The Impact of Basic Infrastructure on Tax Effort: A Case Study of Municipalities/Regencies in Indonesia

A Research Paper presented by:

Arief Budi Wardana

Indonesia

in partial fulfillment of the requirements for obtaining the degree of

MASTER OF ARTS IN DEVELOPMENT STUDIES

Major:

Economics of Development

Members of the Examining Committee:

Dr. Lorenzo Pellegrini

Dr. Robert Sparrow

The Hague, The Netherlands

November 2017

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This document represents part of the author's study program while at the Institute of Social Studies. The view stated therein are those of the author and not necessarily those of the Institute.

Inquiries:

Postal Address:
Institute of Social Studies
P.O. Box 29776
2502 LT The Hague
The Netherlands

Location:
Kortenaerkade 12
2518 AX The Hague
The Netherlands

Abstract

Discussions of tax morale emerge from the failure of the economic deterrence model to fully explain the degree of tax compliance. The vital role assigned to tax revenue as a significant contributor to national government income. Consequently, almost all countries have a serious concern with increasing their tax performance since more than half of the countries in the world, more than 80 percent of the government budget is dependent on tax revenue. A fiscal-psychological model shows how the relationship between tax authorities and taxpayers can emerge through the provision of a stimulus from tax authorities, so that taxpayers' attitudes become more positive, which increases their willingness to pay taxes. Hence, governments should be aware of the demand for infrastructure, because invrastructure provision can increase the moral motivation of citizens to pay tax. In this research, more than a half of infrastructure variables are significant and positively correlated to tax performance indicators. That is a proof that in general, better quality of infrastructure in particular region lead to better tax performance. However, the inconsistency of the effect shows that increased quantity (in this case of infrastructure) should be accompanied by increased quality, and vice versa.

Keywords

Dedications

This research paper is dedicated to my dearest family: beloved wife, Mila Indriastuti, and my son, Haziq Adli Wardana, my mother, Sufiyati, my father, Suwardi, and equally to my mother-in-law, Suparmi, and my father-in law, Sanyoto, for their endless love and support.

Acknowledgements

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List of Acronyms

ASEAN	Association of Southeast Asian Nations
BPHTB	Bea Perolehan Hak atas Tanah dan Bangunan (Tax on Land and Building Transfer)
DGT	Directorate-General of Taxes
GDP	Gross Domestic Product
GDP-R	Gross Domestic Product-Regional
KKPPI	Komite Kebijakan Percepatan Pembangunan Infrastruktur (Committee on Policy for the Acceleration of Infrastructure Development)
KKPPI	Komite Kebijakan Percepatan Penyediaan Infrastruktur (Committee on Policy for the Acceleration of Infrastructure Provision)
KPPIP	Komite Percepatan Penyediaan Infrastruktur Prioritas (The Committee for Acceleration of Priority Infrastructure Delivery)
MP3EI	Masterplan Percepatan dan Perluasan Pembangunan Ekonomi Indonesia (Masterplan for Acceleration and Expansion of Indonesia Economic Development)
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square
PLN	Perusahaan Listrik Negara (National Electric Company)
PODES	Potensi Desa (The Village Potential Statistics)
PUSKESMAS	Pusat Kesehatan Masyarakat (Community Health Center)
PUSTU	Puskesmas Pembantu (Community Health Sub-Center)
RPJMN	Rencana Pembangunan Jangka Menengah (The National Mid-Term Development Plan)
SUSENAS	Survei Sosial Ekonomi Nasional (The National Socio-economic Survei)
VAT	Value Added Tax

Chapter 1 Introduction

1.1   Tax Effort and Basic Infrastructure

The Indonesian tax revenue ratio to Gross Domestic Product (GDP), an indicator of tax performance that is also known as tax effort, is still at a low level compared to the world average tax ratio. According to the World Bank (2017), tax revenue as a percentage of GDP of Indonesia in 2015 was only 10.74 percent, significantly below the world average of 15.82 percent. The Indonesian tax ratio is also relatively low when compared to those of other countries forming part of the ASEAN bloc, such as Malaysia (14.3 percent), Singapore (13.82 percent), the Philipines (13.64 percent), and Thailand (16.45 percent). Moreover, a low level of tax effort creates the impression that tax collection in Indonesia is sub-optimal. Fenochietto and Pessino (2013) find that the Indonesian government collects tax at less than half of its capacity; Indonesia, together with Singapore, Korea, and Japan, thereby ensures that the Asian Pacific is the region in the world with the lowest level of tax effort. However, the cause of the low level of tax effort of Indonesia differs from that of the three other countries mentioned. Singapore, Japan, and Korea experience a low level of tax effort because these countries have a high GDP per capita, but for the Indonesian case this can be attributed to weak tax revenue collection.

Indeed, the tax performance of particular country cannot be assessed by only regarding the tax ratio, since the political choice is influenced by the significance governments assign to taxes in their economies. In a nation that is capable of filling its budget without the need to be highly dependent on tax revenue, the tax ratio tends to be small. For instance, in Arabic countries that are famous for their vast oil reserves, the economy is only taxed at a shallow level. Remarkably, some countries such as Saudi Arabia receive no revenue from income tax, as most other countries do. Moreover, the other possibility of a lower tax ratio occurs when some countries want to increase their international competitiveness in the globalization era by means of a low tax rate. Switzerland and Norway are the best examples of countries that apply a low tax rate to encourage abundant investment inflows into their countries.

Nevertheless, the tax performance of countries or regions with tax ratios can still be assessed as long as the structure of taxation is not too different. It is possible to judge a low tax ratio in

particular countries or regions as low tax performance if the type and the tariff of tax are relatively the same for specified countries or regions. Moreover, the condition of tax institutions should be relatively equal to conclude the tax performance using tax ratio. For instance, some tax institutions have access to the bank account of their citizens, while others are forbidden to gain access to citizens' bank accounts due to restrictions banks have put in place. Moreover, some tax institutions report directly to the president, while others are under the jurisdiction of the Ministry of Finance of the respective country. Hence, if a significant gap occurs between tax structure, the tax ratio as tax performance measurement cannot be used.

An alternative way of assessing the tax performance of a particular region is to look at the tax compliance rate. Indonesia, due to having the fourth largest population in the world by 2015 according to the United Nations (2017), should have a significant number of potential taxpayers. The Central Statistical Bureau of Indonesia showed that in 2015 the Indonesia population was 255.46 million people, with 114.8 million people considered to be part of the labour force (Statistics Indonesia 2017b). However, the number of taxpayers registered at the tax authority was only 5.24 million (non-labour) and 22.33 million (labour) for 2015, according to data of the Directorate General of Taxes (2016). This means that only 24 percent of the total employment force is registered with the Indonesian tax system. Furthermore, the numbers of personal taxpayers that are compelled to report their tax statements are 2.05 million (non-labour) and 14.92 million people (labour), respectively. However, Directorate General of Taxes (2016) counts that only 0.84 million (non-labour) and 9.43 million taxpayers (labour) reported their tax statements. In fact, reported annual tax statements are not a guarantee that taxpayers are willing to pay tax, because the number of taxpayers that actually comply to their payment responsibilities are only 0.61 million (non-labour) and 0.18 million people (labour). Overall, in 2015 the percentage of citizens that paid taxes was only 0.31 percent of the total population. This glance at personal tax compliance leads to the conclusion that Indonesian tax performance still needs to improve.

The taxation conditions for corporate taxpayers are not different from those for personal taxpayers. The Central Statistical Bureau of Indonesia reports that in 2015, in Indonesia there were 3.7 million manufacturing establishments, including 26,322 medium and large corporations, 283,022 small corporations, and 3.39 million micro corporations (Statistics Indonesia 2017b). Moreover, in the construction sector 134,029 corporations joined (Statistics Indonesia 2017b). Furthermore, the financial industry comprises 118 banks supported by 32,963 bank offices (Statistics Indonesia 2017b). Even if only these three sectors are compared

to the corporation taxpayers registered to DGT, around 2.47 million taxpayers (Directorate General of Taxes 2016), the total number of corporations registered with the tax system is still below the basis tax. This means that not all corporations are registered with the Indonesian tax system. In addition, the compliance rate of reporting tax statements was not satisfied for 2015. Out of the 1.18 million entities that were obliged to report tax statements, only 676,405 entities – or about half of the total entities – processed their tax statements (Directorate General of Taxes 2016). Moreover, the total number of corporations that made tax payments in 2015 was only 375,569 – about a third of the number of entities obliged to pay taxes (Directorate General of Taxes 2016). This data shows that only 9.72 percent of corporations in the manufacturing, construction, and banking sectors are paying taxes.

According to data related to tax discussed above, it is evident that Indonesian tax coverage is low for both the personal and corporate sectors. Many individuals or private sector entities still have not entered into the Indonesian tax system. The question then arises: What causes the low tax coverage ratio in Indonesia? One of the main reasons may be the size of the informal sector in Indonesia. Moreover, it may be that the capacity of tax institutions is not high enough to serve a large population such as that of Indonesia. Also, the number of taxpayers that pay tax is low and the amount of tax payments is also not too high; this condition may represent a low motivation for paying tax. Furthermore, the low motivation may be related to the condition of institutions that cannot provide reliable deterrence policies, so that the cost of tax evasion is low. Moreover, there are no substantial government incentives encouraging citizens to pay tax. Indeed, tax institutions reforms that commenced in 2007 have increased taxpayer satisfaction rates, since the DGT has consistently provided better service. However, taxpayers also view the government as an institution in itself. In fact, some indicators show that government performance is perceived to be low and that amongst citizens the level of trust in the government is not high. Hence, due to the absence of significant deterrence policies and a low level of trust in the government, the willingness to pay taxes is also lacking.

The low tax performance rate of Indonesia has become a big issue, since tax revenue is a significant contributor to national government income. According to the Directorate General of Treasury under the Ministry of Finance of Indonesia, 83 percent of the total national revenue for Indonesia is sourced from tax revenue (Directorate General of Treasury 2017). The vital role assigned to tax revenue is also the case outside of Indonesia; almost all countries have a serious concern with increasing their tax performance, which is logical, since tax revenue should be the dominant financial resource used to propel the national budget. According to

Ortiz-Ospina and Roser (2017), for more than half of the countries in the world, more than 80 percent of the government budget is dependent on tax revenue. As a result, tax escalation policies are required for many countries.

Due to their high concern for tax performance, governments need to put in place regulations promoting an escalation of tax revenue. To render this strategy more effective, governments should consider the motivations of taxpayers for non-adherence to tax regulations. In general, Kirchler et al. (2008) specify two principal motivations related to (non-)compliance to tax regulations: the high cost of non-compliance, and citizens' concern with their obligations due to the member of the community. A better understanding of the motivations of taxpayers would provide better outcomes related to tax revenue collection.

Governments can choose two types of approaches to increase tax revenue based on their understanding of taxpayers' motivations. Firstly, they can consider government deterrence policies as an approach for addressing the issue of (low) economic motivation among taxpayers. Such an approach can be linked to the research of Allingham and Sandmo (1972), who assume that the increasing probability of detection and a higher rate of sanctions will reduce tax evasion as well as increase tax compliance. However, taxpayers sometimes behave in a non-rational manner instead of assuming a broader economic perspective when making decisions. The decisions of taxpayers to not comply are not always related to the cost of evading tax. Secondly, the government can consider increasing tax revenue through non-economic approaches. When using this approach, the government needs to create a conducive environment by building trust from citizens and encouraging taxpayers by drawing on their sense of belonging to a specific community.

Although the deterrence approach has the potential power to drive an increase in tax revenue, deterrence policies cannot be applied easily. Such policies require high levels of energy and financial commitments, especially for a huge population and vast country like Indonesia. Moreover, the success of deterrence policies depends on the level of probability of tax institutions to be able to detect tax evasion. When monitoring systems are not reliable enough to identify tax fraud, the cost of evading tax becomes smaller, and taxpayers will decrease their tax payments. Consequently, as a complement to the deterrence policy, the government should create other policies promoting voluntary tax compliance.

Building trust from citizens would enable the government to better motivate citizens to increase their level of payment of taxes. Moreover, trust from citizens will increase with improvements

to existing infrastructure and the creation of new infrastructure enabling better services delivery. Listokin and Schizer (2013) argue that a sufficient public good supply leads to a rise in willingness amongst citizens to pay tax. Furthermore, since taxes from citizens are used to fund government expenditure, such expenditure should be effective. Government expenditure should be prioritized in a way that benefits citizens. One type of expenditure directly benefiting citizens is basic infrastructure expenditure for improving citizens' quality of life. The failure to supply basic infrastructure and corresponding services can be used as a justification for tax evasion.

1.2   Research Questions

Given that deterrence policies can be strengthened by a government focus on voluntary tax compliance brought about by behavioural change amongst taxpayers, this research intends to study the way in which strengthening the relationship between the governments and citizens can promote voluntary tax compliance. In particular, the research seeks to focus on the way in which trust of the government can be improved through its provision of basic infrastructure, in order to improve the tax effort for Indonesia.

The primary research question for this study hence is:

To what extent does the provision of basic infrastructure affect the tax effort in municipalities/regencies in Indonesia?

To facilitate the answering of this research question, a number of sub-questions have been formulated:

a) To what extent does the provision of basic infrastructure impact the non-oil and gas income tax effort in municipalities/regencies in Indonesia?
b) To what extent does the provision of basic infrastructure impact the value-added tax effort in municipalities/regencies in Indonesia?
c) To what extent does the provision of basic infrastructure impact the personal tax reporting compliance rate in municipalities/regencies in Indonesia?
d) To what extent does the provision of basic infrastructure impact the corporate tax reporting compliance rate in municipalities/regencies in Indonesia?

e) To what extent does the provision of basic infrastructure impact the personal tax payment rate in municipalities/regencies in Indonesia?

f) To what extent does the provision of basic infrastructure impact the corporate tax payment rate in municipalities/regencies in Indonesia?

1.3 Study Limitations

In general, the research will draw on three categories of data. Firstly, data of the Indonesian central government on tax revenue in Indonesia, broken down to the municipality/regency level, will be used. Secondly, general data related to the performance of municipalities/regencies in Indonesia will be used. Lastly, data regarding basic infrastructure found in the Indonesian government's Census of 2011 will be used. However, a number of challenges and limitations are likely to emerge. Firstly, the process of matching data on tax revenue to data on municipal attributes and regional proliferation issues during the period of research is a possible limitation. Furthermore, due to time limitation and different coverage areas of the customs office, the data on tax revenue is obtained only from Directorate-General of Taxes and excludes data on tax revenue of the Directorate-General of Customs.

1.4 Importance of the Study

Discussions of tax effort and its determinant factors continue to emerge, especially in developing countries, since governments in developing countries are still highly dependent on tax revenue. If governments can increase tax revenue without downsizing their business sectors, they will have sufficient funds to tackle many problems related to development. By understanding factors that influence tax effort, governments should be able to arrange suitable policies based on an understanding of the non-rational behaviour of taxpayers.

Existing research on the topic of tax effort and tax revenue pays more attention to the country level and conceptualizes countries as homogeneous entities. However, the conditions of intra-state regions may vary, and each region may possess specific characteristics. Furthermore, the decentralization wave in developing countries also contributes to variations in conditions of economic, political, social, and government institutions. Hence, a study at the municipality/regency level is useful for showing the variation across regions. In order to conduct research on factors determining tax effort at the municipality/regency level, a country

with a large number of municipalities/regencies with several variations regarding economic and social conditions is required. Indonesia, having almost 500 municipalities/regencies spread across 17,000 islands, is thus suitable for testing determinants of tax effort. However, at the local government level tax revenue does not significantly contribute to the local budget. According to Central Statistical Bureau of Indonesia (2017), in 2013 municipality/regency tax revenue realization was only 0.82 percent of central tax revenue realization. With that in mind, for this study the tax revenue of central government collected at municipal level is combined with the GDP for municipalities, in order to obtain the tax effort of municipalities/regencies.

Chapter 2 Literature Review

2.1 Tax Revenue

The overall goal of governments is to manage state institutions and provide safety to all citizens; governments are responsible for ensuring and enhancing the quality of life of citizens, and for creating and sustaining a safe and liveable environment. To be able to fulfill their mandates, governments require resources, and governments have a right to explore natural resources to finance their government programmes. However, natural resources are not sufficient to support government budgets on the long term. Moreover, a sole focus on natural resources means that other economic sectors lag behind. One possible solution for governments is the diversification of income sources. Taxes can be an important source of income supplementing income from other sources.

Discussions on tax revenue also relate to tax compliance. If governments want to increase tax revenue, it is necessary to increase tax compliance. Governments can choose a number of options to increase tax compliance by considering the motivations behind the payment of taxes. Research has shown that economic motivation for non-payment of taxes and deterrence approaches cannot fully explain tax compliance. Other motivations for paying tax – what is called a tax morale – can be employed through using a non-economic approach to address a lack of compliance. In the synergetic climate, tax compliance and tax morale will emerge following the escalation of trust of governments or tax institutions.

In an equal tax system, tax performance can be measured by looking at the tax ratio, also called tax effort. Tax effort is like how far the coverage of tax collection in a particular economy. In considering some aspects that may impact on tax effort, it is also important to regard the expenditure policy of governments as a trust-building strategy that could potentially lead to an increased tax effort.

