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Tax Compliance in the Wild: Critical Review of Nudging and Proposition of an Integrative Framework

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ABSTRACT

Context: There is an inflation of behavioral frameworks applied to social problems, such as tax dodging. There has been also a surge in the creation of the so-called nudge units throughout the world, following the success of the pioneer units in USA and UK. Meanwhile, there has been criticism directed at aspects such as 'psychologism,' paternalism, and short-termism associated with nudge approaches. Moreover, by ignoring systems thinking, complexity science and other broader approaches, nudging may lead to interventions that can be ineffective or counterproductive in the long term. **Goal:** To overcome such limitations, the paper proposes an integrative framework, the Nested Circles Model, which put the intended behaviors in a perspective ranging from *microworlds* to broader upstream influences. **Method:** The paper employs a qualitative approach to critically review the literature on nudging and map its shortcomings. **Results and contributions:** The proposed model integrates major concepts from popular behavioral frameworks and incorporates elements that influence the repertoire of behaviors adopted by individuals, including intangible stocks (trust and fairness) and *complexity markers*. The paper concludes by exemplifying the application of the Nested Circles Model to three problems in the context of taxation in Brazil.

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INTRODUCTION

One useful lens to understand the myriad of social and organizational phenomena is the behavioral one. After all, one can say organizations are in the behavior change market, trying to influence the behaviors of external (e.g., customers) and internal (e.g., workers) stakeholders (Soman, 2015). In this paper, we are interested in how this lens has been employed to address complex social problems, such as tax dodging, but the major points can be generalized to problems private organizations usually face, such as managing their capabilities in the continuous effort to adapt to turbulent market conditions.

From this starting point, we note there has been no shortage of mini-theories and behavioral frameworks in the repertoire of managers and public policymakers. On the contrary, recent years have witnessed an increase in the proposition of new models, perhaps because social problems have become more salient, complex, and intractable or at least recognized as so (e.g., Faulkner et al., 2019; Guerra & Harrington, 2018; Michie et al., 2013; Rock, 2008; White et al., 2019). This inflation may become a source of confusion for practitioners and public agencies. In particular, it may have led to a pressure for the adoption of behavioral approaches, especially after the success of the so-called nudge units (governmental bodies dedicated to design interventions based on behavioral economics concepts) throughout the world. Indeed, the creation of nudge units increased substantially over the last years in the same pace as popular approaches inspired by behavioral economics, such as the use of defaults, became common parlance in policy circles (Afif, 2017, Benartzi, S.).

Moreover, government executives (and, of course, private managers) also suffer from FOMO, the fear of missing out (Gaurav, 2019). This, in turn, may have inspired the non-critical adoption or mimicking of behavioral 'packages' to address the usual set of problems that these social actors face.

Employing a critical stance toward nudge interventions, we focus, in particular, on taxation problems, especially the resistance to paying taxes. We hope the reader can easily perceive the similarities to behavioral challenges in other contexts, such as resistance to vaccination, saving for retirement, the maintenance of customers' preferences, and the loyalty of employees.

The research problem, thus, can be defined as: How can public organizations overcome the narrow focus typically associated with behavioral economics and nudge-like interventions in order to influence the behavior of key stakeholders, such as taxpayers and citizens in general, in a sustainable way?

The goal of the paper is to propose a conceptual solution to this question. Hence, to overcome the noise associated with the inflation of behavioral frameworks and the conflicting aspects of nudging, we propose a conceptual model that puts behavioral models into a broader perspective, which allows the incorporation of other more powerful conceptual lenses.

We note theoretical papers like this one are common in the behavioral science literature (e.g., Cohen & Andrade, 2018; White et al., 2019) and they often do not follow the typical structure found in papers employing qualitative and quantitative investigations. In terms of contribution, we expect to add to systems thinking, public administration, and general management literatures, including, in the latter case, problems that involve changing human behavior for good (e.g., organizational and consumer behaviors).

The paper proceeds as follows. First, we briefly review the concepts of behavioral economics applied to taxation, encompassing, with the goal of providing some context, an overview of interventions to increase tax revenue in different countries. Then, we discuss at more length major criticisms directed at nudge interventions, emphasizing one that has been overlooked: the lack of systems thinking in the design of the policies. Next, we present a proposition to broaden the theoretical lenses typically adopted by nudge units, incorporating a more diverse set of behavioral theories and systemic thinking. The proposed conceptual model, the Nested Circles Model, minimizes the focus on individual levers that is often a hallmark of behavioral programs and emphasizes how intervention methods can be applied targeting individuals and/or social actors in the broader social environment, with potential for achieving superior results. Finally, we discuss potential applications in the taxation and other societal contexts.

Review of behavioral economics applied to taxation

Behavioral economics is an academic field created by psychologists Daniel Kahneman and Amos Tversky with roots in the work of researchers such as Herbert Simon and even Adam Smith (Ashraf et al., 2005). Drawing on several streams of behavioral science, the field explores the impact of biases, heuristics, and framing on human decision-making (Kahneman & Tversky, 2000). Major concepts from the discipline include framing effects, loss aversion, the endowment effect, availability bias, mental accounting, and the affect heuristic (Kahneman & Tversky, 2000; Slovic et al., 2007; Thaler, 1999).

Applications of behavioral economics to taxation have been skyrocketed in the last decade after the publication of the best-seller *Nudge*, written by legal

scholar Cass Sunstein and Nobel Prize winner Richard Thaler, and the creation of the first nudge units in USA and UK (Afif, 2017).

A typical intervention concerns redesigning the choice options individuals face in their ordinary lives (the so-called choice architecture) or promoting socially desirable behaviors (e.g., organ donation) using techniques such as defaults. Broader frameworks developed under the umbrella of behavioral economics also include MINDSCAPE (Dolan et al., 2010) and EAST (Hallsworth et al., 2016). The former acronym stands for messenger, incentives, norms, defaults, salience, priming, affect, commitment, and ego. The latter, echoing desirable features of behavioral interventions, stands for easy, attractive, social, and timely. Both try to identify common levers for persuasion and behavior change.

Most OECD countries have implemented interventions based on behavioral economics concepts with the goal of increasing fiscal revenues and decreasing tax gaps (the global amount of unpaid taxes). Important for what is discussed next, some agencies have developed their own frameworks to guide their interventions. For instance, the Australian Tax Office (Australian Tax Office [ATO], 2017) provides a list of key behavioral principles, listed below:

- Make it easy. Design processes, systems, and engagement approaches that minimize taxpayers' effort to meet their obligations.
- Provide certainty about processes, time frames, and how to fulfill obligations.
- Target the approach and personalize messages.
- Provide transparency about what the tax agency knows and what it is doing.
- Emphasize the cost of not taking action.
- Provide planning prompts and limit content length to manage cognitive limits.
- Use social norms and rankings to encourage the right behaviors.
- Emphasize the contribution paying tax makes to the community.
- Use better layouts, design, and colors to highlight key messages.

Examples of interventions

We present in Table 1 a sample of interventions in the field of taxation. They are typically randomized controlled trials (RCTS) employing behavioral economics lenses, with reported positive results, such as increasing tax payment or reducing tax debt.

