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Nudges:

**Lever for Improving
Tax Compliance in the
Moroccan Context**

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NUDGES: LEVER FOR IMPROVING TAX COMPLIANCE IN THE MOROCCAN CONTEXT

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Abstract:

This exploratory study investigates the social determinants and individual perceptions that shape voluntary tax compliance in Morocco. Drawing on a survey of 400 taxpayers across the Kingdom's twelve administrative regions, the findings indicate that social and personal norms, together with a positive perception of the benefits of local taxation, significantly influence tax behavior. In contrast, regional competition does not appear to significantly influence compliance behavior. The territorial disparities observed highlight the importance of tailoring tax policies to regional specificities. These results support the use of targeted nudging strategies, designed in line with local social and cultural realities, as a means of strengthening citizens' tax compliance.

The study provides an integrated interpretation of tax compliance, linking behavioral incentives, perceived fairness, and cooperative governance, and outlines concrete avenues for developing a more inclusive and context-sensitive tax system.

Keywords: *voluntary tax compliance, behavioral nudges, social and personal norms, tax fairness, local taxation.*

JEL Classification: D64; D91; H26; H71; Z13

ملخص

تُحلّل هذه الدراسة الاستكشافية المحددات الاجتماعية والتصورات الفردية التي تؤثر على الامتثال الطوعي للضرائب في المغرب. بالاعتماد على استطلاع شمل 400 من دافعي الضرائب مورّعين على المناطق الإدارية الاثننتي عشرة للمملكة، تكشف النتائج أن المعايير الاجتماعية والشخصية، إلى جانب التصوّر الإيجابي للعوائد المحلية للضرائب، تُمارس تأثيراً ملموساً على السلوك الضريبي. في المقابل، لا تُظهر المنافسة الإقليمية أثراً يُذكر على الامتثال. وتُبرز التفاوتات الإقليمية المسجّلة ضرورة تكيف السياسات الضريبية وفقاً للخصوصيات المحلية. وتدعم هذه النتائج اللجوء إلى استراتيجيات سلوكية موجهة (Nudging)، تُصمّم بناءً على الواقع الاجتماعي والثقافي لكل منطقة، بهدف تعزيز التزام المواطنين بالواجب الضريبي. وتقدّم وتقتراح الدراسة مقارنة متكاملة لفهم الامتثال الضريبي، تربط بين الحوافز السلوكية، والعدالة المدركة، والحوكمة التشاركية، وتقدّم مسارات عملية نحو نظام ضريبي أكثر شمولاً وتكيفاً مع السياقات المحلية

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1. Introduction

In a context marked by growing demands for sustainable development, local taxation constitutes a strategic lever for financing local governments. It supports infrastructure development, improves public services, and strengthens social cohesion (Bird & Zolt, 2008). Yet, in many developing countries, tax compliance remains low, limiting administrations' ability to mobilize the necessary resources and weakening local governance. In Morocco, this challenge is reflected in persistently low voluntary compliance with tax obligations, compounded by regional disparities and widespread negative perceptions of public service effectiveness.

Traditional economic models depict taxpayers as rational agents optimizing utility. However, this approach proves insufficient to explain the diversity of behaviors observed. By contrast, behavioral economics, by integrating psychological, social, and cognitive dimensions, offers a more nuanced understanding of tax decisions (Torgler, 2007; Alm, 2019). It highlights the role of cognitive biases, social norms, and tax morale in shaping compliance intentions.

Within this framework, *nudges* (or behavioral incentives) appear as promising tools to improve tax compliance. By subtly modifying the decision-making environment, they guide taxpayers toward more responsible behavior without resorting to coercion (Thaler & Sunstein, 2008). Numerous international experiments have demonstrated their effectiveness, provided they are carefully adapted to local contexts.

In Morocco, the Directorate General of Taxes (DGI) has undertaken efforts to digitize and simplify procedures and raise tax awareness. Nevertheless, uptake remains limited, and regional disparities pose specific challenges. Perceptions of redistributive fairness, institutional trust, and social norms vary across regions, directly influencing tax behavior.

Against this backdrop, a central question emerges: ***What behavioral and institutional levers promote voluntary tax compliance, and mistrust and perceived ineffectiveness of public action? How can tax compliance be strengthened by Nudges in a context of regional disparities?***

To address this issue, we adopt an exploratory approach combining an in-depth theoretical review with an empirical survey of taxpayers across the Kingdom's twelve regions. This approach enables us to identify the most significant psychosocial determinants, analyze their influence on compliance intentions, and assess the potential of *nudges* as instruments of public policy.

The remainder of the article is structured as follows. The first section reviews the theoretical foundations of behavioral public finance and the main factors influencing tax behavior. The second section presents the results of the empirical survey, highlighting regional disparities and behavioral levers that can be mobilized. The final section discussed policy implications and formulates recommendations for more inclusive and resilient local tax governance.

2. Taxpayer Irrationality in the Context of Behavioral Economics: Theoretical and Conceptual Framework

Understanding tax behavior is a critical issue for public policy, particularly in contexts where voluntary compliance remains insufficient despite existing monitoring and sanctioning mechanisms. Historically, classical economic models have considered taxpayers as rational agents³. However, this reductive view does not adequately explain the diversity of behaviors observed, especially in countries with limited tax enforcement capacity or high institutional heterogeneity.

In response to these limitations, behavioral economics offers a more nuanced interpretation of tax decisions, incorporating psychological, social, and cognitive dimensions into individual choices. This theoretical approach, which departs from the paradigm of perfect rationality, emphasizes the role of cognitive biases, social norms, and tax morale in shaping compliance behavior. It thus opens the door to more suitable intervention strategies based on “soft” mechanisms of influence, such as *nudges*, which aim to guide decisions-making without coercion.

In this context, it is important to distinguish between *voluntary tax compliance*, defined as compliance with tax obligations in the absence of coercion, and *tax citizenship*, which refers to a moral and civic willingness to contribute to public funding. This distinction is particularly relevant in contexts where civic engagement and institutional trust vary across regions. It sheds light on the behavioral mechanisms mobilized in our analysis and provides a clearer articulation of the institutional and social levers that can influence tax attitudes.

2.1. Limitations of traditional economic approaches.

Traditional models of tax compliance, such as the framework proposed by Allingham and Sandmo (1972), rely on a rationalist conception of the taxpayer as a utility-maximizing agent, responsive to the risk of audit and the level of penalties. According to rational choice theory, the decision to comply results from a cost-benefit calculation. Yet, this model falls short in capturing the full spectrum of observed behaviors.

Research in behavioral economics has underscored the importance of non-economic factors in compliance decisions. Notably, Torgler (2007) introduced the concept of tax morale, defined as an intrinsic motivation to meet tax obligations irrespective of external incentives.⁴ This perspective also underscores the role of institutional trust and social norms in shaping tax behavior.

Other scholars have extended this critique. Frey and Feld (2002) highlight the perverse effects of a purely repressive approach, which risks eroding the bond of trust between the state and its citizens and undermining cooperative motivation. Hofmann et al. (2008) emphasize individuals’ cognitive limitations: taxpayers do not always possess complete information or the skills needed to make optimal calculations, thereby challenging the assumption of perfect rationality.

Finally, in contexts where tax enforcement is weak, the persistence of compliant behavior suggests the presence of psychological and social drivers that traditional models fail to capture. These insights paved the way for alternative approaches, notably those inspired by the pioneering work of Tversky and

³ - Guided by optimization calculations based on risk and utility.

