, Q4, Q5, and Q8, generating a weight greater than the eigenvalue 1, and this factor explained 50% of the total variability of the eight questions. The questions Q1, Q2, Q6, and Q7 were unconsidered since they showed weights on factors less than the minimum level of 0.40 (Hair et al. 2006).

To evaluate whether there are trust, power and trust*power effects on the factor of voluntary compliance, ANOVA was adjusted as detailed in Eq. (1), with the concomitant control variables of age and gender. To achieve the normality assumed in the model, transformation was considered $(\text{Factor Voluntary} + 4)^2$, resulting in the FVT variable that was employed as a responsible variable in Table 5.

Table 7 Factor analysis for enforced compliance

Factors	Questions	Weight on factor enforced 1	Weight on factor enforced 2
Factor enforced 1	Q10	0.70	
	Q11	0.89	
Factor enforced 2	Q9		0.78
	Q13		0.80
No factor < 0.40	Q12		
	Q14		
Eigenvalue		2.33	1.10
% Explained variability		0.39	0.18
% Explained accumulated variability		0.39	0.57

It is evident that only the variable trust was significant ($p < 0.001$), meaning that high trust is associated with an increase in voluntary compliance. Notwithstanding the fact that we did not employ ANOVA to straight test Hypothesis 1, it is possible that this result brings an indication of robustness to the hypothesis that high taxpayer trust in government leads to more voluntary tax compliance according to the Brazilian taxpayers' answers. Regarding control variables, it is interesting that age also showed a significant F -statistics and p -value, indicating that older people have a greater propensity to follow the voluntary compliance of tax payment.

In order to achieve a better evaluation of Hypothesis 1, we performed Eq. (3) through a MANOVA, as indicated in Table 6.

As verified in Table 6, there is a statistically significant association between trust and voluntary compliance of at least 0.0001. This result allows us to accept Hypothesis 1—high taxpayer trust in government leads to more voluntary tax compliance. Furthermore, this conclusion demonstrates a trend of greater collaboration with the tax authorities by Brazilian taxpayers, as they verify greater trust in the government. This result is in line with findings in other jurisdictions such as Austria, the UK and the Czech Republic (Muehlbacher et al. 2011), and French (Lemoine and Roland-Lévy 2012; even Brazil has several different features of these developed countries. Furthermore, age's increase denoted a prominence effect on voluntary compliance.

It is very important to highlight that in a prominent voluntary compliance environment, there is no statistical significance for the factor power as well as the interaction between trust and power. This result indicates that trust leads to voluntary compliance for Brazilian taxpayers.

4.2.2 Findings for hypothesis 2

Taking into consideration Hypothesis 2—*High perception of tax authorities' power by taxpayers leads to greater enforcement of tax compliance*—we evaluated the relationship between the enforced compliance and the factor power.

Table 8 ANOVA for enforced compliance—FET1

Variable	<i>F</i> -statistics	<i>P</i> -value
Trust	139.29	<0.0001
Power	36.71	<0.0001
Gender	0.05	0.8222
Age	0.85	0.3578
Trust*power	0.42	0.5171

Table 9 ANOVA for enforced compliance—FET2

Variable	<i>F</i> -statistics	<i>P</i> -value
Trust	0.34	0.5589
Power	266.45	<0.0001
Gender	0.02	0.8877
Age	1.05	0.3068
Trust*power	0.86	0.3541

Table 10 MANOVA for enforced compliance

Variable	<i>F</i> -statistics	<i>P</i> -value
Trust	50.81	<0.0001
Power	129.27	<0.0001
Gender	0.08	0.9983
Age	3.33	0.0033
Trust*power	1.25	0.2794

Beginning with a factor analysis for questions from Q9 to Q14, which mean enforced disclosure, found two factors, as demonstrated in Table 7.

To evaluate whether there are effects of trust, power, and trust*power on the enforced compliance factors, we adjusted the ANOVA models with control variables of age and gender (see Eq. 4). To achieve the normality assumed in the model, we applied the mentioned transformation (factor+4)², creating two new factors: FET1 and FET2. Tables 8 and 9 present the results from Eq. (2).

It is possible to verify that in both tables the variable power was statistically significant by at least 0.0001, corroborating the general mean of Hypotheses 2. Additionally, the factor trust was significant only for FET1. These results support the idea that increases in the perception of the authorities' power stimulate the enforced compliance.

Regarding enforced compliance MANOVA, the results demonstrate significance for trust ($p < 0.0001$), power ($p < 0.0001$), and age ($p = 0.0033$). These findings indicate that higher trust was more associated with lower enforced compliance, higher power was associated with higher enforced compliance, and older age was associated with higher enforced compliance. Table 10 shows these results.