Table 1. Behavioral interventions in taxation contexts.

Country	Problem	Intervention	Results
UK	Late tax payment	Different appeals in letters, including social norms, positive reciprocity, and negative reciprocity	Most appeals showed a statistically significant result; social norms + minority worked best (5.1% in increased payment)
Ireland	Increase the response rate from small businesses to a questionnaire	Use of a personalized note in a mall-mailed correspondence	Increase of 36% in response rate compared to 19% in control group
Canada (Ontario)	Increase the response rate of a tax form	Letter intervention testing the effect of implementation intentions	6% increase in tax payment
Canada	Increase the registration of taxpayers	Three conditions (postal card, colored letter, and generic letter) plus control (no letter)	All manipulations produced significant results; colored letter emphasizing incentives to registration produced the best results (increase of 9%)
Costa Rica	Income tax filing and compliance	Email intervention; control (no email) plus three conditions: salient punishment, behavioral insights (social norms, simplification, and personalization), and information about use of third-party information (e.g., data from financial transactions)	All interventions produced positive results in increasing income tax filing rate (overall increase of 20%); filing rates increased by two additional points for those receiving email about the use of third-party information
Guatemala	Tax delinquency	Letter intervention; control (no letter) plus five conditions: reminder, behavioral design (information plus deterrence message), behavioral design + social norm, behavioral design + deliberate choice, behavioral design + national pride	All letters increased tax declarations; two were most successful: the deterrence message and the social norms message
Poland	Tax delinquency	Letter intervention; combination of soft-tone (highlighting social incentives) and hard-tone (highlighting sanctions) messages; some letters were sent by registered mail	Hard-tone messages produced the best results; letters sent by regular mail were just as effective as those sent by registered mail

Note. Organization for Economic Co-operation and Development (2017). Behavioural insights and public policy: Lessons from around the world. https://read.oecd.org/10.1787/9789264270480-en?format=pdf, and World Bank (2021). Behavioral insights for tax compliance. https://documents1.worldbank.org/curated/en/472181576511865338/pdf/Behavioral-Insights-for-Tax-Compliance.pdf

Critical appraisal

In the taxation context, the use of nudges has allowed public executives to reach and grab the mythical low-hanging fruit, increasing revenues with low-cost interventions (e.g., Organization for Economic Co-operation and Development [OECD], 2017). But if nudging and field experiments have led to unmistakable successes (Hallsworth, 2014), this practice has also attracted criticism. Major lines of objections revolve around (1) the narrow scope and scale, lacking

the potential to address upstream causes of social problems, (2) its technocratic, top-down, paternalistic, and elitist nature, (3) the methodological bias toward RCTs (randomized controlled trials), and (4) the ethics and political morality, which may undermine people's autonomy by exploiting our bounded rationality (Brown, 2012; Ewert, 2020; Leggett, 2014).

In this section, we expand on these lines of criticism, while grouping them differently.

The first group concerns what Reicher (2021) aptly describes as the trap of 'psychologism,' the tendency to limit psychology to the characteristics and limitations of individual minds. It is a shortsighted view when it comes to the complexity of modern social contexts and that shifts the burden entirely to individuals, while potentially corroding trust, cooperation, and solidarity to boot. In this sense, behavioral economists are "too often concerned with describing how human behavior deviates from the assumptions of standard economic models, rather than with understanding why people behave the way they do" (Gal, 2018, p. 1).

The second group of criticism is paternalism. The core of the argument lies on the manipulation of people to make the 'right' decisions, without them realizing the reason behind (Reicher, 2021). It is a limited approach, the argument goes on, especially when it comes to behaviors in a crisis, such as the recent COVID-19 pandemic. Moreover, it is debatable that someone in a position of power may decide what is best for people without actually consulting them.

French (2011) argues the neoliberal and paternalistic flavor of nudging precludes the maximization of personal decision-making and community empowerment. Moreover, he criticizes the narrow focus of nudge-like programs, which tend to emphasize positive rewards or mindless choosing, whereas, depending on the particularities of the case, different approaches (such as co-creation) may be advised. Hence, French (2011) proposes a social marketing/cost exchange matrix that takes into account other possible types of interventions, such as 'hugs' (e.g., rewards), 'smacks' (e.g., penalties and fines), and 'shoves' (e.g., road bumps).

On the other hand, Thaler and Sunstein (2009) counter-argue that paternalism cannot be avoided when people's preferences are ill-formed and unclear. In this sense, libertarian paternalism (as they conceptualize it) can be an acceptable answer inasmuch as it promotes welfare without eliminating freedom of choice. In addition, the field has acknowledged somewhat the criticism and responded by proposing the concept of *nudge plus*, an approach that combines the automatism of nudges with the opportunity to engage the thinking of subjects (Banerjee & John, 2020).

The third group of criticism relies on the absence of evolutionary thinking in behavioral economics. Evolutionary psychologists condemn the notion that biases are irrational. They claim, in sum, we have evolved in the environment of evolutionary adaptedness (EEA) and the biases are only reflections of the mismatch between that environment and present, artificial contexts afforded by modern societies (Collins, 2016; Todd & Gigerenzer, 2007). Collins (2016) aptly points to the current set of 201 biases categorized under the Wikipedia list of cognitive biases as reflecting, in reality, 201 deviations from the wrong model of human behavior. Such immense set, of course, does little to help the designer of behavioral interventions — which biases are more influential? Moreover, even the foundational concepts of behavioral economics, such as prospect theory and loss aversion, have not been exempt from attack (e.g., Gal & Rucker, 2018; Oliver, 2021). Evolutionary thinking can put the focus away from individuals and more on the so-called ultrasocial institutions and the conditions that make *Homo sapiens* an extremely collaborative species (Boyd, 2017; Turchin, 2016).

The size of effects is the fourth group of criticism. There is the impression that nudging seldom results in population level improvements (French & Gordon, 2015). In fact, interventions inspired by behavioral economics, often involving subtle changes in the presentation of choices, tend to produce small effects or short-term results (for instance, Hare et al., 2021). In this respect, Gal (2018, p. 1) acidly argues the discipline "can be thought of as endorsing the outsize benefits of psychological 'tricks,' rather than as calling for more fundamental behavioral or policy change." Often, he claims, interventions produce (small) effects with simple tactics, but these victories tend to distract policymakers from more substantive efforts aimed at upstream sections of the systems.

We add a final group of criticism that complements the rationale above. But, first, let us distinguish upstream from downstream approaches to behavior change. The famous river metaphor (as adapted by Gordon, 2013, p. 1526) is excellent to pinpoint the difference of targeting downstream behaviors instead of the root causes of the problems:

> "People are drowning in a river on a sunny day. Rescue workers are pulling them out as fast as they can manage, but no matter how hard they work, there are always more people floating along and some cannot be rescued in time. A group de-

> cides that rather than concentrating on helping individuals who are 'drowning' in problems once they have fallen in and floated downstream, they will take a walk upstream to see why people are falling into the river in the first place. When they get a few minutes upstream they see that there are suggestive signs encouraging people to swim in the river, and stating how clean and refreshing the water is. Also a new diving board has been built, from which kids are jumping from to show off. The group then walks even further upstream and come across a shantytown built right on the banks of the river, with evidence of landslides and living huts collapsing. They spot groups of unsupervised children playing on the riverbank. The group considers whether they need to recruit more workers to rescue the people who have already fallen in downstream, remove the signs and diving board encouraging people to jump in, or change socioeconomic policy so incomes rise and no poor housing is built close to the river" (Gordon, 2013, p. 1526).