2.1.1 Tax Compliance

Various definitions of tax compliance emerge in the literature, from simple to more comprehensive definitions. James and Alley (2002) in a simple definition of tax compliance

state that it is related to the tax gap, in other words the extent to which the taxpayer complies with tax regulations. Moreover, McKerchar and Evans (2009) argue that full tax compliance refers to the completion of all elements related to tax obligations; tax obligations comprise five elements: registration, filling in tax returns, reporting tax submissions, making tax payments, and retaining any tax documents based on tax regulations. Furthermore, Davos (2014) refers to the comprehensive definition of tax compliance from Roth et al. (1989) which states that tax compliance is related to the timeous and accurate fulfilment by taxpayers of all tax requirements based on current regulations. Based on these definitions, it can be assumed that the compliance of taxpayers should be conceptualized as the conditions that taxpayer meet based on tax regulation in terms of timeousness, the completion of required documents, and the declaration of the amount of tax liability.

It is inevitable that tax authorities never achieve full tax compliance; some degree of non-compliance always exists. A tax gap occurs, since the perceptions of tax authorities and taxpayers regarding the payment of taxes are not necessarily aligned (James and Alley 2002). Based on this reality, Devos (2014) categorizes non-compliance into two groups: intentional and unintentional non-compliance. Devos (2014) explains that intentional non-compliance is awareness of the need to pay tax, but the intentional decision to act against tax law; such actions include illegal tax downsizing, late payments and inadequate documentation. On the other hand, unintentional non-compliance is the failure to comply to tax regulations due to unconsidered decisions. Hence, the motive behind the action creates the distinction between these two categories of non-compliance.

2.1.2   Tax Motivation

Within countries, the tax climate oscillates between an antagonistic and synergetic climate (Kirchler et al. 2008). In an antagonistic climate, tax institutions and taxpayers are perceived to oppose each another, so a significant rift between these two parties and a lack of respect ensues (Kirchler et al. 2008). Conversely, cooperation between tax institutions and taxpayers, and a spirit of excellent service by governments, characterize a synergetic climate that produces a close relationship and respectfulness between taxpayers and tax authorities (Kirchler et al. 2008). The level of tax compliance varies according to reliance on the power and trust embedded in tax institutions (Kirchler et al. 2008). Increasing tax compliance as a product of

tax authorities' power resulting from the cost of punishment, but voluntary tax compliance arises only as a result of a high level of trust in tax authorities (Kirchler et al. 2008). The relationship between tax compliance, power, and trust can be explained by the 'slippery slope' diagram depicted in Figure 1 below.

Under the slippery slope framework, Muehlbacher et al. (2011) distinguish two types of tax compliance: enforced (influenced by power) and voluntary (influenced by trust) tax compliance. Differentiating between types of tax compliance is essential in order to enforce regulations that best address taxpayer non-compliance according to behavioural choices influenced by either power or trust (Muehlbacher et al. 2011). The authors (ibid.) provide empirical evidence showing that trust in tax institutions significantly influences voluntary tax compliance, and they even control for some socio-demographic variables. Formulating tax regulations based on trust dimensions, such as through providing transparency on government expenditure, is beneficial since it is more (cost-)effective for driving voluntary tax compliance (Muehlbacher et al. 2011). Moreover, voluntary compliance is vital for creating a harmonic relationship between governments and citizens – a synergetic climate (Muehlbacher et al. 2011).

Slippery Slope Diagram
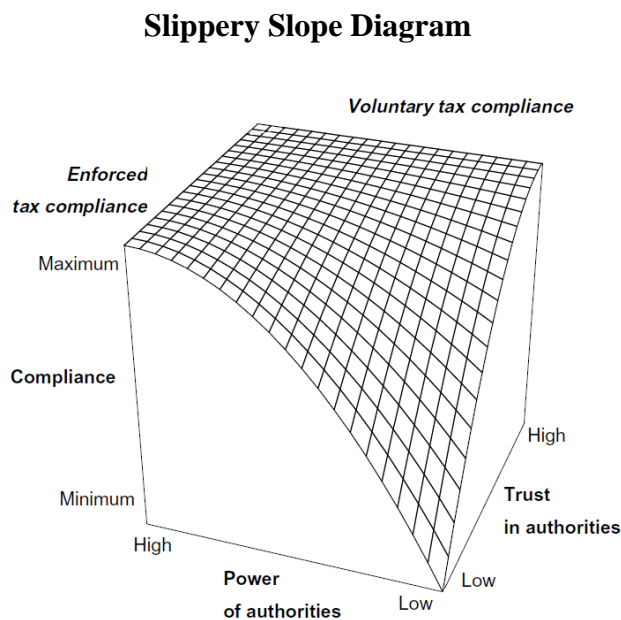
Figure 1. The 'slippery slope' diagram showing the two types of tax compliance and the different principles underlying these two types of compliance. (Source: Kirchler et al. 2008).

2.1.3 Government Approaches for Addressing Tax Compliance

Governments can create some strategies to increase tax revenue based on theoretical perspectives of tax compliance such as those discussed above. Devos (2014) divides tax compliance into two main theoretical approaches – an economic deterrence approach and a behavioural approach. Three schools of thought on the topic of tax compliance can be found, centred around general deterrence, economic deterrence, and fiscal psychology (Riahi-Belkaoui 2004). McKerchar and Evans (2009) on the other hand categorize tax compliance measures as economic deterrence measures, social-psychological measures, and fiscal-psychological measures.

Under economic deterrence theory, governments can increase detection probability, elevate tariffs of taxes, and heighten sanctions, since from this perspective taxpayers wish to maximize their utility based on a cost-benefit analysis (Devos 2014). McKerchar and Evans (2009) argue that sanctions and punishment are sensitive factors affecting taxpayers' behaviour in the economic deterrence model. Feld and Frey (2005) further argue that deterrence policies cannot fully explain the level of tax compliance, since tax morale becomes exogenous in the economic deterrence model.

On the other hand, a behavioural approach that includes social and fiscal psychology relies on moral values and fairness perceptions (Devos 2014). In more detail, McKerchar and Evans (2009) argue that a focus on the social-psychological dimensions concerning personal preferences, causal structure, and equitable structure is necessary for a better understanding of human behaviour. Moreover, a fiscal-psychological model shows how the relationship between tax authorities and taxpayers can emerge through the provision of a stimulus from tax authorities, so that taxpayers' attitudes become more positive, which increases their willingness to pay taxes (McKerchar and Evans 2009).

2.1.4 Tax Morale

Some researchers argue that tax morale is 'the intrinsic motivation to pay tax' (Torgler 2003, Torgler 2004, Pope and Mohdali 2010). In addition, Kornhauser (2007) defines tax morale as the aggregate of non-rational factors and motivations that together highly influence individual compliance with tax regulations. Such factors include social norms, individual values, and all

cognitive processes. Furthermore, Luttmer and Sanghal (2014) argue that tax morale is a general term for all nonpecuniary motivations and factors of tax compliance external to economic deterrence theory. From this definition, tax morale is understood as a set of motivations and factors affecting taxpayers' decision to comply with tax law that goes beyond economic or rational thinking. Discussions of tax morale emerge from the failure of the economic deterrence model to fully explain the degree of tax non-compliance. According to McKerchar and Evans (2009), tax morale is one of the taxpayers' attitude psycess that can be found in the fiscal-psychological model.

2.1.5 Citizen Trust in State Institutions

Torgler (2003b) suggest that trust in the government has the positive and significant effect on taxpayers' willingness to pay tax. Research by Alm et al. (2006) in the Russian context produces the same result, namely that trust of the government is a significant determinant of tax morale as a form of exchange relationship. Cummings et al. (2009) in their research produced similar findings – that increasing tax compliance is linked to an improved tax morale. The authors stress that perceptions regarding government behaviour matter for the willingness to pay tax. In addition, Feld and Frey (2002) state that tax morale not only relates to the intrinsic motivation of every individual taxpayer, but is also a manifestation of the interaction between taxpayers and tax authorities. They also state that trust in the government according to the psychological contract framework should be maintained to achieve better tax compliance (ibid.). Lastly, Feld and Frey (2003) emphasize that the way in which governments treat taxpayers influences the ensuing willingness to pay tax. Hence, it is crucial to avoid negative communication and direct punishment when taxpayers report incorrect income or fail to pay taxes.

2.1.6 Tax Effort

Tax effort could be a criterion for measuring the tax performance of a country (Teera and Hudson 2004, Addison and Levin 2011, Le et al. 2012). Tax effort can be defined in a number of ways. Firstly, tax effort can be defined as the difference between the actual and predicted value of a tax ratio (Piancastelli 2001). Another definition of tax effort is the ratio of actual tax

revenue and the tax capacity of a government (Benson et al. 1988, Berry and Fording 1997). Furthermore, tax effort can also be measured by calculating a ratio of tax revenue realization and Gross Domestic Bruto (Le et al. 2012). The advantages of using the last definition, which is also applied in this research, are that such figures can be easily obtained and are suitable for analyzing tax effort in cases with similar income levels and economic structures (Le et al. 2012).

In general, determinant tax effort has both a supply side and a demand side. Bird (2014) mentions the tax handle as income per capita, population growth, inflation, agriculture share in GDP, and openness of the economy. Many sources of literature suggest that tax effort is determined by tax handle factors or supply side factors. For instance, Stotsky and Mariam (1997) find that tax effort in Sub-Saharan African countries increases when the share of agriculture and mining sectors in GDP are lower, and when the share of exports as part of total GDP and income per capita is higher. In addition, Bahl (2004) states that the ratio of tax revenue to GDP in the Organisation for Economic Co-operation and Development (OECD) members and in less developed countries is influenced by the agricultural share of total GDP, the openness ratio, and population growth. Furthermore, Addison and Levin (2011) state that a smaller share of the agricultural sector of total GDP, a smaller population, more openness in economies, and more peaceful conditions inside countries lead to a higher tax to GDP ratio. Additionally, Besley and Persson (2014) argue that tax effort is influenced by supply-side factors such as GDP per capita and the structure of economies.

Demand-side factors such as tax morale, the size of the shadow economy, institutions, and wealth inequality also influence tax effort (Bird et al. 2008). For instance, Terra and Hudson (2004) argue that in low-income countries, a correlation can be found between the shadow economy and government taxes. Moreover, Melo (2007) states that political instability and weak institutions have an impact on tax revenue. Bird et al. (2014) hypothesize that if taxpayers received adequate public goods from governments, their willingness to pay tax will increase accordingly, which will finally increase tax effort.

2.2   Infrastructure

The concise definition of infrastructure came from Hirschman (1958), who states that infrastructure is capital that produces public goods and services. According to the definition

above, infrastructure can be classified as either capital or public infrastructure (Fourie 2006). The capital dimension of infrastructure is used to differentiate public goods from other types of infrastructure, while the public dimension of infrastructure shows the non-rival character of infrastructure (Fourie 2006).

In general, two types of infrastructure exist: economic infrastructure and social infrastructure. Fourie (2006) states that economic infrastructure is a type of infrastructure that supports economic activity, while social infrastructure is a type of infrastructure that increases the quality of life of citizens. He also states that is hard to adhere to the strict categorization of infrastructure, since economic and social infrastructure sometimes overlap (Fourie 2006).

Indeed, infrastructure is needed to improve quality of life, but not all types of infrastructure can be supplied by the market. Due to market failure, government interventions are needed in order to provide the bulk of the infrastructure (Fourie 2006). Rosen (2005) provides some examples of market failures, such as asymmetric information, market incompleteness, adjustment lag, non-competitive markets, instability of macroeconomies, and income distribution. In terms of infrastructure as a public good, governments need to intervene regarding the non-availability of infrastructure due to market incompleteness (Mueller 2003).

2.3   The Relationship between Infrastructure and Tax Effort

Some reasearchers argue that the interaction between infrastructure and tax effort relates to the government-citizen relationship. Feld and Frey (2007) mention that the relationship between governments and taxpayers should be an exchange relationship: when taxpayers provide money to governments through taxes, they should expect a return from governments. Moreover, the action of paying tax differs from other economic transactional actions, because the individual taxpayer does not directly benefit from paying taxes. Hence, governments should be aware of the demand for public goods, because public goods provision can increase the moral motivation of citizens to pay tax (Halla and Schneider 2005).

Alm et al. (1992) state that despite the presence of deterrence policies, taxpayers' assessment of the provision of public goods also influences tax compliance. Torgler (2003) argues that taxpayers will assess the services they receive from government and will contrast the quality of service delivery with the tax payment. Guth et al. (2005) mention that the level of tax morale should be equivalent to the benefit that taxpayers receive from governments, particularly in

terms of the provision of public goods. The experiment of Keser and Winden (2000) showed that partner conditions can create more cooperative behaviour and minimize freerider behaviour if tax morale is placed in public good contexts; in this case taxpayers tend to contribute more if the government provides an excellent quality of public goods. It is essential for the government to provide reliable information about the provision of public goods, since such transparency tends to increase tax morale.

The policies issued by governments related to public spending can be used to encourage citizens to comply with tax regulation. Barone and Mocetti (2009) argue that the tax morale will increase if taxpayers think that the government is efficiently spending its budget. According to Ollivaud (2017), in order to improve budget efficiency, the government can mix the type of expenditure and prioritize the spending options. Moreover, by improving social-economic conditions and providing better public goods, the tax morale can increase significantly (Martinez-Vazquez and Torgler 2009). Furthermore, Daude et al. (2012) explain that when citizens trust their government, the level of tax morale will increase. As a result, when people see that the government ensures a better quality of public goods, they tend to pay more tax to the government.

When viewed from an economic perspective, taxpayers are rational entities applying rational thinking when making decisions. Because of the belief in the rationality of taxpayers, many governments apply deterrence policies to encourage citizens to pay tax by creating conditions that deter them from non-compliance (Frey and Torgler 2007). These strategies refer to the research of Allingham and Sandmo (1972), who assume that increasing the probability of the detection of tax avoidane and a higher rate of sanctions will reduce tax evasion and consequently increase tax compliance. However, these enforcement strategies of increasing the possibility of detection and punishment are too costly and require a strong tax administration force. In addition, several scholars have described the limitations of deterrence policies (for example Alm et al. 1992, Frey and Feld 2002, Graetz and Wilde 1985). Hence, it is not possible to judge whether taxpayers comply with tax regulations only because the cost of tax evasion is too high.

When the deterrence approach to tax compliance, which considers risk detection and punishment, fails to explain the persistence of tax compliance, it can be assumed that some non-rational factor influences taxpayers' decision not to pay taxes. Brink and Porcano (2016) argue that tax morale explains the non-rational aspect influencing taxpayers is obedient to the

tax regulation. Earlier, several researchers found that the level of tax compliance can be explained by tax morale (Alm et al. 1992, Frey 1997, Frey and Feld 2002, Lewis 1982, Pommerehne et al. 1994, Torgler 2002). Furthermore, the definition of tax morale evolve related to tax evasion attitude or the intrinsic motivation of taxpayers to pay tax as a contribution to society (Torgler et al. 2008, Brink and Porcano 2016).

In addition, tax morale is also related to economic justifications, which is how much tax revenue is collected from the economy and delivered back to the economy as government spending (Torgler and Schaltegger 2005). Two functions of the government budget affect the level of tax morale – allocation and distribution functions (Torgler and Schaltegger 2005). The allocation function describes how an individual taxpayer decides to comply without using a cost-benefit analysis to assess expected gains and losses (Torgler and Schaltegger 2005). The distribution function describes how, as a member of society, the decisions of taxpayers can relate to more universal aspects such as fairness, equity, and incidence (Torgler and Schaltegger 2005).

Chapter 3 Taxation and Infrastructure in Indonesia

3.1 History

The history of taxation in Indonesia commences even before the country's establishment. Before Indonesia gained independence in 1945, the first type of modern tax was land rent, issued by British Government in 1813 (Siahaan 2010). Land rent was a form of income tax whereby farmers were taxed following each harvest season (Samudra 2015). This income tax still existed until independence, and the Indonesian government in 1951 replaced this form of tax with income tax in its modern form (Samudra 2015). Moreover, during the colonial era the colonial government issued some tax regulations to encourage Indonesian people to pay income taxes, including the Income Tax Law of 1920, Income Tax Ordinance 1932, Income Tax 1944 Law (Pohan 2014). In addition, a number of other tax laws were established. The colonial government introduced the Corporate Tax Ordinance of 1925 and the Wage Tax Law of 1935 (Pohan 2014). These colonial tax laws were in place up until 1970 – even after the Indonesian government was established and when it had already started to amend tax regulations (Uppal 2003). However, an entirely novel type of tax introduced 1970 is sales tax, whereby goods and services, including imports, were taxed (Parlaungan 2017).