Table 11 ANOVA for the variable average value of tax paid as a dependent variable

Variable	<i>F</i> -statistics	<i>P</i> -value
Trust	14.02	0.0002
Power	7.11	0.0106
Trust*power	7.63	0.0057
Gender	0.23	0.6286
Age	0.59	0.4425

These results allow us to not reject Hypotheses 2, indicating that for Brazilian taxpayers the power of government authorities represents a major issue for enforced co. This conclusion is aligned with previous literature (e.g., Kirchler 2007 and Wahl et al. 2010).

4.3 Robustness tests

In addition, to enable a robust analysis, we evaluated the effect of the factors trust and power on the value of tax paid (average over ten periods). Additionally, we applied the Mann–Whitney test for trust and power separately as well as the Kruskal–Wallis test for the interaction. The main purpose of these tests was to evaluate the effect of independent variables (trust and power) among the different groups of respondents.

The Mann–Whitney test is a nonparametric test which aims to compare two independent samples. Because it does not require any assumptions about population distribution or its variances, it is used as an alternative to Student's parametric *t* test for average equality (Martins and Domingues 2011).

The Kruskal–Wallis test, in turn, is a nonparametric test equivalent to the ANOVA *F*-test, the aim of which is to detect the existence of a significant difference between the mean values for *k* in various samples (Martins and Domingues 2011). Therefore, it is used to replace ANOVA when the requirements needed to support the assumptions of the ANOVA model are not met.

Regarding the ten periods of tax payments, the respondents were randomly allocated in one of the four fictional countries simulating the following governments' features: (i) high trust and high power; (ii) high trust and low power; (iii) low trust and high power; and (iv) low trust and low power. The respondents were oriented to express their answers under the assumption that they are living in this context as a usual citizen with a formal job with an income per period of R\$ 5200.00 (in Brazilian currency). For all countries and periods, we used a tax rate of 15%. Given this previous information, the maximum value of tax burden per period was R\$ 780.00 = R\$ 5200.00 × 15%, and the minimum value was zero. After each one of the ten rounds, the participants received new information that potentially changed their previous decision.

The results demonstrate the effects of trust (*p*-value ANOVA < 0.001 and Mann–Whitney = 0.0013), power (*p*-value ANOVA = 0.0106 and

Table 12 Multiple Tukey's comparisons for the interaction effects on the average value of tax paid

Interaction	Interaction		
	High trust and high power	High trust and low power	Low trust and high power
High trust and high power			
High trust and low power	0.9986		
Low trust and high power	0.8825	0.8235	
Low trust and low power	<0.0001	<0.0001	0.0005

Table 13 Descriptive analysis of the variable average value of tax paid (10 periods)

Factor	Category	N	Median	Mean	Std	Minimum	Maximum	Mann–Whitney test
Trust	High	177	780	694	193	0	780	0.0013
	Low	212	780	610	259	0	780	
Power	High	206	780	680	207	0	780	0.0057
	Low	183	780	613	259	0	780	
Interaction trust*power	High trust and high power	96	780	690	201	10	780	<0.0001
	High trust and low power	81	780	698	184	0	780	
	Low trust and high power	110	780	670	212	0	780	
	Low trust and low power	102	780	546	289	0	780	

Mann–Whitney=0.0057), and interaction (p -value ANOVA=0.0057, and Mann–Whitney<0.0001) on the value of tax paid. Higher trust had a higher average value paid (R\$ 694.00), and great power also had a higher average payment (R\$ 680.00). Table 11 reproduces the ANOVA results.

For interaction, Table 12, which displays multiple Tukey's comparisons, demonstrates that only the low trust and little power group statistically differed from the others (high trust and high power: p -value<0.0001; high trust and little power: p -value<0.0001; and low trust and high power: p -value=0.0005). In Table 13 it is possible to check that these groups highlighted in Table 12 had an average payment lower than the other groups, with an average of only R\$ 546.00.

In synthesis, all the robustness tests support the non-rejection of both hypotheses raised in Sect. 2, demonstrating that trust and power perception are relevant for Brazilian taxpayer behavior.

5 Extended interpretations of results

The results of the statistical tests shown in the previous section allowed us to answer the research question proposed. Indeed, the hypotheses H_1 (high taxpayer trust in the government leads to more voluntary tax compliance) and H_2 (high perception of tax authorities' power by taxpayers leads to greater enforcement of tax compliance) were not rejected but confirmed.

