

## **Tax Evasion in Indonesia: A Game Theoretical Model**

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### **Abstract**

This study aims to analyze the phenomenon of tax evasion in Indonesia by using game theoretical model and referring to Indonesian Tax Laws. This study uses Inspection Game used by Tsebelis and its refinement by Pradiptyo. The game played by 2 representative agents, namely taxpayer who represents all possible parties that can involve to evade and tax investigator who represents all possible parties that concern with taxes, criminal offenses of taxes, and law enforcement. In line with the refined inspection game, the study finds that increasing the severity of penalty may affect the probability of public (taxpayer) to offend (evade) if certain condition fulfilled, according to the Mixed Strategy Nash Equilibrium of the game. Another policy to decrease the probability of taxpayer to evade his tax expense is applying tax incentives policy. The result shows that tax incentives policy is effective rather than increasing the severity of punishment. Because the game is played by players whose scope is wide, it is suggested to develop the game into more specific players and into the next stage of bribery and extortion game which often happen in Indonesia when the taxpayer plays evade and tax investigator plays investigate.

**Keywords:** Tax Evasion, Game Theory, Inspection Game, Refined Inspection Game

**JEL Classification:** H26, E62

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### **INTRODUCTION**

Tax evasion is one of the problems existing in every country in this world. As one of the main revenue of a country, the tax could be used for running the government and financing development programs. But, it is the fact that every country faces difficulties to optimize their tax revenue. As mentioned above, one of the difficulties is the number of tax evaders. Along with tax avoidance, tax evasion has a negative impact on a country's economy.

Unlike tax avoidance, tax evasion is classified as an illegal act. It carries with it the risk of penalties and prosecutions under the tax laws, whereas, tax avoidance implies a situation in which the taxpayers reduce their tax liability by taking advantage of the loop-holes and ambiguities in the legal provisions (Jain, 1987). Some countries have applied a program to maximize the tax revenue and to minimize tax evasion and/or tax avoidance. In 2010, The USA made terms with other countries' financial institution in order to be able to access the database of American citizens. The program is known as Foreign Account Tax Compliance Act

(FATCA). Other ways used by countries to increase tax obedience of taxpayers are applying tax amnesty, tax holiday, and/or reforming the tax laws.

In Indonesia, the tax laws reform massively began in 1980's after the fall in commodity prices. Since then, tax revenue becomes the main resource of the national budget (Pudyatmoko, 2005:18). The reform produced a tax laws known as "*The Laws Number 6 of 1983 concerning General Provision and Tax Procedures*". The tax authority in Indonesia is Directorate General of Taxes under the control of Ministry of Finance.

Pioneered by Gary Stanley Becker in 1968, an American economist and sociologist, many economists develop economics to analyze the phenomena of criminal behavior. It assumes that individual is rational which means the central element of his rational calculation involves a cost-benefit analysis maximizing expected benefits or minimizing expected costs compared to one of legal references. Becker (1968) argued that the expected utility of committing illegal acts (or crimes) is determined by the probability of being caught and severity of punishment. Becker's argument corresponds to decision theory in which the individual's preference is based on the benefit-cost analysis disregarding other individuals. In contradiction to Becker, Tsebelis (1989) argued that the use of decision theory to explain the relationship between potential offenders and police is not appropriate as both players are rational, thus ideally game theory should be used instead of decision theory. Tsebelis' model was refined by Pradiptyo (2007) based on the framework of Criminal Justice Authority in The United Kingdom.

Considering the above-mentioned studies, this paper aims to create a framework using game theoretic model to explain why some tax payers choose to evade and why some do not. Considering the tax evader and the tax authority and law enforcement agencies or any other entities as the players which interact among each other following their inter-dependence strategies, game theory could result in equilibrium that implies the player's probability of choosing the available strategies in relation with outcome optimization. The result of this study is expected to be very useful for policymaker, especially the tax authority and law enforcement agencies, in formulating provisions for preventing tax evasion and also for the next studies.

