

# Kantian–Nashian interaction and petty tax corruption in developing countries

Binh Tran-Nam

*School of Accounting, Auditing and Taxation, UNSW Sydney, Sydney, Australia*

Received 19 May 2023  
Revised 24 July 2023  
Accepted 2 August 2023

## Abstract

**Purpose** – This paper attempts to develop a simple, static model of tax administration that is capable of explaining the widespread collusive petty tax administration corruption observed in developing countries.

**Design/methodology/approach** – This paper utilizes a positivist research framework and adopts a theoretical method of analysis, although secondary data will also be mentioned to support theoretical arguments whenever it is appropriate to do so.

**Findings** – A high rate of collusive tax corruption is inevitable in developing countries.

**Research limitations/implications** – The model is static and needs to be extended into a dynamic model. **Practical implications** – Traditional enforcement tools such as higher audits or a higher penalty regime against tax evasion do not work. Tax simplification can lessen the incidence of tax corruption.

**Social implications** – Fighting tax corruption requires significant changes in the attitudes of taxpayers and tax auditors.

**Originality/value** – This paper combines the literature on Kantian economics and tax compliance in an innovative fashion.

**Keywords** Developing countries, Kantian, Nashian, Petty tax corruption

**Paper type** Research paper

## 1. Introduction

I first came across Professor Ngo Van Long when I enrolled in the Master's degree in economics by course work at the Australian National University (ANU) in early 1977. Having just freshly graduated from ANU with the Crawford Prize for the best doctoral thesis, he was then a young lecturer in the then most powerful department of economics in Australasia. He offered a course in mathematical economics, which I took as an optional subject for my study. His lecture notes would later become the materials for his well-known joint book on static and dynamic optimization (Leonard & Long, 1992).

It has been more than four and a half decades, yet I can still vividly recall sitting in Professor Long's ANU office and listening to his instructions. With an ever smiling face, he patiently showed me how to apply mathematical methods to analyze the effects of taxation in a market. Even long after my graduation from ANU, he continued to offer me guidance in

---

© Binh Tran-Nam. Published in *Fulbright Review of Economics and Policy*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licences/by/4.0/legalcode>

This paper is a substantially revised version of a paper presented at the international conference *From Economic Theory to Economic Policy: Contributions of Ngo Van Long*, organized by the *Fulbright Review Economics and Policy*, Fulbright University Vietnam, Ho Chi Minh City, 22–23 February 2023. This paper builds upon the work of the late Professor Ngo Van Long and is dedicated to Ngo Van Long. Valuable comments from two Reviewers have resulted in considerable improvements of the paper. The author gratefully acknowledges the reviewers and the usual caveat applies.



---

understanding the intricacies of economic theory through his vast and deep understanding of the subject matter. While I did not become an economic theorist, the rigorous training that I received from him (and Professor Murray Kemp, my PhD thesis supervisor) has always been fundamentally important to my research.

As a former student of Professor Long, it is thus my privilege to contribute a paper to this special issue of the *Fulbright Review of Economics and Policy* in his honor. To this end, it is noted that a large part of his latest publications is concerned with the behaviors of and interactions between Kantian and Nashian economic agents (see, for example, [Grafton, Kompas, & Long, 2017](#); [Long, 2016, 2017, 2017; 2018, 2020; 2020, 2022](#)). Further, as an economic theorist, he was sufficiently interested in various aspects of corruption (see, for example, [Dalgic & Long, 2006](#); [Kemp & Long, 2009](#); [Long & Sengupta, 2008](#)). To dedicate a paper to Professor Long's memory, it is my intention to weave the insights expounded in his work with my own research interest in taxation.

The principal aim of this paper is to propose a simple, theoretical tax collection model to explain the observed level of petty tax corruption in developing countries such as China, Indonesia or Vietnam. The model is constructed by examining the static (one-off) interaction between business taxpayers and tax auditors, who are assumed to be either Kantians or Nashians (meanings to be elaborated in [Section 4](#) of the paper). A major contribution of the paper is the introduction of impure or conditional Kantian behavior. A Kantian agent may switch their behaviors to Nashian if the reward from so doing is sufficiently high. This assumption permits a richer analysis of the phenomenon of tax corruption in practice. In addition to the insights from Professor Long's recent work, the paper is also motivated by the fact that to date insufficient attention has been paid to the role of tax system complexity in the tax corruption literature. In this respect, the paper also attempts to formally link tax complexity to tax corruption, albeit in a simplistic manner.

The scope of the paper is mainly confined to business taxpayers, petty (administrative) tax corruption and developing countries. Unless otherwise stated, tax corruption means administrative tax corruption in the remainder of the paper. However, it will become apparent that the reasoning underlying the model can also be applied to individual taxpayers or developed countries, although in a more limited fashion. The paper utilizes a positivist research framework and adopts a theoretical method of analysis although secondary data will also be mentioned to support theoretical arguments, whenever it is appropriate to do so.

The remainder of the paper is structured as follows. [Section 2](#) provides a comprehensive but succinct review of conceptual issues relating to tax corruption, particularly in the context of developing countries. [Section 3](#) then presents some stylized facts about tax corruption to prepare the ground for the development of the theoretical model. [Section 4](#) briefly discusses the key features of Kantian economics and then considers it in the context of tax administration. The basic elements of theoretical model are described in [Section 5](#) whereas [Section 6](#) examines key implications of the model. In addition to the Kantian and Nashian interaction, the model also embraces elements of the tax compliance such as tax evasion, tax avoidance and tax compliance costs. [Section 7](#) offers some summary remarks.

## 2. Conceptual issues

In this section we will in turn consider the definition, types, causes and impacts, determinants, measurement of tax corruption and tax administration and corruption.

### 2.1 Meaning of tax corruption

We commence with a brief discussion on the meaning and characteristics of tax corruption. It seems sensible to perceive tax corruption as a specific form of corruption. Since corruption is

essentially a social concept, its meaning is both relative and context dependent. What is considered as corruption at a particular place and time in a particular context may not be regarded so at a different place and time or in a different context. For a comprehensive review of the meaning of corruption, the interested reader is referred [Rosid \(2017, ch. 3\)](#).

Corruption is often characterized in terms of two essential characteristics: illegal use/ exercise of public office and illegitimate private gains. In this sense, tax corruption can be defined as the “behaviour on the part of tax officials to improperly and unlawfully enrich themselves, or those close to them, by the misuse of the public power entrusted to them” ([Li, 1997, p. 475](#)). Note that the benefits to corrupt tax officials may consist of financial or non-financial rewards. More importantly, the benefits may be extended to people who are close to the corrupt tax officials. This is relevant in developing countries where the traditional culture encourages sharing, especially among members of the extended family or local community [1].

A key limitation of the above definition is that it does not explicitly mention the role of taxpayers or the interaction between taxpayers and tax officials. In many cases, particularly in business taxation, taxpayers who bribe tax officials may be motivated by their intention to pay less than they are legally liable to, whereas tax officials who receive bribes will also find it necessary to hide their receipt of illegally obtained income. Thus, tax corruption gives rise to a specific type of tax evasion. In summary, instead of thinking of tax corruption as a strict subset of corruption, it is more helpful to view tax corruption as an intersection between corruption and tax evasion.