⁴ - Torgler, B. (2007). *Tax Compliance and Tax Morale: A Theoretical and Empirical Analysis*. Edward Elgar Publishing.

Kahneman on cognitive biases and decision-making under uncertainty.⁵ This research enriched the field of behavioral public finance, exploring how heuristics and cognitive distortions affect tax compliance (Alm & Sheffrin, 2017).⁶

2.2. Contributions of behavioral economics to public finance

Behavioral economics⁷ provides an alternative interpretation of tax behavior, moving beyond the limits of the neoclassical paradigm of perfect rationality. It highlights the influence of cognitive biases, emotions, and social norms on taxpayers' decisions, emphasizing that voluntary compliance cannot be reduced to a purely utilitarian calculation.

Within this framework, Torgler (2007) introduced the concept of *tax morale*, defined as an intrinsic motivation to comply with tax obligations regardless of economic incentives. This form of tax morale is closely linked to institutional trust and perceptions of fairness in the tax system. Subsequent studies have expanded this approach by identifying additional psychological determinants. Hofmann, Hoelzl, and Kirchler (2008) stress the role of procedural justice, administrative transparency, and social interactions in shaping voluntary compliance.⁸

Frey and Torgler (2007) further underline the importance of social norms and the sense of belonging, noting that individuals are more likely to comply when such behavior is perceived as valued and widely shared within their community.⁹ These analyses demonstrate that taxation cannot be separated from the social context in which it takes place.

Together, these contributions gave rise to the field of *behavioral public finance*, which seeks to design more effective tax policies by leveraging cognitive, social, and emotional mechanisms to complement traditional deterrence-based tools. The most emblematic instrument to this approach is the *Nudge*, popularized by Thaler and Sunstein (2008).¹⁰ Nudges guide taxpayer behavior not by restricting choices or significantly altering incentives, but by subtly modifying the decision-making environment. By integrating insights from psychology into policy design, *Nudges* open the way to more targeted interventions that respect individual autonomy.

2.3. Implications of nudges for voluntary tax compliance

The literature on optimal taxation historically stems from neoclassical economics, with landmark contributions from Diamond (1975), Mirrlees (1971), Atkinson (1976), and Stiglitz & Kaplow (1977), who analyzed principles of optimal income taxation and the taxation of basic goods. Their work grounded tax policy recommendations in welfare economics and broadened the state's toolbox beyond audits and penalties.

⁵ - Tversky, A., & Kahneman, D. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291.

⁶ - Alm, J., & Sheffrin, S. M. (2017). Behavioral economics and the study of taxation. In *Handbook of Behavioral Economics and Taxation* (pp. 3–22). Edward Elgar Publishing.

⁷ - Behavioral economics has its roots in the work of Adam Smith (1759) and Herbert Simon (1947), George Katona (1951), and Tibor Scitovsky (1976). These scholars explored the importance of emotions, social norms, and bounded rationality in individual decisions.

⁸ - Hofmann, E., Hoelzl, E., & Kirchler, E. (2008). Preconditions of voluntary tax compliance: Knowledge and evaluation of taxation, norms, fairness, and motivation to cooperate. *Zeitschrift für Psychologie*, 216(4), 209–217.

⁹ - Frey, B. S., & Torgler, B. (2007). Tax morale and conditional cooperation. *Journal of Comparative Economics*, 35(1), 136–159.

¹⁰ - Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions About Health, Wealth, and Happiness*. Yale.

Yet, the limitations of this approach have encouraged the development of strategies more attuned to the psychological and social dimensions of tax behavior. *Nudges*, in particular, provide an innovative response by incorporating emotions, beliefs, and cognitive biases into tax policy design. For instance, fear of uncertainty may influence taxpayers' decisions more strongly than the tax rate itself.¹¹ Muehlbacher & al. (2017) demonstrate the decisive role of *mental accounting* in shaping willingness to pay taxes, thereby revealing the limitations of deterrence-only models.

The integration of *nudges* into tax policy builds directly on the work of Thaler and Sunstein (2008), who define a *nudge* as an intervention that changes behavior without restricting choices or significantly altering economic incentives. In the fiscal domain, this approach has been mobilized to enhance voluntary compliance by relying on cognitive salience and social norms.

Empirical evidence underscores its potential. Experiments conducted by the World Bank in Guatemala, Poland, and Kosovo show that targeted messages emphasizing the social importance of paying taxes can raise compliance and boost public revenues.¹² Hallsworth & al. (2017) found that simply adding a normative message to reminder letters increased payment rates by 5 - 9 % in the United Kingdom. Similarly, Kettle & al. (2016) tested personalized and simplified letters, reporting significant improvements in taxpayer responsiveness. The OECD (2019) documents numerous examples of *nudges* in tax administrations, emphasizing that their effectiveness depends on both behavioral design and institutional trust.

Conceptually, these interventions are grounded in theories of *bounded rationality* (Simon, 1947, 1955), *social norms* (Cialdini & al., 1990), and *cognitive salience* (Kahneman, 2011), which explain why individuals' responses vary depending on the framing and context-sensitive tools for improving tax compliance.

3. Tax Compliance and Conformity: Behavioral Determinants and the Contribution of Nudges

Behavioral public finance provides a new framework for justifying government interventions aimed at strengthening voluntary tax compliance. By applying the principles of nudges, public policies can encourage more civic-minded tax behavior based on adherence rather than coercion. Numerous empirical studies have demonstrated that voluntary tax compliance, defined as a moral and civic willingness to contribute to collective financing, represents a powerful lever for sustainable fiscal governance.

By combining traditional economic approaches with insights from behavioral psychology, administrations can design more effective strategies for resource mobilization. In the Moroccan context, an exploratory survey by Machmoune and Nmili (2021) highlights that perceptions of tax fairness and consent to taxation are key determinants of compliance. Taxpayers who perceive the system as fair and transparent are significantly more likely to comply voluntarily with their obligations.

¹¹ - Muehlbacher, S., Kirchler, E., & Schwarzenberger, H. (2017). Mental accounting and tax compliance: Experimental evidence. *Journal of Economic Psychology*, 61, 49–58.

¹² - World Bank (2016). *Behavioral Insights for Tax Compliance: Evidence from Field Experiments*.

3.1 Improving tax compliance through nudges

Promoting sustainable compliance remains a universal challenge for tax administrations, which often oscillate between coercive strategies and approaches that encourage voluntary adherence. Kirchler & al. (2008) distinguish between enforced compliance, based on the coercive power of the administration, and voluntary compliance, rooted in trust and the perceived legitimacy of the state. The latter is closely tied to the concept of tax compliance as a civic and moral disposition to contribute to public financing.

Torgler (2007) emphasizes that tax compliance is not merely regulatory obedience, but reflects a normative attitude shaped by perceptions of justice, institutional transparency, and social identification. Compliance thus becomes an indicator of the quality of the relationship between taxpayers and the state, as well as a strategic lever for policies that privilege engagement over punishment.

Within this perspective, the contributions of behavioral economics open promising avenues. Kahneman's (2011) dual-process theory distinguishes between intuitive, fast decisions (*System 1*) and deliberate, reflective ones (*System 2*). The cognitive biases embedded in *System 1* can lead taxpayers to adopt behaviors that run counter to their fiscal interests. By reshaping the choice architecture, policymakers can guide decisions without coercion, precisely the function of *nudges*, as defined by Thaler and Sunstein (2008).