## LITERATURE REVIEW

### Economics of Crime

The analysis of the Economics of Crime is generally considered to have begun with the publication of Gary S. Becker's *Crime and Punishment: an economic approach* in 1968. The analysis assumes that individual's decision to commit crime is based on his consideration related to the benefits he earns and costs he pays (of committing crime). Becker (1968) concluded that a potential offender will commit crime when its expected benefits exceed his expected costs. So, individual will be deterred from offending if the probability of conviction and the severity of punishment rise. The theory is well-known as Decision Theory, under the basic theory of rational-choice.

Another methodology used to explain criminal behavior is Game Theory. It is Tsebelis (1989) who criticized Becker's decision theory and begun with analyzing criminal behavior by using game theoretical approach in 1989. Tsebelis (1989, 1991, 1993) argued that any attempts to increase the severity of punishment

reduced the probability of criminal justice authority in enforcing the law but it did not affect the probability of individuals from offending. The situation of the Tsebelis' game concerning the criminal behavior is widely known as Inspection Game.

Some economists tend to use game theory than decision theory in analyzing phenomena in criminal. Pradiptyo (2007) refined the Inspection Game proposed by Tsebelis and concluded that any attempt to increase the severity of punishment is going to reduce the likelihood of offending if certain condition hold. In addition, he showed that crime prevention initiatives are more effective rather than increasing the severity of punishment. Some applicable studies in Indonesia about the game theoretical approach in analyzing offending behavior were made by Nugraha (2012) who explained law enforcement mechanism of tackling money laundering in Indonesia, Maytandi (2016) who modeled corrupt activities within public procurement process of goods and services in Indonesia.

### Game Theory

Rasmusen (2006:10) stated that Game Theory is a study concerning individual's actions in decision making, whether he has to do or not to do something, and He is conscious that his actions affect the other. Three basic assumptions of game theory are individualism, rationality, and mutual interdependence (Romp, 1997:1-4). Individualism means that players in game theory are considered to take action as rational individual decision-makers. Rationality means that the players assumed to be rational according to their self-interest. Mutual interdependence means that the strategy chosen by one player is determined by the strategy of others. The optimal solution of the game theory is named Nash Equilibrium. It can be defined as a combination of players' strategies which are the best response to each other (Carmichael, 2005:36). Nash Equilibrium can be distinguished into two, Pure Strategy Nash Equilibrium (PSNE), and Mixed Strategy Nash Equilibrium (MSNE). PSNE is the one in which each player only has one particular strategy. However, in MSNE, the player has some choices of strategy that do not absolutely dominate among another.

The common model of game used by crime economists is Inspection Game. An inspection game is a mathematical model of a non-cooperative situation where an inspector verifies that another party, called inspectee, adheres to legal rules. The inspector intends to deter illegal activity on the part of the inspectee and, should illegal activity nevertheless take place, detect it with the highest possible probability and as soon as possible (Avenhauss, 2004).

		Police	
		<i>Enforce</i>	<i>Not Enforce</i>
Public	<i>Offend</i>	<i>a<sub>1</sub>, a<sub>2</sub></i>	<i>b<sub>1</sub>, b<sub>2</sub></i>
	<i>Not Offend</i>	<i>c<sub>1</sub>, c<sub>2</sub></i>	<i>d<sub>1</sub>, d<sub>2</sub></i>

Where:  $c_1 > a_1$ ,  $b_1 > d_1$ ,  $a_2 > b_2$ , and  $d_2 > c_2$

Figure 1. Inspection Game  
 Source: Tsebelis (1989)