### *2.2 Types of tax corruption*

As discussed in [Nguyen, Doan, and Tran-Nam \(2017\)](#), tax corruption can be classified by reference to the stage of tax system operation, scale of corruption, frequency of corruption, or the process of corruption. In terms of the operation of the tax system, corruption may happen at tax policy making, tax enforcement or tax dispute resolution. Tax policy corruption is an example of political corruption ([Transparency International, 2017](#)) in which tax policymakers abuse their position for private gains by granting unjustified tax benefits to some taxpayers. While this conceptual possibility exists, it is generally extremely difficult to find evidence of tax policy corruption in practice. Tax administration corruption which arises from tax enforcement is the focus of the present paper.

In terms of scale, tax corruption can be petty and grand ([United Nations Development Programme, 2008, p. 6](#)). Petty tax corruption refers to the bribes (known in Vietnam as informal or unofficial payments) received by relatively low-level tax officials (tax inspectors/ auditors) in their interaction with taxpayers (individuals and firms). Grand tax corruption, on the other hand, refers to the abuse of public power by high-level tax officials, such as directors or senior staff, involving much larger sums of money. Tax corruption in this article refers to petty tax administration corruption, unless otherwise stated.

In terms of process, it is possible to distinguish between extortionary and collusive tax corruption. In the case of extortionary tax corruption, it is the tax official who makes the demand for the bribe in the first place. In the case of collusive tax corruption on, the bribery can be suggested by either or both the tax official and taxpayer. Whether tax bribery is extortionary or collusive, the amount of the bribe is arrived at after a process of negotiation and tends to be proportional to the amount of taxation that is in dispute.

### *2.3 Causes and impact of tax corruption*

The causes for corruption have been well discussed in the literature (see, for example, [Tanzi, 1998](#)). In the case of tax corruption in developing countries, there are both general and specific causes. General causes include political (lack of transparency, accountability and genuine will

to fight corruption), institutional (lack of a competent public sector; no objective measure of public sector performance; job-buying practice in the public sector), cultural (sharing within the extended family of local community, compromising and paternalistic culture) and economic (low wages in the public sector). Specific causes include tax complexity, discretionary power of tax officials (e.g. assessing turnover for the purposes of presumption taxes), ineffective tax administration (frequent site visits to business taxpayers, no effective system of independent tax dispute resolution), poor business practice (poor tax and accounting record keeping) and business motive (desire to pay as little tax as possible).

Tax corruption gives rise to harmful consequences on social welfare and economic development (see, for example, Purohit, 2007). Nguyen *et al.* (2017, p. 293) point out five such negative impacts: loss in the tax revenue collected (particularly damaging to developing and transition countries), distortion in the allocation of resources (reducing economic efficiency and decreasing foreign direct investment inflows), reduction in tax equity (those who enjoy the benefits of tax corruption tend to be relatively high income individuals), adverse effect on tax morale (see Rosid, 2017) and reinforcement of public perception of general corruption (threatening the political legitimacy of the government).

But it is well known that corruption can be wheel sanding or wheel greasing (see Nguyen, Ho, Le, & Nguyen, 2016; Nguyen, Doan, Nguyen, & Tran-Nam, 2016 for a review of the theoretical arguments and empirical evidence regarding the two hypotheses). A recent empirical study of small and medium enterprises in Vietnam by Doan, Vu, Tran-Nam, and Nguyen (2021) indicates that petty tax corruption may encourage firm's innovation inputs and outputs. These authors suggest that collusive tax corruption may assist firms, at least in the short term, in two different ways: tax "savings" from corruption represents an important source of fund for investment, and "tax-abiding" businesses may receive preferential treatments from other government agencies.

#### 2.4 Determinants of tax corruption

There is very limited empirical evidence on the determinants of tax corruption at the macro level. In a study of 47 countries drawn from the World Economic Forum's *Global Competitiveness Reports 2002–04* and other sources, Richardson (2006) finds that, after controlling for economic development, size of government and democracy, the higher the level of power distance [2] and uncertainty avoidance, the higher is the level of petty tax corruption in a country. In a similar study involving 48 countries, after controlling for the three economic and political variables mentioned above plus the top marginal individual income tax rate, Richardson (2006) finds that tax evasion and tax law complexity directly affect petty tax corruption while the level of self-assessment is inversely related to petty tax corruption. While those findings are plausible, the potential endogeneity between tax corruption and independent variables (such as uncertainty avoidance or tax evasion) casts some doubts on the applicability of the ordinary least squares (OLS) estimation method employed.

#### 2.5 Measurement of tax corruption

Measuring tax corruption is intrinsically difficult for two main reasons. First, due to its secret and illegal nature, direct and systematic observations of tax corruption are not possible. Secondly, tax corruption has several different dimensions, and it is thus not easy to combine these aspects into a single measurement or index. Thus, it is very problematic to arrive at a set of measures of tax corruption which are comparable across countries and consistent over time.

Broadly speaking, tax corruption can be measured directly or indirectly. A direct, objective measurement of tax corruption may include, for example, the frequency and the amount of bribery that a taxpayer makes to tax officials. Such information can in principle be

collected from taxpayers through the means of a questionnaire- or interview-based survey. A direct, objective measurement of tax corruption can be further categorized into an absolute measure (e.g. the average dollar value of the tax-related bribes) or a relative measure (e.g. the ratio of bribe payments to tax liability or the ratio of bribe payments to firm's total costs or profits). A direct, subjective measurement of tax corruption seeks to obtain (normally informed) views/perceptions of relevant stakeholders such as tax officials, business entities, institutional agencies (including donors) and individuals through questionnaire-based surveys. This is the most widely used approach in gauging the level of tax corruption in countries around the world.

An additional means to assess the extent of tax corruption is to rely on a set of indirect measures, which can be either objective or subjective. For example, it is well known that tax corruption often occurs as a result of the interaction between tax officials (inspectors and auditors) and taxpayers. Thus, in the case of tax corruption, indirect measures may include the Paying Taxes indicators compiled by the World Bank [3].

### *2.6 Tax administration and tax corruption*

There is a small but growing body of theoretical literature on corruption in the context of tax administration. [Becker's \(1968\)](#) economics-of-crime framework gave rise to a general model of administrative corruption ([Becker & Stigler, 1974](#)). In this model, the public official chooses the number of corrupt acts to maximize expected income. The model suggests that the public official's probability of committing corrupt activities depends positively on the private sector wage and the benefit from the corrupt act and negatively on the probability of being caught, the size of the fine if caught and the public sector wage. Petty tax administration corruption is formally analyzed in [Chander and Wilde \(1992\)](#). Their key finding is that in the presence of corruption, audit rates are generally higher than in its absence. In a paper on why corruption and the unofficial economy can persist, [Çule and Fulton \(2009\)](#) demonstrate that business and tax audit culture can create multiple equilibria. [Vasina \(2003\)](#) examines the optimal strategy for tax enforcement in the presence of tax corruption.

## **3. Stylized facts about tax corruption**

This section briefly summarizes some stylized facts about tax corruption, bearing in mind that information about tax corruption is much less readily available than that about general corruption. These empirical facts will then be incorporated in the formulation of the theoretical model. Note that while the specific examples are drawn from Vietnam, they are generally applicable to most other developing and transition countries.

First, while tax corruption is a global problem, the evidence suggests that it is most prevalent and serious in developing countries. The prevalence of tax corruption in developing countries can be indirectly supported by the strong negative correlation between corruption perceptions index (CPI) [4] and the level of economic development ([Transparency International, 2023](#)). Some more specific data is also available. A 2012 survey sponsored by the World Bank and Government Inspectorate of Vietnam suggests that tax officials are identified by businesses as the public officials creating the most difficulties and the ones that have been given the most unofficial payments and gifts ([World Bank and Government Inspectorate of Vietnam, 2012](#), pp. 44–45).