Empirical studies confirm their effectiveness. John and Blume (2018) demonstrate that simplified messaging and appeals to descriptive social norms can increase voluntary tax compliance. Vainre & al. (2020) emphasize the need for targeted behavioral interventions to influence complex practices such as payroll tax compliance among employers. Similarly, Leets & al. (2020) show that personalized messages and tailored reminders significantly improve payment rates.

Taken together, these findings converge toward a clear conclusion: nudges, as subtle yet strategic interventions, can strengthen tax compliance by activating cognitive and social levers. By tailoring message content and mobilizing peer-based references, tax administrations can foster more civic-minded practices grounded in voluntary adherence rather than coercion.

3.2 Determinants of tax compliance in the local context

Tax compliance results from a complex interplay of psychological, social, and institutional factors. Among these, the perception of tax fairness¹³ emerges as a key determinant of voluntary compliance (Hofmann & al., 2008). Likewise, trust in public administration, reinforced by transparency and efficiency, enhances the perceived legitimacy of taxation (Kirchler & al., 2008).¹⁴

Social norms also play a central role. They encompass both descriptive norms – perceptions of what others do – and injunctive norms – perceptions of what others approve –. These informal rules shape the expectations of individuals within their community. Such norms can either promote compliance by reinforcing civic duty and solidarity, or tolerate non-compliance when collective expectations are weaker. This variability highlights the importance of considering social norms as contextual variables capable of amplifying or limiting the effectiveness of behavioral interventions (Frey & Torgler, 2007; Hallsworth & al., 2017).

¹³ - This refers in particular to distributive justice (fair allocation of resources) and procedural justice (fairness in decision-making processes).

¹⁴ - Such as the relationship with the state, previous experiences of governance, or community dynamics.

Finally, cultural and historical specificities of each territory exert a significant influence on how compliance is expressed. Empirical studies¹⁵ underline that the impact of *nudges* is often context-dependent, temporary, and heterogeneous, varying across taxpayer profiles. This calls for their careful and complementary integration into tax policy. In local and regional contexts, tax compliance is embedded within dynamics specific to the cultural, economic, and social realities of each territory.

The literature highlights five major determinants:

- ***Perceived impact:*** Compliance is reinforced when taxpayers directly observe the benefits of taxation in their locality. Tangible projects – such as infrastructure, schools, or social programs – make the link between contribution and collective welfare more salient, thereby legitimizing taxation.
- ***Regional competition:*** Citizens compare their region with others and aspire for it to be exemplary or more developed. This dynamic of rivalry may foster higher expectations for governance and encourage compliance as a way to strengthen the region's standing.
- ***Social norms:*** Beyond their general influence, social norms operate as informal rules within communities. Whether they promote compliance or tolerate evasion, they shape citizens' perceptions of their tax obligations (Cialdini & Trost, 1998).
- ***Personal norms:*** Rooted in the internalization of social norms, personal norms represent individual moral convictions. They embody intrinsic ethical commitments toward tax contribution, independent of external pressures or collective expectations (Wenzel, 2004).
- ***Perceived fairness:*** Perceptions of distributive justice are decisive for sustaining compliance. When certain regions are seen as contributing more than they receive, while others benefit disproportionately from public spending, a sense of inequity emerges. Such perceptions of unfairness, whether grounded in fiscal balances or redistributive policies, can undermine voluntary compliance. Conversely, when taxation is viewed as impartial and equitable, compliance is more likely to be maintained (Bordignon, 1993).

In summary, community interactions, perceptions of territorial disparities, and proximity to local actors play a decisive role in shaping tax compliance. Incorporating the local dimension thus makes it possible to understand how social and personal norms interact with regional socio-economic conditions to generate tax behaviors adapted to territorial specificities.

The following section therefore offers a contextualized empirical analysis of tax compliance. It seeks to identify the main determinants of taxpayer behavior in Morocco, to assess the effectiveness of behavioral interventions, and to explore the conditions for their adaptation to local realities. By linking theoretical foundations to field data, this approach provides a basis for operational recommendations aimed at fostering more inclusive and effective tax governance.

¹⁵ - OECD, 2021; Behavioural Insights Team, 2020.

4. Regional Specificities and the Effectiveness of Tax Nudges: A Behavioral Survey in Morocco

In the Moroccan context, marked by institutional heterogeneity and pronounced regional disparities, tax civility emerges as a key determinant of compliance. It reflects a moral willingness to contribute to collective financing, shaped by perceptions of fairness, institutional trust, and local norms. Exploratory studies (Machmoune & Nmili, 2021) and international experiments (World Bank; Hallsworth & al., 2017) suggest that nudges can significantly enhance tax compliance, provided they are adapted to local realities.

This empirical section examines the regional specificities of tax compliance in Morocco through the lens of behavioral economics. Drawing on the concept of *nudges*, it seeks to identify the cognitive and social levers most likely to foster voluntary tax compliance in diverse territorial contexts.

Our exploratory approach builds on the structural framework of Jimenez and Iyer (2016), but adapts it to the Moroccan context. Specifically, the model was modified to incorporate two additional variables, regional motivation and local competition, while excluding the variable of trust.

This framework allows us to test five main hypotheses, centered on regional disparities, perceptions of redistributive fairness, and the effectiveness of behavioral incentives. The empirical analysis is based on survey data collected through a structured questionnaire administered to a representative sample across several Moroccan regions. To examine the relationships between latent variables and test the proposed model, we rely on structural equation modeling (SEM). Robust statistical tools (SmartPLS, Stata) are employed to validate the psychometric structure of the scales, assess the reliability and validity of the constructs, and evaluate the differentiated effects of *nudges* across local contexts. This approach provides both theoretical and practical insights into the conditions under which *nudges* can serve as effective instruments of tax policy, while highlighting the territorial dynamics that shape compliance.

4.1 Comparative analysis of tax revenues and budget allocations by region

Highly industrialized regions, such as Casablanca-Settat, contribute significantly to national tax revenues due to their dense and structured economic fabric. Conversely, some regions with weaker economic structures – such as Drâa-Tafilalet – generate lower fiscal revenues and benefit from greater redistribution. This imbalance may feed perceptions of redistributive injustice.

Table 1 compares tax revenues collected by region with budgets allocated to local authorities. It introduces a budget-to-revenue ratio, calculated on the basis of national percentages, which identifies net contributor regions (ratio < 1), net beneficiary regions (ratio > 1), and balanced regions (ratio \approx 1).

Table 1: Regional disparities in tax revenues and budgetary redistribution

Region	% Revenue Collected	% Budget Allocated	Budget/Revenue Ratio	Status
Casablanca-Settat	21.5	17.7	0.82	Contributor
Rabat-Salé-Kénitra	17.2	15.3	0.89	Contributor
Tangier-Tetouan-Al Hoceima	9.1	8.7	0.96	Contributor
Fez-Meknes	7.2	8.4	1.17	Beneficiary
Marrakech-Safi	10.3	10.1	0.98	Balanced
Beni Mellal-Khenifra	4.1	5.6	1.37	Beneficiary
The Oriental	3.6	5.2	1.44	Beneficiary
Souss-Massa	4.6	5.7	1.24	Beneficiary
Drâa-Tafilalet	2.3	3.0	1.30	Beneficiary
Guelmim-Oued Noun	0.5	1.0	2.0	Beneficiary
Laayoune-Sakia El Hamra	0.4	1.2	3.0	Beneficiary
Dakhla-Oued Ed Dahab	0.3	1.1	3.67	Beneficiary

Source: Ministry of Economy and Finance, General Treasury of the Kingdom - Monthly bulletin of local finance statistics, February 2025.