An Inspection Game (Figure 1.) shows that there is no Pure Strategy Nash Equilibrium. Instead, the inspection game has a Mixed Strategy Nash Equilibrium. Considering  $p^*$  as the probability of public to offend and  $q^*$  as the probability of police to enforce the law, The MSNE of the game describes as the following equations:

$$p^* = \frac{d_2 - c_2}{a_2 - b_2 + d_2 - c_2} \quad (1)$$

$$q^* = \frac{b_1 - d_1}{b_1 - d_1 + c_1 - a_1} \quad (2)$$

### Legal Review

Tax evasion is declining to pay taxes, including income taxes, employment taxes, sales and excise taxes, other federal, state, or local taxes, which are owed. It carries with it the risk of penalties and prosecutions under the tax laws (Jain, 1987). In Indonesia, tax evasion provisions have been coded in Tax Laws. Articles 38, 39, 39A and 41B in “*The Laws Number 28 of 2008 Concerning the Third Amendment of the Laws Number 6 of 1983 Concerning General Provision and Tax Procedures*” provide an explanation of the Criminal Provisions (of taxes)<sup>1</sup>.

Articles 38, 39, 39A and 41B define implicitly those who are categorized as tax evader, along with the penalties and sanctions which may vary. The articles state that the tax evader is not just taxpayers, but also those who obstruct or hinder the investigation of tax evasion case. Referred to article 44, the authority of investigating criminal tax offenses belongs to officials of the Directorate General of Taxes<sup>2</sup>. Then, the result of the investigation is submitted to public prosecutor through the State Police Investigation Official pursuant to the provisions of the regulating Law on Criminal Procedures.

### METHOD

This study uses game theoretical approach to analyze and to model the mechanism of combating tax evaders in Indonesia by referring to the Tax Laws concerning General Provisions and Tax Procedures in Indonesia. This study will expand Tsebelis’ Inspection Game and its refinement which is refined by Pradiptyo (2007). In terms of aggregated payoffs, Pradiptyo’s model is similar with Tsebelis’. But in Pradiptyo’s, each element in the payoff matrix is then presented into more specific identity as following:

$$a_1 = U_O - U_D \quad (3)$$

$$b_1 = U_O + U_R \quad (4)$$

$$c_1 = d_1 = U_R \quad (5)$$

$$a_2 = B_E - C_E - C_S \quad (6)$$

$$b_2 = 0 \quad (7)$$

$$c_2 = B_R - C_E \quad (8)$$

$$d_2 = B_R \quad (9)$$

Where:

$U_O$  = Immediate utility arises from committing an offence.

$U_D$  = Disutility of serving direct punishment (e.g., imprisonment, fine, community service).

- $U_R$  = Positive reputational effects to individuals for not being convicted. deterrence effects arise due to enforcement of the law.
- $B_E$  = Benefits of enforcing the law including the detection of incidents and any
- $B_R$  = Reputational benefits in achieving objectives set by the Criminal Justice Authority.
- $C_E$  = Costs of enforcement of the law including, for instance, costs of investigation and costs to dispatch police officers in certain areas.
- $C_S$  = Costs to deliver courts' sentences, including direct and indirect punishments (e.g., the list of positions that cannot be taken by ex-offenders, the length of probationary period, and the length of period offenders have to report to police about their mobility).

## RESULT AND DISCUSSION

### The Game of Tax Evasion

This study model the phenomenon of tax evasion as a 2-player 2x2 simultaneous inspection game played by representative agents, namely Taxpayer and Tax Investigator. The game assumes that hindering parties are integrated within taxpayers because above-mentioned legal review states that those who obstruct or hinder the investigation of tax evasion are implicitly classified as tax evaders, likewise, it assumes that tax investigator is also representing all other justice authorities concerning violation of taxes. Hence, strategies of Taxpayer are "Evade" or "Not Evade" and the strategies of Tax Investigator are "Investigate" or "Not Investigate". The term 'investigate' means not only the process of investigation but also prosecution and other relevant process concerning law enforcement in taxation.