By acting usually on the downstream level, nudges are also free of conflict, avoiding power issues that are often at the heart of complex social problems and the messy realities that make social progress everything but a linear process. It is a clear absence of systems and complexity thinking. In addition, more than common anticipated or unanticipated side effects (Emery et al., 2021), interventions can lead to second-order and n-order effects that undermine their intended results over the long term. For instance, nudging people to recycle (e.g., Milford et al., 2015) may contribute to increased consumption of resources over time (Catlin & Wang, 2013), thereby sabotaging the original intention. Few, if any, nudging interventions take into account n-order effects.

Consider, for instance, a context where behavioral programs are often applied, the alleviation of poverty. Interventions may range from simply providing special nets to repel mosquitoes carrying the malaria protozoan to widely ambitious programs in poor countries that include the development of local economic capabilities through new behaviors, such as better use of fertilizers or provision of new skills to local people (see Kotler & Lee, 2009, for a comprehensive sample of these interventions in the domain of social marketing). However, these programs often fail to produce the expected results and may even aggravate the prevailing conditions (Ojomo, 2020). A good summary of how top-down, non-systemic interventions fail in this context (poverty) is provided by Saeed (1994, p. 1):

> "If there existed a social vacuum instead of a living society with a complex motivational pattern, the tasks of economic planning and implementation would be much simplified. Those of us entrusted with planning could spend our time visualizing an ideal future, and those concerned with implementation could, provided they had the inclination and the degree of control needed, fruitfully engage in bringing together the material and human resources to realize that future. Unfortunately, the social systems that have to be dealt with through planning and implementation of plans consist of human actors who may often not play their roles as envisioned by the planner but act under the influence of the pressures in life that they actually experience. Add to this the limitations of the physical resource environment and the technological choices available, and the possibilities of success of an idealistic plan prepared without adequate knowledge of the workings of the system in which it is to be implemented appear very limited, however well-intentioned the plan. It is not surprising that mixed results have come from the efforts to improve conditions in the so-called under-developed ... countries" (Saeed, 1994, p. 1).

Perhaps the best piece of criticism about the lack of systems thinking in nudging came from Chater and Loewenstein (2022). Criticizing the widespread view that social problems can be tackled 'cheaply and effectively' at the level of the individual (the *i-frame*, as they call it), the authors show how this common frame has led researchers and policymakers away from most effective and durable solutions, at the systems' level (the *s-frame*). The *i-frame*, the realm of nudge-like interventions, they argue, is politically uncontroversial, cheap, and promises big results from making cognitively frail individuals play the social game better. On the other hand, *s-frame* policies are all about changing the rules of the game, i.e., the system of rules, norms, and institutions that govern our lives. Chater and Loewenstein review examples from different contexts, such as climate change, plastic waste, and obesity, but perhaps the closest example for the discussion undertaken in this paper is in the financial domain, the problem of inadequate preparation for retirement (in USA and UK). The standard account, they argue, is that people overvalue the present as they are tempted by immediate pleasures of spending versus the delayed benefits of saving. An *s-frame* view, however, points to inadequate incomes, ill-designed retirement plans that can never produce comfortable levels of pen-

sions, and the increasing share of workers not associated with companies that offer pension plans.

Therefore, there is a clear gap concerning the need for incorporating systems and complexity thinking to address upstream levels of complex social problems. In the context of taxation, for instance, it is easier to devise nudge-like interventions to increase the collection of tax debt, but in highly unequal countries this may simply ignore structural problems that lead the tax burden to fall disproportionately on the shoulders of the poor or even the dysfunctional nature of ill-designed tax systems that are endogenous to the problem, as it is the case in Brazil (Lisboa & Latif, 2013).

Broadening theoretical lenses: The Nested Circles Model

The incorporation of broader theoretical lenses can help in overcoming the lines of criticism reviewed above. Of course, an inevitable problem is there is too much to draw from; as stated before, there is no scarcity of frameworks and theories dealing with social behavior and it is not easy to conciliate systems thinking and complexity science, by themselves vast fields, with theoretical approaches in behavioral science that tend to focus on downstream or proximal influences on behavior. Undoubtedly, the diversity of sources of influence on social behavior is immense. A good example in the taxation context is the influential framework on determinants of tax compliance proposed by Kirchler, E. (2007), one of the major voices in the so-called non-deterrence approach to taxpayer behavior that take into account more than perceived risk of punishment (see Hallsworth, 2014, for a summary on deterrence and non-deterrence approaches). Figure 1 presents Kirchler's framework, which goes way beyond 'psychologism,' including important intangible stocks, such as attitude, fairness perceptions, and tax morale.