The budget-to-revenue ratio provides a concise indicator of redistributive imbalances across Moroccan regions. Net contributors, such as Casablanca-Settat, Rabat-Salé-Kénitra, and Tangier-Tetouan-Al Hoceima, generate more revenues than the budgets allocated to them (ratios below 1). Their strong fiscal contributions, combined with lower returns, may feed perceptions of under-compensation. In contrast, net beneficiaries, including Fez-Meknes, Beni Mellal-Khenifra, the Oriental, and Drâa-Tafilalet, receive allocations that exceed their tax contributions (ratios above 1). These transfers reflect the redistributive role of the central government in supporting regions with weaker economic structures. The southern regions (Guelmim, Laayoune, Dakhla) stand out with particularly high ratios, highlighting the extent of budgetary redistribution in their favor. This distinctive pattern suggests a deliberate policy of territorial support, but it may also raise questions of perceived imbalance in other parts of the country. Finally, regions such as Marrakech-Safi and Souss-Massa present ratios close to equilibrium, suggesting a relative proportionality between their contribution and the resources they receive.

Overall, these disparities illustrate the tension between the redistributive logic of national fiscal policy and the perceptions of fairness at the regional level. They show that tax compliance cannot be dissociated from the territorial dimension of redistribution, since taxpayers' attitudes are shaped not only by their individual obligations but also by how their region is positioned within the broader fiscal balance.

4.2 Perceptions of unfairness and effects on tax compliance

The disparities highlighted by the budget-to-revenue ratio are not merely accounting imbalances: they can profoundly shape citizens' tax behavior. Several studies in behavioral economics¹⁶ suggest that perceptions of fairness in the allocation of public resources are a major determinant of voluntary compliance.

When taxpayers feel that their region is disadvantaged in terms of public services despite high tax

¹⁶ - See Frey (1997), Luttmer & Singhal (2014), Kirchler (2007).

contributions, this can generate a sense of redistributive injustice and weaken the legitimacy of taxation. Conversely, an allocation perceived as fair can foster civic pride and strengthen willingness to cooperate with the tax authorities.

In this sense, the analysis of regional disparities is not limited to a technocratic exercise; it opens the way to reflection on the psychological and social mechanisms underlying compliance. The following subsection explores these dynamics through the prism of redistributive nudges, social norms, and perceived reciprocity effects.

4.3 Survey protocol and hypothesis testing

This subsection outlines the survey protocol used to test behavioral hypotheses related to tax compliance. It presents the sample, the conceptual model, and the variables employed. The objective is to empirically anchor the behavioral interpretation introduced above.

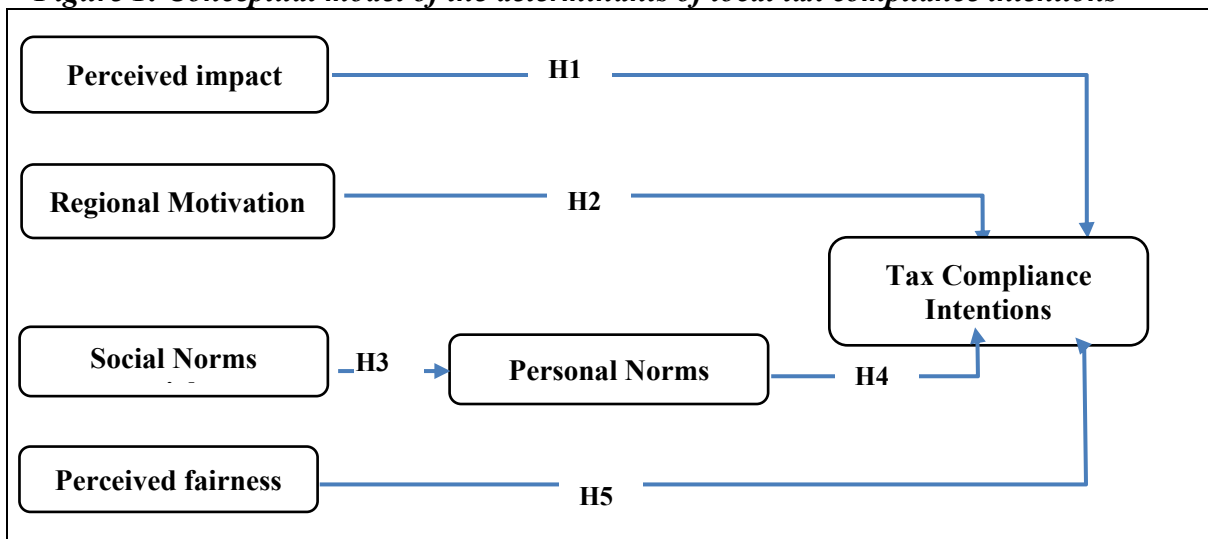
4.3.1 Working hypotheses

The empirical analysis is guided by a set of hypotheses formulated from the literature in behavioral economics, public taxation, and social psychology. These hypotheses reflect the theoretical mechanisms likely to influence tax compliance, particularly through taxpayers' perceptions of redistributive fairness according to their region of origin:

- **H1:** Perceived impact of local public services reinforces tax compliance intentions.
- **H2:** Regional competition positively influences taxpayers' compliance.
- **H3:** Social norms positively influence taxpayers' intentions to comply with tax regulations.
- **H4:** Personal norms have a significant effect on tax compliance intentions, acting as a mediating variable.
- **H5:** Perceived fairness significantly influence compliance intentions.

Figure 1 presents the conceptual model summarizing the hypotheses outlined above.

Figure 1: Conceptual model of the determinants of local tax compliance intentions



Source: Prepared by the authors.

This diagram highlights how psychosocial and territorial factors are expected to influence tax compliance intentions, which represent the dependent variable of the model.

4.3.2 *Sample strategy and data collection*

The study employed a proportional allocation strategy to ensure that the sample reflected the demographic weight of Morocco's twelve administrative regions. Respondents were selected so that more densely populated and economically significant regions, such as Casablanca-Settat and Rabat-Salé-Kénitra, were proportionally represented in the survey.

Data were collected through a structured online questionnaire administered to 400 individuals. The instrument was designed to capture taxpayers' perceptions of distributive fairness, social and personal norms, and the perceived impact of public services. The use of an online format facilitated wide geographical coverage while ensuring standardized responses.

Although the sample size ($n = 400$) may seem modest in relation to the total population of Moroccan households (9,275,038), it remains statistically acceptable for an exploratory study, provided that the sampling method is rigorous. Territorial representativeness was ensured by a proportional distribution of households in each region, allowing for significant socio-economic diversity to be captured. However, the results must be interpreted with caution, particularly with regard to their generalization to the entire population. This limitation is recognized as inherent in exploratory behavioral studies, where analytical depth takes precedence over demographic exhaustiveness.

4.3.3 *Sampling structure*

The final sample comprises 400 Moroccan taxpayers distributed across the twelve regions of the Kingdom. The regional distribution reflects the country's territorial diversity, with higher concentrations in Casablanca-Settat (21%), Rabat-Salé-Kénitra (15%), and Marrakech-Safi (13%).