The results demonstrate that trust is associated with voluntary compliance, and the higher the trust is in government, the more voluntary that the compliance is. It is worth noting that when individuals trust the government, they tend as a consequence to observe the law, complying with tax obligations more voluntarily as a result. In addition, the results demonstrate that higher trust is associated with lower enforced compliance, indicating that, when an individual trusts the government, the enforcement power of the authorities becomes less relevant. In turn, the variable power of authorities was associated with higher enforced compliance, indicating that, in the presence of great power, individuals comply with tax obligations as a response to this context; in other words, they pay taxes not voluntarily but forcibly.

Although our results are fully aligned with the previous literature detailed above (e.g., Wahl et al. 2010; Muehlbacher et al. 2011; Lemoine and Roland-Lévy 2012; Benk and Budak 2012; Lisi 2012a, b; Lozza et al. 2013; Kastlunger et al. 2013; Gangl et al. 2013; Kogler et al. 2013), it is matter to emphasize that our conclusions expand the literature about the slippery slope framework showing that even in emerging economies with a lack of confidence in the government like Brazil,³ the taxpayers are sensitive to the variables trust and power. Furthermore, the Brazilian taxpayers demonstrated a positive reaction regarding to voluntary compliance when there is an increase in trust.

It is important to emphasize that the Brazilian tax authorities have signaled the importance of increasing cooperation and trust with taxpayers. Specifically in the state of São Paulo was promulgated in 2018 the Law no. 1320, which creates the tax compliance stimulation program (TCSP) aiming to develop a mutual trust environment between taxpayers and the authorities. More specifically, the TCSP tries to mitigate the amount of tax litigations through the increase in voluntary compliance. Our results contribute with this kind of initiative demonstrating empirically that a high trust by the taxpayers leads to increases in voluntary compliance, potentially reducing costs of tax litigations. Thus, based on the results and answering the research question, it can be claimed that the interaction of taxpayers, authorities, and government is significant in terms of tax compliance. When a trust environment prevails in the interaction of these actors, there will be, as a consequence, higher voluntary tax compliance, while perception of the greater power of authorities by taxpayers affects their attitudes, inducing them to observe the law forcibly, i.e., as a response to the exercise of legal coercion, thus characterizing enforced compliance.

³ According to the 2018 Edelman Trust Barometer reporting, 81% of Brazilians believe that Government is one institution highly corrupted. In the 2018 edition, Brazil denotes an extreme loss in trust, seventeen points compared to 2017 survey. For more details see: <https://www.edelman.com/trust-barometer>.

The results confirm the limitation of the classical economic paradigm that assumes taxpayer rationality insofar as they suggest that the taxpayer, in the presence of a cooperative environment and trust in authorities and the government, will observe the law voluntarily rather than seek to maximize usefulness. Hence, taxpayers are motivated by factors other than the desire for economic maximization. In addition, the results show that the variables trust and power affect the tax collection level, and in countries with characteristics of low trust in the government and little perception of authorities' power, there will be more tax evasion.

The results corroborate the literature review by empirically demonstrating that trust is a vector of voluntary compliance, while power is a vector of enforced compliance, confirming the assumptions of the slippery slope framework. In addition, the results confirm that both the "service paradigm" and the "crime paradigm" have tools that induce higher tax compliance, enabling the authorities to manage them more effectively, thus interconnecting both paradigms according to cost allocation strategies and achieving a larger number of contributors.

Finally, when we compare the results of this study to the results of other studies cited in the literature review in which the slippery slope framework was employed, we observe similar results. The similarity in the results strengthens the model's validity for developing countries, which lack effective trust levels, as in the case of Brazil.

6 Conclusion

The purpose of this manuscript was evaluated how taxpayers' behaviors are affected by the interactions with tax authorities and the government in the Brazilian context. Furthermore, the research aimed to assess the crime and service paradigms and their influences on tax collection values and to determine whether they affected enforced and voluntary tax compliance.

Our main results demonstrate that there is no unique or misleading paradigm. Depending on the context, both the "crime paradigm" and the "service paradigm" will be appropriate to fight tax evasion, and the "touchstone" is distinguishing how the authorities should use the tools proposed by both paradigms, which involves a strict resource allocation analysis and full awareness of the positive and harmful effects of each alternative. Thus, the taxpayer should be addressed as a customer by the public administration but should be held accountable when engaging in misconduct.

In addition, we sought to compare the results obtained in this paper with the results of applying the slippery slope framework, created by the researcher Erich Kirchler from the University of Vienna to other countries.

The empirical results support the hypotheses that trust in the government leads to more voluntary tax compliance and high perception of tax authorities' power by taxpayers leads to more enforced tax compliance even in the Brazilian context where the population does not have a high trust in the government and in the institutions.