Further, many transition economies are known for their bureaucratic administration and burdensome regulation. For example, in the 2015 calendar year, paying taxes in Vietnam took 540 hours which was more than 2.5 times longer than the average of the East Asia and Pacific countries (198 hours) ([World Bank, 2017](#)) [5]. Similarly, the number of tax payments in Vietnam in 2015 was 31 times which also far exceeded the average of the East Asia and

Pacific Region (22.9 times). Facing this business environment, there is an incentive for firms to pay bribes to obtain better, faster and more certain government services and decisions (applications, licenses, tax audits, etc.).

Secondly, enterprises around the world, including those in developing countries, have to maintain their tax records, calculate, report and pay a variety of business taxes t, especially corporate income tax (CIT) and value added tax (VAT) and deal with tax administration agencies on an on-going basis. Their frequency of their tax reporting typically depends on the size of their annual sales revenue (more frequent reporting for relatively larger enterprises). The tax administration agency will verify and randomly post-audit the tax filings of some enterprises for tax compliance. In addition, the tax administration agency may conduct tax audits of all enterprises at regular intervals, say, every three to five years. Tax corruption is likely to happen during in-person visits of the government tax officials to the enterprises.

Thirdly, the tax/accounting rules and procedures in developing and transition countries tend to be prescriptive with little room to maneuver. The tax officials appear have many discretionary powers in interpreting the tax laws, and taxpayers have little recourse to independent tax dispute resolution. To pressure businesses to make unofficial payments, tax officials may rely on common practices such as sticking to ambiguous tax rules/procedures and prolonging tax audit time.

Fourthly and finally, despite the discretionary power of tax officials, a very high proportion of tax bribes are not extortionary. For example, in the case of Vietnam, unofficial payments are actively suggested by businesses (almost 90% of all cases) and only in about 10% of cases are the unofficial payments demanded ([World Bank and Government Inspectorate of Vietnam, 2012](#), p. 46). This has been confirmed by an independent survey based on a random sample of household businesses indicating that about 70% of the respondents always or often collude with tax auditors for mutual benefits ([Dang, Phung, & Ninh, 2016](#), p. 413). In addition, only a small fraction of respondents (about 13%) feel guilty about engaging in such an unlawful conduct. In fact, many Vietnamese businesses perceive that corruption is a normal aspect of doing business and that they engage in corrupt activities to follow the “rules of the game” ([Nguyen, Ho, Le, & Nguyen, 2016](#); [Nguyen, Doan, Nguyen, & Tran-Nam, 2016](#), p. 361).

#### 4. Economic behaviors and interaction

##### 4.1 *Kantian vs Nashian behaviors*

Cooperation is a product of homo sapiens evolution that has been reinforced by norms of behavior. [Elster \(2017\)](#) distinguishes between moral and social norms. Social norms involve punishment by third parties while moral norms need not be associated with external punishment. When Adam Smith developed his economic theory, he did have in mind self-interested economic agents who also abide to social and moral norms [6] ([Smith, 1790](#), Part III, Chap. 6, p. 190). However, the Marginal Revolution and the rise of neoclassical economics have replaced the moral economic agent by the rational, amoral economic agent. Using game theory terminology, a rational, amoral agent may be called a Nashian agent who strives to maximize her utility taking as given the action of others (see, for example, Long, 2-16; 2018).

While many eminent economists have long recognized the important role of morality in economic behavior and interaction, it is [Laffont \(1975\)](#) and [Roemer \(2010, 2015\)](#) who first formalized Kantian ethics in economic theory [7]. In particular, Roemer provides an operational definition for Kantian behavior. A Kantian agent would deviate from a proposed equilibrium profile only if she would be better off when all other individuals deviate likewise. This contrasts with a Nashian agent defined above. As parents, people typically teach their children the Kantian norm, for example, do not throw rubbish on the beach; how would you like if everyone throws rubbish on the beach? This is clearly not Nashian reasoning.

The work of Laffont and Roemer has been generalized in various directions. Long (2016) and Grafton *et al.* (2017) examined the concept of Kant–Nash equilibrium in an economy in which Nashian and Kantian economic agents coexist. Further, Long (2020) suggests that, through moral education, individuals derive a warm glow for adhering to the Kantian ethics. Thus, parents have collectively an incentive to provide moral education to their children.

#### *4.2 Kantian–Nashian interaction in tax administration*

The formal distinction between Kantian and Nashian behaviors can supplement our understanding of tax compliance. There are several competing theories of tax compliance, namely, the deterrence model, the fiscal psychology model and behavioral model. Since these models have been extensively reviewed in the literature (see, for example, Andreoni, Erard, & Fienstein, 1989; Hashimzade, Myles, & Tran-Nam, 2013), it is not useful to reproduce that discussion in detail here. Suffice to say that each model is associated with a particular type of taxpayers. For example, in the fiscal psychology model, taxpayers are largely assumed to be Kantian. Further, no single model is by itself capable of offering a complete and consistent explanation of the full range of tax compliance behaviors observed in practice.

Since the deterrence model can be modified using the Kantian–Nashian dichotomy to study tax corruption, it is helpful to consider the model in more detail. The deterrence model is based on the income tax evasion work of Allingham and Sandmo (1972), which can be viewed as an application of the economic theory of crime developed by Becker (1968). Under this approach, a rational taxpayer will evade income tax so long as the (marginal) benefit from evasion exceeds the expected (marginal) cost of being caught and punished. The deterrence model has been extended in various ways, for example, a more realistic formulation of tax penalty (Yitzhaki, 1974), [8] the role of tax auditors (Yitzhaki & Vakneen, 1988), mixture of honest and dishonest taxpayers (Erard & Feinstein, 1994) and the relationship between general corruption and firm tax evasion (Alm, Martinez-Vazquez, & McClellan, 2016).

From the perspective of this paper, the deterrence model rests on two critical assumptions. First, all taxpayers are Nashian and, secondly, all tax auditors are Kantian. There are other implicit assumptions, but they are not critical. For example, the deterrence model also assumes that tax auditors are highly competent so that they never fail to detect tax evasion during tax audits, if tax evasion actually occurred. Obviously, there cannot be petty tax administration corruption in the presence of pure Kantian tax auditors. To permit the possibility of tax corruption, some tax auditors have to be Nashian. Similarly, to allow for the possibility that some taxpayers report their income honestly, it is necessary to assume that some taxpayers are Kantian.

Unlike previous studies on Kantian economics, we do not assume absolute or pure Kantian preferences. Rather, we assume that there is an asymmetry between Kantian and Nashian agents. A Nashian agent will remain Nashian in all circumstances. However, a Kantian agent may, in certain circumstances, switch their behaviors if the reward from so doing is sufficiently attractive. No one is a saint, and everybody has a price! There exists a cost (benefit) threshold above which a conditional Kantian taxpayer (tax auditor) will switch into being Nashian (to be further elaborated in the next section). This behavior-reversal assumption is motivated by empirical observations regarding tax administration in developing countries [9].

### **5. The theoretical model**

We are now ready to formulate and examine a simple, static, partial equilibrium model of tax administration to account for petty tax administration corruption. The basic elements of the model are as follows.

### 5.1 Tax policy and administration

Business taxpayers typically face a variety of taxes imposed by the government. Following the long-held tradition in tax compliance research, we focus on business income tax. Under the income tax law, taxable income ( $Y$ ) is equal to business revenue minus deductible expenses. The income tax liability of a business taxpayer ( $T$ ) is given by

$$T = \begin{cases} tY & Y \geq 0 \\ 0 & Y < 0 \end{cases} \quad (1)$$

where  $t$  ( $0 < t < 1$ ) is the exogenously given income tax rate [10]. Since the income tax law is complex, there is no unique taxable income for any given set of tax data. Instead, the true income tax liability of any taxpayer is assumed to lie within an interval  $[\underline{Y}, \bar{Y}]$ .