The first tax reforms in Indonesia signed with the issue of a set of tax regulation in 1983, including General Provision and Tax Procedure Law, Income Tax Law and Value Added Tax and Sales on Luxury Goods Law (Parlaungan 2017). Moreover, an additional tax law called the Land and Building Tax Law (of 1985) regulates property tax (Alsah 1992). Due to the establishment of this new set of laws, the colonial tax laws were no longer applicable. The Land and Building Tax in 2011 was shifted from central to local government to support decentralization programmes. The second tax reform commenced in 1994 when four tax laws were established, including the Tax Dispute Settlement Body Law, the Local Government Tax and Retribution Law, the Tax Collection with Coerce Warrant Law, and the Fee on Land and Building Transfer Law (Parlaungan 2017). Through these two waves of tax reform, the Indonesian tax system was improved (Ikhsan et al. 2005). However, the Indonesian tax authority was still characterized by a number of weaknesses, such as inadequate tax administration, corruption, and weak law enforcement (World Bank 2005). As a response to such weaknesses, the third tax reform wave commenced in 2002. The reforms focused on

improving the functioning of the Indonesian tax authority rather than focusing on the reform of tax laws (Parlaungan 2017). The objective of this third wave of reforms was to enact changes that would increase accountability, comprehensive control, and service quality (Parlaungan 2017).

3.2   Tax Contribution on Government Budget

Although for many developing countries tax collection remains problematic, developing country governments still rely on tax as a dominant source of revenue. For instance, the Indonesian government's revenue is dominated by tax revenue. According to the Directorate-General of Treasury of the Ministry of Finance of Indonesia, 83 percent of the national revenue came from tax revenue in 2016, as shown in Figure 2 (Directorate General of Treasury 2017).

Revenue Realization of Indonesian Budget in 2016
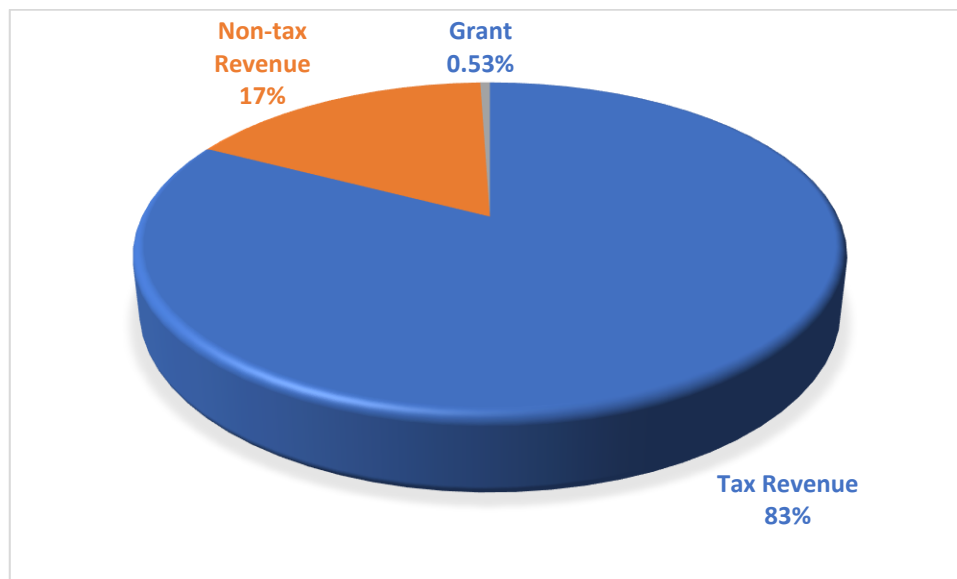
Figure 2. Graph showing the main sources of income funding the Indonesian government budget in 2016. (Source: Directorate-General of Treasury 2017).

Tax revenue, used to fund the Indonesian government budget, is collected by two state institutions under the Ministry of Finance of Indonesia. The Directorate-General of Taxes (Directorate General of Taxes) collects income tax, value-added tax, property tax, and other

types of tax. On the other hand, the Directorate-General of Customs is responsible for managing excise tax and international trade tax. According to Figure 3, the Directorate-General of Taxes is responsible for collecting around 86 percent of the total tax; in other words, more than 70 percent of national budget revenue is collected by the DGT.

Tax Revenue Realisation of Indonesian Budget in 2016

Figure 2. Graph showing the composition of tax revenue in the Indonesian government budget in 2016. (Source: Directorate-General of Treasury 2017).

A high level of dependence of the Indonesian national budget on tax revenue is not followed by high tax effort. Moreover, the poor realization of tax revenue in Indonesia may be responsible for the decrease in tax effort in the country discussed later in this paper. According to the Central Statistical Bureau of Indonesia (2017), the realization of tax revenue in the past ten years was not satisfied. In the last decade, Indonesian tax institutions succeeded in exceeding the tax revenue target only twice – in 2008 and 2011. On the other hand, the realization for the remaining years was below target, as shown in Table 1.

Table 1. Tax Revenue Target and Realization in the Indonesian National Budget for the period 2007-2016 (billions Rp).

Year	Tax Revenue Target	Tax Revenue Realization	%
2007	509,462	490,988	96.37%
2008	591,978	658,701	111.27%
2009	725,843	619,922	85.41%
2010	742,738	723,307	97.38%
2011	850,255	873,874	102.78%
2012	1,032,570	980,518	94.96%
2013	1,192,994	1,077,307	90.30%
2014	1,280,389	1,146,866	89.57%
2015	1,379,992	1,240,419	89.89%
2016	1,546,665	1,539,166	99.52%

Source: Ministry of Finance (2017).

3.3 Tax Institutions

According to Article 23a of the 1945 Constitution of the Republic of Indonesia, "all taxes and other levies for the needs of the state of a compulsory nature shall be regulated by law" (People's Consultative Assembly 2002: 9). Moreover, Article 2 of the Law of The Republic of Indonesia (No. 6 of 1983) concerning general provisions and tax procedures, last amended into Law No. 16 of 2000, states that "every taxpayer shall be obligated to register at the office of the Directorate General of Taxes in the district where the taxpayer resides or domiciles and deserves a Taxpayer Identification Number" (Directorate General of Taxes 2000: 18-19).

The tax laws administered by the DGT include:

- The Income Tax Law, regulated under the Law of the Republic of Indonesia (No. 7 of 1983), last amended into Law No. 36 of 2008;
- The Value Added Tax and Sales on Luxury Goods Law, regulated under the Law of the Republic of Indonesia (No. 8 of 1983), last amended into Law No. 42 of 2009;

- The Land and Building Tax for Plantation, Forestry, and Mining Sectors, regulated under the Law of the Republic of Indonesia (No. 12 of 1985), last amended into Law No. 12 of 1994; and

- Stamp Duty, regulated under the Law of the Republic of Indonesia (No. 13 of 1985).

Article 21e of the Law of the Republic of Indonesia (No. 32 of 2004) concerning regional administration states that "in implementing autonomy, regions have the rights to collect regional taxes and levies" (President of Indonesia 2004: 11-12). In addition, Article 2 of the Law of the Republic of Indonesia (No. 28 of 2009) concerning local taxation and charges distinguishes the type of taxes according to the region. In the law, provincial governments are authorized to collect "Motor Vehicle Tax, Excise/Tax For Transfer of Ownership of Motor Vehicle, Motor Vehicle Fuel Tax, Surface Water Tax, and Cigarette Tax" (President of Indonesia 2009: 11), while municipalities/regencies may collected "Hotel Tax, Restaurant Tax, Entertainment Tax, Advertising Tax, Street Lighting Tax, Tax on Non-Metal Mineral and Rock, Parking Tax, Ground Water Tax, Tax on Swallows' Nests, Rural and Urban Land and Building Tax, Excise/Tax for Acquiring Right on Land and Building" (ibid.).

Based on the Indonesian Constitution and the laws mentioned above, it is evident that tax is collected at the national and local levels by the central and local government, respectively. Central government tax collection is delegated to the DGT under the Ministry of Finance. Tax collection at the local government level is delegated to either the province or municipality/regency.

3.4   Tax Revenue and Compliance

Since the tax revenue of Indonesia is collected predominantly by the DGT, this section focuses on the central government tax administrated by the DGT. The tax revenue trends are shown in Table 2.

Table 2. Tax Revenue and a Number of Tax Performance Indicators

Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
National Revenue	706.11	979.31	847.10	992.25	1205.35	1332.32	1432.06	1545.46	1496.05	1784.25
Tax Revenue	490.99	658.70	619.92	723.31	873.87	980.52	1077.31	1146.87	1240.42	1539.17
Tax Revenue (DGT)	425.37	571.11	544.53	620.20	742.74	835.83	921.27	981.83	1060.83	1105.81
Tax Revenue Growth (DGT)	18.75	34.26	-4.65	13.90	19.76	12.53	10.22	6.57	8.05	4.24
Economic Growth	6.30	6.00	4.60	6.20	6.20	6.00	5.60	5.00	4.90	5.00
Inflation (y-o-y)	6.60	11.10	2.80	7.00	3.80	4.30	8.40	8.40	3.40	3.00
Natural Growth	13.32	17.77	7.53	13.63	10.24	10.56	14.47	13.82	8.47	8.15
Revenue Performance Improvement	5.43	16.50	-12.18	0.26	9.52	1.98	-4.25	-7.25	-0.42	-3.91
GDP at Current Price	3950.90	4948.70	5606.20	6864.10	7831.70	8615.70	9546.10	10569.70	11531.70	12406.80
Tax Ratio	12.43	13.31	11.06	10.54	11.16	11.38	11.29	10.85	10.76	12.41
Tax Revenue Target	509.46	591.98	725.84	742.74	850.26	1032.57	1192.99	1280.39	1379.99	1546.67
Percentage Tax Revenue Realization	96.37	111.27	85.41	97.38	102.78	94.96	90.30	89.57	89.89	99.52
Revenue Target (DGT)	432.52	534.53	577.39	661.50	763.67	885.03	995.21	1072.37	1294.26	1355.20
Percentage Tax Revenue Realization (DGT)	98.35	106.84	94.31	93.76	97.26	94.44	92.57	91.56	81.96	81.60

Source: Ministry of Finance (2017), Statistics Indonesia (2017).

The table reveals that the tax ratio has oscillated between 10 and 14 percent over the past decade. The highest tax ratio was 13.31 percent in 2008, and the lowest 10.76 percent in 2015. Moreover, the realization of total tax revenue ranged from 85 percent (2009) to 111 percent (2008). When only taxes collected by the DGT are regarded, the range is similar, with the percentage of tax revenue realization varying from 81 percent (2016) to maximum 107 percent (2008). It is clear that the peak year for tax revenue realization (DGT) was 2008 – the same year when the tax ratio was at its highest. On the other hand, where the tax ratio was at its near-lowest level in 2015, this year also saw the lowest tax revenue realization rate. The DGT in 2015 also experienced a shortfall below the average realization achievement from the previous period. However, the low tax revenue realization trend continued in 2016, becoming the worst realization rate in a decade.

The failure of realization to comply with the tax revenue target since the target increases significantly in the past two years. Tax revenue must increase by 25 percent compared to the

realization of the previous year. The increase for 2015 and 2016 are 32 percent and 28 percent, respectively. In this period, the natural growth of tax should have been under 10 percent, since economic growth was stable and inflation was at a relatively low level. Furthermore, it is clear that the DGT did not perform very well, since revenue performance improvement produced negative values over the past four years, indicating a deterioration in revenue performance.

Because Indonesia has recently become home to the fourth largest population in the world, it should logically have a large tax base. In the personal sector, it can be assumed that the working class population can form a tax base. According to data taken from the 2010 National Labor Force Survey, Indonesia has around 109 million citizens that work for an income (Statistics Indonesia 2012: 86-87). Table 3 presents the distribution of working citizens by age groups.

Table 3. Economically Active Citizens in Indonesia in 2010

Age Group	Number of Working Persons	Number of Unemployed Persons	Total Number of Economically Active Persons
15–19	5,611,435	2,306,728	7,918,163
20–24	11,106,140	1,869,016	12,975,156
25–29	14,577,663	1,159,747	15,737,410
30–34	15,601,361	643,799	16,245,160
35–39	14,351,963	407,489	14,759,452
40–44	13,565,026	368,327	13,933,353
45–49	11,149,511	245,575	11,395,086
50–54	9,245,315	223,078	9,468,393
55–59	6,156,212	171,188	6,327,400
60+	8,305,773	305,139	8,610,912
Total	**109,670,399**	**7,700,086**	**117,370,485**

Source: Statistical Yearbook of Indonesia 2012, based on the August National Labor Force Survey (Statistics Indonesia 2012:86-87).

In addition, due to Indonesia's size it can be expected that the number of corporations in the country should be high; indeed, in the manufacturing sector, by 2011 more than 3 million corporations were operational (Table 4).

Table 4. Number of Establishments of Large, Medium, Micro, and Small Manufacturing Industries in 2011

Classification of industry	Number of Establishments (Unit)			
	Large and Medium	*Micro*	*Small*	*Total*
Food and Beverages	5,777	905,385	119,811	1,030,973
Tobacco	989	54,258	452	55,699
Textiles	2,616	226,017	17,117	245,750
Wearing Apparel	1,830	202,809	101,629	306,268
Tanning and Dressing of Leather	665	17,690	18,959	37,314
Wood and Products of Wood	1,141	697,970	39,442	738,553
Paper and Paper Products	450	6,628	886	7,964
Publishing, Printing, and Reproduction of Recorded Media	515	19,058	8,629	28,202
Coal, Refined Petroleum Products and Nuclear Fuel	65	-	-	65
Chemicals and Chemical Products	1,142	27,540	1,849	30,531
Rubber and Plastic Products	1,621	14,457	1,472	17,550
Non-Metallic Mineral Products	1,606	179,578	59,830	241,014
Basic Metals	266	815	766	1,847
Fabricated Metal Products except for Machinery and Equipment	957	68,827	17,986	87,770
Machinery and Equipment	382	308	514	1,204
Computers, Electronic and Optical Products	318	238	39	595
Electrical Machinery and Equipment	236	829	36	1,101
Repair and Installation of Machinery and Equipment	-	5,616	1,120	6,736
Motor Vehicles, Trailers and Semitrailers	303	1,610	1,195	3,108
Other Transport Equipment	331	6,425	786	7,542
Furniture and Other Manufactured Goods	2,160	118,673	31,766	152,599
Total	**23,370**	**2,554,731**	**424,284**	**3,002,385**

Source: Statistical Yearbook of Indonesia 2013, based on the Annual Large and Medium Manufacturing Establishment Survey and the Micro and Small Manufacturing Industry Survey, of BPS-Statistics Indonesia.

Moreover, in 2011, construction establishments numbered more than 134,000 (Table 5). Furthermore, the financial sector comprises almost 15,000 bank offices, including branch offices (Table 6). Hence, for these three sectors alone, at least 3.15 million corporations should be registered in the tax system of Indonesia.

Table 5. Number of Construction Establishments by Type of Establishment Group for 2011

Type of Establishment	Number of Establishments
Small	115,515
Medium	16,372
Large	2,117
Total	**134,004**

Source: Statistical Yearbook of Indonesia 2013, based on the Updating of Construction Establishment Directory, of BPS-Statistics Indonesia.

Table 6. Number of Banks and Bank Offices in 2011

Description	Number of Banks	Number of Bank Offices
State Banks	4	4,362
Regional Government Banks	26	1,472
Private National Banks	56	7,108
Sharia Commercial Banks	11	1,390
Foreign and Joint Banks	23	465
Total	**120**	**14,797**

Source: Statistical Yearbook of Indonesia 2013, of BPS-Statistics Indonesia.

However, in actual fact the number of taxpayers registered in the tax system of the DGT in 2011 was just a portion of the total expected tax basis. Only 20.34 million Indonesians pay personal tax, while 109 million citizens work. In the corporate sector, only 1.9 million corporations pay tax, while the combined number of corporations for just three sectors (discussed above) is 3.15 million.

Table 7. Tax Compliance Rate for 2011

Description	Personal Sector	Corporate Sector	Total Number
Registered Taxpayers	20,341,971	1,884,713	22,226,684
Taxpayers Obliged to Complete Tax Statements	13,938,059	1,015,449	14,953,508
Taxpayers Completing Tax Statements	8,579,688	499,695	9,079,383
Taxpayers Paying Taxes	793,675	479,494	1,273,169

Source: Directorate Information Technology, Directorate-General of Taxes.

Of all taxpayers registered, not all are obliged to complete tax statements (Table 7). Overall, 60 percent of taxpayers are obliged to complete tax statements. Moreover, of total registered taxpayers, the percentage of taxpayers that pay tax is only 5.73 percent.

3.5   Infrastructure

According to the Global Competitiveness Index for 2011-2012, Indonesia's infrastructure is ranked 76th, and the country receives a total score of 3.77 for its infrastructure (Schwab et al. 2011). For this index, infrastructure is an essential pillar for measuring global competitiveness. Moreover, the overall competitiveness index of Indonesia is 4.38 and its rank is 46. However, the index position of Indonesia is still lower than those of neighbouring countries, such as Brunei Darussalam, ranked 56th (4.23), Malaysia, ranked 26th (5.22), Singapore, ranked 3rd (6.33), and Thailand, ranked 42nd (4.65). It is hence evident that Indonesia must improve its performance related to infrastructure.