For analytical purposes, the sample was segmented according to the tax contribution of the regions of origin. Budgetary data reveal that six regions—Casablanca-Settat, Rabat-Salé-Kénitra, Marrakech-Safi, Tangier-Tetouan-Al Hoceima, Fez-Meknes, and Souss-Massa—account for 73.3% of local tax revenue. The remaining six regions—Oriental (7.5%), Beni Mellal-Khenifra (6.4%), Drâa-Tafilalet (4.5%), Laayoune-Sakia El Hamra (3.6%), Guelmim-Oued Noun (2.4%), and Dakhla-Oued Ed Dahab (2.2%)—contribute only 26.7%.

The socio-professional composition of respondents is also diverse: 36% executives and civil servants, 21% professionals, 24% merchants, artisans, and employees, and 19% students.¹⁷ This heterogeneity strengthens the explanatory scope of the study by integrating both territorial disparities and socio-economic diversity into the behavioral analysis.

4.3.4 *Analytical approach and data processing*

The analysis followed a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, implemented with SmartPLS, in order to test the research hypotheses and assess the robustness of the conceptual model.

A three-step procedure was applied:

¹⁷ See Appendix 1: Sample description

1. **Exploratory analysis:** Preliminary analyses were carried out using Stata, where Principal Component Analysis (PCA) was employed to refine the measurement items and verify the factorial structure of the constructs. Items with weak contributions were eliminated to improve construct validity.
2. **Measurement model assessment:** The measurement model was then validated through confirmatory analysis in SmartPLS. Reliability was examined using Cronbach's alpha and composite reliability. Convergent validity was assessed using Average Variance Extracted (AVE), while discriminant validity was evaluated according to the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio (HTMT), in line with established PLS-SEM standards.
3. **Structural model assessment:** Finally, the structural model was estimated to test the hypothesized relationships between latent variables. This involved analyzing path coefficients, R² values, effect sizes (f²), and predictive relevance (Q²). In addition, direct, indirect, and mediating effects were examined, with particular attention to the mediating role of personal norms. Bootstrapping with 5,000 resamples was employed to ensure robust estimation of path coefficients and significance levels, thereby enhancing the reliability of the model's statistical outputs.

The choice of PLS-SEM is consistent with the objectives of this study. It is particularly appropriate for models that are both exploratory and predictive, involve multiple latent constructs, and where the data may not strictly meet normality assumptions. Moreover, PLS-SEM allows for the simultaneous analysis of mediating mechanisms, which is essential to capture the role of personal norms in shaping compliance intentions.

This analytical protocol therefore made it possible to refine the measurement scales, validate the factorial structure, and rigorously test the structural relationships specified in the research model. The next section presents the empirical results obtained from this procedure.

4.4 Data and interpretation of results

As a preliminary step, the normality of the data distribution was examined. Skewness and kurtosis statistics, as well as the Kolmogorov–Smirnov and Shapiro–Wilk tests, indicated that all values fell within the recommended thresholds (± 2). These results confirm that the assumption of univariate normality is satisfied, thereby ensuring the suitability of the dataset for subsequent analyses.¹⁸

The empirical results focus on the psychometric robustness of the measurement instruments, the validity of the constructs, and the structural relationships between latent variables. The objective is to verify the relevance of the proposed theoretical model and to evaluate the hypotheses formulated in the context of this research on tax compliance in Morocco.

- **Internal consistency of measurement scales:** The reliability of the scales was assessed using Cronbach's alpha, calculated before and after item deletion. The initial coefficients ranged from 0.64 to 0.82, indicating overall satisfactory internal consistency. After removing the least effective items, the reliability of the *Social Norms* and *Perceived Fairness* scales improved to 0.71 and 0.76, respectively. These adjustments ensure greater psychometric stability of the instruments used for subsequent analyses.¹⁹

¹⁸ - See Appendix 2: Normality test

¹⁹ - See Appendix 3: Purification of measurement scales

- **Unidimensionality of measurement scales:** Principal Component Analysis (PCA) was performed for each scale separately to verify their unidimensionality. KMO scores ranged from 0.50 to 0.78, indicating variable but generally acceptable adequacy. Despite the recommended caution for the *Perceived Fairness* scale, a single component was retained for each construct, with eigenvalues greater than 1 and percentages of explained variance ranging from 59.65% to 80.92%. These results confirm the unidimensional structure of the scales.²⁰
- **Convergent validity:** Within the PLS-SEM framework, the assessment of the measurement model revealed that all item loadings exceeded 0.70, attesting to their significant contribution to their respective constructs. Composite reliability values were above the recommended 0.70 threshold, and average variance extracted (AVE) exceeded 0.50 for all latent variables, confirming convergent validity.²¹
- **Discriminant validity:** The Fornell-Larcker criterion was applied to assess discriminant validity. The square roots of the AVE for each construct were consistently higher than the inter-construct correlations, as shown in Appendix 5. For example, *Tax Compliance Intentions* had a square root of AVE of 0.822, exceeding all its correlations with other variables. These results confirm the conceptual distinctiveness of each construct.²²
- **Structural model analysis:** The estimation of the structural model highlights significant relationships between several psychosocial determinants and tax compliance intentions. Hypotheses H1, H3, H4, and H5 are supported, with positive and significant path coefficients, while H2 is not supported, indicating that interregional comparison does not exert a significant influence on voluntary tax compliance. In addition, the mediating effect of personal norms is confirmed. These results underscore the central role played by social and personal norms, perceived fairness, and the perceived impact of public services in fostering tax compliance intentions (see Table 2).²³

Table 2: results of hypothesis testing (structural model)

<i>Hypotheses</i>	<i>Relationship</i>	<i>Regression coefficient</i>	<i>T-Values</i>	<i>P-Values</i>	<i>Conclusion</i>
<i>H1</i>	Perceived impact → TCI	0.141	2.932	0.003	<i>Accepted</i>
<i>H2</i>	Regional competition → TCI	-0.014	0.289	0.772	<i>Rejected</i>
<i>H3</i>	Social norms → TCI	0.196	4.257	0.000	<i>Accepted</i>
<i>H4</i>	Personal norms → TCI	0.374	7.251	0.000	<i>Accepted</i>
<i>H5</i>	Perceived fairness → TCI	0.129	2.733	0.006	<i>Accepted</i>
<i>Mediating Effect</i>	Social norms → Personal norms	0.256	5.063	0.000	<i>Accepted</i>

Source: Authors, results of structural model analysis (Smart_PLS).

²⁰ - See Appendix 4: Principal Component Analysis

²¹ - See Appendix 5: Convergent validity of constructs

²² - See Appendix 6: Fornell-Larcker criterion

²³ - See Appendix 7: Structural Model

- **Regional differences in tax compliance:** A comparative analysis between high-contribution and low-contribution regions reveals differentiated patterns in the determinants of compliance. In the low-contribution group, only social norms exert a significant effect, suggesting that compliance is primarily shaped by community expectations. In contrast, the high-contribution group follows the general trends of the model, with multiple determinants influencing compliance intentions. These findings suggest that regional dynamics condition the effectiveness of behavioral incentives and should therefore be explicitly considered in the design of tax policy instruments.

4.5 Results and behavioral insights: validation of hypotheses and implications

Data analysis reveals significant disparities in tax compliance behavior across Moroccan regions. These differences are not solely attributable to economic conditions but also reflect social and cultural dynamics specific to each territory. In low-contribution regions, for example, social norms exert a particularly strong influence on compliance intentions, suggesting that community mechanisms may compensate for perceptions of redistributive inequity or inefficiency.