Under self-assessment, each taxpayer is legally required to keep tax records, calculate taxable income, report and pay income tax (if it is positive). Any business taxpayer is subject to tax audit at random. Tax auditors look for evidence of tax evasion [11] and tax avoidance [12]. A taxpayer is said to evade taxes if her reported income ( $Y^D$ ) is lower than  $\underline{Y}$ , the minimum level of acceptable income. In this case, the taxpayer will have to pay a penalty which is proportional to the difference between the assessed income ( $Y^*$ ) and the reported tax where  $Y^*$  lies strictly within  $\underline{Y}$  and  $\bar{Y}$ . A taxpayer is said to avoid taxes if her  $Y^D$  is greater than or equal to  $\underline{Y}$ , but less than  $Y^*$ . In this case, she will pay top up tax which is equal to the tax rate multiplied by the excess of  $Y^*$  over  $Y^D$ . That is, there is no penalty for tax avoidance. If the business taxpayer overpays income tax ( $Y^D > Y^*$ ), she will receive a refund which equals to the amount of tax overpayment.

In symbols, the tax evading taxpayer, if she is caught, is required to pay an additional tax ( $\Delta T$ ) in accordance with the following formula:

$$\Delta T = f \times (Y^* - Y^D) \quad (2)$$

where  $f$  ( $> t$ ) is the (exogenously given) tax penalty rate. If the business taxpayer avoids taxes, her additional tax ( $\Delta T$ ) will be given by

$$\Delta T = t \times (Y^* - Y^D) \quad (2')$$

Note that, if  $Y^D > Y^*$ ,  $\Delta T$  becomes negative so that taxpayer receives a refund of  $t \times (Y^D - Y^*)$ .

### 5.2 Taxpayers

There are a fixed and large number of business taxpayers ( $M$ ) in the tax system. A business taxpayer can be an individual or a legal entity (e.g. a company). For ease of analysis, it is conveniently assumed that every business taxpayer behaves like an individual. This assumption allows us to speak of a well-defined and stable taxpayer's compliance preference. Taxpayers are heterogeneous in terms of revenue and cost structures and tax compliance preferences. Before tax audit, there are  $M_K$  (conditional) Kantian taxpayers and  $M_N$  Nashian taxpayers.

For convenience, it is assumed that taxable income of every taxpayer is positive. A (conditional) Kantian taxpayer will never choose to evade taxes. In good faith, she will report her income ( $Y_{Ki}^D$ ) at the minimum level of acceptable income, i.e.  $Y_{Ki}^D = \underline{Y}_{Ki}$  ( $i = 1, 2, \dots, M_K$ ). But she has a behavioral-reversal threshold  $\alpha_i$  (a monetary amount), which is assumed to be exogenously given. If the costs of tax audit are less than  $\alpha_i$ , she will be willing to incur the full additional costs of tax audit. If the costs of tax audit turn out to exceed  $\alpha_i$ , she will be willing to bribe tax auditors to avoid paying the full additional costs.



In contrast, a Nashian taxpayer will always choose to underreport income, bearing in mind the risk of being audited and caught for tax evasion. She will report her income ( $Y_{Nj}^D$ ) as fraction of the minimum level of acceptable income, i.e.  $Y_{Nj}^D = \delta_i \underline{Y}_{Nj}$  where  $0 < \delta_i < 1$  ( $i = 1, 2, \dots, M_N$ ). A Nashian taxpayer is always willing to offer bribes to avoid paying the full costs of tax audit. Conceptually, as a conditional Kantian  $i$ -th taxpayer's behavioral-reversal threshold  $\alpha_i$  ( $i = 1, 2, \dots, M_K$ ) approaches zero/infinity, she is approaching a Nashian/pure Kantian taxpayer.

### 5.3 Tax auditors

There are a fixed and large number of tax auditors ( $N$ ) in the tax system. Tax auditors are assumed to be able to detect tax evasion and tax avoidance, if these have occurred, during tax audits. Further, each of them is capable of completing  $a$  number of tax audits during the period under study. It is further assumed that the number of tax auditors is much smaller than that of taxpayers so that  $aN < M$ . Tax auditors are heterogeneous in terms of their professional ethics. Before tax audit, there are  $N_K$  (conditional) Kantian tax auditors and  $N_N$  Nashian tax auditors.

Each (conditional) Kantian tax auditor is associated with an exogenously given behavior-reversal threshold  $\beta_j$  (a monetary sum). If her personal gains from tax audit are less than  $\beta_j$  a (conditional) Kantian tax auditor will neither negotiate nor accept tax bribes. However, if her personal gains from tax audit exceed  $\beta_j$  she will be willing to engage in collusive corruption with the audited taxpayer. In contrast, a Nashian tax auditors will always demand tax bribery first (extortionary corruption) whenever the opportunity arises. Conceptually, as a conditional Kantian  $j$ -th tax auditor's behavioral-reversal threshold  $\beta_j$  ( $j = 1, 2, \dots, N_K$ ) approaches zero (infinity), she is approaching a Nashian (pure Kantian) tax auditor.

### 5.4 Tax audits

A tax auditor seeks to determine the "true" taxable income of the audited taxpayer by checking tax data provided by the taxpayer and interpreting the relevant tax law while adhering to the tax administration agency's practices. For simplicity, the tax auditor's assessment is assumed to be final in the sense that business taxpayers have no opportunities to dispute a tax auditor's assessment. Audited taxpayers have thus two options, either accept the tax auditor's assessed income or to offer a bribe. If the taxpayer accepts the tax auditor's assessed income, she will incur two additional costs: the additional tax and the compliance costs arising from the audit. The additional tax depends on whether the taxpayer is tax evading or avoiding. The tax compliance cost is supposed to be a stable, increasing function in the excess of assessed income over declared income. For the  $i$ -th taxpayers, her tax compliance cost can be expressed as  $c_i(Y_i^* - Y_i^D)$  where  $c_i(0) = 0$  and  $c_i' > 0$  ( $i = 1, 2, \dots$ ). The additional tax potentially payable by the taxpayer is known to the tax auditor but not the taxpayer's compliance cost. If the taxpayer offers a bribe, her tax audit cost is simply the bribe.

## 6. Results and discussions

### 6.1 Probability weights of interactions

In this static model of tax collection, the central tax administrative agency has no a priori knowledge of taxpayers' compliance preferences. In the absence of such knowledge, a low cost and effective strategy for the tax administrative agency is random auditing. Since there is a total of  $aN$  tax audits, the average probability of a taxpayer being selected for audit equals to  $p$  ( $\equiv aN/M$ ), which is greater than zero and less than unity.

For every tax audit, there are four possible types of interaction between taxpayers and tax auditors: (i) a conditional Kantian taxpayer audited by a conditional Kantian tax auditor, (ii) a conditional Kantian taxpayer audited by a Nashian tax auditor, (iii) a Nashian taxpayer audited by a conditional Kantian tax auditor and (iv) a Nashian taxpayer audited by a Nashian tax auditor. We commence by working out the probability weights of the four possible interactions in a typical tax audit. Bearing in mind the pre-audit distribution of taxpayers and auditors, these four probability weights under random sampling are summarized in Table 1.