To accelerate infrastructure provision, the Indonesian government issued a Presidential Decree (No. 81 of 2001) whereby a Committee on Policy for the Acceleration of Infrastructure Development (KKPPI) was established. In addition, the government issued a Presidential Regulation (No. 42 of 2005) whereby a Committee on Policy for the Acceleration of Infrastructure Provision (KKPPI) was established; it also amended Presidential Regulation (No. 12 of 2011). Since the KKPPI was not effective, the government then issued a Presidential Regulation (No. 75 of 2014) whereby a Committee for the Acceleration of Priority Infrastructure Delivery (KPPIP) was established.

To increase the competitiveness of infrastructure, the government issued a number of programmes to build infrastructure. In 2005 the Indonesian government held the Indonesia Infrastructure Summit which, according to Soesastro and Adjie (2005), was supposed to persuade the country's business sector to invest in some infrastructure projects, in the energy, transportation, telecommunications, and water sectors. However, Booth (2005) pessimistically stated that Indonesia would need an investment of $22.5 billion for infrastructure, since the appraisal process was not reasonable. He added that investment projects would be more attractive to investors, especially foreign investors, if they would be supported by reliable information and accompanied by legal system reforms (Booth 2005).

In 2011, the Indonesian government established the Masterplan for the Acceleration and Expansion of Indonesian Economic Development (MP3EI). Kuncoro (2013) states that MP3EI was an effort intended to create sustainable economic growth. The plan is better than existing programs since it has visible targets, is compact but comprehensive, and is defined from input to outcome (Kuncoro 2013). However, as a new government was elected in 2014, the plan was

changed in January 2015 when the 2015-2019 National Mid-Term Development Plan (RPJMN) was launched.

Under the Jokowi regime, the government now focuses on three programs: infrastructure, deregulation, and de-bureaucratization (Warburton 2017). Particularly pertaining to infrastructure, the government has committed itself to launching and running a megaproject of $411 billion; for this figure, electricity supply could for example be increased with 35,000 megawatts, new roads totalling 3,650 kilometers in length could be built, or access to clean water could be ensured for all regions in Indonesia (Warburton 2017). The Indonesian government has expressed its confidence that this infrastructure boom could tackle inequality, stimulate economic activity in the outer islands, and drive rapid economic growth (Warburton 2017).

However, to enable an infrastructure boom, much funding is required. Yusuf and Sumner (2015) note that fuel subsidies were eliminated and that a shift of focus to infrastructure and social expenditure occurred at the start of the Jokowi regime. The total budget allocation for infrastructure was around $23.9 billion – an increase of 86 percent when compared to the previous budget allocation period (Davidson 2016). Warburton (2017) argues that infrastructure became a political brand for the Jokowi regime, and more so than for the previous regime. However, such priority infrastructure projects seem to fail due to poor coordination, a hesitant leadership style, and political conflict (Yusuf and Sumner 2015).

Chapter 4 Methodology and Data

4.1   Methodology

In this research, the research question will be answered by employing quantitative methods; an assessment of the relationship between specified dependent and independent variables will be conducted. The main group of independent variables comprises some basic infrastructure indicators, including education, health, transportation, electricity, telecommunications, safe water, and safe sanitation. Moreover, the dependent variables comprise tax performance indicators, including tax effort, compliance of tax reporting, and tax payment. In this research, the model is controlled for by using variables including the dummy region, GDP-R per capita, Gini coefficient, GDP-R of the agriculture sector, level of economic sector formality, and rate of population growth. The models that are needed to answer the research question are:

$$
\begin{aligned}
Tax\_Effort\_All_i \\
&= \alpha + \beta_1 Govt\_School_i + \beta_2 Health\_Fac_i + \beta_3 Road\_Asphalt_i + \beta_4 Electric_i \\
&\quad + \beta_5 Water_i + \beta_6 Telecom_i + \beta_7 Sanitation_i + \beta_8 Control\ Variables_i + \epsilon_i
\end{aligned}
$$

$$
\begin{aligned}
Tax\_Effort\_Income\_Tax\_NOG_i \\
&= \alpha + \beta_1 Govt\_School_i + \beta_2 Health\_Fac_i + \beta_3 Road\_Asphalt_i + \beta_4 Electric_i \\
&\quad + \beta_5 Water_i + \beta_6 Telecom_i + \beta_7 Sanitation_i + \beta_8 Control\ Variables_i + \epsilon_i
\end{aligned}
$$

$$
\begin{aligned}
Tax\_Effort\_VAT_i \\
&= \alpha + \beta_1 Govt\_School_i + \beta_2 Health\_Fac_i + \beta_3 Road\_Asphalt_i + \beta_4 Electric_i \\
&\quad + \beta_5 Water_i + \beta_6 Telecom_i + \beta_7 Sanitation_i + \beta_8 Control\ Variables_i + \epsilon_i
\end{aligned}
$$

$$
\begin{aligned}
Person\_Tax\_Report_i \\
&= \alpha + \beta_1 Govt\_School_i + \beta_2 Health\_Fac_i + \beta_3 Road\_Asphalt_i + \beta_4 Electric_i \\
&\quad + \beta_5 Water_i + \beta_6 Telecom_i + \beta_7 Sanitation_i + \beta_8 Control\ Variables_i + \epsilon_i
\end{aligned}
$$

$$
\begin{aligned}
Corp\_Tax\_Report_i \\
&= \alpha + \beta_1 Govt\_School_i + \beta_2 Health\_Fac_i + \beta_3 Road\_Asphalt_i + \beta_4 Electric_i \\
&\quad + \beta_5 Water_i + \beta_6 Telecom_i + \beta_7 Sanitation_i + \beta_8 Control\ Variables_i + \epsilon_i
\end{aligned}
$$

$$
\begin{aligned}
Person\_Tax\_Payment_i \\
&= \alpha + \beta_1 Govt\_School_i + \beta_2 Health\_Fac_i + \beta_3 Road\_Asphalt_i + \beta_4 Electric_i \\
&\quad + \beta_5 Water_i + \beta_6 Telecom_i + \beta_7 Sanitation_i + \beta_8 Control\ Variables_i + \epsilon_i
\end{aligned}
$$

$$
\begin{aligned}
Corp\_Tax\_Report_i \\
&= \alpha + \beta_1 Govt\_School_i + \beta_2 Health\_Fac_i + \beta_3 Road\_Asphalt_i + \beta_4 Electric_i \\
&\quad + \beta_5 Water_i + \beta_6 Telecom_i + \beta_7 Sanitation_i + \beta_8 Control\ Variables_i + \epsilon_i
\end{aligned}
$$

Explanation of the variables:

tax_effort_all	:	Tax effort as part of all tax revenue
tax_effort_income_tax_nog	:	Tax effort as part of income tax revenue
tax_effort_vat	:	Tax effort as part of value added tax revenue
person_tax_report	:	Ratio of compliance personal taxpayer to reporting
corp_tax_report		Ratio of compliance corporate taxpayer to reporting
person_tax_payment	:	Ratio of compliance personal taxpayer to payment
corp_tax_payment	:	Ratio of compliance corporate taxpayer to payment
govt_school	:	Number of government schools
health_fac	:	Number of health infrastructure
road_asphalt	:	Percentage of villages with asphalt roads
electric	:	Percentage of households with access to electricity
water		Percentage of households with access to safe water
telecommunication	:	Percentage of household with access to fixed line phone connections
sanitation	:	Percentage of households with access to safe sanitation
control_variables	:	Gross Domestic Product of Region per capita; rate of population growth; share of population with formal health insurance; GDP-R of agriculture sector; Gini coefficient; and dummy variable of municipality

The estimation of the models uses Ordinary Least Square (OLS) with STATA as computer software to analyze the data. Even there is a heteroskedasticity problem, OLS estimator still reliable by using White's heteroscedasticity-corrected standard errors (robust standard errors) as a base to estimate OLS estimator (Gujarati et al. 2009: 391). Appendix B-D provide some result regarding the assumption test.

4.2   Data

4.2.1   Municipality/Regency

The objective of the research is to examine the relationship among variables at the lowest level of government in Indonesia, namely the municipality or regency level. After the wave of decentralization, the number of municipalities and regencies continues to increase. Since the

research focuses mainly on data for the year 2011, the Ministry of Domestic Affairs Regulation (No. 66 of 2011) is used to determine the spread of municipalities/regencies. According to the regulation, there are 497 municipalities and regencies in Indonesia, as shown in Table 8.

Table 8. List of Municipalities/Regencies in Indonesia in 2011

Province	Number of Regencies	Number of Municipalities	Total
Aceh	18	5	23
Sumatera Utara	25	8	33
Sumatera Barat	12	7	19
Riau	10	2	12
Jambi	9	2	11
Sumatera Selatan	11	4	15
Bengkulu	9	1	10
Lampung	12	2	14
Kep. Bangka Belitung	6	1	7
Kepulauan Riau	5	2	7
DKI Jakarta	1	5	6
Jawa Barat	17	9	26
Jawa Tengah	29	6	35
Daista Yogyakarta	4	1	5
Jawa Timur	29	9	38
Banten	4	4	8
Bali	8	1	9
Nusa Tenggara Barat	8	2	10
Nusa Tenggara Timur	20	1	21
Kalimantan Barat	12	2	14
Kalimantan Tengah	13	1	14
Kalimantan Selatan	11	2	13
Kalimantan Timur	10	4	14
Sulawesi Utara	11	4	15
Sulawesi Tengah	10	1	11
Sulawesi Selatan	21	3	24
Sulawesi Tenggara	10	2	12
Gorontalo	5	1	6
Sulawesi Barat	5	0	5
Maluku	9	2	11
Maluku Utara	7	2	9
Papua	28	1	29
Papua Barat	10	1	11
	399	98	497

Source: Ministry of Domestic Affairs Regulation No. 66 of 2011.

Due to limitations regarding the availablity of data, the author cannot collect all data of the variables for the entire population. In this case, the sample consists of 479 municipalities/regencies in Indonesia representing around 96 percent of the total population, see Appendix A.

4.2.2 Tax Revenue

Central tax revenue data administrated by the DGT under the Ministry of Finance is used for this research. According to Indonesian Law No. 6 of 1983, most recently amended into Law No. 16 of 2009, there are five types of central tax: Income Tax, Value Added Tax and Sales on Luxury Goods Tax, Land and Building Tax, Tax on Land and Building Transfer (BPHTB), and Stamp Duty, as presented in Table 9 alongside the parameters used for the statistical analysis.

Table 9. Tax Revenue Collected by the DGT in 2011

VARIABLES	N	Mean	SD	Min	Max
Tax_Revenue	490	1,269	10,405	0.00116	177,308
Income_Tax_NOG	490	710.6	6,535	0.000960	128,186
VAT	490	550.6	4,211	0.000200	71,142
Land&Building Tax	490	0	0	0	0
BPHTB	490	0	0	0	0
Other_Tax	490	8.025	39.47	-0.595	612.2
Income_Tax_OG	490	0.0356	0.286	0	5.905

Source: Directorate-General of Tax of the Ministry of Finance of Indonesia.

The mean of tax revenue is 1.269 billion IDR. Standard deviation is significant at 10.405 billion IDR. The municipality with the highest tax revenue is Jakarta Selatan with 177,308 billion IDR, and the lowest tax revenue is found in Tambauw, with 1.16 million IDR. In 2011, there was no tax revenue from Land and Building Tax and BPHTB, since these taxes shifted to local governments.

Two types of tax dominate tax revenue in Indonesia. The most prominent contribution is non oil and gas income tax, at around 56 percent, followed by value added tax, at around 43 percent (Figure 4).

Tax Revenue Based on Type of Tax for 2011
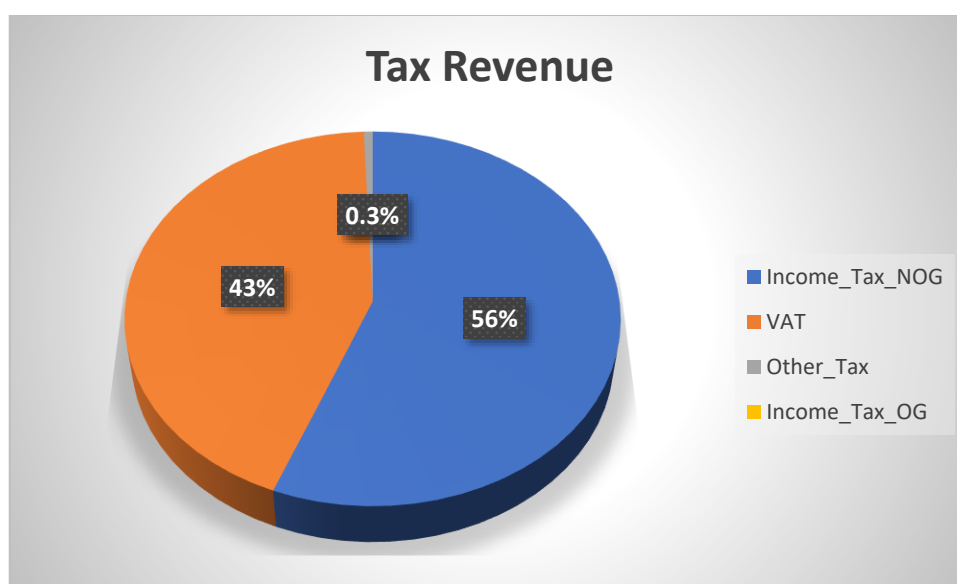
Figure 4. Source: Directorate-General of Tax of the Ministry of Finance of Indonesia.

The distribution of tax revenue based on the type of tax within municipalities/regencies is not far from the aggregate tax revenue. Still, Jakarta Selatan and Tambrauw are the biggest and smallest contributors to income tax and VAT among Indonesian municipalities/regencies.

4.2.3   Gross Domestic Product Regional

The data related to Gross Domestic Product for particular municipalities/regencies (GDP-R) was obtained from the Central Statistical Bureau of Indonesia. On average, the size of economy of municipalities/regencies in Indonesia amounts to around 15 trillion IDR. However, the gap between regions is large, since the standard error is 33 trillion IDR. The summary statistics for GDPR of municipalities/regencies in Indonesia are shown in Table 10.

Table 10. Gross Domestic Product of Region for 2011

Variables	n	Mean	SD	Min	Max
GDPR_BPS	490	15,912	33,010	100	295,375

Source: Central Statistical Bureau of Indonesia (2012).

The economic size of municipalities/regencies is aligned with the tax revenue collected in particular regions. In fact, the municipalities with the highest and the lowest GDP-R – Jakarta Selatan and Tambrauw – also have the highest and lowest tax revenues.

4.2.4 Tax Effort

The data on tax effort is a calculation of tax revenue divided by GDP-R for particular municipalities/regencies. To get a more accurate description of the major types of tax, the tax effort, particularly related to income tax and VAT, is computed as shown in Table 11.

Table 11. Tax Effort for 2011

Variables	n	Mean	SD	Min	Max
tax_effort_all	490	0.0235	0.0413	1.00e-05	0.646
tax_effort_income_tax	490	0.0131	0.0255	0	0.467
tax_effort_vat	490	0.0100	0.0175	0	0.241

Source: Author's calculation, based on data from the Central Statistical Bureau of Indonesia
and the Directorate-General of Tax of the Ministry of Finance of Indonesia.

The smallest tax effort is seen in the Tambrauw municipality, while the biggest tax effort is seen in Jakarta Selatan. Labuan Batu Utara has a tax effort figure of close to zero because the income from tax revenue is very low (37.38 billion IDR compared to the GDP-R of 12.063 trillion IDR). For the VAT tax effort, the smallest contributor is Tambrauw, and the largest is Jakarta Pusat.

4.2.5 Compliance with Tax Reporting

Using data of the DGT on the number of taxpayers obliged to complete tax statements and the actual number of taxpayers completing tax statements, the degree of tax compliance in terms of reporting requirements is calculated. At the national level, around half of taxpayers obliged to complete tax statements comply. The figures for taxpayer compliance are shown in Table 12.

Table 12. Taxpayers' Compliance with Tax Reporting

Variables	n	Mean	SD	Min	Max
report_ratio_person	490	0.596	0.201	0	1.667
report_ratio_corp	490	0.461	0.163	0	0.922

Source: Author's calculation, based on data from the Directorate-General of Tax of
the Ministry of Finance of Indonesia.

However, when examining the lower levels of tax compliance, it is found that in some regions no taxpayers comply with tax reporting obligations. No personal taxpayers in Dogiyai, Nduga, Tolikara, Puncak, and Mamberamo Raya have filed tax reports. The figures regarding corporations' compliance with tax reporting obligations are even more bleak: In seven regions there is no compliance with tax reporting obligations. This includes the five regions mentioned above, along with Lanny Jaya and Yalimo. In the case of Yalimo, there is zero compliance, because no corporations are registered in the tax system. In addition, Waropen and Pontianak have reported the highest rates of tax compliance among both personal and corporate taxpayers.

4.2.6   Taxpayers' Compliance with Tax Payment

The tax revenue for each region is already relatively clear. However, it is also necessary to show taxpayers' compliance with tax payment. To show this, using data from the DGT, the ratio of number of taxpayers paying tax is divided by the number of taxpayers registered in particular regions, as shown in Table 13.