Furthermore, these specific findings demonstrate that a high perception of authorities' power by taxpayers positively affects enforced tax compliance (crime

paradigm), while in contrast, a high level of taxpayer trust in the authorities positively affects voluntary tax compliance (service paradigm).

Considering the complexity of the theme, the conclusions presented must be evaluated with caution. First, it should not be inferred that the results exhaust the subject matter, which, because it involves human behavior, deserves further studies to confirm or not the results of this research.

Therefore, further studies on the subject matter are encouraged, reproducing, for instance, the methodology and the slippery slope framework used herein or resorting to various methodologies, including archival research, which could reinforce the findings of experimental studies, as also advocated by Weigel et al. (1987). It is also suggested that this study be replicated since replication is the primary means of validating results (Hair et al. 2006), either by enrolling participants with similar or different characteristics and locations or by increasing the sample size, rendering the results even more robust.

Appendix A: reproduction in text of the online survey

Home screen

The survey below is performed as a part of the MA thesis in Accounting submitted to FEA—School of Economics, Business, and Accounting of the University of São Paulo—and it aims to investigate the factors influencing Brazilian taxpayer behavior that show a relevant social nature, insofar as it is intended to foster the debate on fiscal public policies.

Considering the importance of this theme, volunteer participants are asked to complete the forms with seriousness and attention, seeking to enter the hypothetical situation as if it were real and answering their utterances with absolute sincerity. In doing so, you will contribute to the debate on this sensitive theme in our society.

It is worth emphasizing that we guarantee you the anonymity and confidentiality of your answers, and the data will be entered into a condensed database. Furthermore, on the identification page, the name, e-mail, and income are optional. If you agree to participate, click below to start the survey; this act constitutes a manifestation of your free and informed consent to participate on a voluntary basis.

Finally, the researcher thanks you for your voluntary participation, and he registers the esteem for and collaboration in this relevant debate for Brazilian society.

Instructions 1/4

Below, you will receive information about the country in which you live. Imagine vividly that you actually live in this country and provide your answers according to this premise.

With each new step, you receive information and then must indicate the amount to be paid as tax that you choose for the period. Finally, answer the questionnaire, and the experiment will be finished.

Instructions 2/4

You are a citizen in Vermonde and have a job. Local legislation requires that each year you declare and pay your income tax in accordance with the standards.

There is no withholding of taxes at the source in Vermonde. It is worth stating that the choice for full compliance with the law on the amount to be collected is solely up to you, capitulating to government inspections.

Before disclosing data and paying your income taxes, you can receive information on issues of various domains.

Your income per period is \$ 5200.00 (in the currency used in Vermonde).

The effective income tax rate provided for by law is 15%.

You can decide which amount of taxes to pay up to the limit of the tax burden provided for by law. In other words, you choose to pay for each period between \$ 0 and \$ 780.00.

If you are fined for tax evasion, i.e., if you fail to pay the full amount of tax as provided for by law, the fine will be 50% of the amount evaded.

The prescription and validity period is 3 (three) years, which means that, if you are inspected, the government will assess the 3 (three) previous periods, seeking any payment less than the percentage provided for by law.

The value that remains to you, then, is the amount of your income minus the value of taxes paid and, where appropriate, the amount of the fine for tax evasion.

Instructions 3/4—group high trust

Vermonde is the country where you were born and in which you live. In the last census, conducted in January 2013, a total population of 16,336,000 inhabitants was found. The unemployment rate falls within the global average.

Since its independence in 1849, the country has been characterized by having strong political stability and a democratic government. Referendums are regularly held so that Vermonde citizens express their opinions about the set of laws under debate in Congress.

The government has a good reputation among the people. According to surveys, 70% of the population is satisfied with the current government.

The tax burden is equally distributed among the population, i.e., it conforms to the occupation and remuneration of social classes. The people of Vermonde believe that it is a duty of every citizen to contribute to the collection of taxes.

The country's legislation is transparent, and the government provides the opportunity for free advice on legal issues and tax issues through population information centers. Additionally, Vermonde authorities are very focused on providing services to the people, and they are keen to support the citizens.

The population is well informed about government spending insofar as it is regularly disclosed, which enables everyone to know where the money from their taxes has been applied. A survey conducted in November 2012 showed that 78% of the population believes that the money that they spend on taxes is properly used by the government.

In addition, only a small part of the tax revenue is diverted by politicians. According to an international corruption index, Vermonde is among the countries with the world's lowest corruption rates.

All these factors involve much of people's trust in the country in which they live.