Let us begin with the taxpayer perspective. By committing evasion, the taxpayer will absolutely gain immediate utility ( $U_E$ ), such as the money earned from unpaid or underpaid taxes (if he/she fails to file tax return or files a false an incomplete tax return). If the taxpayer is getting investigated, he/she will acquire immediate disutility ( $D_E$ ) meaning that he/she will be prosecuted under the criminal laws and then will receive penalty(s).  $U_E - D_E$  will be taxpayer's net benefit of evading taxes while the investigator plays 'investigate'. If he/she does not evade the tax expense, he/she will receive benefits in terms of positive reputation benefits ( $U_R$ ), i.e. known as an obedient taxpayer. However, when he/she evades the tax expense while the investigator decide not to conduct an investigation, he/she will enjoy the reputational benefits along with the immediate utility ( $U_E + U_R$ ).

From Tax Investigator's perspective, investigating the suspicious taxpayer or tax return will produce benefits of investigation ( $B_I$ ). The benefits are, for example, the detection of cases, the information gathered about revenue loss, and deterrence benefits arising. On the other hand, conducting investigation until prosecution and execution is costly ( $C_I$ ). The Directorate General of Taxes under the control of Ministry of Finance, as a tax authority in Indonesia, has to incur costs for time and human resources dedicated for inspecting and auditing the suspicious taxpayer (or tax return) and submitting the investigation report to law enforcement agencies. The investigator will get and pay nothing if he/she does not investigate when taxpayer commits evasion. In the case when taxpayer does not evade his/her tax expense, the tax investigator will gain reputational benefits ( $B_R$ ) from his/her

institution because of achieving the objectives from his/her chief leader (to eradicate and prevent evasion), whether or not he/she conducts an investigation.

The normal form of the game is shown by the following figure:

		Tax Investigator	
		Investigate (y)	Not Investigate (1-y)
Taxpayer	Evade (x)	$U_E - D_E, B_I - C_I$	$U_E + U_R, 0$
	Not Evade (1-x)	$U_R, B_R - C_I$	$U_R, B_R$

Where:  $U_R > U_E - D_E$ ,  $U_E + U_R > U_R$  and  $B_I - C_I > 0$ ,  $B_R > B_R - C_I$

Figure 2. Inspection Game: Tax Evasion

Consider  $y$  to be the probability of the investigator to investigate the evasion. The taxpayer tends to commit evasion if:

$$(U_E - D_E)y + (U_E + U_R)(1 - y) \geq U_R y + U_R(1 - y)$$

$$U_E \geq y(D_E + U_R) \tag{10}$$

Equation (10) implies that the taxpayer will evade the taxes if and only if the immediate utility ( $U_E$ ) of committing evasion exceeds the expected disutility of getting investigated and the expected loss of reputational effects [ $y(D_E + U_R)$ ]

Similarly, the method is used by the investigator to decide whether to investigate. Considering  $x$  as the probability of the taxpayer to evade, thus the investigation will conduct if:

$$(B_I - C_I)x + (B_R - C_I)(1 - x) \geq B_R(1 - x)$$

$$B_I x \geq C_I \tag{11}$$

Equation (11) proposes that the investigator will investigate if and only if the expected benefits of investigation [ $B_I x$ ] exceed the cost of investigation ( $C_I$ ). Adopting the equations (1) (2), we find that the MSNE of the game are:

$$x = \frac{B_R - (B_R - C_I)}{B_I - C_I - 0 + B_R - (B_R - C_I)} = \frac{C_I}{B_I} \tag{12}$$

$$y = \frac{U_E + U_R - U_R}{U_E + U_R - U_R + U_R - (U_E - D_E)} = \frac{U_E}{U_R + D_E} \tag{13}$$

Whereby  $x, y \in (0,1)$

Where:

- $U_E$  = Immediate utility arises from committing evasion.
- $D_E$  = Disutility of serving direct punishment because of evading (e.g., imprisonment, fine, community service).
- $U_R$  = Positive reputational effects to individuals for not being investigated and convicted.
- $B_I$  = Benefits of investigating including the detection of incidents and any deterrence effects arise due to enforcement of the law.
- $B_R$  = Reputational benefits in achieving objectives set by the Justice Authority.
- $C_I$  = Costs of investigating, including, for instance, times spent for enforcing law, costs of investigation, costs to hiring tax officers, and other relevant costs to process law enforcement.