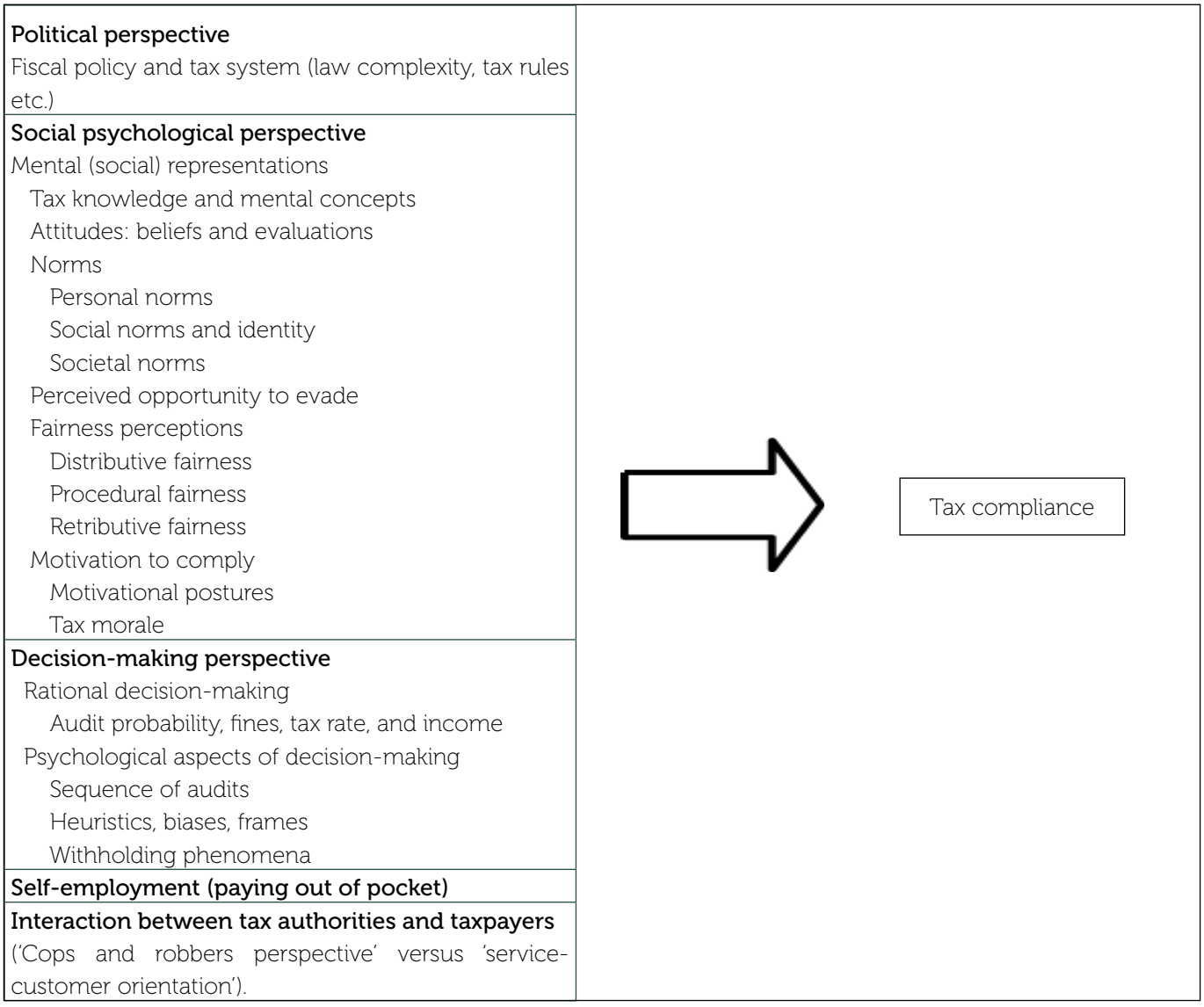

Figure 1. Determinants of tax compliance.
Note. Kirchler, E. (2007). The economic psychology of tax behaviour. Cambridge University Press.

Frameworks such as Kirchler's, however, imply a linear mindset that cannot account for the truly dynamic, complex relationships involving taxpayers' behaviors and their determinants. These determinants include, as stated above, societal intangibles that behave like stocks and take time to change, such as perceptions of trust, fairness, satisfaction, and shared mental models.

Thus, the question boils down to how to represent the myriad of influences on social behaviors in a comprehensive framework that also accounts for systems and complexity thinking. With the goal of providing a broader template for public policies and interventions in the taxation and other socially relevant contexts, we propose a theoretical model with concentric circles, each representing a source of influence on taxpayer behavior, the Nested Circles Model (Figure 2).

The model intends to overcome the limitations associated with the criticism on nudging discussed above. Of course, it is far from being a unique model when it comes to concentric or multilevel representations of influences on human behavior — for instance, Bronfenbrenner (1992) has a well-known multilevel conceptual model on child development. However, it implies new propositions regarding the pervasiveness of societal intangibles, such as trust and fairness, and a more modest role for tax agencies (or any state agency), which compete with other social actors in the midstream level (even if endowed with more power) to influence taxpayer behavior. In other words, tax agencies are but one social actor in the system and they can only hope to influence system's and taxpayers' behaviors. They do not control or command them, as it is often assumed in taxation contexts.

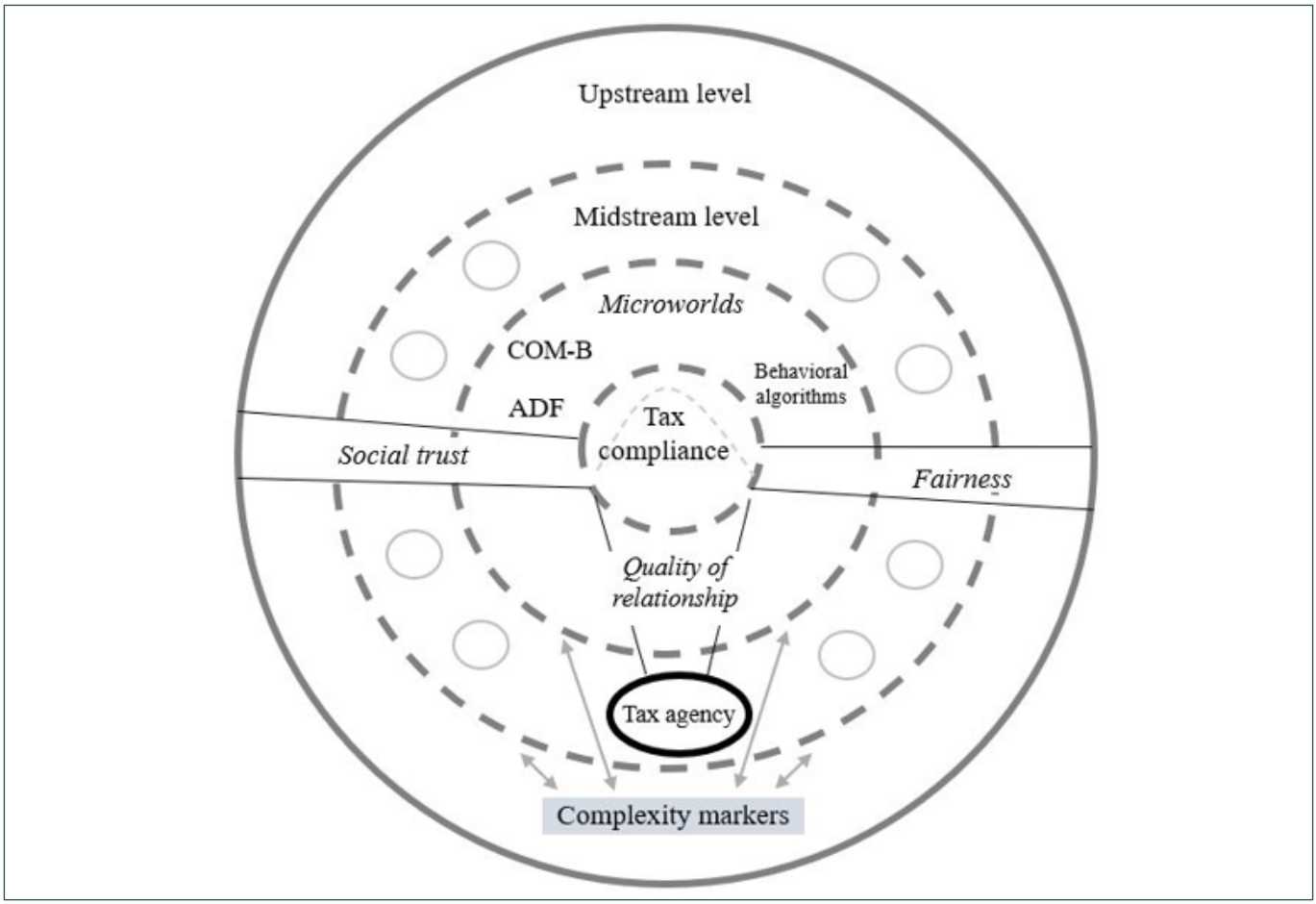

Figure 2. Nested circles model.
Note. Elaborated by the authors.