Since there are only four outcomes as shown in the two-by-two Table 1, the four probabilities  $w_{ij}$  sum to unity in view of the fact that  $M_K + M_N \equiv M$  and  $N_K + N_N \equiv N$ . For numerical illustration, suppose that  $M_K = 10,000$ ,  $M_N = 40,000$ ,  $N_K = 1,000$  and  $N_N = 3,000$ . We then have  $w_{KK} = 0.05$ ,  $w_{KN} = 0.15$ ,  $w_{NK} = 0.20$  and  $w_{NN} = 0.60$ , i.e. in a typical tax audit, there are 5% chance that a conditional Kantian taxpayer is audited by a conditional Kantian tax auditor; 60% chance that a Nashian taxpayer is audited by a Nashian tax auditor, etc.

6.2 Interaction (i): conditional Kantian taxpayer and conditional Kantian tax auditor

When a conditional Kantian taxpayer  $i$  is audited by a conditional Kantian tax auditor  $j$ , the tax audit cost to the taxpayer is the sum of the additional tax  $t \times (Y_{Ki}^* - \underline{Y}_{Ki})$  and the compliance cost  $c_i(Y_{Ki}^* - \underline{Y}_{Ki})$  ( $i = 1, 2, \dots, M_K N_K / N$ ). The potential gain to the tax auditor, should she choose to accept bribe, is bounded above by  $t \times (Y_{Ki}^* - \underline{Y}_{Ki})$ . All possible outcomes under interaction (i) are summarized in Table 2 where the first action refers to that of the taxpayer and the second to that of the tax auditor.

If  $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) \leq \alpha_i$ , the taxpayer has no incentive to offer any bribe. Similarly, if  $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) \leq \beta_j$ , the tax auditor also has no incentive to accept any tax bribe. Taxpayer and tax auditors are willing to negotiate a bribe only if  $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) > \alpha_i$  and  $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) > \beta_j$ . These conditions are necessary but not sufficient for tax corruption to take place. For this to occur, the taxpayer and tax auditor must find a tax bribe  $B_{KiKj}$ , which is mutually agreeable to the taxpayer (smaller than her additional tax audit costs) and the tax auditor (larger than her behavioral-reversal threshold). Thus, for tax corruption to take place, it must also hold true that  $\alpha_i > B_{KiKj} > \beta_j$ .

The nature of tax corruption in this case is collusive and it does not matter who is the first to suggest the bribe. The magnitude of the tax bribe can be expressed as  $B_{KiKj} = \gamma_{KiKj} t \times (Y_{Ki}^* - \underline{Y}_{Ki})$  where  $1 < \gamma_{KiKj} < 1 + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) / [t \times (Y_{Ki}^* - \underline{Y}_{Ki})]$ . The probability of corruption under

Tax auditor Taxpayer	Conditional Kantian	Nashian
Conditional Kantian	$w_{KK} = (M_K N_K) / (MN)$	$w_{KN} = (M_K N_N) / (MN)$
Nashian	$w_{NK} = (M_N N_K) / (MN)$	$w_{NN} = (M_N N_N) / (MN)$

Table 1.  
Probability weights of  
interactions for  
each audit

Source: Table by author

		Conditional Kantian tax auditor	
		$t \times (Y_{Ki}^* - \underline{Y}_{Ki}) \leq \beta_j$	$t \times (Y_{Ki}^* - \underline{Y}_{Ki}) > \beta_j$
Conditional Kantian Taxpayer	$t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) \leq \alpha_i$	No offer; No offer	No offer; Offer
	$t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) > \alpha_i$	Offer; No offer	Offer; Offer

Table 2.  
Conditional Kantian  
taxpayer and  
conditional Kantian  
tax auditor

Source: Table by author

interaction (i) is  $q_{KK} \equiv$  Percentage of cases in which  $\alpha_i > \beta_j$ ,  $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) > \alpha_i$  and  $t \times (Y_{Kj}^* - \underline{Y}_{Kj}) > \beta_j$ . Note that it is conceivable that  $q_{KK} = 0$ .

6.3 Interaction (ii): conditional Kantian taxpayer and Nashian tax auditor

Since the Nashian tax auditor will always suggest or demand a bribe, there are only two cases as depicted in Table 3. Tax corruption occurs when  $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) > \alpha_i$ , in which case the taxpayer will accept tax auditor's demand for bribery. While tax bribery is mutually agreeable to both parties in this case, we may nevertheless call it an extortionary bribe in view of the Nashian tax auditor's proactive role in the bribery. The magnitude of the mutually acceptable tax bribe can be expressed as  $B_{KiNj} = \gamma_{KiNj} t \times (Y_{Ki}^* - \underline{Y}_{Ki})$  where  $0 < \gamma_{KiNj} < 1$ . In this case, we may assume a Nash bargaining solution of  $\gamma_{KiNj} = 1/2$  for all relevant  $i$  and  $j$ . The probability of corruption under interaction (ii) is  $q_{KN} \equiv$  Percentage of cases in which  $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) > \alpha_i$ .

6.4 Interaction (iii): Nashian taxpayer and conditional Kantian tax auditor

In interaction (iii), the taxpayer's additional costs are  $f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) + c_i(Y_{Ni}^* - \delta_i \underline{Y}_{Ni})$ . There are only two cases as depicted in Table 4. Tax corruption does not occur when  $f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) \leq \beta_j$  as the Kantian tax auditor does not accept a bribe although the Nashian taxpayer wants to offer one. Tax corruption takes place when  $f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) > \beta_j$ , in which case the now Nashian tax auditor is willing to accept the taxpayer's bribery offer. Tax corruption is truly collusive as the Nashian taxpayer will always offer a bribe first. The magnitude of the mutually acceptable tax bribe can be expressed as  $B_{NiKj} = \gamma_{NiKj} f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni})$  where  $1 < \gamma_{NiKj} < 1 + c_i(Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) / [f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni})]$ . The probability of corruption under interaction (iii) is  $q_{NK} \equiv$  Percentage of cases in which  $f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) > \beta_j$ .

6.5 Interaction (iv): Nashian taxpayer and Nashian tax auditor

In this interaction, collusive tax corruption will always take place so that  $q_{NN} = 1$ . The magnitude of the mutually acceptable tax bribe can be expressed as  $B_{NiNj} = \gamma_{NiNj} f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni})$  where  $0 < \gamma_{NiNj} < 1$ . Again, in this case, we may assume a Nash bargaining solution of  $\gamma_{NiNj} = 1/2$  for all relevant  $i$  and  $j$ .

6.6 Propositions

We are now ready to summarize the above results in a series of propositions.

**Table 3.**  
Conditional Kantian taxpayer and Nashian tax auditor

		Nashian tax auditor
Conditional Kantian Taxpayer	$t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) \leq \alpha_i$ $t \times (Y_{Ki}^* - \underline{Y}_{Ki}) + c_i(Y_{Ki}^* - \underline{Y}_{Ki}) > \alpha_i$	No offer; offer Offer; offer
<b>Source:</b> Table by author		

**Table 4.**  
Nashian taxpayer and conditional Kantian tax auditor

	Conditional Kantian tax auditor	
Nashian taxpayer	$f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) \leq \beta_j$ $f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) > \beta_j$	$f \times (Y_{Ni}^* - \delta_i \underline{Y}_{Ni}) > \beta_j$
<b>Source:</b> Table by author		

*P1.* (Probability of tax corruption):

The overall probability of tax corruption in this model is

$$\rho = p(w_{KK}q_{KK} + w_{KN}q_{KN} + w_{NK}q_{NK} + w_{NN}) = \quad (3)$$

$$= a(M_K N_K q_{KK} + M_K N_N q_{KN} + M_N N_K q_{NK} + M_N N_N) / M^2 \quad (3')$$

where all the terms on the right-hand-side of (3) and (3') are defined as previously.