4.5.1 Empirical validation of hypotheses on tax compliance

Beyond deterrence-based approaches, the results confirm that social and psychological factors play a decisive role in voluntary tax compliance. Building on the framework of Jimenez and Iyer (2016), enriched here with perceived impact and regional competition, this study contributes to behavioral economics applied to taxation by highlighting the interplay between fairness perceptions, social norms, and territorial dynamics.

- **Perceived impact of public services (H1):** The results show that taxpayers' willingness to comply increases when they perceive tangible benefits from taxation (e.g., infrastructure, local services). This finding corroborates the theory of the psychological tax contract (Feld & Frey, 2007), according to which the legitimacy of tax collection depends on the visible return of contributions in terms of public goods.
- **Social norms (H3):** Consistent with Wenzel (2004), social norms positively influence compliance intentions, with group identification reinforcing adherence to collective rules. This effect is especially pronounced in low-contribution regions, where community expectations seem to counterbalance perceptions of redistributive inequity.
- **Personal norms (H4):** Acting as mediators of social norms, personal norms underline the role of internalized beliefs and values in shaping compliance behavior. This result, also noted by Wenzel (2004), suggests that interventions should simultaneously address the collective dimension (shared expectations) and the individual dimension (moral convictions). In this sense, tax compliance is not merely a rational calculation but part of a system of shared and internalized values.
- **Perceived fairness (H5):** In line with Kirchler et al. (2010), fairness emerges as a strategic determinant of compliance, encompassing both distributive and procedural justice. When taxpayers perceive the system as fair, their willingness to comply is reinforced. This factor is particularly salient in Morocco, where regional disparities often fuel perceptions of injustice that may undermine tax legitimacy.

- **Regional competition (H2):** Contrary to expectations, interregional comparison does not significantly influence compliance intentions. The lack of effect may reflect the low visibility of redistribution mechanisms or a stronger attachment to local rather than regional identities. This finding suggests that competition-based approaches are unlikely to serve as effective behavioral levers in the Moroccan context.

Taken together, these findings confirm that voluntary tax compliance is deeply embedded in social, cultural, and territorial logics, rather than being exclusively driven by deterrence or rational cost-benefit calculations.

4.5.2 Practical implications in the Moroccan context

The results of this study suggest several operational avenues for strengthening voluntary tax compliance in Morocco, taking into account socio-cultural and territorial specificities. These recommendations can serve as behavioral levers for the tax administration:

- **Increase the visibility of tax revenues:** Authorities should better communicate the concrete public investments financed by taxes, particularly in net contributor regions, in order to reinforce perceptions of reciprocity and strengthen the psychological tax contract.
- **Mobilize social norms:** Awareness campaigns drawing on community leaders, local figures, and peer influence could reinforce adherence to tax norms, especially in low-contribution regions where community dynamics are a strong driver of compliance.
- **Adapt policies to regional contexts:** The heterogeneous effect of social norms across regions highlights the need for a territorialized approach. Tax nudges should be calibrated to the socio-economic and cultural realities of each region, rather than applying uniform interventions nationwide.
- **Promote fair and transparent taxation:** Strengthening perceptions of fairness—both distributive and procedural—is crucial. Clear and inclusive communication by the tax administration could increase trust, improve perceptions of legitimacy, and foster voluntary compliance.
- **Reassess regional comparison strategies:** The absence of significant effects of regional competition suggests that inter-territorial rivalry is not a salient behavioral lever. Policy efforts should instead emphasize community-based and identity-based mechanisms of mobilization.

These implications can be partly explained by structural factors such as institutional density, the perceived quality of public services, and the degree of proximity between citizens and the tax administration. In less-endowed regions, skepticism about tax fairness tends to erode compliance, while in better-equipped regions compliance is more strongly motivated by institutional legitimacy and perceptions of reciprocity.

Overall, the findings call for a more inclusive and territorialized approach to tax governance. Tailoring awareness and mobilization strategies to regional realities—by reinforcing social norms where they are most influential and addressing fairness concerns where perceptions of injustice are strongest—could simultaneously enhance voluntary tax compliance and consolidate the legitimacy of the state in its redistributive functions.

4.6 Policy recommendations in the Moroccan context

Building on the behavioral levers identified in this study, several policy orientations could help strengthen voluntary tax compliance in Morocco:

- **Institutionalize local tax transparency:** Authorities should systematically publish, at the regional level, the concrete benefits of tax revenues—such as infrastructure, public services, and local investments—in order to reinforce perceptions of reciprocity and legitimize taxation.
- **Deploy community-based awareness campaigns:** By mobilizing social norms, targeted communication initiatives can promote tax contribution as a shared civic duty. The involvement of local actors (elected officials, associations, community leaders) would enhance the credibility and acceptance of these messages.
- **Adapt tax policies to regional disparities:** The heterogeneous influence of social norms across regions calls for territorialized approaches. Policies should integrate local socio-economic realities by tailoring incentives, redistribution mechanisms, and communication strategies.
- **Strengthen fairness and tax justice:** The tax administration should promote practices perceived as fair, particularly in taxpayer treatment, dispute resolution, and resource redistribution. A system perceived as just is a key driver of voluntary compliance.
- **Reorient interregional comparison strategies:** Since regional competition does not significantly influence compliance, efforts should focus on reinforcing identity-based and community-based mechanisms rather than fostering fiscal rivalry between territories.

These recommendations support a more inclusive and territorially sensitive fiscal governance grounded in trust, transparency, and citizen engagement. They provide Moroccan decision-makers with actionable behavioral levers to enhance the efficiency of the tax system while respecting cultural and regional specificities.

CONCLUSION

This study has advanced our understanding of the behavioral determinants of tax compliance in Morocco by combining a theoretical framework rooted in behavioral economics with an empirical survey covering the Kingdom's twelve administrative regions. The findings highlight the central role of social and personal norms, the perceived impact of public services, and perceptions of fairness in shaping voluntary tax compliance intentions. The mediating effect of personal norms between social norms and compliance further demonstrates that tax behavior is not solely the product of rational calculation, but is embedded in a system of shared and internalized values.

Perceived fairness emerges as a strategic lever, particularly in contexts marked by redistributive disparities that may be viewed as unjust. By contrast, the hypothesis of regional competition was not supported, suggesting that inter-territorial comparisons have little impact on compliance intentions. These results underscore the need to tailor tax policies to territorial specificities: emphasizing the benefits of taxation in high-contribution regions, mobilizing community-based messages in low-endowment areas, and designing interventions that align with dominant social norms.

Beyond the validation of these behavioral determinants, the study contributes to broader debates on tax governance. As Kirchler et al. (2008) argue in the *slippery slope model*, sustainable compliance depends on balancing administrative power with citizen trust. Similarly, evidence from Fellner, Sausgruber & Traxler (2013) and Alm & Torgler (2011) suggests that behavioral interventions are most effective when embedded within a cooperative governance strategy built on transparency, simplification, and taxpayer recognition.

These results carry important policy implications. Nudges should not be conceived as isolated tools, but rather as components of an integrated approach that combines behavioral insights with institutional reform. Promoting a culture of voluntary tax compliance in Morocco requires not only well-calibrated nudges, but also credible communication, procedural fairness, and policies sensitive to regional disparities.

Finally, while this research offers both academic and policy-oriented contributions, it is not without limitations. The reliance on self-reported data and an online survey design may introduce biases, and future studies could strengthen external validity through longitudinal designs or experimental approaches. Nevertheless, these findings invite a rethinking of fiscal strategies, placing greater emphasis on behavioral levers, civic engagement, and regional adaptation. Future studies could explore longitudinal designs or field experiments to assess the durability and scalability of behavioral interventions.