Hence, a proposition can be advanced from the model: state agencies are just one social actor in the systems where they function, even if endowed with power and legitimacy derived from the law. They can only aspire to influence social behavior; full control is an illusion.

Following the tradition of system thinking, in particular the concept of holon as proposed by Koestler (1970), the model aims at providing a comprehensive mapping of broad social factors that create attractors for the behaviors predominant in a system. Holons are semi-au-

tonomous sub-wholes in a broader hierarchy. The goal of adopting them as conceptual lenses, according to Koestler (1970), is:

> "to supplant the dualistic way of thinking in terms of 'parts' and 'wholes,' which is so deeply engrained in our mental habits, by a multi-leveled, stratified approach. A hierarchically-organized whole cannot be 'reduced' to its elementary parts; but it can be 'dissected' into its constituent branches of holons" (Koestler 1970, p. 136 author's emphasis).

Thus, each circle in the model constitutes a nested holon. We now explain each holon in more detail.

Microworlds

Life happens in microworlds: our families, educational settings, the businesses we engage with, the public transportation system, our neighborhoods, health centers and so on. Perhaps it is easier to picture all typical journeys we make every day to solve our problems, run errands, buy products, go to places (work, school, etc.) and stay in contact with friends, colleagues, and family. Thus, the places we go and the people and organizations we interact with comprise our microworlds, where national, professional, and other cultures are daily enacted, recreated, and eventually modified. It is also where collective mental models and intangible assets (such as trust and satisfaction) percolate from upstream channels, being shared and refined. In this socially constructed reality, group influences can be channeled through different mechanisms, such as groupthink (Janis, 1982), homophily (McPherson et al., 2001), and organizational cultures (Schein, 2010). In the taxation context, friends, family, colleagues, and other direct contacts can impact compliance levels, in particular in the case of taxes levied on individuals. Microworlds, depicted as the first nested circle in the model, are also where complexity markers (more on that below) influence and are influenced by the collective behavior of social agents, in an autocatalytic way.

Traditional approaches in behavioral economics and related fields, in turn, tend to be individual-centric, relying on the force of behavioral drivers as perceived by individuals, but often stripping away these broader influences that are channeled into microworlds.

Nevertheless, these approaches can be useful as a starting point and as complements to the analysis of other broader drivers. Hence, from the diverse set of popular frameworks, we incorporate two models, the ADF and COM-B frameworks. We also add the concept of behavioral algorithms, as explained below, as another useful lens to analyze (and influence) behaviors in microworlds.

When discussing social behavior, it is important to take into account degrees of compliance. Here, it is useful to borrow a proposition from the social marketing literature concerning the typical distribution of compliance or propensity to behave according to socially valued goals (Lee & Kotler, 2016). Figure 3 presents this idea in the format of a curve (which is also at the core of the proposed model — see Figure 2). The 'tell me' segment refers to the fraction of the target population that changes their behavior when adequately informed. The 'make me' segment, in turn, accounts for the existence of resistant fractions, who only perform the intended behavior under coercion (typically, by law). It is important to have this curve in mind as most frameworks focus on the 'help me' segment, where compliance may be low due to factors such as psychological or physical barriers, inadequate incentives, and so on. In any case, this heterogeneity, which may help by itself in segmenting the public, is a key characteristic of behaviors of social interest.

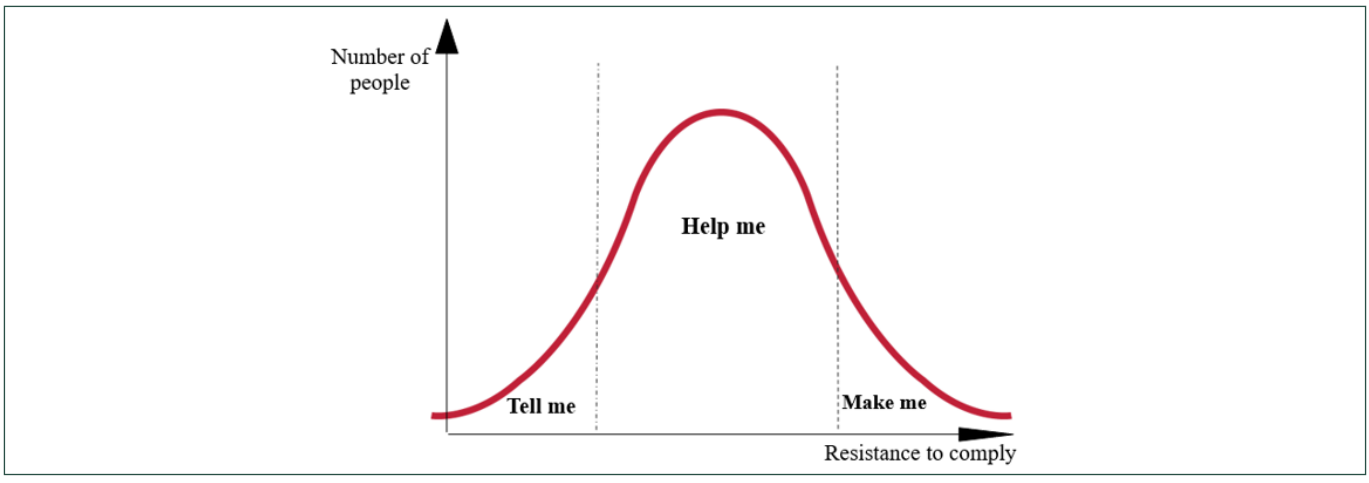

Figure 3. The compliance curve.
Note. Adapted from Lee, N. R. & Kotler, P. (2016). Social marketing: Changing behaviors for good (5th edition). Sage.

Hence, assuming heterogeneity in compliance and delving into the behavioral lenses, we start with the COM-B framework, an acronym for capability, opportunity, and motivation (Michie et al., 2013). Capabilities include physical skills but also psychological capabilities, such as knowledge, attention, and self-regulation. Opportunity includes physical (e.g., governmental branches) and social opportunities (e.g., social norms). Motivation, in turn, refers to automatic behaviors or the ones that have sufficient value and self-congruence for individuals to generate the necessary energy for their performance. One interesting expansion of the COM-B model is the behavior change wheel (Michie et al., 2011), which, like the Nested Circles Model, accounts for broader influence channels. It presents three layers in a circle: the most inner layer accounts for sources of behavior (motivation, capability, and opportunity), the second one deals with intervention functions, such as education, coercion, and incentivization, and the last layer accounts for policy categories, such as marketing, legislation, and fiscal measures.