Equation (12) describes that the probability of taxpayer to evade the taxes negatively correlates with the benefit and cost ratio of investigating the suspicious taxpayer (or tax return), whereas, equation (13) implies that the investigator's probability to conduct investigation has positive correlation with the indirect utility of evading the taxes. Conversely, it has negative correlation with the disutility of getting investigated and the loss of reputational benefit of getting investigated.

The equation (12) could also be interpreted that, given the cost of investigating, the probability of taxpayer to evade the taxes increases as the benefits of conducting investigation decreases. It means that in order to prevent the tax payer to evade taxes,  $B_I$  must increase. On the other hand, the equation (13) shows that the investigator will not investigate if the direct and/or reputational disutility increases, given the immediate utility of evading taxes. The following section discusses the impact of policies made by the government to eradicate and prevent tax evasion.

### Increasing the Severity of Penalty(s)

It has explained and coded in Indonesia Tax Laws (article 44) that the authority to investigate the crime of taxation belongs to tax officers (of Directorate General of Taxes) who are given a special authority. However, through ministry of finance, the tax authority could propose laws amendments concerning taxes. Hence, the authority which in this game is represented by tax investigator is assumed to be able to increase the severity of penalty ( $D_E$ ).

Considering the above-mentioned situation, the investigator can increase the disutility of getting investigated ( $D_E$ ) or the loss of reputational benefits ( $U_R$ ) or both. Suppose that justice authority concerning taxes decides to increase the severity of direct penalty ( $D_E^*$ ), such as increasing the duration of imprisonment and increasing the fines levied upon evaders through Law amendments, *ceteris paribus*.

An attempt to increase the severity of penalties is costly, especially when it is done through law amendments. Based on taxpayer's observation, the policy increases the costs of investigation ( $C_I^*$ ) and make a change in the benefits of investigation ( $B_I^*$ ). Then  $D_E^* > D_E$ ,  $C_I^* > C_I$ , and  $B_I^*$  is unclear whether  $B_I^* > B_I$  or  $B_I^* < B_I$  or  $B_I^* = B_I$ .

Let  $x^*$  and  $y^*$  denote the new equilibrium, considering the recent changes, then:

$$x^* = \frac{C_I^*}{B_I^*} \quad (14)$$

$$y^* = \frac{U_E}{U_R + D_E^*} \quad (15)$$

Where  $x^*, y^* \in (0,1)$

Form the equations (14) (15), It is shown that the probability of investigator to investigate the evasion ( $y^*$ ) will decrease since  $U_R + U_D^* > U_R + U_D$ . On the contrary, there are three possible changes of the probability of taxpayer to evade. Increasing the severity of penalty has an ambiguous impact. It may reduce the probability of taxpayer to evade, however, to some extend, it may increase the probability of taxpayer to evade, provided certain conditions are fulfilled.

$x^* < x$ , if:

$$B_I^* - C_I^* > B_I - C_I \quad (16)$$

$x^* > x$ , if

$$B_I^* - C_I^* < B_I - C_I \quad (17)$$

and  $x^* = x$ , if

$$B_I^* - C_I^* = B_I - C_I \quad (18)$$

### Tax Incentives Policy

The tax incentives are widely used by countries, including Indonesia, to encourage people or business enterprise to be obedient taxpayers, so do of investment. Investment is expected to be increasing, and the people who invest become obedient taxpayers.