REFERENCES:

- Allingham, M. G., & Sandmo, A. (1972). Income tax evasion: A theoretical analysis. *Journal of Public Economics*, 1(3–4), 323–338.
- Alm, J., McClelland, G. H., & Schulze, W. D. (1992). Why do people pay taxes? *Journal of Public Economics*, 48*(1), 21–38.
- Alm, J., & Torgler, B. (2006). Culture differences and tax morale in the United States and in Europe. *Journal of Economic Psychology*, 27(2), 224–246.
- Andreoni, J., Erard, B., & Feinstein, J. (1998). Tax compliance. *Journal of Economic Literature*, 36(2), 818–860.
- Atkinson, A. B. (1976). *The economics of inequality*. Oxford University Press.
- Bordignon, M. (1993). A fairness approach to income tax evasion. *Journal of Public Economics*, 52*(3), 345–362.
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1990). A focus theory of normative conduct. *Journal of Personality and Social Psychology*, 58*(6), 1015–1026.
- Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity, and compliance. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (Vol. 2, pp. 151–192). McGraw-Hill.
- Diamond, P. A. (1975). A many-person Ramsey tax rule. *Journal of Public Economics*, 4*(3), 225–234.
- Feld, L. P., & Frey, B. S. (2007). Tax compliance as the result of a psychological tax contract: The role of incentives and responsive regulation. *Law & Policy*, 29(1), 102–124.
- Fellner, G., Sausgruber, R., & Traxler, C. (2013). Testing enforcement strategies in the field: Threat, moral appeal and social information. *Journal of the European Economic Association*, 11*(3), 634–660. <https://doi.org/10.1111/jeea.12004>
- Frey, B. S., & Torgler, B. (2007). Tax morale and conditional cooperation. *Journal of Comparative Economics*, 35*(1), 136–159. <https://doi.org/10.1016/j.jce.2006.10.006>
- Hallsworth, M., List, J. A., Metcalfe, R. D., & Vlaev, I. (2017). The behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics*, 148*, 14–31. <https://doi.org/10.1016/j.jpubeco.2017.02.003>
- Hofmann, E., Hoelzl, E., & Kirchler, E. (2008). Preconditions of voluntary tax compliance: Knowledge and evaluation of taxation, norms, fairness, and motivation to cooperate. *Journal of Psychology*, 216*(4), 209–217. <https://doi.org/10.1027/0044-3409.216.4.209>
- John, P., & Blume, T. (2018). How best to nudge taxpayers? The impact of message simplification and descriptive social norms on payment rates in a central London local authority. *Journal of Behavioral Public Administration*, 1*(1).
- Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.
- Kettle, S., Hernandez, M., Ruda, S., Sanders, M., & Hauser, O. (2016). Behavioral interventions in tax compliance: Evidence from HMRC. *Journal of Behavioral Public Administration*, 1*(1).
- Kirchler, E., Hoelzl, E., & Wahl, I. (2008). Enforced versus voluntary tax compliance: The “slippery slope” framework. *Journal of Economic Psychology*, 29*(2), 210–225. <https://doi.org/10.1016/j.joep.2007.05.004>
- Kornhauser, M. E. (2006). A tax morale approach to compliance: Recommendations for the IRS. *Florida Tax Review*, 8, 599–622.
- Leets, L., Sprenger, A., Hartman, R., Kohn, N., Thomas, J. S., Vu, C., ... & Wijesinghe, S.

- (2020). Effectiveness of nudges on small business tax compliance behavior. *Journal of Behavioral Public Administration*, 3*(2).
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, 65*(3), 272–292.
 - Loewenstein, G., & Chater, N. (2017). Putting nudges in perspective. *Behavioral Public Policy*, 1*(1), 26–53. <https://doi.org/10.1017/bpp.2016.7>
 - Machmoume, S., & Nmili, M. (2021). Study of the impact of civic-mindedness on tax compliance: An exploratory study in the Moroccan context. *Alternatives Managériales Économiques*, 3*(3), 603–621.
 - Mirrlees, J. A. (1971). An exploration in the theory of optimum income taxation. *Review of Economic Studies*, 38*(2), 175–208.
 - Muehlbacher, S., Hartl, B., & Kirchler, E. (2017). Mental accounting and tax compliance: Experimental evidence for the effect of mental segregation of tax due and revenue on compliance. *Public Finance Review*, 45*(1), 118–139.
 - Muehlbacher, S., Kirchler, E., & Schwarzenberger, H. (2017). Mental accounting and tax compliance: Experimental evidence. *Journal of Economic Psychology*, 61*, 49–58.
 - OECD. (2019). Tools and ethics for applied behavioral insights: The BIT working paper series. OECD Publishing. <https://doi.org/10.1787/9ea76a8f-en>
 - Sheffrin, S. M. (1993). What does the public believe about tax fairness? *National Tax Journal*, 46*(3), 301–308.
 - Simon, H. A. (1947). *Administrative behavior*. Macmillan.
 - Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, 69*(1), 99–118. <https://doi.org/10.2307/1884852>
 - Stiglitz, J. E., & Kaplow, L. (1977). Taxation, information, and efficiency. *American Economic Review*, 67(2), 419–425.
 - Sugden, R. (2009). On nudging: A review of *Nudge: Improving decisions about health, wealth, and happiness* by Richard H. Thaler and Cass R. Sunstein. *International Journal of the Economics of Business*, 16*(3), 365–373.
 - Sunstein, C. R. (2015). *The ethics of influence: Government in the age of behavioral science*. Cambridge University Press. <https://doi.org/10.1017/CBO9781316492878>
 - Tan, L. M., & Braithwaite, V. (2018). Motivations for tax compliance: The case of small business taxpayers in New Zealand. *Australian Tax Forum*, 33*(2), 221–247.
 - Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
 - Torgler, B. (2002). Does culture matter? Tax morale in an East-West-German comparison. *FinanzArchiv/Public Finance Analysis*, 58*(4), 504–528.
 - Torgler, B. (2007). *Tax compliance and morality: A behavioral economics approach*. Edward Elgar Publishing.
 - Vainre, M., Aaben, L., Paulus, A., Koppel, H., Tammsaar, H., Telve, K., ... & Uusberg, A. (2020). Nudging towards tax compliance: A fieldwork-informed randomised controlled trial. *Journal of Behavioral Public Administration*, 3*(1).

APPENDICES

Appendix 1: Sample description

Characteristics		Frequency	Percentage
Gender	Male	207	52
	Female	193	48%
Region	Tangier-Tetouan-Al Hoceima	45	11
	The Oriental	25	6
	Fez-Meknes	47	12
	Rabat-Salé-Kenitra	59	15
	Beni Mellal-Khenifra	27	7
	Casablanca-Settat	85	21
	Marrakech-Safi	52	13
	Drâa-Tafilalet	16	4
	Souss-Massa	30	7
	Guelmim-Oued Noun	5	1
	Laayoune-Sakia El Hamra	6	1
	Dakhla-Oued Ed-Dahab	3	1
Socio-professional category	Managers and civil servants	143	36
	Liberal professions	84	21
	Traders and artisans	40	10
	Workers and employees	56	14
	Students	77	19
Total		400	100

Source: Authors, based on survey data.