Instructions 3/4—group low trust

Vermonde is the country where you were born and in which you live. In the last census, conducted in January 2013, a total population of 16,336,000 inhabitants was found. The unemployment rate falls within the global average.

Since its independence in 1849, the country has been characterized by having weak political stability and an oligarchic government, with power concentrated in the hands of a few. Referendums are rarely held so that Vermonde citizens express their opinions about the set of laws under debate in Congress.

The government has a bad reputation among the people. According to surveys, 70% of the population is not satisfied with the current government.

The tax burden is not equally distributed among the population, i.e., it does not conform to occupations and remuneration. The people of Vermonde believe that it is not a duty of every citizen to contribute to the collection of taxes.

The country's legislation is not transparent, and there are no population information centers to provide people with free advice on legal issues and tax issues. Additionally, Vermonde authorities are not focused on providing services to the people or interested in supporting the citizens.

The population is poorly informed about government spending because it is not regularly disclosed, making it impossible for everyone to know where the money from their taxes has been applied. A survey conducted in November 2012 showed that 78% of the population believes that the money that they spend on taxes is not properly used by the government.

In addition, a large part of the tax revenue is diverted by politicians. According to an international corruption index, Vermonde is among the countries with the world's highest corruption rates.

All of these factors involve little of the people's trust in the country in which they live and in its governors.

Instructions 4/4—group great power

Surveillance over tax evasion in Vermonde is very effective. Because of tax legislation, it is easy for the government to inspect its citizens and businesses and thus prosecute tax evaders.

The government assigns a large budget for the tax administration to perform inspections and to curb tax evasion. Through the resources available, the administration can employ highly qualified tax inspectors. In addition, the population believes that the inspectors have a constant presence in the country's everyday life.

The likelihood of being inspected in Vermonde is regarded as high. In other words, people and companies are frequently audited. Therefore, most of the tax

evasion practices are detected. In addition, fines for tax evasion are regarded as high. When tax evaders are detected, they must anticipate the payment of severe fines. The tax administration is not benevolent with tax evaders.

All of these factors lead Vermonde citizens to assess their government as very capable of controlling tax evasion.

Instructions 4/4—group little power

Surveillance over tax evasion in Vermonde is not very effective. Because of the tax legislation, it is difficult for the government to inspect its citizens and businesses and thus to prosecute tax evaders.

The government assigns a small budget for the tax administration to perform inspections and to curb tax evasion. With the resources available, the administration cannot employ highly qualified tax inspectors. In addition, the population believe that the inspectors are absent from the country's everyday life.

The likelihood of being inspected in Vermonde is regarded as low; in other words, people and companies are not frequently audited. Therefore, most tax evasion practices are not detected. In addition, fines for tax evasion are regarded as low in Vermonde. When tax evaders are detected, they do not have to anticipate the payment of severe fines. The tax administration is not benevolent with tax evaders.

All of these factors lead Vermonde citizens to assess their government as not capable of controlling tax evasion.

Adherence questionnaire (5-point Likert scale)

1. Based on the description above, is it possible to conclude that Vermonde is a country where citizens trust their government?
2. Based on the description above, is it possible to conclude that Vermonde is a country where the government has much surveillance strength in the face of taxpayers?

Questionnaire (5-point Likert scale)

Considering the information received about Vermonde, the country where you were born and in which you live, answer the questionnaire below:

- Q1** Is paying taxes the right thing to do?
- Q2** Is paying taxes a responsibility that should be voluntarily accepted by all of the citizens in Vermonde?
- Q3** I feel morally obliged to pay taxes in Vermonde
- Q4** Does paying my taxes represent a benefit to all of the citizens in Vermonde?
- Q5** I believe that paying taxes helps Vermonde's government to do the things needed by the population
- Q6** Usually, I pay my taxes willingly
- Q7** I do not feel good about paying taxes in Vermonde

- Q8** I accept the responsibility of paying my share of taxes
- Q9** If you do not cooperate with tax authorities of Vermonde, will they be strict with you?
- Q10** Are the Vermonde tax authorities more interested in finding something wrong that you might have done than in helping you to do the right thing?
- Q11** Is it recommended to avoid the tax authorities in Vermonde?
- Q12** It is impossible to satisfy the tax authorities fully
- Q13** If you are caught evading taxes, the tax authorities will always regard you as an evader
- Q14** As a society, we need more people willing to face the tax authorities

Periods

Period	Information
1st period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
2nd period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
3rd period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
4th period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
5th period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
6th period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
7th period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
8th period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
9th period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD
10th period	Consider the information received so far and enter the amount you will pay in taxes within this PERIOD

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