Back to the game, suppose that tax authority makes policy to give tax incentives. The policy is exactly enjoyed by taxpayer who does not evade or, in the other words, the obedient taxpayer. The evader that is not convicted is also get the benefits because the evader not being convicted is freely to enjoy the capital inflow gained from the application of the policy (the incentive benefits denote by  $P_E$ , such that  $P_E > 0$ ). From the tax authority's perspective, represented by tax investigator, the incentives enjoyed by taxpayer increases the other cost variable in his/her payoffs (denotes by  $CP_I$ , such that  $CP_I > 0$ ). The addition cost variable means the cost of making the policy, such as socialization costs and other cost relevant to the policy-making and applying it. The game becomes the following:

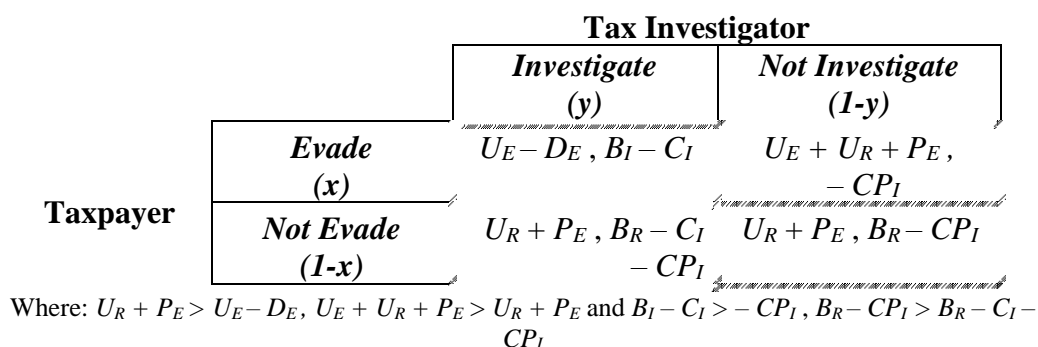


Figure 3. Inspection Game: Role of Incentives Policy

As the previous 2 games, the inspection game with tax incentives policy has no pure strategy. Therefore, the game has mixed strategy:

$$x^{**} = \frac{B_R - CP_I - (B_R - C_I - CP_I)}{B_I - C_I - (-CP_I) + B_R - CP_I - (B_R - C_I - CP_I)} = \frac{C_I}{B_I + CP_I} \quad (19)$$

$$y^{**} = \frac{U_E + U_R + P_E - (U_R + P_E)}{U_E + U_R + P_E - (U_R + P_E) + U_R + P_E - (U_E - D_E)} = \frac{U_E}{U_R + D_E + P_E} \quad (20)$$

Where  $x^{**}, y^{**} \in (0,1)$



Equation (19) obviously shows that the probability of taxpayer to evade is  $x^{**} < x$ . Although the policy is also decrease the probability of tax authority to conduct investigation (equation 20 shows that  $y^{**} < y$ ), it doesn't matter, given the level of law enforcement and penalty hold.

## CONCLUSION

By using the game theoretical approach, this study of tax evasion phenomenon in Indonesia concludes that in order to decrease the probability of taxpayer to evade his tax expenses can be done by increasing the severity of penalty and applying tax incentives policy, referring to Mixed Strategy Nash Equilibrium (MSNE). However, if the tax (justice) authority decides to increase the severity of penalty, the probability of taxpayer evading his tax expenses is unclear, whether it is increase, decrease, or constant. Another result of this study show that applying the tax incentives is more effective to prevent taxpayer than increasing the severity of penalty.

This study constructs the game by using the Indonesian Tax Laws which can be affirmed by empirical findings and case studies. There are many assumptions in this game which exactly can be minimized. For example, the game is represented by 2 agents that include many parties or agencies concerning taxes, criminal act of taxes, and law enforcement. Actually, the game can be played by many players. The analysis can be developed to some specific games. For instance, after the basic game played, the game can be continued to bribery or extortion game because it is the fact that, in Indonesia, such activities and cases—bribery and extortion—are easily found in criminal justice.

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