The ADF framework (Cohen & Andrade, 2018), in turn, uses comprehensive conceptual categories to group major elements usually present in common behavioral theories. These categories are accessibility, desirability, and feasibility. Using the accessibility lever, interventions must create strong associations, by increasing attention levels and learning via personal involvement, consistency with existing knowledge and beliefs, and concrete presentation. Clear and explicit reminders at the point of action may also be used to create salience and leverage situational factors. Using the desirability lever, interventions must work on decreasing the attractiveness of current behaviors while increasing the appeal of new ones and strengthening motivation and goal commitment. In turn, using the feasibility lever, interventions must address resources and skills that are necessary to enact the desirable behaviors, while also acting on the environment, such as making superior choices defaults.

We note that both ADF and COM-B models can encompass elements from other behavioral frameworks, such as status (a desirable or motivating element), from the SCARF framework (Rock, 2008).

We also incorporate in the model the concept of behavioral algorithms, which is broader than the simple conceptualizations of behaviors used in most frameworks. The study of algorithms has a long tradition in the field of ethology (Hogan, 2017). The idea of goal-motivated, semi-fixed ingrained sequences of actions can be easily adapted from the animal domain to human behaviors with the provision of more flexibility in the latter case. Consider, for instance, the concept of behavioral chains as proposed by McKenzie-Mohr (2011). They are a sequence of behaviors that must be performed in most behaviors of social interest. McKenzie-Mohr cites composting as a representative example. It includes nothing less than a set of at least 14 behaviors: (1) travel to a hardware store to purchase a composter, (2) purchase the composter, (3) transport the composter to one's house; (4) put the composter together, (5) site the composter somewhere in the yard, (6) find a container to use to collect kitchen scraps, (7) communicate with family members about using the container, (8) place the scraps in the container, (9) take the container out to the composter (repeatedly), (10) mix the kitchen scraps with yard waste (occasionally), (11) stir the compost (frequently), (12) harvest the compost, (13) spread the compost on lawns or gardens, and (14) repeat behaviors 8 to 13 for a very long time. It is easy to see parallels in the domain of taxpayer behavior and other social behaviors.

In conclusion, behavior at the microworld level (1) has different determinants, as encompassed by the frameworks discussed above, (2) is often malleable in the 'help me' and 'tell me' segments, but (3) responds to more influences than the usual list of factors at the individual level suggests. Thus, we need to investigate these distant, often tangled influences to have a more complete picture at the systems level.

Midstream influences

As seen above, influences on social behavior range from the downstream individual level to the broader social environment (Gordon, 2013). The middle layer, however, is where lie the resources and capabilities (within organizations) necessary to change downstream behavior. Midstream influences, thus, refer to mediate social environments and all actors that populate this other layer of interest, such as professional communities, opinion leaders, social media influencers, other organizations, and, in our case, tax agencies. Figure 2 represents tax agencies as one among a myriad of social actors trying to reach their goals within that messy social reality. It is also useful to take into account the existence of networks, such as the media and professional associations, which process information, produce consensus on social issues, and influence taxpayer behavior (Korobow et al., 2007).

Upstream influences

Upstream social actors are the ones capable of producing societal, cultural, or legislative change, such as finance ministries, politicians, legislative bodies, social entrepreneurs, activists, and the media (Gordon, 2013). It is at the upstream level that structural change

happens via regulatory changes, technological developments, cultural change, and economic shifts (Hastings, 2012). Such changes may be intentional as a result of well-orchestrated efforts, which often require partnerships with upstream and midstream stakeholders and other broader, systemic approaches (Dibb, 2014; Kennedy, 2016). However, in many cases these large changes result from the nonsynchronous movements of policy channels and social actors at the midstream (policy) level, producing, in the end, patterns akin to punctuated equilibrium models — policies stay in place for a very long time followed by moments of rapid change and rearrangement (Weible & Sabatier, 2018).

Social trust, fairness, and quality of relationship: The role of intangibles

There is a plethora of societal intangibles that influence social behavior: trust, fairness, reputation, legitimacy, satisfaction, among others (Canel et al., 2020). We emphasize, in particular, the role of well-known constructs such as trust, fairness, and the quality of relationship between the tax agency and taxpayers.

Trust refers to the willingness to incur in risk when one is dealing or transacting with a third party. It is often conceived as having at least three major perceptual dimensions: competence, integrity (honesty), and benevolence — the perception that an entity puts the interest of stakeholders at least on par with its own (Doney & Cannon, 1997; Morgan & Hunt, 1994).

Fairness is an important driver of taxpayer behavior, encompassing judgments regarding distributive justice (i.e., if the system is fair and if taxes benefit the taxpayers and society as a whole) and procedural and interactional perceptions springing from the ongoing relationship with the tax agency (Greenberg, 1990). For instance, while tax audits may increase compliance in the short term, if they are perceived as unfair, they may have adverse effects on future compliance (Hirschhorn, 2021).

Finally, in the well-known slippery slope framework (Kirchler et al., 2008), taxpayer behavior depends on the interactions of two factors, trust in authorities and power of authorities, which exist on a sliding scale. We subsume power within quality of relationship, considering that, as said before, the power of a tax agency as any social actor is more like influencing behaviors than properly commanding them, even if the law confers the agency the right to punish wrongdoers. Quality of relationship may be conceived, as the other intangibles, as a stock (Warren, 2008) that increases in response to nurturing activities (especially when following a service-customer orientation, in the case of tax agencies) and decreases due to mishaps and inadequate management.

How to intervene in complex systems? Complexity markers

In the spirit of model thinking as advocated by Page (2018), we stress the benefits of simultaneously employing multiple lenses to study and intervene in a social system. In other words, behavior change may be a legitimate goal in many interventions but is far from being the only one. Instead, a systems perspective brings the question of how to evaluate performance of the broader system in the long term — in other words, what are the variables that denote a healthy state of the system under consideration?

For example, in the taxation context, Hirschhorn (2021) argues in favor of moving tax administration 'beyond gap thinking' (a clear narrow view), by considering the theoretical maximum revenue that could be collected within the legislative framework and plausible levels of resourcing.

By incorporating a systems perspective, we argue, public executives can understand why the future often matters more than the present and structure policies and interventions accordingly. This perspective can be enacted from multiple methods suited for this challenge. Social systems are complex adaptive systems, whose dynamics often rely on the interplay of diverse networks of actors (Levin, 2019; Page, 2018). Systemic approaches help in disentangling the complex web of causation behind the different dynamics, using conceptual tools such as feedback loops, nonlinearities, delays, stocks, and flows. In this sense, system dynamic modeling is a powerful method capable of representing these concepts (Sterman, 2000; 2002; 2006; 2012), but is far from the only one. There is also value in incorporating modeling tools from soft systems methodology and complexity science in general (Cabrera & Cabrera, 2015; Checkland, 1999; Waldrop, 1993). We do not argue in favor of a closed set of methods or artifacts of investigation; better value lies on the diversity of tools of lenses.

In any case, employing adequate lenses may help in producing a more complete picture of any social problem, accounting for possible effects of different intervention. Moreover, they help in identifying what may be called complexity markers, another ingredient in the Nested Circles Model. Table 2 presents major characteristics of complex social systems, serving as a blueprint for what these markers are.

Table 2. Fifteen characteristics (complexity markers) of complex social systems.