Table 13. Taxpayers' Contribution to Tax Payment

Variables	n	Mean	SD	Min	Max
payment_ratio_person	490	0.0324	0.0220	0	0.200
payment_ratio_corp	490	0.280	0.0844	0	0.596

Source: Author's Calculation, based on data of the Directorate-General of Tax of
the Ministry of Finance of Indonesia.

No payment of taxes by personal taxpayers is found for nine regions: Yalimo, Maybrat, Mamberamo Tengah, Lanny Jaya, Yahukimo, Dogiyai, Tolikara, Puncak, and Mamberamo Raya. The highest payment ratio is in Nduga, the same province with the worst payment ratio. Corporate taxpayers fare better in complying to tax payment: Only three regions, Yalimo, Mamberamo Tengah and Dogiyai, have zero payments by corporate taxpayers. Among corporate taxpayers, the best payment ratio can be found in Solok.

4.2.7   Infrastructure

For the infrastructure-related variables used for this statistical analysis, six variables were obtained from the Village Census (PODES) and the National Socioeconomic Survey (SUSENAS) of 2011. The remaining infrastructure-related variables – transportation, electricity, water, telecommunications, and sanitation – were obtained from calculations of World Bank staff found in the Indodapoer dataset. Data on the education and health variables, on the other hand, was obtained directly from the PODES 2011 dataset.

4.2.7.1   Education

For this study, the education variable is represented by a number of government schools in particular regions, ranging from kindergartens to universities, and including special education schools. Government schools up to an elementary level of schooling are widespread across regions, while not all regions have government schools beyond this level of schooling (Table 14).

Table 14. Number of Government Schools by 2011

Variables	n	Mean	SD	Min	Max
kindergarten	480	8.233	8.548	0	110
elementary	480	272.5	245.8	2	1,549
junior_high	480	43.26	26.58	0	160
senior_high	480	12.48	7.597	0	48
senior_high_vocational	480	5.227	3.591	0	27
university	480	1.323	2.434	0	18
extraordinary	480	1.406	1.640	0	11
sum_govt_school	480	344.5	277.4	3	1,710

Source: Village Census (PODES) of 2011 of the Central Statistical Bureau of Indonesia.

4.2.7.2   Health

The health infrastructure variable is an aggregate of health facilities in particular regions, including hospitals, maternity hospitals, polyclinics, community health centres (puskesmas), and community health sub-centres (pustu). The summary statistics of health-related variables are presented in Table 15.

Table 15. Number of Health Infrastructure by 2011

Variables	n	Mean	SD	Min	Max
hospital	480	4.152	6.318	0	72
maternity	480	10.75	21.35	0	147
polyclinic	480	20.75	46.71	0	470
puskesmas	480	304.8	230.8	2	1,678
pustu	480	45.98	31.43	0	202
sum_infras_health	480	386.4	266.4	3	1,778

Source: Village Census (PODES) of 2011 of the Central Statistical Bureau of Indonesia.

4.2.7.3   Other Infrastructure Variables

While the form of education and health variables are absolute values, the other infrastructure variables are expressed using percentage form. Firstly, transportation infrastructure in this research only pertains to the share of asphalt roads. The author did not include other transportation infrastructure such as seaports and airports, because such types of infrastructure are not common across regions. Secondly, the share of households with access to electricity is used for the electricity infrastructure variable. The electricity supply is predominantly controlled by Indonesia's national electric company (PLN). Moreover, water infrastructure is expressed as a percentage of households with access to safe water. Safe water can be provided by both public and private water utilities, or drawn directly from nature. Furthermore, the share of households with fixed telephone line connections represents the telecommunication infrastructure variable. In 2011, cellular telephone use was low, so fixed telephone line connections are more suitable as proxies of the variable. Lastly, the variable of sanitation treatment infrastructure is explained by regarding the share of households that have access to safe sanitation.

Table 16. Share of Adequate Transportation, Electricity, Water, Telecommunications, and Sanitation Infrastructure in 2011

Variables	n	Mean	SD	Min	Max
road_asph	490	0.678	0.278	0	1
electric	489	86.40	20.31	0	100
water	489	54.83	22.00	0	100
telecommunication	489	5.732	8.900	0	55.86
sanitation	489	61.07	18.03	0	96.42

Source: National Socioeconomic Survey (SUSENAS) of the World Bank.

4.2.8 Control Variables

Besides infrastructure, a number of other factors influence tax effort. Some variables that cannot be omitted are hence used for this analysis (Table 17). Wealth is represented by per capita GDP. The population growth variable represents demograpic factors. Economic structure is distinguishable by looking at the form of local government, since a region with more dynamic economic conditions will have municipalities. The agriculture sector is likewise important, since tax collection in the agriculture sector is relatively difficult compared to other sectors. To take into account the informal economy, the percentage of the total population with health insurance can be used. Lastlythe , Gini coefficient is an indicator of the inequality level across regions.

Table 17. Summary Statistics of the Control Variables

Variables	(1) n	(2) Mean	(3) SD	(4) Min	(5) Max
gdpr_pc	490	32.34	44.65	4.424	374.8
pop_growth	490	0.0293	0.180	-0.775	3.686
shi_formal	490	0.108	0.0661	0	0.389
gdpr_agri	490	2,008	2,261	0	14,825
Gini	490	0.326	0.0479	0.184	0.478
munic_dummy	490	0.196	0.397	0	1

Sources: Central Statistic Bureau of Indonesia, World Bank

4.2.9 Correlation Among Variables

In Chapter 2, a positive correlation was found between infrastructure provision and tax effort. A higher level of infrastructure provision to citizens can lead to the generation of a higher level of trust in the government, as well as an increased willingness to pay tax. Moreover, it is also important to understand the interaction between tax effort and some control variables. Firstly, we expect the relationship between per capita GDP and tax effort to move in positive direction. The logic of the correlation is that per capita GDP as an indicator of economic development will increase the capacity for tax collection (Bahl 1971). Secondly, the rapid rate of population growth is expected to inhibit performance related to tax effort. Bahl (2003) argues that if the population grows more rapidly, the tax system cannot absorb the growth and misses the opportunity to monitor new potential taxpayers. Moreover, tax effort has the tendency of being higher in municipalities than in regencies, since the economic structure of municipalities is more dynamic. Bird et al. (2008) mention that with a better economic structure, the tax handle is available and influences tax effort in positive way. Furthermore, if GDP from the agriculture sector is dominant in a region, the tax effort will likely decrease. Bird et al. (2008) note that the collection of tax becomes harder in regions where the agriculture sector dominates economic activity. In addition, a formal economy should support a higher tax effort. Bird et al. (2008) state that shadow economies, referring to informal economies, lower tax effort. Lastly, a higher Gini coefficient, as an indicator of inequality, lowers the tax effort. If the public perceives the distribution of income and wealth to be unfair, they are less likely to respect the government, influencing their trust in the government and, hence, their willingness to pay tax. Table 18 summarizes the relationship between variables.

Table 18. Explanation of Variables

Variables	Definition	Expected Sign	Source
DEPENDENT			
tax_effort_all	Ratio all tax revenue to GDP-R		DGT and Central Statistical Bureau of Indonesia
tax_effort_income_tax	Ratio income tax revenue to GDP-R		DGT and Central Statistical Bureau of Indonesia
tax_effort_vat	Ratio value added tax revenue to GDP-R		DGT and Central Statistical Bureau of Indonesia
report_ratio_person	Ratio personal taxpayer that completed tax statement to compulsory taxpayer		DGT
report_ratio_corp	Ratio corporate taxpayer that completed tax statement to compulsory taxpayer		DGT
payment_ratio_person	Ratio personal taxpayer paying tax to registered taxpayer		DGT
payment_ratio_corp	Ratio corporate taxpayer paying tax to registered taxpayer		DGT
INDEPENDENT			
sum_govt_school	Number of government schools	+	PODES 2011
sum_infras_health	Number of health infrastructure	+	PODES 2011
road_asph	Villages with asphalt roads (% of total villages)	+	SUSENAS 2011
houelcacsnzs	Household access to electricity (% of total households)	+	SUSENAS 2011
houh2oacsnzs	Household access to safe water (% of total households)	+	SUSENAS 2011
houmltmainzs	Household access to fixed telephone line connections (% of total households)	+	SUSENAS 2011
houstaacsnzs	Household access to safe sanitation (% of total households)	+	SUSENAS 2011

CONTROL			
gdpr_pc	Per capita Gross Domestic Product for Region	+	Central Statistical Bureau of Indonesia
pop_growth	Rate of population growth	-	Central Statistical Bureau of Indonesia
shi_formal	Share of population with formal health insurance	+	Central Statistical Bureau of Indonesia
gdpr_agri	Regional GDP from agriculture sector	-	Central Statistical Bureau of Indonesia
Gini	Inequality measurement	-	Central Statistical Bureau of Indonesia
munic_dummy	Dummy variable of municipality	+	Central Statistical Bureau of Indonesia

Chapter 5 Results

5.1 Results of the Analysis

In Model 1 (Tax Effort All), the basic infrastructure variables with a significant effect on tax effort are education, health, electricity, and telecomunications. The correlation of the infrastructure variables is positive, except for the electricity variable. This means that, without taking into account the electricity variable, every additional supply of infrastructure for variables shown to be significant in the model leads to a general increase in tax effort.

Models 2 and 3 show that, when tax effort is related to specific types of tax (income tax and value-added tax), the coefficients are relatively lower than that of Model 1. This makes sense, since the value of tax effort for models 2 and 3 is around half of the value of tax effort for Model 1. Moreover, for models 2 and 3 the level of significance also decreases, so that the education variable is no longer significant for these models. Furthermore, the health variable, only significant at 5%, decreases the level of confidence of Model 1 from 1%. Another finding is that the electricity variable is still negative while significance increases at 1% in Model 2, even if the value of the coefficient becomes smaller. Lastly, the telecommunication variable is consistently significant across the tax effort models, with variation on the level of significance.

In addition, for Models 4 and Model 5 that investigate the level of compliance of tax reporting, the health infrastructure variable is significant, but has a negative sign. Moreover, the education variable is also found to be significant for both models. Transportation infrastructure only has an impact on the compliance rate of corporate taxpayers. In contrast, access to safe water only has a significant impact on the compliance rate of personal taxpayers. Lastly, sanitation provision only affects the level of compliance of corporate taxpayers.

The transportation variable has a strong positive effect on the number of taxpayers that make tax payments. In both personal and corporate sectors, the significance of the transportation variable is 1%. The health variable is also significant, but the effect is negative. A negative effect on tax payment is also produced by access to electricity, but only for corporate taxpayers. The telecommunications variable has a positive and significant effect only on personal taxpayers' compliance with tax payment. Lastly, safe sanitation only has a positive impact on corporate taxpayer payment.

Table 19. Results of the Analysis

Model Variables	OLS Tax Effort All	OLS Tax Effort Income Tax	OLS Tax Effort VAT	OLS Reported Person	OLS Reported Corp	OLS Payment Person	OLS Payment Corp
log_sum_govt_school	0.00449*	0.00248	0.00197	0.0438*	0.0837***	0.00253	-0.00631
	(0.00270)	(0.00152)	(0.00139)	(0.0234)	(0.0198)	(0.00293)	(0.0118)
log_sum_infras_health	0.00694***	0.00371**	0.00322**	-0.0552**	-0.0695***	-0.00773***	-0.0181*
	(0.00256)	(0.00146)	(0.00127)	(0.0225)	(0.0207)	(0.00232)	(0.0110)
road_asph	0.00344	0.00139	0.00183	0.0908	0.0706*	0.0155***	0.0702***
	(0.00536)	(0.00279)	(0.00292)	(0.0620)	(0.0411)	(0.00494)	(0.0221)
electric	-0.000179**	-9.97e-05***	-7.83e-05*	-0.000581	-0.000248	-0.000177	-0.000772*
	(7.14e-05)	(3.62e-05)	(4.03e-05)	(0.00110)	(0.000704)	(0.000108)	(0.000449)
water	3.45e-06	-1.55e-06	5.01e-06	0.00152***	0.000953	6.54e-05	0.000153
	(0.000107)	(7.28e-05)	(4.17e-05)	(0.000586)	(0.000581)	(8.30e-05)	(0.000261)
telecommunication	0.00243**	0.00143*	0.00100***	-0.00155	-0.000526	0.000541***	9.40e-06
	(0.00111)	(0.000802)	(0.000367)	(0.00137)	(0.00100)	(0.000190)	(0.000545)
sanitation	-4.71e-05	-1.33e-05	-3.44e-05	0.000757	0.00148***	1.45e-05	0.00102***
	(0.000109)	(4.84e-05)	(6.36e-05)	(0.000714)	(0.000514)	(6.63e-05)	(0.000284)
gdpr_pc	0.000159*	7.99e-05**	8.02e-05	-0.000447**	9.07e-05	-4.01e-05*	-0.000102
	(9.02e-05)	(4.01e-05)	(5.21e-05)	(0.000189)	(0.000153)	(2.16e-05)	(8.14e-05)
gini	0.0193	0.00882	0.0103	0.351	-0.0560	0.0409*	0.298***
	(0.0219)	(0.0136)	(0.00990)	(0.226)	(0.153)	(0.0229)	(0.0822)
gdpr_agri	-2.71e-06***	-1.35e-06***	-1.36e-06***	3.46e-06	-1.10e-05***	6.25e-08	-3.01e-06*
	(7.08e-07)	(4.04e-07)	(3.53e-07)	(4.98e-06)	(4.14e-06)	(5.35e-07)	(1.72e-06)
pop_growth	-7.54e-05	-0.000162	0.000155	-0.0469*	0.0339	-0.00525	0.000150
	(0.000959)	(0.000559)	(0.000503)	(0.0264)	(0.0244)	(0.00359)	(0.0322)
shi_formal	-0.0242	-0.00932	-0.0163	-0.178	0.279**	-0.0283	0.0462
	(0.0316)	(0.0166)	(0.0166)	(0.179)	(0.133)	(0.0214)	(0.0763)
munic_dummy	0.0101	0.00594	0.00310	-0.0405	-0.0798***	0.00412	-0.0651***
	(0.00923)	(0.00628)	(0.00351)	(0.0407)	(0.0294)	(0.00407)	(0.0155)
Constant	-0.0443**	-0.0243*	-0.0197**	0.462***	0.251**	0.0502**	0.286***
	(0.0195)	(0.0126)	(0.00804)	(0.119)	(0.100)	(0.0218)	(0.0647)
Observations	479	479	479	479	479	479	479
R-squared	0.405	0.354	0.385	0.101	0.204	0.250	0.141

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The endogenous model above presents some potential problems. For instance, improved conditions related to infrastructure may increase tax effort and other tax performance indicators. However, the weak performance of taxation may inhibit government expenditure, including expenditure on infrastructure. Table 20 provides some outputs of the endogenous investigation, including the 2SLS estimation, Wooldridge's score test, regression-based test, and the first stage regression.