Appendix 2: Normality test

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
IM 1	-0.417	0.122	-1.014	0.244
IM 2	0.545	0.122	-0.968	0.244
IM 3	-0.092	0.122	-1.144	0.244
IM 4	-0.018	0.122	-1.086	0.244
CR 1	-1.283	0.122	1.037	0.244
CR 2	-1.936	0.122	1.516	0.244
CR 3	-1.458	0.122	1.510	0.244
CR 4	-1.008	0.122	0.337	0.244
CR 5	-0.528	0.122	-0.488	0.244
NS 1	1.110	0.122	0.855	0.244
NS 2	-0.211	0.122	-1.345	0.244
NS 3	-0.264	0.122	-1.155	0.244
NS 4	0.238	0.122	-0.996	0.244
NP 1	-1.029	0.122	0.307	0.244
NP 2	-0.796	0.122	-0.319	0.244
NP 3	-1.462	0.122	1.498	0.244
NP 4	-0.650	0.122	-0.545	0.244
EG 1	-1.180	0.122	0.608	0.244
EG 2	0.464	0.122	-0.533	0.244
EG 3	0.349	0.122	-0.740	0.244
CF 1	-0.592	0.122	-0.852	0.244
CF 2	-0.129	0.122	-0.754	0.244
CF 3	0.554	0.122	-1.037	0.244

Source: Stata output.

Appendix 3: Purification of measurement scales

The Scale	Cronbach's alpha before purification	Item removed	Cronbach's alpha after purification	Number of items before purification	Number of items after purging
Perceived impact	0.78	None	0.78	4	4
Regional motivation	0.82	None	0.82	5	5
Social norms	0.60	NS1	0.71	4	3
Personal standards	0.79	None	0.78	4	4
Perceived fairness	0.64	EP1	0.76	3	2
Tax compliance	0.75	None	0.75	3	3

Source: Authors, results of reliability analysis (Stata).

Appendix 4: Principal Component Analysis (PCA)

The scales	Measure of samplin adequacy (KMO)	Eigenvalue	Percentage of variance explained	Number of components retained
Perceived impact	0.76	2.44	61.12	1
Regional motivation	0.77	2.98	59.65	1
Social norms	0.66	1.83	60.97	1
Personal norms	0.78	2.48	62.04	1
Perceived fairness	0.50	1.62	80.92	1
Tax compliance	0.63	2.03	67.75	1

Source: Authors, results of PCA (Stata).

Appendix 5: Convergent validity of constructs

Construct	Items	External loads / Factor loading	Composite reliability (CR)	Average Variance Extracted (AVE)
Perceived impact	IM1	0.744	0.787	0.610
	IM2	0.702		
	IM3	0.846		
	IM4	0.823		
Regional motivation	CR1	0.745	0.850	0.585
	CR2	0.778		
	CR3	0.774		
	CR4	0.779		
	CR5	0.748		
Social norms	NS2	0.751	0.708	0.604
	NS3	0.830		
	NS4	0.748		
Personal standards	NP1	0.825	0.849	0.612
	NP2	0.682		
	NP3	0.748		
	NP4	0.861		
Perceived fairness	EG2	0.886	0.772	0.809
	EG3	0.912		
Tax compliance	CF1	0.912	0.814	0.676
	CF2	0.772		
	CF3	0.774		

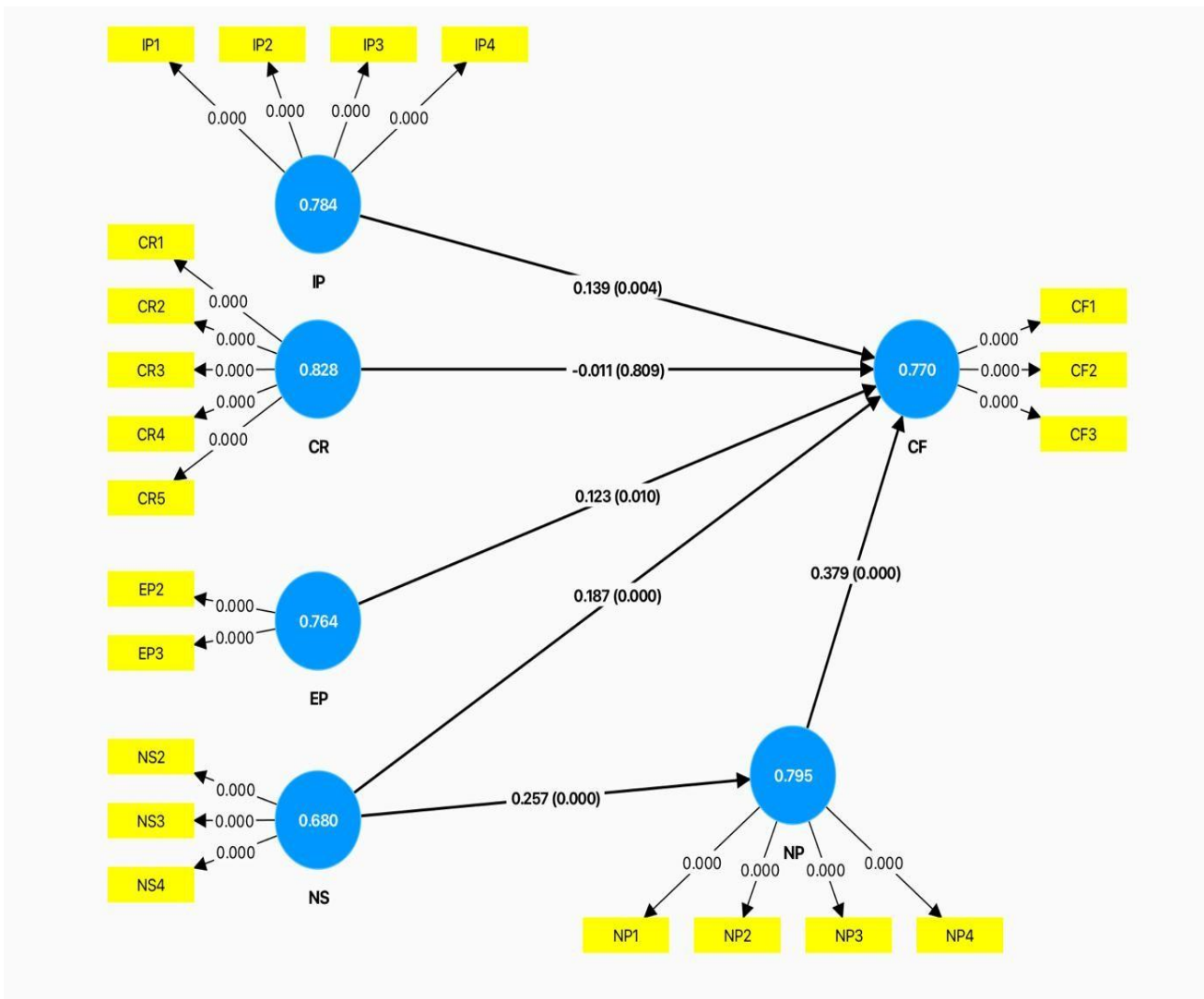
Source: Authors, results of measurement model (Smart_PLS).

Appendix 6: Fornell-Larcker criterion

	TCI	CR	EG	IM	PN	SN
TCI	0.822					
CR	0.219	0.765				
EG	0.265	0.102	0.899			
IM	0.298	0.302	0.334	0.781		
PN	0.480	0.437	0.209	0.244	0.782	
SN	0.318	0.071	0.061	0.136	0.256	0.777

Source: Authors, results of discriminant validity analysis (SmartPLS).

Appendix 7: Structural Model



Source: SmartPLS output.