Characteristic	Description
1. Networks of heterogeneous social actors	In all social systems, the people involved can be thought of as networks of heterogeneous social actors, each one acting on a limited diet of information and self-interest. This is valid for taxpayers, citizens in general, and individuals performing other social roles, such as consumers.
2. Emergence	The behavior of the whole system is different from that of individual social actors and can be said to emerge from rules governing the actions of downstream social actors. Traffic, for instance, emerges when most people opt for driving at the same time, influencing, in turn, the decision of social actors in using other means of transportation or moving closer to their main destinations.
3. Endogeneity	The dynamics of systems arise spontaneously from their internal structure. Self-reinforcing and balancing feedback loops define how the system behaves over time. For instance, the more incentivized tax collection programs are expected, the more taxpayers avoid paying their taxes on time.
4. Nonlinearity	Effects are rarely proportional to causes. Instead, nonlinearities are the rule. A higher tax burden may produce less tax revenues.
5. Scaling	The Pareto principle, or '80-20 rule,' is useful for explaining why problems such as income inequality persist. More generally, most social problems are caused by a small percentage of segments, groups, or individuals.
6. Different time scales	Changes in systems occur on many different time scales, and such scales sometimes interact among themselves. Many policies that address symptoms in a system, such as building roads to alleviate traffic, produce benefits in the short term, only to be defeated in the long term.
7. Path dependence and hysteresis	Decisions alter the state of the world, causing changes in the system and triggering other social actors to act in response. The new situation then constrains the path for subsequent courses of action. For instance, once a country chooses to rely on roads to connect its economic centers, it is very difficult to change its transportation system to trains, for instance. The same stickiness occurs in the taxation system.
8. Delays, accumulation of stocks, and inertia	Policies usually require a long time horizon to manifest their results. Material stocks (e.g., financial resources, people) and non-material stocks (e.g., reputation, human capital, trust) accumulate over the continuous passage of time. Moreover, delays in recognizing problems and changing the course of policies create strong inertia in social systems.
9. Adaptation, learning, and exploitation	Capabilities and decision-making rules employed by social actors change over time. Adaptive systems may balance exploitation and exploration. Many social actors strive to find points of exploitation in the system, as it is common in the taxation system: all tax holes will be exploited.
10. Presence of surprising and counter-intuitive behaviors	Causes and effects are distant in time and space. The natural tendency of human beings is to pay attention to concrete symptoms. Causes are often buried under deep layers of systemic structures. Traffic is the perfect example: it is caused not by excess vehicles, but by the inadequate management of scarce resources, such as roads and the right to pollute.
11. Policy resistance	The complexity of systems overwhelms our ability to understand them. Many seemingly obvious solutions fail or worsen the underlying problem, as it is the case of tax debt collection programs (see discussion in the main text).
12. Temporal trade-off	The long-term response of a system is often different from its short-term response. Effective policies often cause worse-before-better behavior, while superficial solutions tend to produce small improvements and then make the underlying problem worse over time.
13. Resilience	Resilience is a function of redundancy, modularity, and diversity. Complex social systems have different degrees of resilience. They typically absorb most of the 'normal' disturbance from the outside, but resilience is lost when the system is optimized for efficiency — this is when tipping points may be easily crossed. COVID-19 exposed how our national economies are deeply interconnected in an 'efficient' system, depending on raw materials from abroad, a situation that created bottlenecks, scarcity, and inflation.
14. Local rationality	Bounded rational social actors strive to reach their own goals, which often are in opposition to the goals of the entire system. Taxpayers may only care about their personal cost/benefit ratio when deciding whether to comply with the tax code.
15. Balance of power and narratives	In any social system, a balance of power favors some class or network of social actors. Groups who have access to political and economic channels often control the societal mechanisms of sense-making — perceiving and interpreting problems, opportunities, and enacting pressures for change.

Note. Adapted from Carvalho. H. C. (2020). Fifteen characteristics of complex social systems. https://i2insights.org/2020/03/17/fifteen-aspects-of-complex-systems and Sterman, J. D. (2000). Business dynamics: Systems thinking and modeling for a complex world. Irwin/McGraw-Hill.

Examples and discussion

The framework allows the exploration of possibilities beyond traditional uses of behavioral sciences. Employing it as a conceptual lens, researchers and practitioners can identify leverage points for change, especially at the upstream level. With an eye to complexity markers, we cite three examples to contextualize the possible application of the model in the taxation context: the Brazilian case of VAT degradation, tax delinquency, and trust in tax agencies. We also discuss briefly how the nested circles could address other phenomena, such as water provision and corruption. In the examples below, we focus, in particular, on the systemic perspective, but the reader should bear in mind the possible use of the behavioral models discussed earlier (ADF, COM-B, and behavioral algorithms). In all cases, we identify the complexity markers (Table 2), referring them by number.

First, VAT degradation. In Brazilian states, a policy that has been widely adopted in the last decade is the so-called *substituição tributária* (tax substitution). It disfigures the traditional nature of a VAT-like tax by changing the responsibility for tax collection for a long list of products. Instead of collection at each step of the economic chain, tax agencies typically attribute to manufacturers (who are the first players in the chain), based on an estimation of final prices to consumers, the responsibility for paying the entire amount of taxes levied throughout the chain. The goal is to curb evasion, which is usually higher at the retail level (the last leg in the chain). The rationale is based on the realization that the number of retail businesses is much larger

(and harder to audit) than manufacturers. However, it is a flawed rationale as De Angelis (2016) aptly demonstrates and as a systemic/complexity lens would suggest. The policy produced different effects in the short and long term (complexity marker #12), leading to a clear degradation and the accumulation of distortions in the system over time, by imposing, for instance, the requirement for small businesses to anticipate the collection of the VAT-like tax in every purchase from suppliers outside the state (in Brazil, VAT is a state tax). In this context, managing the tax gap becomes challenging, as it is paradoxically more difficult and time-consuming to detect tax evasion in transactions like these. Tax debt, in the end, may increase in volume (or remain at the same previous levels) and degrade in terms of probability of payment (complexity markers #1, #6, #8, #9, #11, and #14). Hence, employing nudge-like interventions or restricted behavioral frameworks in this case can increase the efficiency in tax debt collection up to a point but the root causes of the problem would remain unchanged. Worse, successes in the downstream phase (i.e., increasing collection with the aid of nudges) can preclude proper inquiry about the true root causes. In sum, this is a clear case calling for a framework such as Nested Circles to tackle the underlying problem in all of its complexity.