Table 20. Endogenous Investigation

Variables	Education 2SLS	Education First Stage	Health 2SLS Health	Health First Stage	Transportation 2SLS	Transportation First Stage	Electric 2SLS	Electric First Stage
INFRASTRUCTURE								
log_sum_govt_school	-0.00704		0.00775	0.658***	0.00757	0.0720***	0.0217	9.261***
	(0.0165)		(0.00635)	(0.0358)	(0.00660)	(0.0190)	(0.0467)	(1.251)
log_sum_infras_health	0.0147	0.639***	0.00251		0.00355	-0.0905***	-0.000205	-4.038***
	(0.0122)	(0.0348)	(0.00669)		(0.00567)	(0.0186)	(0.0187)	(1.289)
road_asph	0.00849	0.414***	0.00110	-0.537***	-0.0372		0.0571	28.96***
	(0.00835)	(0.110)	(0.00694)	(0.110)	(0.0680)		(0.144)	(2.875)
electric	-4.54e-05	0.0114***	-0.000202**	-0.00512***	7.47e-05	0.00618***	-0.00203	
	(0.000204)	(0.00154)	(8.21e-05)	(0.00163)	(0.000418)	(0.000614)	(0.00496)	
water	-2.09e-06	-0.000295	1.62e-05	0.00312**	0.000154	0.00373***	0.000346	0.187***
	(0.000107)	(0.00139)	(0.000104)	(0.00140)	(0.000253)	(0.000552)	(0.000918)	(0.0387)
telecommunication	0.00259**	0.0144***	0.00243**	0.00156	0.00254**	0.00285**	0.00182	-0.324***
	(0.00112)	(0.00333)	(0.00110)	(0.00345)	(0.00111)	(0.00141)	(0.00197)	(0.0957)
sanitation	-5.32e-05	6.87e-06	-4.83e-05	0.00103	-0.000133	-0.00194***	0.000417	0.255***
	(0.000107)	(0.00139)	(0.000108)	(0.00141)	(0.000178)	(0.000573)	(0.00126)	(0.0379)
INSTRUMENT								
natural_disaster		0.000271**		0.000664***		7.72e-05		0.00171
		(0.000117)		(0.000115)		(4.89e-05)		(0.00335)
gdpr_pc	0.000145	-0.00116***	0.000155*	-0.000708	0.000132	-0.000652***	0.000206	0.0257**
	(9.36e-05)	(0.000446)	(8.92e-05)	(0.000455)	(9.97e-05)	(0.000185)	(0.000152)	(0.0128)
gini	0.0328	1.191***	0.0159	-0.633	0.0251	0.150	0.0226	1.975
	(0.0313)	(0.413)	(0.0217)	(0.422)	(0.0257)	(0.174)	(0.0364)	(11.88)
gdpr_agri	-1.76e-06	7.98e-05***	-2.71e-06***	-3.63e-06	-3.22e-06**	-1.29e-05***	-1.59e-06	0.000599*
	(1.41e-06)	(1.06e-05)	(6.91e-07)	(1.14e-05)	(1.26e-06)	(4.63e-06)	(3.04e-06)	(0.000318)
pop_growth	-9.40e-05	0.00807	-0.000138	0.0106	0.00115	0.0326	-0.0134	-7.129**
	(0.00162)	(0.101)	(0.00103)	(0.102)	(0.00314)	(0.0420)	(0.0362)	(2.856)
shi_formal	-0.0416	-1.574***	-0.0223	0.213	-0.0242	-0.0221	0.0238	25.47**
	(0.0365)	(0.374)	(0.0320)	(0.387)	(0.0314)	(0.159)	(0.136)	(10.82)
munic_dummy	0.00783	-0.199**	0.00861	-0.326***	0.0133	0.0773**	0.0106	0.215
	(0.00929)	(0.0848)	(0.00898)	(0.0853)	(0.0115)	(0.0354)	(0.0102)	(2.433)
Constant	-0.0438**	0.190	-0.0327	2.790***	-0.0407**	0.128	-0.0291	9.145
	(0.0182)	(0.230)	(0.0204)	(0.194)	(0.0188)	(0.0956)	(0.0412)	(6.540)
Test for excl. instruments		3.98147** [0.0466]		30.1552*** [0.0000]		3.00635* [0.0836]		0.237438 [0.6263]
Wooldridge's score test				0.432552 (p = 0.5107)				
Regression-based test				0.408085 (p = 0.5233)				
Observations	479	479	479	479	479	479	479	479
R-squared	0.393	0.803	0.403	0.742	0.380	0.660	0.161	0.704

Robust standard errors in parentheses, F statistic for the joint significance in square brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 20b. Continuation of Table 20

Variables	Water 2SLS	Water First Stage	Telecommunication 2SLS	Telecommunication First Stage	Sanitation 2SLS	Sanitation First Stage
INFRASTRUCTURE						
log_sum_govt_school	0.00484	-0.329	0.00241	2.682***	0.00462*	0.00764
	(0.00303)	(1.548)	(0.00336)	(0.621)	(0.00275)	(1.546)
log_sum_infras_health	0.00503	3.371**	0.00702***	0.283	0.00700***	1.116
	(0.00379)	(1.517)	(0.00259)	(0.624)	(0.00252)	(1.522)
road_asph	-0.0122	23.95***	0.00114	3.054**	0.00647	-12.42***
	(0.0275)	(3.545)	(0.00683)	(1.513)	(0.00637)	(3.665)
electric	-0.000347	0.256***	-0.000117	-0.0743***	-0.000257*	0.348***
	(0.000298)	(0.0530)	(0.000113)	(0.0219)	(0.000147)	(0.0518)
water	0.000663		-4.81e-05	0.0600***	-4.11e-05	0.187***
	(0.00109)		(0.000139)	(0.0188)	(0.000135)	(0.0455)
telecommunication	0.00218*	0.359***	0.00325**		0.00240**	0.0858
	(0.00120)	(0.112)	(0.00160)		(0.00110)	(0.113)
sanitation	-0.000178	0.188***	-6.51e-05	0.0144	0.000173	
	(0.000242)	(0.0456)	(0.000109)	(0.0190)	(0.000361)	
INSTRUMENT						
natural_disaster		-0.00477		-0.00383**		-0.0139***
		(0.00392)		(0.00160)		(0.00387)
gdpr_pc	0.000143	0.0230	0.000131	0.0337***	0.000149	0.0424***
	(9.48e-05)	(0.0150)	(9.49e-05)	(0.00593)	(9.20e-05)	(0.0148)
gini	0.0279	-13.57	0.00439	17.68***	0.0191	-0.759
	(0.0288)	(13.90)	(0.0295)	(5.630)	(0.0218)	(13.89)
gdpr_agri	-2.70e-06***	1.38e-05	-2.26e-06***	-0.000532***	-2.99e-06***	0.00131***
	(7.72e-07)	(0.000374)	(8.22e-07)	(0.000151)	(9.19e-07)	(0.000368)
pop_growth	-0.000902	1.079	0.000199	-0.470	-6.52e-05	-0.542
	(0.00280)	(3.366)	(0.000988)	(1.376)	(0.00137)	(3.361)
shi_formal	-0.0528	44.62***	-0.0231	-0.193	-0.0277	19.38
	(0.0519)	(12.57)	(0.0329)	(5.209)	(0.0306)	(12.69)
munic_dummy	0.00525	7.419***	-0.000987	13.52***	0.00800	9.526***
	(0.0117)	(2.828)	(0.0178)	(0.982)	(0.00911)	(2.810)
Constant	-0.0353*	-16.18**	-0.0310	-18.13***	-0.0499**	17.32**
	(0.0203)	(7.636)	(0.0214)	(3.023)	(0.0242)	(7.620)
Test for excl. instruments		2.02793 (0.1551)		9.03636*** (0.0028)		13.7163*** (0.0002)
Wooldridge's score test			0.432552 (p = 0.5107)			
Regression-based test			0.408085 (p = 0.5233)			
Observations	479	479	479	479	479	479
R-squared	0.362	0.654	0.394	0.644	0.400	0.475

Robust standard errors in parentheses, F statistic for the joint significance in square brackets

*** p<0.01, ** p<0.05, * p<0.1

The instrument chosen for infrastructure is natural disasters. Data on natural disasters, specifically the number of disasters occurring in particular regions over the last three years, was obtained from PODES 2011. Natural disasters are correlated with infrastructure, since the higher frequency of disasters in some regions implies that infrastructure may potentially be damaged or destroyed. Moreover, natural disasters do not have a direct effect on tax effort,

since even if the tax revenue decreases, natural disasters also decrease economic growth in particular regions.

To investigate whether infrastructure is endogenous or exogenous to the model, a test for endogeneity was conducted. Since robust standard errors are required, the Wooldridge's score test and a regression-based test were used (Stata 2017). The results show that the Wooldridge's score test does not reject the null hypothesis that all infrastructure variables are exogenous at conventional significance levels (p = 0.5107). Moreover, the regression-based test also does not reject the null hypothesis even at a 10% significance level (p = 0.5233). This means that infrastructure variables are exogenous to the model.

It is important to determine whether the instrument is valid when using first stage regression. The output shows that the instrument variable (natural disasters) is significant for four infrastructure variables: education, health, telecommunications, and safe sanitation. Moreover, the F statistic is significant, so the IV natural disasters have significant explanatory power to explain five infrastructure variables, namely education, health, transportation, telecommunications, and sanitation. As a result, the OLS estimator is efficient and still can be used to interpret the model.

5.2   Discussion

More than half of infrastructure variables are significant in the model above. Some of them, such as the correlation between infrastructure and tax performance, conform with the expected signs (Table 18). There is proof that in general, better infrastructure quality in particular regions leads to better tax performance. The findings show that citizens are appreciative of government spending on infrastructure. Such appreciation can result in increasing trust in the government and, hence, an increase in tax performance in municipalities/regencies with better conditions related to infrastructure.

The discussion is now broken down according to particular types of infrastructure variables. Firstly, education infrastructure should have a positive effect on tax performance since the taxpayers, who are usually adults, are more appreciative of the benefits of education. Indeed, when paying tax, taxpayers do not benefit directly from investments in education infrastructure; however, they nevertheless perceive the importance of education, which drives them to

contribute to society by increasing tax effort in general and compliance with tax reporting and payment, in particular. This is the case for both individual and corporate taxpayers. At least two arguments can be provided regarding the motivations of taxpayers for paying tax based on government expenditure on education infrastructure. Firstly, as taxpayers are a mature population group, they have an altruistic spirit related to better education for future generations. Secondly, this group has a mindset that education is linked to an increase in human capital necessary to supply the requirements of the economy and increase the competitiveness of society-at-large.

In some models, such as the specific tax effort and tax payment performance models, an improvement in education conditions does not seem sufficient for increasing the willingness of taxpayers to pay tax. This may be attributed to the availability of private schools that may better meet the expectations of taxpayers. According to Kristiansen and Pratikno (2006), private education via religious organizations is dominant in the Indonesian education system.

Moreover, the high cost of education can also contribute to a decrease of trust in the government. Kristiansen and Pratikno (2006) report that education fees are high and continue to increase, but weak of accountability and transparency. Susanti (2011) also found that higher education became costly after regulations were issued that led to the commercialization of public universities. Adding to that, Leer (2016) found that decentralization in Indonesia had no significant effect on education quality and that teaching effort continues to decrease, particularly in rural areas. Hence, if the three models show the positive impact of the education variable, problems related to the quality and cost of education shown in other models reduces this impact.

Regarding healthcare facilities, such facilities are beneficial for all citizens, including taxpayers. Since taxpayers are likely customers of healthcare facilities, it can be expected that they would appreciate improved healthcare facilities. In this case, of particular importance is the extent to and speed at which healthcare facilities improve access to healthcare services. For the entire tax effort model, an increase in the number of healthcare facilities in particular regions is shown to lead to a better tax effort.

However, in the other tax performance indicator models (compliance with tax reporting and payment), the number of health facilities has a negative impact on compliance with tax reporting and payment. The inconsistency of the effect shows that even if there are abundant healthcare facilities, this cannot guarantee excellent service. Transparency and accountability

remain major issues related to public healthcare facilities in Indonesia (Kristiansen and Santoso 2006). Furthermore, Kristiansen and Santoso (2006) argue that healthcare facilities are becoming increasingly profit-driven, so that the role of preventative health and good healthcare services for impoverished persons becomes less significant. It can be concluded that an improvement of healthcare infrastructure should increase tax performance, as long as the government is able to increase citizen trust through accountability related to expenditure and through its provision of affordable and universal healthcare.

In addition, improvements in transportation infrastructure should have a direct impact on economic efficiency. For this study the condition of asphalt roads was regarded, and the data shows that improved quality of roads has a positive impact on corporate tax reporting and compliance of taxpayers with tax payment. This seems logical, because the corporate sector can increase profits through efficient transportation provided by good transportation infrastructure networks. However, the quality of roads has no significant effect on tax effort and compliance with tax reporting, because even if road quality does matter, the lack of a comprehensive system is not enough to build trust in the government. Leung (2016) argues that road transportation infrastructure is insufficient for increasing public trust, because Indonesia does not have an integrated public transport system, including mass public transport, traffic management, parking facilities, and non-motorized facilities.

The research shows that electricity has a negative impact on tax effort, related both to general taxes and specific taxes. Moreover, access to electricity is essential for economic activity, and an expanded electricity network should contribute to the development of the business sector. However, Indonesia is an anomaly, because the research shows that an improvement in electricity infrastructure does not result in an increased tax effort. In fact, abundant Indonesian population in rural area were unconnected to electricity, concentrated outside Jawa-Bali island (Jayawardena 2005). One possible explanation may be disagreement of citizens with electricity tariffs. Through the Ministry of Energy and Mineral Resources' Regulation No. 7 of 2010, electricity tariffs were increased in 2010. The increase became controversial due to the belief among citizens that the increase was too high (detikFinance 2010). Moreover, the possible negative impacts of an increase in electricity tariffs led the Young Enterpreneur Association (HIPMI) to lobby to persuade the government to erase VAT for SMEs (Viva 2010).

Another infrastructure variable regarded in this study is access to safe water, which is crucial for human survival. The results show that personal taxpayers living in regions with better

access to safe water are more likely to comply with tax reporting. However, the model on tax performance is not related to access to water. Water is freely available in nature or citizens should pay for access to clean water, both for communities or corporate water consumers. Indeed, a number of government-owned water companies supply clean water to households. However, the rate of water connections is low – for example, in Jakarta, Indonesia's capital city, where one would expect a higher water connection rate, only 46-56 percent of households have water connections, making it one of the cities in Asia with the lowest levels of water connections (Bakker et al. 2008). Citizens who are not connected to the water grid use groundwater and surface water collected from rivers, springs, and rainfall (ibid.). Consequently, improved access to water is not considered a result of government intervention.

Another basic infrastructure variable used for this research is telecommunications. Besides access to cellular telephones, better access to fixed telephone lines is seen as essential for communication. The three models of tax effort provided evidence that tax performance tends to rise in regions with high telecommunications coverage. Moreover, the number of taxpayers that comply with tax payment tends to rise with improved access to telecommunications. However, telephone connections do not really increase compliance with tax reporting and tax payment. Sridhar and Sridhar (2007) argue that an improvement of telecommunication infrastructure is only effective if no significant gap exists between digital accessibility and support by means of the provision of useful economic information for citizens. Rahay and Day (2017) state that Indonesian SMEs are lagging far behind developed countries in term of e-commerce adoption. Even with rapid progress in the telecommunications sector, households and SMEs have limited access to the internet due to its high cost and low speed (Kurnia 2006). As a result, improvements in the telecommunications sector cannot drive tax compliance, since taxpayers do not derive direct economic benefit from improved access to telecommunications.

Lastly, adequate access to safe sanitation is important for ensuring healthy communities. Moreover, good sanitation also contributes to better environmental conditions. Even if improved sanitation does not influence tax effort, this type of variable can increase the rate of compliance with tax reporting and payment, both for personal and corporate taxpayers. The inconsistent results may be due to a weak demand from citizens for better sanitation infrastructure in Indonesia in general (Winters et al. 2014). In fact, the government is not really focused on water and sanitation provision, even after the decentralization of the government (Engel and Susilo 2014). As a result, sanitation infrastructure provision cannot influence tax performance in general.

Chapter 6 . Conclusion

Government efforts to increase tax revenue, especially by means of a deterrence approach, are difficult to apply. Some literature provides strong evidence that overreliance on a deterrence approach fails to sufficiently explain compliance behaviour of taxpayers. However, harsh punishment or command-and-control measures will never establish voluntary tax compliance. Moreover, a lack of government capacity can also hamper the application of strict deterrence policies, especially in large countries such as Indonesia. The high financial and energy cost of such measures required to fully monitor taxpayer behaviour is also a limiting factor.

Research on the psychological contract between governments and taxpayers suggests that the creation of a synergetic climate should be an important consideration in government policies, since it can lead to improvements in tax effort. Since willingness to pay tax emerges when trust increases, the government should provide evidence that it can reliably manage government expenditure funded by tax revenue. As a market failure phenomenon, basic infrastructure becomes a priority sector for governments. The provision of infrastructure in developing countries seems to be quite challenging due to governance-related issues such as corruption and manipulation that can undermine infrastructure delivery. In other words, if citizens perceive that the availability of basic infrastructure is satisfied, they tend to place a higher level of trust in the government.

This research find that the majority of infrastructure variables have a positive impact on tax performance indicators. Indeed, tax performance of particular regions cannot be justified through reference solely to the tax ratio. Hence, it is important to provide additional measurements of tax performance, including compliance with tax reporting and tax payment. Moreover, instead of focusing only on the amount of tax revenue collected by tax institutions, an analysis of incidence of compliance with tax reporting and payment provides a more comprehensive measurement of tax performance.

Some interesting findings in the research is that some infrastructure variables have a negative correlation with tax effort and other tax performance indicators. This shows that increased quantity (in this case of infrastructure) should be accompanied by increased quality, and vice versa. If governments do not pay sufficient attention to the provision of excellent and affordable

infrastructure-related services, the provision of physical infrastructure can actually decrease citizen trust in governments.