Proof.

By definition,  $\Pr(\text{Tax corruption}) = \Pr(\text{Tax audit})\Pr(\text{Tax corruption}/\text{Tax audit})$ . Now,  $\Pr(\text{Tax audit}) = p$  and  $\Pr(\text{Tax corruption}/\text{Tax audit}) = w_{KK}q_{KK} + w_{KN}q_{KN} + w_{NK}q_{NK} + w_{NN}q_{NN} = w_{KK}q_{KK} + w_{KN}q_{KN} + w_{NK}q_{NK} + w_{NN}$ . Combining these two equations yields (3). Bearing Table 1 ( $\equiv aN/M$ ) in mind, (3') can also be derived in a straightforward manner. QED.

*P2.* (Some limiting cases):

(a)When all conditional Kantian taxpayers become pure Kantian,

$$\rho = p(w_{NK}q_{NK} + w_{NN}) = a(M_N N_K q_{NK} + M_N N_N) / M^2 \quad (4)$$

(b)When all conditional Kantian tax auditors become pure Kantian,

$$\rho = p(w_{KN}q_{KN} + w_{NN}) = a(M_K N_N q_{KN} + M_N N_N) / M^2 \quad (5)$$

(c)When all conditional Kantian taxpayers and tax auditors become pure Kantian,

$$\rho \rightarrow pw_{NN} = a(M_N N_N) / M^2 \quad (6)$$

Proof.

(a)As  $\alpha_i \rightarrow \infty$  for all  $i = 1, 2, \dots, M_K$ ,  $q_{KK} \rightarrow 0$  and  $q_{KN} \rightarrow 0$  so that (3) simplifies to (4).

(b)As  $\beta_j \rightarrow \infty$  for all  $j = 1, 2, \dots, N_K$ ,  $q_{KK} \rightarrow 0$  and  $q_{NK} \rightarrow 0$  so that (3) simplifies to (5).

(c)As  $\alpha_i \rightarrow \infty$  for all  $i = 1, 2, \dots, M_K$  and  $\beta_j \rightarrow \infty$  for all  $j = 1, 2, \dots, N_K$ ,  $q_{KK} \rightarrow 0$ ,  $q_{KN} \rightarrow 0$  and  $q_{NK} \rightarrow 0$  so that (3) collapses into (6).

It is apparent that the probability  $\rho$  depends on two types of factors: institutional (such as  $a$ ,  $t$ ,  $f$  and tax complexity) and behavioral (the evasion rates  $\delta_i$ , the thresholds  $\alpha_i$  and  $\beta_j$  and the proportions of Nashians and conditional Kantians in the taxpayer and tax auditor

populations). Propositions 3 and 4 are concerned with the tax policy instruments whereas Propositions 5 and 6 deal with behavioral variables.

P3. (Effect of audit rate, tax rate and fine rate):

The overall probability of tax corruption is positively related to  $a$ , non-decreasing in  $t$  and  $f$ .  
Proof.

The positive effect of  $a$  on  $p$  can be seen from equation (3'). An increase in  $t$  will tend to raise  $w_{KK}$  and  $w_{KN}$ . Similarly, an increase in  $f$  will tend to raise  $w_{NK}$ . QED.

P4. (Effect of tax simplification):

Tax simplification can reduce the incidence of tax corruption.

Proof.

Tax simplification reduces income uncertainty (i.e. narrows down the interval  $[\underline{Y}, \bar{Y}]$ ) and tax compliance costs  $c$ . The combined effect of tax simplification would depress  $w_{KK}$ ,  $w_{KN}$  and  $w_{NK}$ . In the case of interaction (iv), while tax corruption would still take place with certainty, the magnitude of the tax bribe would be reduced as a result of tax simplification. QED

P5. (Effects of tax evasion fraction and behavioral switching thresholds):

The overall probability of tax corruption is non-increasing in  $\delta_i$ ,  $\alpha_i$  and  $\beta_j$ , or any combination of these parameters.

Proof.

It is easy to see that a reduction in the tax evasion fraction (i.e. an increase in an individual  $\delta_i$  or a combination of  $\delta_j$ ) will tend to lower  $w_{NK}$ . Further, an increase in an individual  $\alpha_i$  (or any combination of  $\alpha_j$ ) will tend to decrease  $w_{KK}$  and  $w_{KN}$ , whereas a rise in an individual  $\beta_j$  (or any combination of  $\beta_j$ ) will tend to reduce  $w_{KK}$  and  $w_{NK}$ . Given that effects of  $\delta_i$ ,  $\alpha_i$  and  $\beta_j$  on  $\rho$  are similar, Proposition 5 also holds for an increase in any combination of these three parameters. QED.

P6. (Effects of a change in the pre-audit proportions of taxpayers and tax auditors):

The overall probability of tax corruption is.

(a) decreasing (increasing) in  $M_K$  ( $M_N$ ) holding  $M$  constant; and

(b) decreasing (increasing) in  $N_K$  ( $N_N$ ) holding  $M$  constant.

Proof.

We first note that the definitions of  $q_{KK}$ ,  $q_{NK}$  and  $q_{KN}$  are independent of the pre-audit population distributions of taxpayers and tax auditors. Holding  $M$  constant and keeping in mind that  $M_N = M - M_K$ , by differentiating (3') partially with respect to  $M_K$ , we obtain

$$\partial\rho/\partial M_K = a[N_K(q_{KK} - q_{NK}) + N_N(q_{KN} - 1)]/M^2 \quad (7)$$

$$\partial\rho/\partial M_N = (\partial\rho/\partial M_K)(\partial M_K/\partial M_N) = (\partial\rho/\partial M_K)[\partial(M - M_N)/\partial M_N] = -\partial\rho/\partial M_K \quad (7')$$

Utilizing the same procedure, we can also obtain

$$\partial\rho/\partial N_K = a[M_K(q_{KK} - q_{NK}) + M_N(q_{KN} - 1)]/M^2 \quad (8)$$

$$\partial\rho/\partial N_N = -\partial\rho/\partial N_K \quad (8')$$

Since the definition of  $q_{KK}$  is much more restrictive than that of  $q_{NK}$ , if we are willing to entertain a reasonable assumption that the distributions of  $\beta_j$  in Interactions (i) and (iii) are largely similar, then  $q_{KK}$  is smaller than  $q_{NK}$ , that is, the probability of corruption in the

Kantian taxpayer–Kantian tax auditor interaction is lower than that in the Nashian taxpayer–Kantian tax auditor interaction. As  $(q_{KK} - q_{NK})$  and  $(q_{KN} - 1)$  are both negative, the proposition is established. QED.

### 6.7 Discussions and policy implications

From a theoretical perspective, it is useful to examine how the model findings are related to those in previous studies on tax administration corruption. First, we note that the Alingham–Sandmo deterrence model is a special case of the present model in the sense that if  $\alpha_i$  ( $i = 1, 2, \dots, M_K$ ) approaches zero,  $\beta_j$  ( $j = 1, 2, \dots, N_K$ ) approaches infinity and  $N_N = 0$ , the present model approaches the standard tax compliance deterrence model. The model being studied also generates various interaction outcomes (which may be termed multiple equilibria) as anticipated by Çule and Fulton (2009). Further, the negative influence of the tax rate and penalty rate on tax corruption is consistent with the findings of Chander and Wilde (1992).