The second example concerns tax delinquency or tax dodging, a common problem faced by all tax agencies in the world. Of course, traditional prescriptions from ADF, COM-B, and behavioral algorithms frameworks can be the first line of choice for an intervention, as many tax agencies have been doing throughout the globe. However, similarly to the first example, this downstream approach often leaves the structures producing the undesirable behavior unchanged. For example, it is common in Brazil the recurrent concession of incentives (for instance, diminished fines) in special tax debt collection programs. Instead of addressing the root causes behind an increasing amount of unpaid but recognized tax debt (such as the low efficacy of tax collection), politicians resort to offering benefits for immediate payment, hence decreasing overall fairness in the system and changing taxpayers' expectations for good. Figure 4 presents a causal loop diagram, a usual tool in the system dynamics playbook (Sterman, 2000), depicting the problem. By expecting similar programs in the future, agents adapt their behavior, leading to the creation of a self-fulfilling prophecy in the system (complexity markers #3, #7, #9, and #12). Take notice that, as said above, we could easily employ behavioral tools from the microworlds nested circle (ADF, COM-B, or behavioral algorithms frameworks) to accelerate take-up and boost tax collection in such initiatives. However, only by employing modeling approaches suited to the complexity of the problem could one uncover the true dynamics at play and devise alternatives for upstream interventions based on tools such as advocacy (for instance, to change the law).

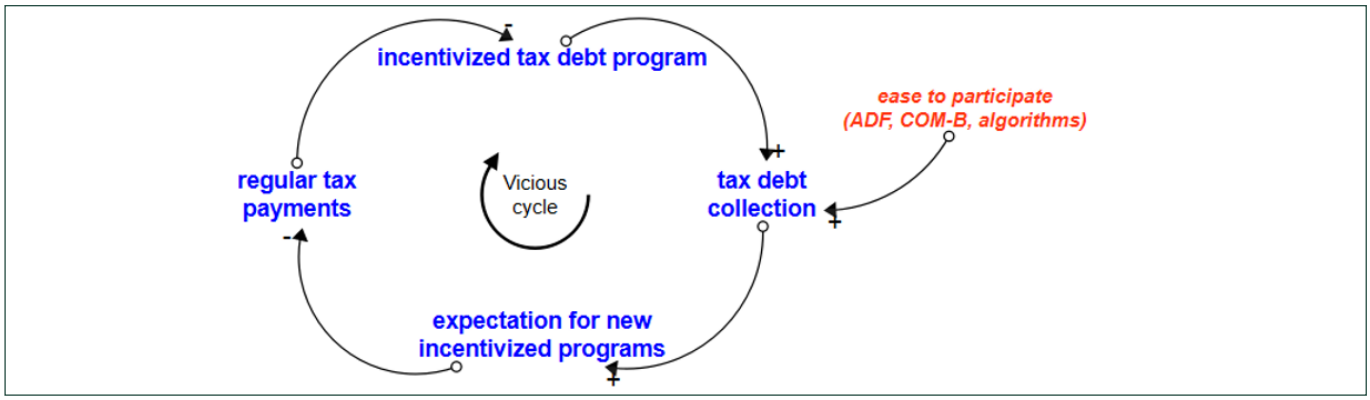

Figure 4. Causal loop diagram for the recurrent tax debt collection programs in Brazil.
Source: Elaborated by the authors.

The third example concerns a common cause of inadequate behaviors in taxation: low trust in tax agencies. Building trust may be difficult using nudge approaches (complexity markers #6 and #8). Some interventions, for instance, have offered taxpayers some degree of choice on how governments spend tax revenues (e.g., Alm et al., 1999) but it is debatable whether this approach alone can be sufficient. However, combining this kind of intervention with branding programs (that act on building intangible assets, such as brand image) and experience management (thus conveying better perceptions of technical competence) may be a superior bet, especially in developing countries, where low trust in government agencies (and in other citizens in general) is the norm.

Consider now an example from another context, the case of contaminated water sources discussed by Glennerster and Takavarasha (2013). Suppose you are

in charge of evaluating alternatives for improving the quality of water with the goal of avoiding diarrhea in children, as usually international aid agencies do. You calculate the cost-effectiveness of improving the water sources from which citizens collect their water (i.e., building infrastructure for piped water) versus providing chlorine to be added to the water stored in their houses (usually retrieved from wells). In the example, the conclusion does not favor funding for building and maintaining the structure for piped water because, essentially, of higher costs. However, the approach backed by this paper would add different considerations to the table. For instance, one may question the framing of the problem as it does not consider benefits beyond preventing diarrhea (such as freeing time used to carry water and bringing about further opportunities for economic development). Moreover, the redundancy (i.e., resilience, complexity marker #13) to be brought about by a new infrastructure may protect the community against unexpected threats, such as contamination in wells by mercury or toxic metals. This 'expect the unexpected' mindset is typically absent in traditional impact evaluations.

Other social phenomena such as corruption could also benefit from the framework. Corruption is often conceptualized through individualistic lenses (see De Graaf, 2007, for a review of major theories), but it is often associated with low societal trust and self-reinforcing mechanisms at the upstream level, such as culture, governance, and politics (Anderson et al., 2019). It is easy to set a phone number to stimulate whistle-blowers while the structures that increase corruption, such as low transparency and concentration of power, are left unchanged (complexity markers #9, #11, and #14).

Finally, the design of policies to intervene in complex social systems must respect two major premises. First, it is the problem that should define the choice of the conceptual tools, instead of the other way around. Often what is framed as a behavioral problem may be better conceptualized as a systemic one, as the examples above suggest. Second, organizational resources, capabilities, experience, legitimacy, and access to stakeholders, all elements in the midstream and upstream levels, put an additional constraint on the choice of the tools and the focus of intervention. For instance, it may be the case that a particular tax agency has a strong reputation that affords access to lawmakers. Hence, this relationship may afford constant updating in tax laws. On the other hand, consider a scenario in which tax agencies do not have this special status, having to resort to other low leverage means to influence taxpayer behavior, such as nudges or education.

CONCLUSION

In this article, we reviewed common interventions in the tax context that have been inspired by the creation of nudge units. After discussing limitations and presenting the major lines of criticism, we presented a framework with the goal of integrating multilevel thinking on causes and influences of taxpayer behavior.

The major contribution from the proposed framework is moving away from the 'psychologism' often associated with traditional nudge interventions. By balancing downstream, midstream, and upstream factors that influence behavior change and behavior maintenance, the conceptual model may help in fostering critical thinking and broader approaches to social problems. In addition, by relying on the concept of complexity markers, the model identifies common traps faced by run-of-the-mill policies, suggesting a template for the development of better policies.

Among the limitations, there is no formal modeling in the paper, which remains as suggestion for future work. We acknowledge empirical testing may be a barrier in such holistic frameworks (this criticism is often leveraged at other socioecological models — Neal & Neal, 2013), which call for less reductionist approaches, such as system dynamics and agent-based modeling. Suggestions also include the application of the framework to other problems in taxation. For instance, how can the elements discussed here help in improving the quality of the Brazilian tax system, marked by decades-long failed attempts at reformation?

Finally, there is no impediment to applying the model to other contexts, such as in private management. For instance, how often are structural organizational problems framed as behavioral ones in this context? Low workforce commitment may reflect low quality of relationship and inadequate management of motivational drivers, such as job satisfaction (an intangible stock). Different timescales may create barriers for investments in human capital as the true effects may vary over time, preventing firms from getting the most from their workforce and benefiting from organizational learning (see Rahmandad, 2008, for a clever modeling of this phenomenon). On the other hand, there is no scarcity of downstream, microworlds approaches to increase 'organizational happiness' and similar short-term, deceiving outcomes.

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