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Appendix

Appendix A: List of Sample Municipalities/Regencies

No	Name of Local Government	BPS Code	Type of Local Government	No	Name of Local Government	BPS Code	Type of Local Government
1	Simeulue	1101	Regency	36	Langkat	1213	Regency
2	Aceh Singkil	1102	Regency	37	Nias Selatan	1214	Regency
3	Aceh Selatan	1103	Regency	38	Humbang Hasundutan	1215	Regency
4	Aceh Tenggara	1104	Regency	39	Pakpak Bharat	1216	Regency
5	Aceh Timur	1105	Regency	40	Samosir	1217	Regency
6	Aceh Tengah	1106	Regency	41	Serdang Bedagai	1218	Regency
7	Aceh Barat	1107	Regency	42	Batu Bara	1219	Regency
8	Aceh Besar	1108	Regency	43	Padang Lawas Utara	1220	Regency
9	Pidie	1109	Regency	44	Padang Lawas	1221	Regency
10	Bireuen	1110	Regency	45	Labuhan Batu Selatan	1222	Regency
11	Aceh Utara	1111	Regency	46	Labuhan Batu Utara	1223	Regency
12	Aceh Barat Daya	1112	Regency	47	Nias Utara	1224	Regency
13	Gayo Lues	1113	Regency	48	Nias Barat	1225	Regency
14	Aceh Tamiang	1114	Regency	49	Kota Sibolga	1271	Municipality
15	Nagan Raya	1115	Regency	50	Kota Tanjung Balai	1272	Municipality
16	Aceh Jaya	1116	Regency	51	Kota Pematang Siantar	1273	Municipality
17	Bener Meriah	1117	Regency	52	Kota Tebing Tinggi	1274	Municipality
18	Pidie Jaya	1118	Regency	53	Kota Medan	1275	Municipality
19	Kota Banda Aceh	1171	Municipality	54	Kota Binjai	1276	Municipality
20	Kota Sabang	1172	Municipality	55	Kota Padang Sidempuan	1277	Municipality
21	Kota Langsa	1173	Municipality	56	Kota Gunungsitoli	1278	Municipality
22	Kota Lhokseumawe	1174	Municipality	57	Kepulauan Mentawai	1301	Regency
23	Kota Subulussalam	1175	Municipality	58	Sijunjung	1304	Regency
24	Nias	1201	Regency	59	Kota Padang	1371	Municipality
25	Mandailing Natal	1202	Regency	60	Kota Solok	1372	Municipality
26	Tapanuli Selatan	1203	Regency	61	Kota Sawah Lunto	1373	Municipality
27	Tapanuli Tengah	1204	Regency	62	Kota Padang Panjang	1374	Municipality
28	Tapanuli Utara	1205	Regency	63	Kota Bukittinggi	1375	Municipality
29	Toba Samosir	1206	Regency	64	Kota Payakumbuh	1376	Municipality
30	Labuhan Batu	1207	Regency	65	Kota Pariaman	1377	Municipality
31	Asahan	1208	Regency	66	Kuantan Singingi	1401	Regency
32	Simalungun	1209	Regency	67	Indragiri Hulu	1402	Regency
33	Dairi	1210	Regency	68	Indragiri Hilir	1403	Regency
34	Karo	1211	Regency	69	Pelalawan	1404	Regency
35	Deli Serdang	1212	Regency	70	Siak	1405	Regency

No	Name of Local Government	BPS Code	Type of Local Government	No	Name of Local Government	BPS Code	Type of Local Government
71	Kampar	1406	Regency	106	Bengkulu Utara	1703	Regency
72	Rokan Hulu	1407	Regency	107	Kaur	1704	Regency
73	Bengkalis	1408	Regency	108	Seluma	1705	Regency
74	Rokan Hilir	1409	Regency	109	Mukomuko	1706	Regency
75	Kepulauan Meranti	1410	Regency	110	Lebong	1707	Regency
76	Kota Pekanbaru	1471	Municipality	111	Kepahiang	1708	Regency
77	Kota Dumai	1473	Municipality	112	Bengkulu Tengah	1709	Regency
78	Kerinci	1501	Regency	113	Kota Bengkulu	1771	Municipality
79	Merangin	1502	Regency	114	Lampung Barat	1801	Regency
80	Sarolangun	1503	Regency	115	Tanggamus	1802	Regency
81	Batang Hari	1504	Regency	116	Lampung Selatan	1803	Regency
82	Muaro Jambi	1505	Regency	117	Lampung Timur	1804	Regency
83	Tanjung Jabung Timur	1506	Regency	118	Lampung Tengah	1805	Regency
84	Tanjung Jabung Barat	1507	Regency	119	Lampung Utara	1806	Regency
85	Tebo	1508	Regency	120	Way Kanan	1807	Regency
86	Bungo	1509	Regency	121	Tulangbawang	1808	Regency
87	Kota Jambi	1571	Municipality	122	Pesawaran	1809	Regency
88	Kota Sungai Penuh	1572	Municipality	123	Pringsewu	1810	Regency
89	Ogan Komering Ulu	1601	Regency	124	Mesuji	1811	Regency
90	Ogan Komering Ilir	1602	Regency	125	Tulang Bawang Barat	1812	Regency
91	Muara Enim	1603	Regency	126	Kota Bandar Lampung	1871	Municipality
92	Lahat	1604	Regency	127	Kota Metro	1872	Municipality
93	Musi Rawas	1605	Regency	128	Bangka	1901	Regency
94	Musi Banyuasin	1606	Regency	129	Belitung	1902	Regency
95	Banyu Asin	1607	Regency	130	Bangka Barat	1903	Regency
96	Ogan Komering Ulu Selatan	1608	Regency	131	Bangka Tengah	1904	Regency
97	Ogan Komering Ulu Timur	1609	Regency	132	Bangka Selatan	1905	Regency
98	Ogan Ilir	1610	Regency	133	Belitung Timur	1906	Regency
99	Empat Lawang	1611	Regency	134	Kota Pangkal Pinang	1971	Municipality
100	Kota Palembang	1671	Municipality	135	Karimun	2101	Regency
101	Kota Prabumulih	1672	Municipality	136	Bintan	2102	Regency
102	Kota Pagar Alam	1673	Municipality	137	Natuna	2103	Regency
103	Kota Lubuklinggau	1674	Municipality	138	Lingga	2104	Regency
104	Bengkulu Selatan	1701	Regency	139	Kepulauan Anambas	2105	Regency
105	Rejang Lebong	1702	Regency	140	Kota Batam	2171	Municipality

No	Name of Local Government	BPS Code	Type of Local Government	No	Name of Local Government	BPS Code	Type of Local Government
141	Kota Tanjung Pinang	2172	Municipality	176	Purbalingga	3303	Regency
142	Kepulauan Seribu	3101	Regency	177	Banjarnegara	3304	Regency
143	Kota Jakarta Selatan	3171	Municipality	178	Kebumen	3305	Regency
144	Kota Jakarta Timur	3172	Municipality	179	Purworejo	3306	Regency
145	Kota Jakarta Pusat	3173	Municipality	180	Wonosobo	3307	Regency
146	Kota Jakarta Barat	3174	Municipality	181	Magelang	3308	Regency
147	Kota Jakarta Utara	3175	Municipality	182	Boyolali	3309	Regency
148	Bogor	3201	Regency	183	Klaten	3310	Regency
149	Sukabumi	3202	Regency	184	Sukoharjo	3311	Regency
150	Cianjur	3203	Regency	185	Wonogiri	3312	Regency
151	Bandung	3204	Regency	186	Karanganyar	3313	Regency
152	Garut	3205	Regency	187	Sragen	3314	Regency
153	Tasikmalaya	3206	Regency	188	Grobogan	3315	Regency
154	Ciamis	3207	Regency	189	Blora	3316	Regency
155	Kuningan	3208	Regency	190	Rembang	3317	Regency
156	Cirebon	3209	Regency	191	Pati	3318	Regency
157	Majalengka	3210	Regency	192	Kudus	3319	Regency
158	Sumedang	3211	Regency	193	Jepara	3320	Regency
159	Indramayu	3212	Regency	194	Demak	3321	Regency
160	Subang	3213	Regency	195	Semarang	3322	Regency
161	Purwakarta	3214	Regency	196	Temanggung	3323	Regency
162	Karawang	3215	Regency	197	Kendal	3324	Regency
163	Bekasi	3216	Regency	198	Batang	3325	Regency
164	Bandung Barat	3217	Regency	199	Pekalongan	3326	Regency
165	Kota Bogor	3271	Municipality	200	Pemalang	3327	Regency
166	Kota Sukabumi	3272	Municipality	201	Tegal	3328	Regency
167	Kota Bandung	3273	Municipality	202	Brebes	3329	Regency
168	Kota Cirebon	3274	Municipality	203	Kota Magelang	3371	Municipality
169	Kota Bekasi	3275	Municipality	204	Kota Surakarta	3372	Municipality
170	Kota Depok	3276	Municipality	205	Kota Salatiga	3373	Municipality
171	Kota Cimahi	3277	Municipality	206	Kota Semarang	3374	Municipality
172	Kota Tasikmalaya	3278	Municipality	207	Kota Pekalongan	3375	Municipality
173	Kota Banjar	3279	Municipality	208	Kota Tegal	3376	Municipality
174	Cilacap	3301	Regency	209	Kulon Progo	3401	Regency
175	Banyumas	3302	Regency	210	Bantul	3402	Regency

No	Name of Local Government	BPS Code	Type of Local Government	No	Name of Local Government	BPS Code	Type of Local Government
211	Gunung Kidul	3403	Regency	246	Kota Probolinggo	3574	Municipality
212	Sleman	3404	Regency	247	Kota Pasuruan	3575	Municipality
213	Kota Yogyakarta	3471	Municipality	248	Kota Mojokerto	3576	Municipality
214	Pacitan	3501	Regency	249	Kota Madiun	3577	Municipality
215	Ponorogo	3502	Regency	250	Kota Surabaya	3578	Municipality
216	Trenggalek	3503	Regency	251	Kota Batu	3579	Municipality
217	Tulungagung	3504	Regency	252	Pandeglang	3601	Regency
218	Blitar	3505	Regency	253	Lebak	3602	Regency
219	Kediri	3506	Regency	254	Tangerang	3603	Regency
220	Malang	3507	Regency	255	Serang	3604	Regency
221	Lumajang	3508	Regency	256	Kota Tangerang	3671	Municipality
222	Jember	3509	Regency	257	Kota Cilegon	3672	Municipality
223	Banyuwangi	3510	Regency	258	Kota Serang	3673	Municipality
224	Bondowoso	3511	Regency	259	Kota Tangerang Selatan	3674	Municipality
225	Situbondo	3512	Regency	260	Jembrana	5101	Regency
226	Probolinggo	3513	Regency	261	Tabanan	5102	Regency
227	Pasuruan	3514	Regency	262	Badung	5103	Regency
228	Sidoarjo	3515	Regency	263	Gianyar	5104	Regency
229	Mojokerto	3516	Regency	264	Klungkung	5105	Regency
230	Jombang	3517	Regency	265	Bangli	5106	Regency
231	Nganjuk	3518	Regency	266	Karang Asem	5107	Regency
232	Madiun	3519	Regency	267	Buleleng	5108	Regency
233	Magetan	3520	Regency	268	Kota Denpasar	5171	Municipality
234	Ngawi	3521	Regency	269	Lombok Barat	5201	Regency
235	Bojonegoro	3522	Regency	270	Lombok Tengah	5202	Regency
236	Tuban	3523	Regency	271	Lombok Timur	5203	Regency
237	Lamongan	3524	Regency	272	Sumbawa	5204	Regency
238	Gresik	3525	Regency	273	Dompu	5205	Regency
239	Bangkalan	3526	Regency	274	Bima	5206	Regency
240	Sampang	3527	Regency	275	Sumbawa Barat	5207	Regency
241	Pamekasan	3528	Regency	276	Lombok Utara	5208	Regency
242	Sumenep	3529	Regency	277	Kota Mataram	5271	Municipality
243	Kota Kediri	3571	Municipality	278	Kota Bima	5272	Municipality
244	Kota Blitar	3572	Municipality	279	Sumba Barat	5301	Regency
245	Kota Malang	3573	Municipality	280	Sumba Timur	5302	Regency

No	Name of Local Government	BPS Code	Type of Local Government	No	Name of Local Government	BPS Code	Type of Local Government
281	Kupang	5303	Regency	316	Barito Selatan	6204	Regency
282	Timor Tengah Selatan	5304	Regency	317	Barito Utara	6205	Regency
283	Timor Tengah Utara	5305	Regency	318	Sukamara	6206	Regency
284	Belu	5306	Regency	319	Lamandau	6207	Regency
285	Alor	5307	Regency	320	Seruyan	6208	Regency
286	Lembata	5308	Regency	321	Katingan	6209	Regency
287	Flores Timur	5309	Regency	322	Pulang Pisau	6210	Regency
288	Sikka	5310	Regency	323	Gunung Mas	6211	Regency
289	Ende	5311	Regency	324	Barito Timur	6212	Regency
290	Ngada	5312	Regency	325	Murung Raya	6213	Regency
291	Manggarai	5313	Regency	326	Kota Palangka Raya	6271	Municipality
292	Rote Ndao	5314	Regency	327	Tanah Laut	6301	Regency
293	Manggarai Barat	5315	Regency	328	Kota Baru	6302	Municipality
294	Sumba Tengah	5316	Regency	329	Banjar	6303	Regency
295	Sumba Barat Daya	5317	Regency	330	Barito Kuala	6304	Regency
296	Nagekeo	5318	Regency	331	Tapin	6305	Regency
297	Manggarai Timur	5319	Regency	332	Hulu Sungai Selatan	6306	Regency
298	Kota Kupang	5371	Municipality	333	Hulu Sungai Tengah	6307	Regency
299	Sambas	6101	Regency	334	Hulu Sungai Utara	6308	Regency
300	Bengkayang	6102	Regency	335	Tabalong	6309	Regency
301	Landak	6103	Regency	336	Tanah Bumbu	6310	Regency
302	Pontianak	6104	Regency	337	Balangan	6311	Regency
303	Sanggau	6105	Regency	338	Kota Banjarmasin	6371	Municipality
304	Ketapang	6106	Regency	339	Kota Banjar Baru	6372	Municipality
305	Sintang	6107	Regency	340	Paser	6401	Regency
306	Kapuas Hulu	6108	Regency	341	Kutai Barat	6402	Regency
307	Sekadau	6109	Regency	342	Kutai Kartanegara	6403	Regency
308	Melawi	6110	Regency	343	Kutai Timur	6404	Regency
309	Kayong Utara	6111	Regency	344	Berau	6405	Regency
310	Kubu Raya	6112	Regency	345	Malinau	6406	Regency
311	Kota Pontianak	6171	Municipality	346	Bulungan	6407	Regency
312	Kota Singkawang	6172	Municipality	347	Nunukan	6408	Regency
313	Kotawaringin Barat	6201	Regency	348	Penajam Paser Utara	6409	Regency
314	Kotawaringin Timur	6202	Regency	349	Tana Tidung	6410	Regency
315	Kapuas	6203	Regency	350	Kota Balikpapan	6471	Municipality

No	Name of Local Government	BPS Code	Type of Local Government	No	Name of Local Government	BPS Code	Type of Local Government
351	Kota Samarinda	6472	Municipality	386	Maros	7308	Regency
352	Kota Tarakan	6473	Municipality	387	Pangkajene Dan Kepulauan	7309	Regency
353	Kota Bontang	6474	Municipality	388	Barru	7310	Regency
354	Bolaang Mongondow	7101	Regency	389	Bone	7311	Regency
355	Minahasa	7102	Regency	390	Soppeng	7312	Regency
356	Kepulauan Sangihe	7103	Regency	391	Wajo	7313	Regency
357	Kepulauan Talaud	7104	Regency	392	Sidenreng Rappang	7314	Regency
358	Minahasa Selatan	7105	Regency	393	Pinrang	7315	Regency
359	Minahasa Utara	7106	Regency	394	Enrekang	7316	Regency
360	Bolaang Mongondow Utara	7107	Regency	395	Luwu	7317	Regency
361	Siau Tagulandang Biaro	7108	Regency	396	Tana Toraja	7318	Regency
362	Minahasa Tenggara	7109	Regency	397	Luwu Utara	7322	Regency
363	Bolaang Mongondow Selatan	7110	Regency	398	Luwu Timur	7325	Regency
364	Bolaang Mongondow Timur	7111	Regency	399	Toraja Utara	7326	Regency
365	Kota Manado	7171	Municipality	400	Kota Makassar	7371	Municipality
366	Kota Tomohon	7173	Municipality	401	Kota Parepare	7372	Municipality
367	Kota Kotamobagu	7174	Municipality	402	Kota Palopo	7373	Municipality
368	Banggai Kepulauan	7201	Regency	403	Buton	7401	Regency
369	Banggai	7202	Regency	404	Muna	7402	Regency
370	Morowali	7203	Regency	405	Konawe	7403	Regency
371	Poso	7204	Regency	406	Kolaka	7404	Regency
372	Donggala	7205	Regency	407	Konawe Selatan	7405	Regency
373	Toli-Toli	7206	Regency	408	Bombana	7406	Regency
374	Buol	7207	Regency	409	Wakatobi	7407	Regency
375	Parigi Moutong	7208	Regency	410	Kolaka Utara	7408	Regency
376	Tojo Una-Una	7209	Regency	411	Buton Utara	7409	Regency
377	Sigi	7210	Regency	412	Konawe Utara	7410	Regency
378	Kota Palu	7271	Municipality	413	Kota Kendari	7471	Municipality
379	Kepulauan Selayar	7301	Regency	414	Kota Baubau	7472	Municipality
380	Bulukumba	7302	Regency	415	Boalemo	7501	Regency
381	Bantaeng	7303	Regency	416	Gorontalo	7502	Regency
382	Jeneponto	7304	Regency	417	Pohuwato	7503	Regency
383	Takalar	7305	Regency	418	Bone Bolango	7504	Regency
384	Gowa	7306	Regency	419	Gorontalo Utara	7505	Regency
385	Sinjai	7307	Regency	420	Kota Gorontalo	7571	Municipality