From an empirical perspective, the model seems to explain well the high rate of tax corruption and high rate of collusion observed in developing countries. Continuing the above numerical illustration, suppose that  $a = 2$ ,  $M = 50,000$ ,  $N = 4,000$ ,  $w_{KK} = 0.05$ ,  $w_{KN} = 0.15$ ,  $w_{NK} = 0.20$ ,  $w_{NN} = 0.60$ ,  $q_{KK} = 0.06$ ,  $q_{KN} = 0.10$  and  $q_{NK} = 0.15$ . We then have  $w_{KK}q_{KK} + w_{KN}q_{KN} + w_{NK}q_{NK} + w_{NN} = 0.05(0.06) + 0.15(0.10) + 0.20(0.15) + 0.60 = 0.648$ , i.e. almost 65% of tax audit cases result in petty tax corruption. Further, the vast majority of these corruption outcomes (corresponding to  $w_{KK}$ ,  $w_{NK}$  and  $w_{NN}$ ) is collusive.

The theoretical results from model analysis are both confirmatory and revealing. For example, as expected, a conditional Kantian tax auditor is less likely to take bribe than her Nashian counterpart. But, somewhat unexpectedly, when a conditional Kantian tax auditor decides to accept bribe, she will take a higher proportion of the audited taxpayer's additional tax than does her Nashian counterpart. Since the number of taxpayers is much larger than that of tax auditors, it can be inferred from equations (7) and (8) that the impact on the tax corruption probability of an increase in the pre-audit population proportion of Kantian tax auditors is much more powerful than that of Kantian taxpayers (with the same percentage change). This reaffirms the a priori expectation of the important role of tax auditors in fighting tax corruption.

From a policy perspective, it is apparent that traditional administrative tools of income tax deterrence such as high rate of audit or severe tax penalty regimes do not work in the presence of Nashian behaviors. In fact, these instruments may even worsen the incidence of tax corruption. What may help to fight against tax corruption is tax simplification which reduces both tax liability uncertainty and tax compliance costs. The decline of the CIT rate in many developing countries over recent times may have the beneficial effect of discouraging petty tax administration corruption. Finally, administrative tax corruption arises from in-person interaction between the taxpayer and the tax auditor. This can be lessened by using online interaction or tax auditor rotating (to avoid any development of relationship between tax auditors and taxpayers).

## 7. Summary conclusions

Building on the theoretical work of the late Professor Ngo Van Long on Kantian economics, the deterrence model of tax compliance has been extended to explain and analyze the incidence of tax administration corruption in developing countries. The simple, static model explicitly considers the interaction of heterogeneous taxpayers and tax auditors during tax audits where some taxpayers and tax auditors possess the (conditional) Kantian behavioral norms while other taxpayers and tax auditors are Nashian in their behavior. The model contains a novel feature in that it allows the possibility of behavioral reversal. More

specifically, a Kantian taxpayer (tax auditor) may switch into being a Nashian taxpayer (tax auditor) if the reward is sufficiently large. Another interesting feature of my approach is that some common elements of tax compliance (such as tax evasion, tax avoidance and tax compliance costs) and tax complexity are incorporated into the model, albeit in a simplistic fashion.

The model gives rise to four possible types of interaction between taxpayers and tax auditors. These interactions produce a variety of results concerning the conditions for tax corruption to occur, type of tax corruption (extortionary or collusive), the probability of tax corruption, bribery amounts to tax auditors and the “savings” by taxpayers. These theoretical results, especially the high rate of tax corruption, appear to be consistent with stylized facts about tax corruption in developing countries. There are also some policy implications from the analysis of the model. In the presence of Nashian behavioral norms, the traditional administrative tools of tax deterrence (such as higher rate of tax audit or more severe tax penalties) do not generally work as they may even raise the incidence of tax corruption. However, tax simplification is shown to be an effective tool against petty tax corruption.

The model can be enhanced in different directions and in varying degrees. First, since the model being considered is essentially one period, the most natural extension is to extend it into a multi-period model. It is interesting to examine how repeated audits can affect the behaviors of taxpayers and tax auditors, especially the negotiated agreements between them. In such an intertemporal setting, we can also study how the association between taxpayers (or between tax auditors) affect their attitudes and behaviors. However, it may not be so straightforward to model the entry of new taxpayers and tax auditors and the exit of existing taxpayers and tax audits.

Secondly, while the paper is motivated by petty tax corruption in developing and transition countries, its conceptual approach has a greater applicability. Subject to appropriate modifications, the model could also provide an insightful examination of tax administration in developed countries. Thirdly, there are also less ambitious extensions. For example, instead of assuming all tax auditors to be highly competent, we may consider the situation where tax auditors are heterogeneous in terms of ability so that some always detect tax evasion/avoidance while others only detect them sometimes.

## Notes

1. There is a Vietnamese saying that “One mandarin helps the whole clan” (*Một người làm quan cả họ được nhờ*).
2. Power distance refers to how paternalistic the relationship between superiors and subordinates is. The more paternalistic, the higher is the power distance.
3. In September 2021, the World Bank announced it permanently discontinued its Doing Business Report, which used to include the Paying Taxes indicators.
4. CPI is a summary index of general corruption, varying from 0 (highly corrupt) to 100 (very clean). It has been annually published for most countries in the world on a time comparable basis by the Transparency International since 2012.
5. This refers to the number of hours that a medium-sized company must spend to pay (or withhold) all taxes and mandatory contributions in a given year.
6. Morality and altruism are distinct concepts. Morality is concerned with doing the right or just thing, while altruism means that one’s welfare depends positively on others’ welfare. These concepts are correlated as they are both related to cooperation, which tends to be favored by natural selection.
7. For a more detailed discussion on the Kantian economics literature, refer to Long (2018, pp. 193–196).

8. A particularly important extension of the deterrence model is by Yitzhaki (1974) who expressed the punishment from tax evasion as a fine levied on unpaid tax, which is more in line with actual practice.
9. The behavioral-reversal assumption is compatible with moral licensing which occurs when a person uses their prior good behavior to justify later bad behavior. The key difference is that in a one-period model with one-off tax audit, there cannot be moral licensing.
10. If  $Y < 0$ , such as loss can be carried forward in future tax periods in a more realistic, multi-period model.
11. Tax evasion occurs when a taxpayer violates the letter of the tax law.
12. Tax avoidance occurs when a taxpayer abides by the letter of the tax law but not the spirits of the tax law.