No	Name of Local Government	BPS Code	Type of Local Government	No	Name of Local Government	BPS Code	Type of Local Government
421	Majene	7601	Regency	456	Nabire	9404	Regency
422	Polewali Mandar	7602	Regency	457	Kepulauan Yapen	9408	Regency
423	Mamasa	7603	Regency	458	Biak Numfor	9409	Regency
424	Mamuju	7604	Regency	459	Paniai	9410	Regency
425	Mamuju Utara	7605	Regency	460	Puncak Jaya	9411	Regency
426	Maluku Tenggara Barat	8101	Regency	461	Mimika	9412	Regency
427	Maluku Tenggara	8102	Regency	462	Boven Digoel	9413	Regency
428	Maluku Tengah	8103	Regency	463	Mappi	9414	Regency
429	Buru	8104	Regency	464	Asmat	9415	Regency
430	Kepulauan Aru	8105	Regency	465	Yahukimo	9416	Regency
431	Seram Bagian Barat	8106	Regency	466	Pegunungan Bintang	9417	Regency
432	Seram Bagian Timur	8107	Regency	467	Tolikara	9418	Regency
433	Kota Ambon	8171	Municipality	468	Sarmi	9419	Regency
434	Halmahera Barat	8201	Regency	469	Keerom	9420	Regency
435	Halmahera Tengah	8202	Regency	470	Waropen	9426	Regency
436	Kepulauan Sula	8203	Regency	471	Supiori	9427	Regency
437	Halmahera Selatan	8204	Regency	472	Mamberamo Raya	9428	Regency
438	Halmahera Utara	8205	Regency	473	Nduga	9429	Regency
439	Halmahera Timur	8206	Regency	474	Lanny Jaya	9430	Regency
440	Pulau Morotai	8207	Regency	475	Mamberamo Tengah	9431	Regency
441	Kota Ternate	8271	Municipality	476	Yalimo	9432	Regency
442	Fakfak	9101	Regency	477	Puncak	9433	Regency
443	Kaimana	9102	Regency	478	Dogiyai	9434	Regency
444	Teluk Wondama	9103	Regency	479	Kota Jayapura	9471	Municipality
445	Teluk Bintuni	9104	Regency				
446	Manokwari	9105	Regency				
447	Sorong Selatan	9106	Regency				
448	Sorong	9107	Regency				
449	Raja Ampat	9108	Regency				
450	Tambrauw	9109	Regency				
451	Maybrat	9110	Regency				
452	Kota Sorong	9171	Municipality				
453	Merauke	9401	Regency				
454	Jayawijaya	9402	Regency				
455	Jayapura	9403	Regency				

Appendix B: Multicolinearity Test

	log_su~l	log_su~h	road_a~h	houelc~s	houh2o~s	houmlt~s	housta~s
log_sum_go~l	1.0000						
log_sum_in~h	0.7736	1.0000					
road_asph	0.2101	-0.1406	1.0000				
houelcacsnzs	0.4594	0.1040	0.6851	1.0000			
houh2oacsnzs	0.1671	-0.1016	0.6765	0.6477	1.0000		
houmltmainzs	-0.0417	-0.2645	0.4719	0.3120	0.5665	1.0000	
houstaacsnzs	0.1561	-0.0612	0.3611	0.5446	0.5554	0.4087	1.0000
gdpr_pc	-0.1081	-0.1665	-0.0037	0.0957	0.1591	0.2606	0.2539
gini	0.0545	-0.0999	0.2504	0.2112	0.2525	0.3419	0.1955
gdpr_agri	0.6111	0.5291	-0.0644	0.2374	-0.0314	-0.2504	0.1311
pop_growth	-0.0755	-0.0347	-0.0643	-0.1420	-0.0627	-0.0278	-0.0685
shi_formal	-0.2933	-0.3980	0.3778	0.2525	0.4638	0.4602	0.3119
munic_dummy	-0.2674	-0.4827	0.4948	0.3058	0.5680	0.7368	0.4256

	gdpr_pc	gini	gdpr_a~i	pop_gr~h	shi_fo~l	munic_~y
gdpr_pc	1.0000					
gini	0.1082	1.0000				
gdpr_agri	0.0351	-0.1053	1.0000			
pop_growth	-0.0150	0.0000	-0.0356	1.0000		
shi_formal	0.0577	0.2956	-0.3807	-0.0003	1.0000	
munic_dummy	0.1435	0.2640	-0.3512	-0.0187	0.6142	1.0000

. vif

Variable	VIF	1/VIF
log_sum_go~l	5.03	0.198791
log_sum_in~h	3.62	0.276230
munic_dummy	3.52	0.284151
houelcacsnzs	3.38	0.296215
road_asph	2.92	0.342043
houh2oacsnzs	2.88	0.347432
houmltmainzs	2.78	0.360322
gdpr_agri	1.98	0.504664
shi_formal	1.94	0.514423
houstaacsnzs	1.85	0.539580
gdpr_pc	1.25	0.801600
gini	1.21	0.827641
pop_growth	1.03	0.975551
Mean VIF	2.57	

Appendix C: Heteroskedasticity Test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of tax_effort_all

        chi2(1)      =   3694.31
        Prob > chi2  =    0.0000



Szroeter's test for homoskedasticity


    Ho: variance constant
    Ha: variance monotonic in variable
```

Variable	chi2	df	p	
tax_effort~l	443.96	1	0.0000	#
log_sum_go~l	54.33	1	0.0000	#
log_sum_in~h	3.92	1	0.0478	#
road_asph	306.65	1	0.0000	#
houelcacsnzs	361.82	1	0.0000	#
houh2oacsnzs	314.26	1	0.0000	#
houmltmainzs	431.31	1	0.0000	#
houstaacsnzs	214.16	1	0.0000	#
gdpr_pc	346.74	1	0.0000	#
gini	278.10	1	0.0000	#
gdpr_agri	284.36	1	0.0000	#
pop_growth	11.70	1	0.0006	#
shi_formal	118.85	1	0.0000	#
munic_dummy	597.79	1	0.0000	#

 # unadjusted p-values

Appendix D: Autocorrelation Test

```
. bgodfrey

Number of gaps in sample:  3

Breusch-Godfrey LM test for autocorrelation
```

lags(p)	chi2	df	Prob > chi2
1	15.590	1	0.0001

```
                     H0: no serial correlation

. dwstat

Number of gaps in sample:  3

Durbin-Watson d-statistic( 14,   479) =   1.62518
```

Appendix E: Regression Model 1 Dependent Variable: Tax Effort All

```
Linear regression                               Number of obs   =       479
                                                F(13, 465)      =      8.09
                                                Prob > F        =    0.0000
                                                R-squared       =    0.4049
                                                Root MSE        =    .03264
```

tax_effort_all	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
log_sum_govt_school	.0044903	.0027018	1.66	0.097	-.0008188	.0097995
log_sum_infras_health	.0069395	.0025554	2.72	0.007	.0019179	.0119611
road_asph	.0034362	.0053589	0.64	0.522	-.0070945	.013967
houelcacsnzs	-.0001792	.0000714	-2.51	0.012	-.0003195	-.0000388
houh2oacsnzs	3.45e-06	.0001065	0.03	0.974	-.0002059	.0002128
houmltmainzs	.0024323	.0011146	2.18	0.030	.000242	.0046226
houstaacsnzs	-.0000471	.0001088	-0.43	0.665	-.0002609	.0001667
gdpr_pc	.0001587	.0000902	1.76	0.079	-.0000186	.000336
gini	.0192535	.0219175	0.88	0.380	-.023816	.0623231
gdpr_agri	-2.71e-06	7.08e-07	-3.82	0.000	-4.10e-06	-1.31e-06
pop_growth	-.0000754	.0009589	-0.08	0.937	-.0019598	.001809
shi_formal	-.0242214	.0315615	-0.77	0.443	-.0862423	.0377995
munic_dummy	.0100604	.0092296	1.09	0.276	-.0080764	.0281972
_cons	-.0443052	.019525	-2.27	0.024	-.0826734	-.005937

Appendix F: Regression Model 1 Dependent Variable: Tax Effort Income Tax

```
Linear regression                          Number of obs   =        479
                                           F(13, 465)      =       8.28
                                           Prob > F        =     0.0000
                                           R-squared       =     0.3537
                                           Root MSE        =     .02103
```

tax_effort_income_tax	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
log_sum_govt_school	.002483	.0015178	1.64	0.103	-.0004995	.0054655
log_sum_infras_health	.0037142	.0014641	2.54	0.012	.0008371	.0065913
road_asph	.0013923	.002792	0.50	0.618	-.0040942	.0068788
houelcacsnzs	-.0000997	.0000362	-2.76	0.006	-.0001708	-.0000286
houh2oacsnzs	-1.55e-06	.0000728	-0.02	0.983	-.0001445	.0001414
houmltmainzs	.0014317	.0008021	1.78	0.075	-.0001444	.0030078
houstaacsnzs	-.0000133	.0000484	-0.28	0.783	-.0001086	.0000819
gdpr_pc	.0000799	.0000401	1.99	0.047	1.09e-06	.0001587
gini	.0088158	.013596	0.65	0.517	-.0179013	.035533
gdpr_agri	-1.35e-06	4.04e-07	-3.34	0.001	-2.14e-06	-5.54e-07
pop_growth	-.0001623	.0005591	-0.29	0.772	-.0012609	.0009364
shi_formal	-.0093171	.0166188	-0.56	0.575	-.0419743	.0233401
munic_dummy	.0059412	.0062762	0.95	0.344	-.006392	.0182744
_cons	-.0243372	.0125574	-1.94	0.053	-.0490134	.000339

Appendix G: Regression Model 1 Dependent Variable: Tax Effort VAT

```
Linear regression                                Number of obs   =       479
                                                 F(13, 465)      =      5.69
                                                 Prob > F        =    0.0000
                                                 R-squared       =    0.3852
                                                 Root MSE        =    .01407
```

	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
log_sum_govt_school	.0019747	.0013909	1.42	0.156	-.0007585	.0047079
log_sum_infras_health	.0032244	.001272	2.53	0.012	.0007248	.0057239
road_asph	.0018265	.0029169	0.63	0.532	-.0039055	.0075585
houelcacsnzs	-.0000783	.0000403	-1.94	0.053	-.0001575	9.79e-07
houh2oacsnzs	5.01e-06	.0000417	0.12	0.904	-.0000769	.0000869
houmltmainzs	.0010019	.0003673	2.73	0.007	.0002802	.0017237
houstaacsnzs	-.0000344	.0000636	-0.54	0.589	-.0001593	.0000905
gdpr_pc	.0000802	.0000521	1.54	0.124	-.0000221	.0001826
gini	.0103467	.0099049	1.04	0.297	-.0091172	.0298106
gdpr_agri	-1.36e-06	3.53e-07	-3.86	0.000	-2.06e-06	-6.70e-07
pop_growth	.0001546	.0005026	0.31	0.758	-.0008331	.0011423
shi_formal	-.0163078	.0166274	-0.98	0.327	-.048982	.0163664
munic_dummy	.0030966	.0035111	0.88	0.378	-.0038029	.0099961
_cons	-.0197396	.008043	-2.45	0.014	-.0355448	-.0039344

Appendix H: Regression Model 1 Dependent Variable: Tax Effort Personal Taxpayers Report

```
Linear regression                                Number of obs   =        479
                                                 F(13, 465)      =       3.95
                                                 Prob > F        =     0.0000
                                                 R-squared       =     0.1007
                                                 Root MSE        =     .19338
```

report_ratio_person	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
log_sum_govt_school	.0437802	.0234235	1.87	0.062	-.0022489	.0898092
log_sum_infras_health	-.0551876	.0225126	-2.45	0.015	-.0994266	-.0109486
road_asph	.0907661	.0620146	1.46	0.144	-.0310974	.2126295
houelcacsnzs	-.0005811	.0010987	-0.53	0.597	-.0027402	.001578
houh2oacsnzs	.0015169	.0005857	2.59	0.010	.0003659	.0026679
houmltmainzs	-.0015503	.0013714	-1.13	0.259	-.0042452	.0011446
houstaacsnzs	.000757	.0007139	1.06	0.290	-.0006459	.0021599
gdpr_pc	-.0004466	.000189	-2.36	0.019	-.0008179	-.0000753
gini	.3509841	.2256879	1.56	0.121	-.0925104	.7944786
gdpr_agri	3.46e-06	4.98e-06	0.69	0.488	-6.33e-06	.0000132
pop_growth	-.0469196	.0263529	-1.78	0.076	-.098705	.0048659
shi_formal	-.178469	.1794132	-0.99	0.320	-.5310301	.1740921
munic_dummy	-.0404672	.0407033	-0.99	0.321	-.1204524	.039518
_cons	.4620442	.1187603	3.89	0.000	.2286709	.6954175

Appendix I: Regression Model 1 Dependent Variable: Tax Effort Corporation Taxpayers Report Compliance

```
Linear regression                          Number of obs   =       479
                                           F(13, 465)      =      9.34
                                           Prob > F        =    0.0000
                                           R-squared       =    0.2038
                                           Root MSE        =    .14752
```

report_ratio_corp	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
log_sum_govt_school	.0837207	.0197897	4.23	0.000	.0448325	.122609
log_sum_infras_health	-.0695315	.0206829	-3.36	0.001	-.1101749	-.028888
road_asph	.0706117	.0411132	1.72	0.087	-.010179	.1514025
houelcacsnzs	-.000248	.0007045	-0.35	0.725	-.0016323	.0011364
houh2oacsnzs	.0009532	.0005807	1.64	0.101	-.0001878	.0020943
houmltmainzs	-.0005263	.0010036	-0.52	0.600	-.0024985	.0014459
houstaacsnzs	.0014773	.0005137	2.88	0.004	.0004678	.0024868
gdpr_pc	.0000907	.0001535	0.59	0.555	-.0002109	.0003923
gini	-.0559959	.1534056	-0.37	0.715	-.3574501	.2454582
gdpr_agri	-.000011	4.14e-06	-2.67	0.008	-.0000191	-2.90e-06
pop_growth	.0339289	.0244071	1.39	0.165	-.0140328	.0818907
shi_formal	.2794542	.1326318	2.11	0.036	.0188223	.540086
munic_dummy	-.0798133	.0293901	-2.72	0.007	-.1375672	-.0220594
_cons	.2511992	.100423	2.50	0.013	.05386	.4485384

Appendix J: Regression Model 1 Dependent Variable: Tax Effort Personal Taxpayers Payment Compliance

```
Linear regression                          Number of obs   =        479
                                           F(13, 465)      =      13.54
                                           Prob > F        =     0.0000
                                           R-squared       =     0.2500
                                           Root MSE        =     .01935
```

payment_ratio_person	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
log_sum_govt_school	.0025299	.0029272	0.86	0.388	-.0032223	.008282
log_sum_infras_health	-.0077256	.002322	-3.33	0.001	-.0122886	-.0031627
road_asph	.0155462	.0049405	3.15	0.002	.0058378	.0252546
houelcacsnzs	-.0001768	.000108	-1.64	0.102	-.0003889	.0000354
houh2oacsnzs	.0000654	.000083	0.79	0.431	-.0000976	.0002285
houmltmainzs	.0005408	.0001905	2.84	0.005	.0001665	.0009152
houstaacsnzs	.0000145	.0000663	0.22	0.827	-.0001159	.0001448
gdpr_pc	-.0000401	.0000216	-1.86	0.064	-.0000826	2.31e-06
gini	.0409356	.0229385	1.78	0.075	-.0041405	.0860116
gdpr_agri	6.25e-08	5.35e-07	0.12	0.907	-9.89e-07	1.11e-06
pop_growth	-.0052546	.0035947	-1.46	0.144	-.0123185	.0018093
shi_formal	-.0282794	.0214319	-1.32	0.188	-.0703949	.013836
munic_dummy	.0041167	.0040733	1.01	0.313	-.0038876	.012121
_cons	.0502319	.0217941	2.30	0.022	.0074048	.093059

Appendix K: Regression Model 1 Dependent Variable: Tax Effort Corporation Taxpayers Payment Compliance

```
Linear regression                              Number of obs   =        479
                                               F(13, 465)      =       9.26
                                               Prob > F        =     0.0000
                                               R-squared       =     0.1411
                                               Root MSE        =     .07833
```

payment_ratio_corp	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
log_sum_govt_school	-.0063113	.0118087	-0.53	0.593	-.0295162	.0168937
log_sum_infras_health	-.0181094	.0109513	-1.65	0.099	-.0396297	.0034108
road_asph	.0701524	.0221403	3.17	0.002	.026645	.1136599
houelcacsnzs	-.0007716	.0004489	-1.72	0.086	-.0016536	.0001105
houh2oacsnzs	.000153	.0002609	0.59	0.558	-.0003598	.0006658
houmltmainzs	9.40e-06	.0005453	0.02	0.986	-.0010622	.001081
houstaacsnzs	.0010189	.0002838	3.59	0.000	.0004613	.0015765
gdpr_pc	-.0001022	.0000814	-1.26	0.210	-.0002622	.0000577
gini	.2980048	.0822093	3.62	0.000	.1364571	.4595526
gdpr_agri	-3.01e-06	1.72e-06	-1.75	0.081	-6.39e-06	3.73e-07
pop_growth	.0001496	.032154	0.00	0.996	-.0630355	.0633348
shi_formal	.0462228	.0762712	0.61	0.545	-.1036561	.1961017
munic_dummy	-.0650856	.0155481	-4.19	0.000	-.0956388	-.0345324
_cons	.285576	.0646603	4.42	0.000	.1585134	.4126387