## References

- Allingham, M., & Sandmo, A. (1972). Income tax evasion: A theoretical analysis. *Journal of Public Economics*, 1, 323–338.
- Alm, J., Martinez-Vazquez, J., & McClellan, C. (2016). Corruption and firm tax evasion. *Journal of Economic Behavior and Organization*, 124, 146–163.
- Andreoni, J., Erard, B., & Fienstein, J. (1989). Tax compliance. *Journal of Economic Literature*, 36, 818–860.
- Becker, G. (1968). Crime and punishment: An economic approach. *Journal of Political Economy*, 76, 169–217.
- Becker, G. S., & Stigler, G. J. (1974). Law enforcement, malfeasance, and compensation of enforcers. *Journal of Legal Studies*, 3, 1–18.
- Chander, P., & Wilde, L. (1992). Corruption in tax administration. *Journal of Public Economics*, 49, 333–349.
- Çule, M., & Fulton, M. (2009). Business culture and tax evasion: Why corruption and the unofficial economy can persist. *Journal of Economic Behavior and Organization*, 72, 811–822.
- Dalgic, E., & Long, N. V. (2006). Corrupt local governments as resource farmers: The helping hand and the grabbing hand. *European Journal of Political Economy*, 22, 115–138.
- Dang, H. G., Phung, T. X., & Ninh, Q. H. (2016). Corruption risks in Vietnam's household business sector. *Crime, Law and Social Change*, 65, 395–422.
- Doan, H. Q., Vu, N. H., Tran-Nam, B., & Nguyen, N. A. (2021). Effects of tax administration corruption on innovation inputs and outputs: Evidence from small and medium enterprises in Vietnam. *Empirical Economics*, 62, 1773–1800.
- Elster, J. (2017). On seeing and being seen. *Social Choice and Welfare*, 49, 721–734.
- Erard, B., & Feinstein, J. S. (1994). Honesty and evasion in the tax compliance game. *The RAND Journal of Economics*, 25, 1–19.
- Grafton, R. Q., Kompas, & Long, N. V. (2017). A brave new world? Kantian–Nashian interaction and the dynamics of global climate change mitigation. *European Economic Review*, 99, 31–42.
- Hashimzade, N., Myles, G., & Tran-Nam, B. (2013). Applications of behavioural economics to tax evasion. *Journal of Economic Surveys*, 27, 941–977.
- Kemp, M. C., & Long, N. V. (2009). Foreign aid in the presence of corruption: A differential game. *Review of International Economics*, 17, 230–243.
- Laffont, J. -J. (1975). Macroeconomic constraints, economic constraint and ethics: An introduction to Kantian economics. *Economica*, 42, 430–437.
- Leonard, D., & Long, N. V. (1992). *Optimal control theory and static optimization in economics*. Cambridge: Cambridge University Press.



- Li, J. (1997). Counteracting corruption in tax administration in transitional countries: A case study of China. *Bulletin for International Taxation*, 51, 474–492.
- Long, N. V. (2016). Kant–Nash equilibrium in a quantity-setting oligopoly. In P. von Mouche, & F. Quartieri (Eds), *Equilibrium Theory for Cournot Oligopolies and Related Games: Essays in Honour of Koji Okuguchi* (pp. 179–202). Cham: Springer.
- Long, N. V. (2017). Mixed-strategy Kant–Nash equilibrium in games of voluntary contributions to a public good. In W. Buchholz, & D. Riebelke (Eds), *The Theory of Externalities and Public Goods* (pp. 107–126). Cham: Springer, Essays in Memory of Richard C. Cornes.
- Long, N. V. (2017). Voluntary contributions to public goods: Interactions between Kantian and non-Kantian contributors. In *Keynote address to Vietnam Economists Annual Meeting (VEAM) 2017*, Ho Chi Minh City, 1–2 August. Banking University.
- Long, N. V. (2018). Foreign aid: Equilibria in pure and mixed strategies with Kantian and Nashian donors. In B. Tran-Nam, M. Tawada, & M. Okawa (Eds), *Recent Developments in Normative Trade Theory and Welfare Economics* (pp. 191–207). Singapore: Springer.
- Long, N. V. (2020). A dynamic game with interaction between Kantian players and Nashian players. In P. Pineau, S. Sigué, & S. Taboubi (Eds), *Games in Management Science: Essays in Honor of Georges Zaccour* (pp. 249–268). Cham: Springer.
- Long, N. V. (2020). Warm glow and the transmission of pro-socialness across generations. *Journal of Public Economic Theory*, 22, 371–387.
- Long, N. V. (2022). Efficiency-inducing tax credits for charitable donations when taxpayers have heterogeneous behavioral norms. In C. Le-Van, V. Pham-Hoang, & M. Tawada (Eds), *International Trade, Economic Development, and the Vietnamese Economy* (pp. 249–268). Singapore: Springer, Essays in Honor of Binh Tran-Nam.
- Long, N. V. and Sengupta, B. (2008). Yardstick competition, corruption, and electoral incentives. CESifo Working Paper Series No. 2345, CESifo, Munich.
- Nguyen, T. V., Ho, B. D., Le, C. Q., & Nguyen, H. V. (2016). Strategic and transactional costs of corruption: Perspectives from Vietnamese firms. *Crime, Law and Social Change*, 65, 351–374.
- Nguyen, N. A., Doan, Q. H., Nguyen, N. M., & Tran-Nam, B. (2016). The impact of petty corruption on firm innovation in Vietnam. *Crime, Law and Social Change*, 65, 377–394.
- Nguyen, N. A., Doan, Q. H., & Tran-Nam, B. (2017). Tax corruption and private sector development in Vietnam. *eJournal of Tax Research*, 15, 290–311.
- Purohit, M. C. (2007). Corruption in tax administration. In A. Shah (Ed.), *Performance Accountability and Combating Corruption* (pp. 285–302). Washington DC: World Bank.
- Richardson, G. (2006). The influence of culture on fiscal corruption: Evidence across countries. *Law in Context*, 24, 124–142.
- Richardson, G. (2006). Taxation determinants of fiscal corruption: Evidence across countries. *Journal of Financial Crime*, 13, 323–338.
- Roemer, J. (2010). Kantian equilibrium. *Scandinavian Journal of Economics*, 112, 1–24.
- Roemer, J. (2015). Kantian optimization: A microfoundation for cooperation. *Journal of Public Economics*, 127, 45–57.
- Rosid, A. (2017). The impact of perceptions of corruption upon intentional non-compliance behaviour of personal income taxpayers: An Indonesian perspective. PhD thesis. Sydney: School of Taxation and Business Law, UNSW.
- Smith, A. (1790). A theory of moral sentiment. In K. Haakonssen (Ed.), *Cambridge Texts in the History of Philosophy* (pp. 1–411). Cambridge: Cambridge University Press, (2002).
- Tanzi, V. (1998). Corruption around the world: Causes, consequences, scope and cures. IMF Working Paper WW/98/63, IMF, Washington DC.

- 
- Transparency International (2017). Political corruption. Available from: <https://www.transparency.org/en/corruptionary/political-corruption> (access 10 February 2023).
- Transparency International (2023). Corruption perceptions index. Available from: <https://www.transparency.org/en/cpi/2022> (accessed 10 February 2023).
- United Nations Development Programme (UNDP) (2008). *A users' guide to measuring corruption*. Oslo: UNDP Oslo Governance Centre.
- Vasina, P. A. (2003). Optimal tax enforcement with imperfect taxpayers and inspectors. *Computational Mathematics and Modeling*, 14, 160–172.
- World Bank (2017). 'Paying taxes', doing business. Available from: <http://www.doingbusiness.org/data/exploretopics/paying-taxes> (accessed 10 March 2023).
- World Bank and Government Inspectorate of Vietnam (2012). *Corruption from the perspectives of citizens, firms and public officials: Results of sociological surveys*. Hanoi: National Political Publishing House.
- Yitzhaki, S. (1974). A note on income tax evasion: A theoretical analysis. *Journal of Public Economics*, 3, 201–202.
- Yitzhaki, S. and Vakneen, Y. (1988). The shadow price of a tax inspector. Policy, Planning, and Research Working Papers WPS 76, World Bank, Washington DC.

#### Corresponding author

Binh Tran-Nam can be contacted at: [b.tran-nam@unsw.edu.au](mailto:b.tran-nam@unsw.edu.au)

---

For instructions on how to order reprints of this article, please visit our website:

[www.emeraldgrouppublishing.com/licensing/reprints.htm](http://www.emeraldgrouppublishing.com/licensing/reprints.htm)

Or contact us for further details: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)